Course: Computer Network for Communication
Course Code: CSA0735
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Assignment III

Project: OSPF + IPv6 for Node Routing in a Vedio platform

Scenario:

A Vedio Streaming platform uses OSPF (Open Shortest path first) with IPv6 to efficiently route data between nodes (Routers, Servers, Data Centers). The System relies on a Link State Database, Anycast routing, and manages OSPF Overhead for performance.

Key Concepts Explained

Parameters	Meaning
1. Link State Database (LSDB)	Stores a complete map of the network topology at each router.
2. Anycast Routing	Routes a user's request to the nearest server (based on routing metrics.
3. OSPF (Open Shortest path first)	A link-state routing protocal that finds the shortest path using Dijkstra's Diagram.
4. IPv6	A modern Ip addressing system with larger address space and build in support for anycast.
5. OSPF Overhead	Extra memory and CPU used for route updates and SDF calculations.
6. Shortest path first (SPF) Algorithm	Used by OSPF to calculate the fastest route from source to destination.
7. Scalability with IPv6	IPv6 supports a vast number of nodes, ideal for large Vedio platforms.

1. if 20 Routers each store 500 links, how many total links?

Each router stores info about all 500 links, but the total number of unique links is:

formulla:

Since each link is shared between 2 Routers:

$$\text{Total Unique links} = \frac{20 \times 500}{2} = 5{,}000 \text{ links}$$

each router stores full info for routing decisions, but physical link are counted by only once.

2. What's the impact on memory Usage?

- Each router must store:
  - 500 link entries + router IDs, LSA headers, and topology data
  - As router increase, LSDB grows, consuming more RAM/CPU for:
    - Link-State Advertisement (LSA) storage.
    - SPF (Shortest Path first) recalculations.
- In large networks, this ~~pro~~increases:
  - Memory Usage
  - CPU cycles
  - OSPF overhead

More links = more memory need per router, which may impact speed and efficiency in a high load Vedio platform.

3. How does Anycast reduce routing hops?

Anycast allows multiple servers to share the same IPv6 address, and routers use OSPF, shortest path algorithm to send data to the nearest server in terms of routing cost.

In a vedio platform using OSPF with IPv6, Anycast helps reduce the number of routing hops through the following ways:

1. OSPF (Open Shortest path First):
   OSPF calculates the shortest path to the destination, so data reaches the closest Anycast Server, reducing the number of hops.
2. Lower Latency:
   fewer hop mean quicker data delivery, which is essential for buffer-free vedio streaming and user satisfaction.
3. Automatic failover:
   if one server goes down, OSPF automatically reroutes data to the next nearest Server, maintaining service continuity with minimal hops.
4. Load Balancing:
   Traffic is distributed across nearby servers, keeping each route efficient and congestion free.

▲ Instead of fixed server route, users connect to the closest available server, making streaming fast and more efficient.

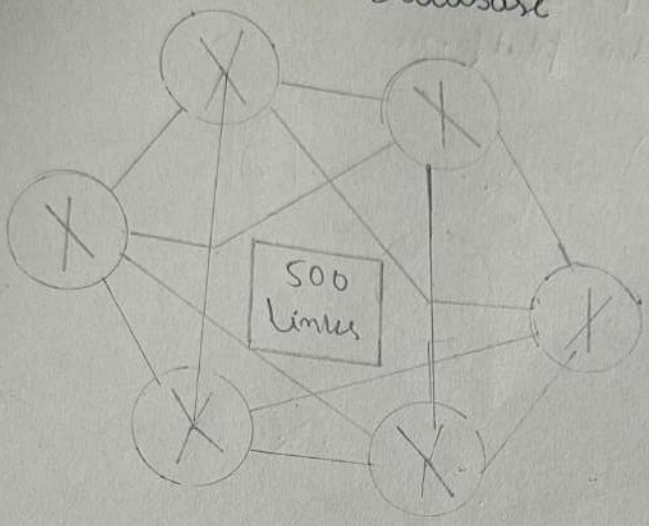
- Summary Table: OSPF + IPv6 in Vedio Platforms

Concept	Purpose	Use in Vedio Platform
LSDB	Stores network Topology	Ensures accurate path selection
Anycast	Routes to nearest Server	Reduces Latency and hop count
OSPF Overhead	Updates and route recalculation	Add load as network grows
5000 Links	Total in LSDB	Requires Large memory allocation
IPv6+ OSPF	Modern routing Combo	Scales better with many streaming nodes.

- Conclusion:

Using OSPF with IPv6 and Anycast routing Provides fast and efficient data routing for Vedio platforms. While OSPF offers smart path Selection, its overhead and memory usage must be Optimized - especially as the number of routers and link increases. Anycast helps reduce routing hops and improves the User experience by connecting Users to the nearest Server.

Link State Database



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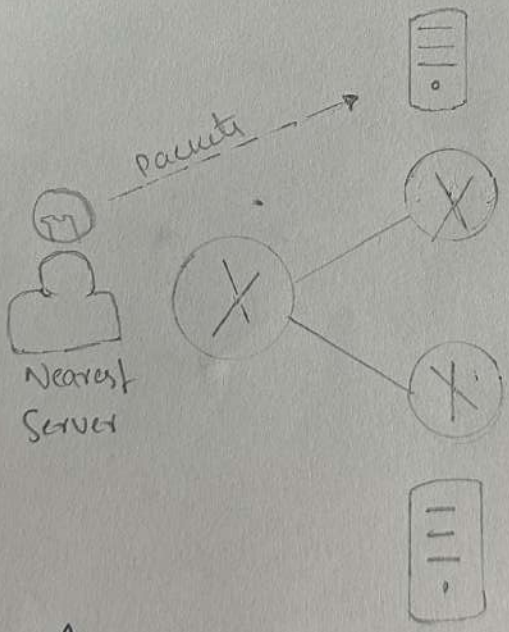

Anycast Routing

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OSPF + IPv6 in
Vedio platform