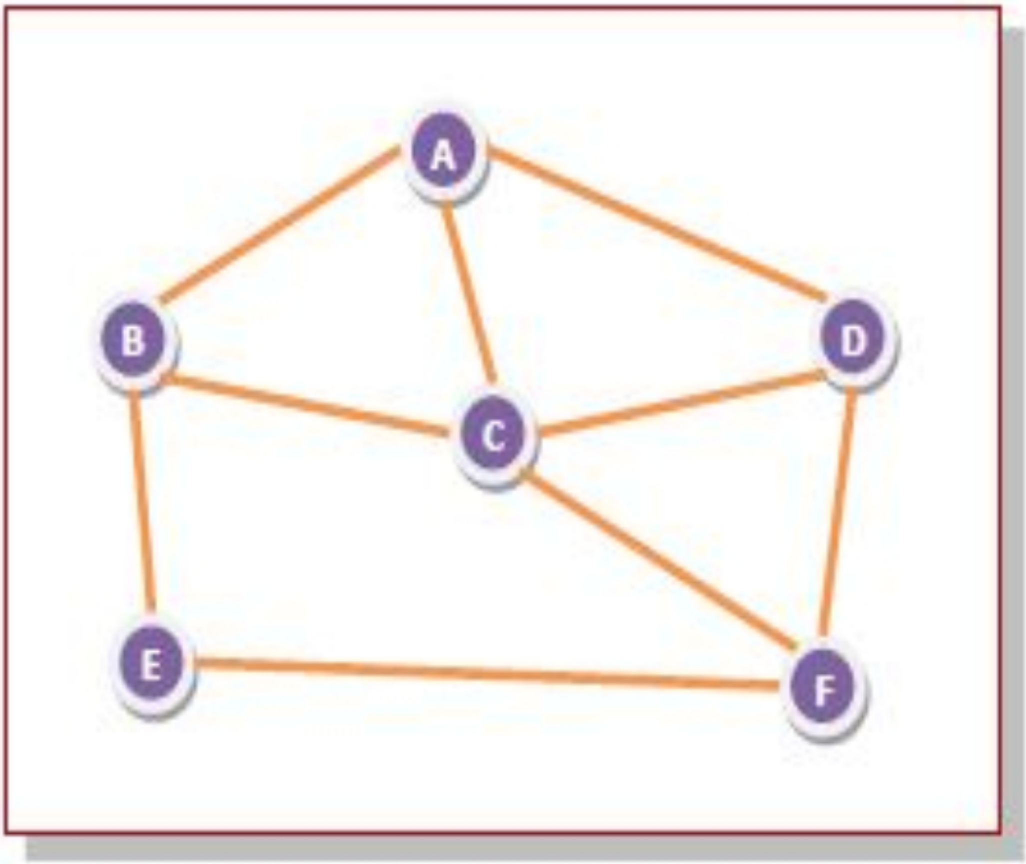
Flooding in Computer Network

Flooding is a non-adaptive routing technique following this simple method: when a data packet arrives at a router, it is sent to all the outgoing links except the one it has arrived on.

For example, let us consider the network in the figure, having six routers that are connected through transmission lines.

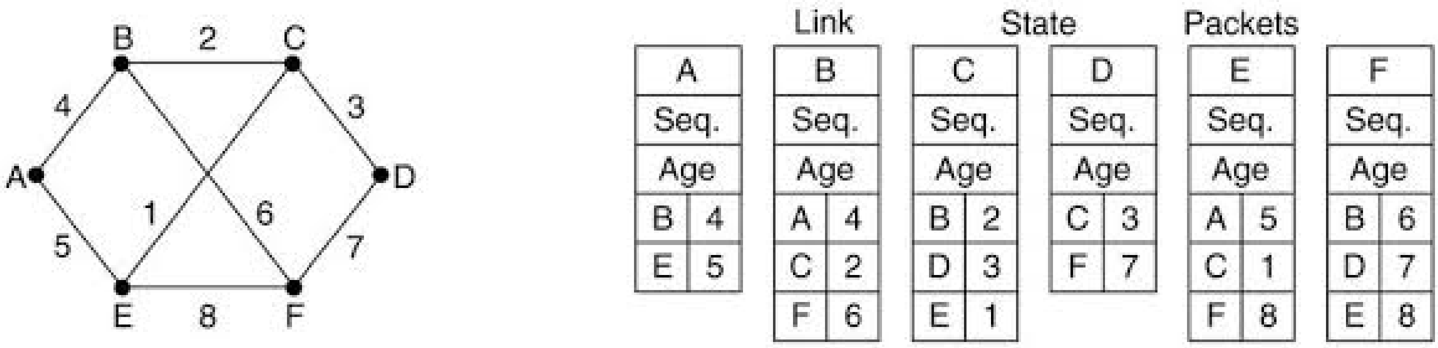


Using flooding technique –

- An incoming packet to A, will be sent to B, C and D.
- B will send the packet to C and E.
- C will send the packet to B, D and F.
- D will send the packet to C and F.
- E will send the packet to F.
- F will send the packet to C and E.

