OSPF

Open Shortest Path First

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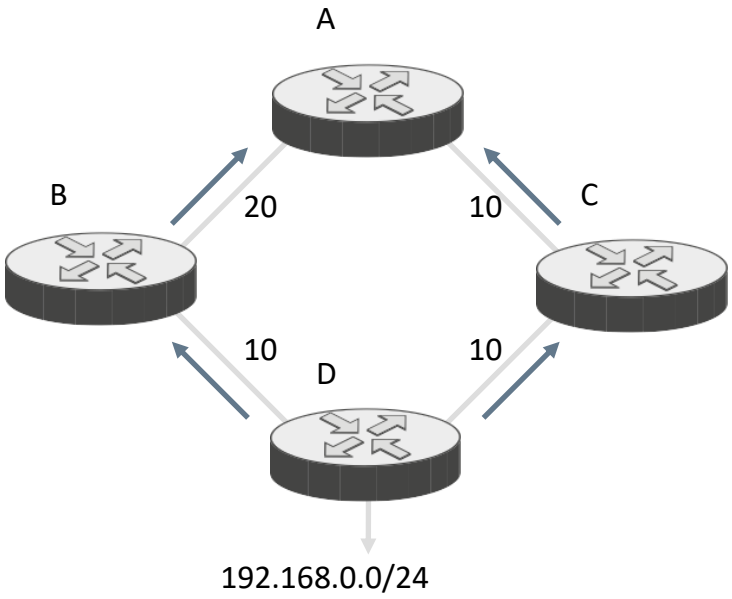
CCDP

Theory

- If the requirements is to have MPLS Traffic Engineering, Standard based and Enterprise level protocol then only choice is OSPF.

  - OSPF as a link state protocol has many similarities with IS-IS but if the requirements is to run IPsec, since IS-IS doesn't work on top of IP, it is not well suited for Enterprise environment.

LSA Flooding

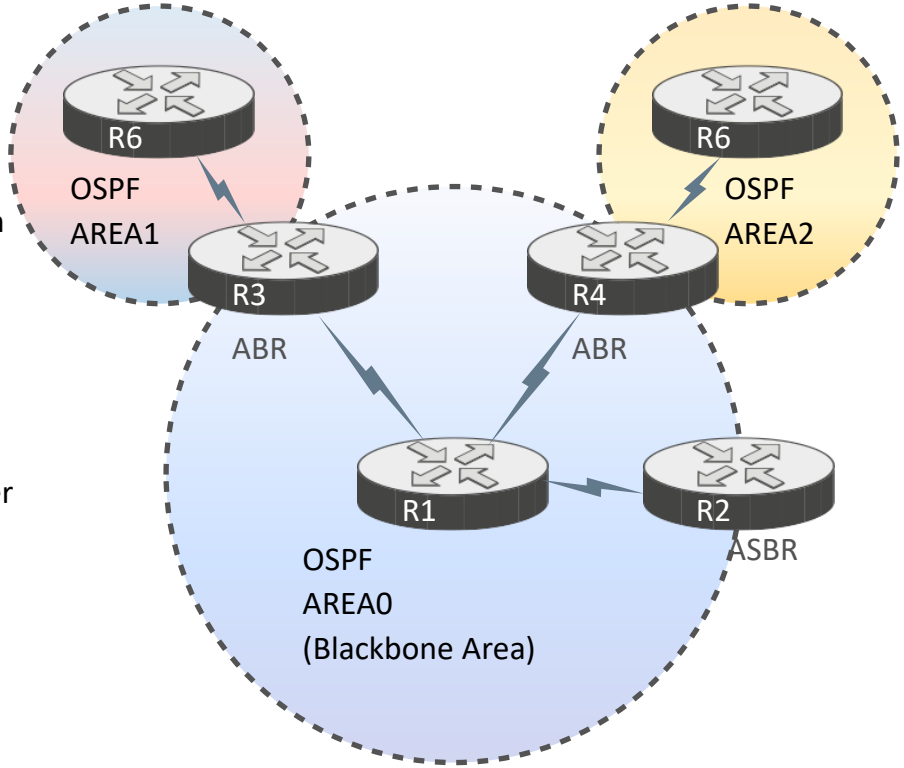


- This process of recording and re-transmitting is called flooding.
- Since information is flooded within a link State network, every router should have the same information about the network (How it looks like).