5.2.5 Link State Routing

3. Building Link State Packets



(a) (b)

Figure 5-12. (a) A network. (b) The link state packets for this network.

Link State Routing

Link state routing is a technique in which each router shares the knowledge of its neighborhood with every other router in the internetwork.

The three keys to understand the Link State Routing algorithm:

- **Knowledge about the neighborhood:** Instead of sending its routing table, a router sends the information about its neighborhood only. A router broadcast its identities and cost of the directly attached links to other routers.

- **Flooding:** Each router sends the information to every other router on the internetwork except its neighbors. This process is known as Flooding. Every router that receives the packet sends the copies to all its neighbors. Finally, each and every router receives a copy of the same information.
- **Information sharing:** A router sends the information to every other router only when the change occurs in the information.

Each node uses Dijkstra's algorithm on the graph to calculate the optimal routes to all nodes.

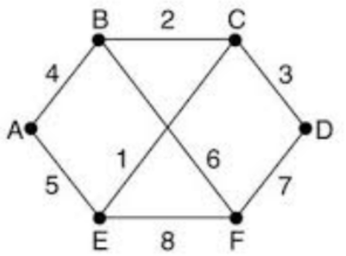
- The Link state routing algorithm is also known as Dijkstra's algorithm which is used to find the shortest path from one node to every other node in the network.
- The Dijkstra's algorithm is an iterative, and it has the property that after k^{th} iteration of the algorithm, the least cost paths are well known for k destination nodes.

Link-State Packet
Sequence Number

The first LSP generated by a router, when it first connects to a network, has a sequence number of **1**. The sequence number is increased by 1 whenever a newer version of the LSP is generated as a result of changes in a router's environment.

5.2.5 Link State Routing

3. Building Link State Packets



(a)

Link State Packets

A	B	C	D	E	F
Seq.	Seq.	Seq.	Seq.	Seq.	Seq.
Age	Age	Age	Age	Age	Age
B 4	A 4	B 2	C 3	A 5	B 6
E 5	C 2	D 3	F 7	C 1	D 7
	F 6	E 1		F 8	E 8

(b)

Figure 5-12. (a) A network. (b) The link state packets for this network.

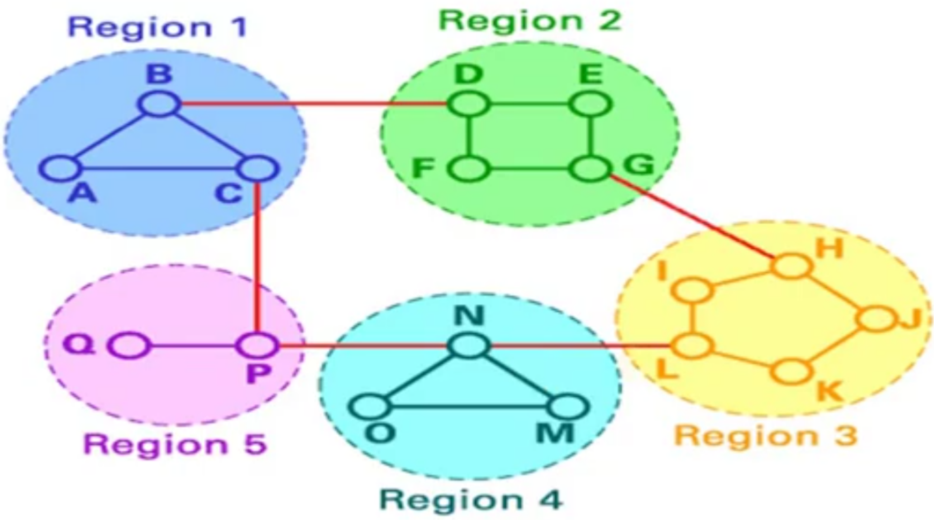
3. Hierarchical routing

When the network size grows, the number of routers in the network increases. Consequently, the size of routing tables increases, as well, and routers can't handle network traffic as efficiently.
We use **hierarchical routing** to overcome this problem.

Hierarchical Routing is essentially a 'Divide and Conquer' strategy.
The network is divided into different regions and a router for a particular region knows only about its own domain and other neighbour routers.

In hierarchical routing, routers are classified in groups known as **regions**.

Each router has only the information about the routers in its own region and has no information about routers in other regions. So routers just save one record in their table for every other region.



Network graph

A's routing table

Destination	Line	Weight
A	----	---
B	B	1
C	C	1
Region 2	B	2
Region 3	C	4
Region 4	C	3
Region 5	C	2

Example:
If A wants to send packets to any router in region 2 (D, E, F or G), it sends them to B, and so on. As you can see, in this type of routing, the tables can be summarized, so network efficiency improves.
The above example shows two-level hierarchical routing.