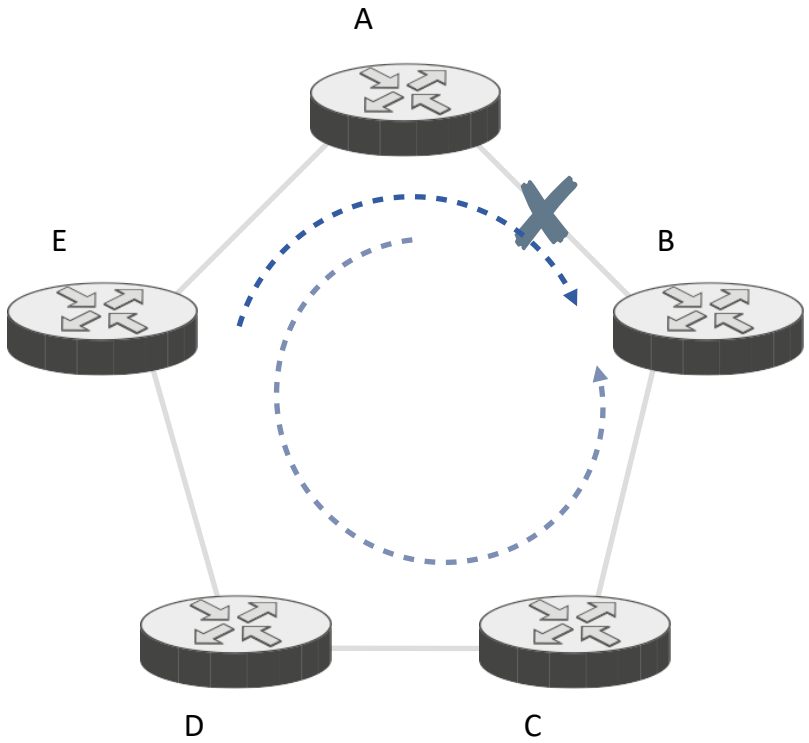
lsa

ABR (Area Border Router) and ASBR (Autonomous System Border Router)

- When scaling become an issue network is broken into separate flooding domains, which we call it areas.
- The router connecting the two area is called an Area Border Router (ABR).
- The router connecting the network to the other networks is called ASBR.



Convergence & Micro-loop



Overlay Technologies and OSPF (GRE, MGRE, DMVPN, GETVPN, LISP)

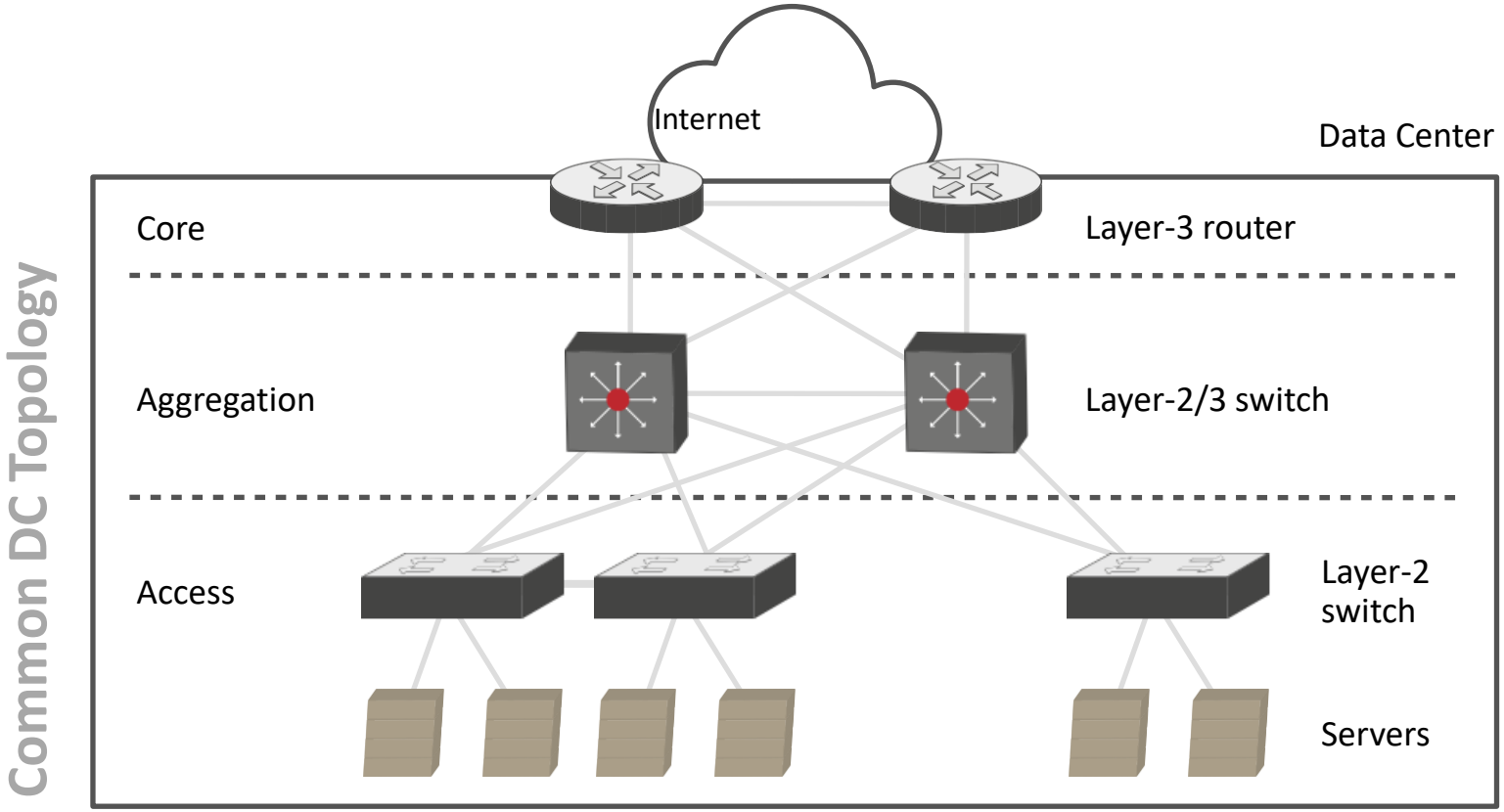
- OSPF can work on top of many overlay technologies.
    - GRE, MGRE, DMVPN, GETVPN and LISP can be used to create overlay/VPN in the networks.
- OSPF can be used for these overlay mechanisms as an underlay infrastructure routing protocol.

Overlay Technologies and OSPF (GRE, MGRE, DMVPN, GETVPN, LISP)

- OSPF works over GRE, MGRE and DMVPN
    - OSPF doesn't work over GETVPN and LISP, because both are tunnelless VPN mechanisms, routing protocols can be an underlay for them but not an overlay
- OSPF with GRE is not scalable for large scale deployment but scaling limitation comes from GRE, it is not the OSPF problem, MGRE provides scalability with OSPF even in large scale deployment.

OSPF in the Datacenter

- OSPF can be used at the DC edge to advertise DC prefixes to the WAN and Campus network



OSPF Design Best Practices

- Unless there is a valid reason, don’t deploy Multi Area OSPF, keep the design simple, it provides better convergence, less configuration on the ABR nodes and optimal traffic flow.

- Don’t enable OSPF on the customer facing ports, for MPLS L3 VPN PE-CE protocol, enable prefix limit, authentication and control plane policing

OSPF Design Best Practices

- Use OSPF Prefix-suppression feature to remove infrastructure links from the Type 1 (Router) LSA, it provides scalability if necessary.

- Always start deploying OSPF Area 0 (Backbone Area), it will provide easier migration when multi area OSPF design is necessary.

OSPF Design Best Practices

- Use OSPF network type ‘ point to point ‘, it removes the Types 2 LSA from LSDB, thus better for troubleshooting and high availability also it is good for fast convergence.

- If there is DR in the OSPF domain, make sure you don’t have performance problem with it.

OSPF CASE STUDIES

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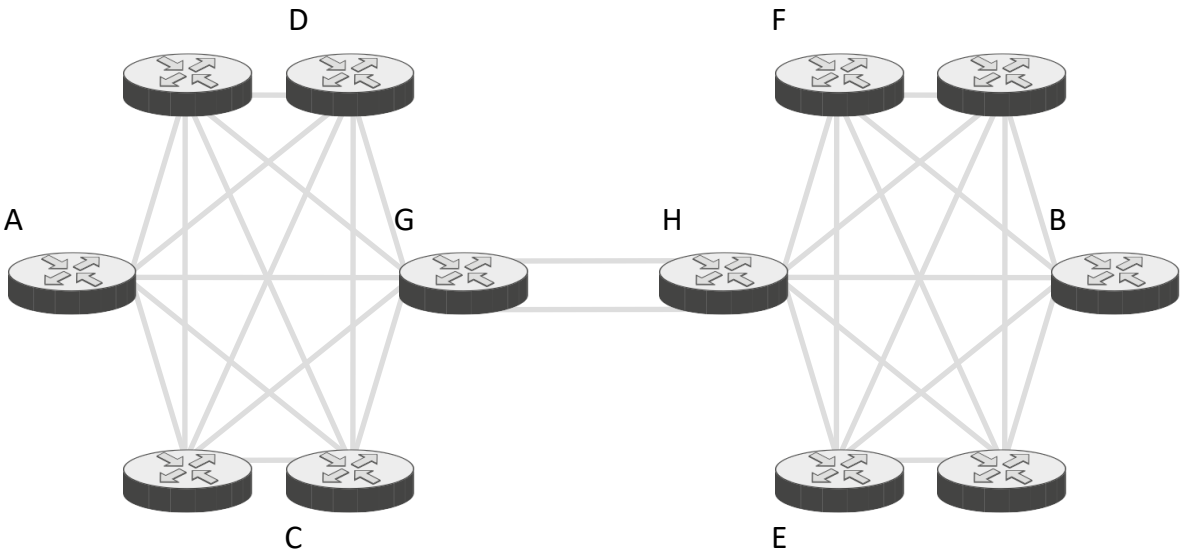
ABR Placement

- Where should we place an ABR in the below topology. Why?



ABR Placement

- Between Router A and Router B there are 1800 different paths. (5x6) x 2 (5x6) If we would put all of them in a same area we would have flooding, convergence, resource utilization, troubleshooting problems.

- If we use Router G or Router H as an ABR, we will have only 32 paths max (5x6) +2 between Router A and B, this will greatly reduce the load on the resources, reduces the overall complexity thus makes troubleshooting easier.

- Put ABR always a place where you can separate the complex topologies.

OSPF

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QUIZ

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Question 1

How many routers can be placed in any given OSPF area?

A. 50

B. 100

C. 250

D. Less than 50

E. It depends

Answer 1

F. It depends

As it is explained in the OSPF chapter, you cannot have a numeric answer for this question.

There is no numeric answer of this question. It depends on how many links each router have, stability of the links, hardware resources such as CPU and Memory of the routers and physical topology of the network.

For example in full mesh topology, every router is connected to each other and number of links is too much compare to ring or partial topologies.

Thus, in one OSPF network you may place 50 routers in one OSPF area, but other OSPF network can have 100s of routers in one area.

Question 2

Why many different types of LSAs are used in OSPF? (Chose all that apply)

A. Provides Scalability

B. Allow Multi-Area OSPF design

C. Provides fast convergence

D. Provides High Availability

E. Better Traffic Engineering

Answer 2

A. Provides Scalability

B. Allow Multi-Area OSPF design

Question here is asking the reason of having multiple different types of OSPF LSAs. As you have seen in the OSPF chapter there are 11 different types of OSPF LSAs.

Although there are other reasons to use OSPF LSAs, two important ones are scalability and Multi-Area design. They don't help for fast convergence or high availability LSAs are not related with High Availability or Fast convergence. Although MPLS Traf c engineering can use OSPF Opaque LSAs for the distributed CSPF calculation, CSPF is not mandatory and many networks which have MPLS Traf c engineering uses Of ine Path calculation tool such as Cariden Mate.