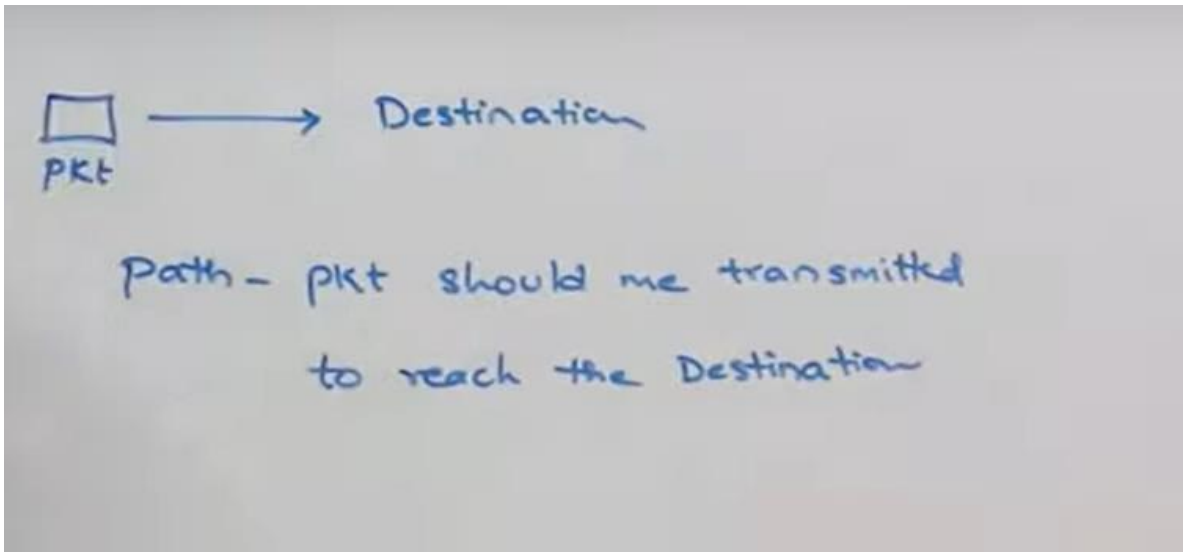
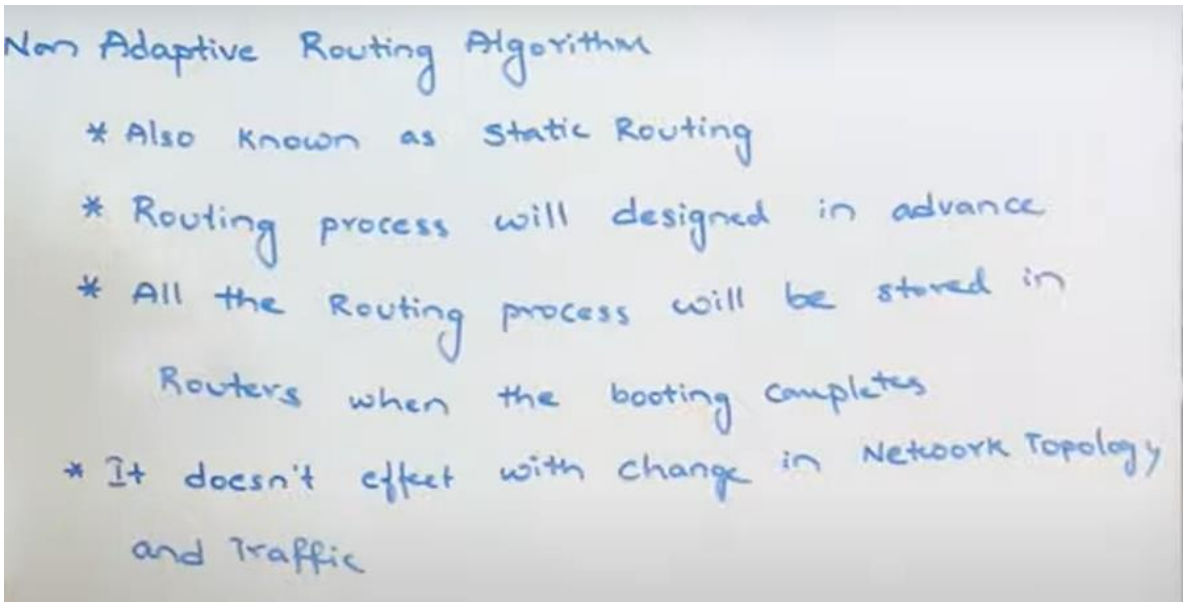
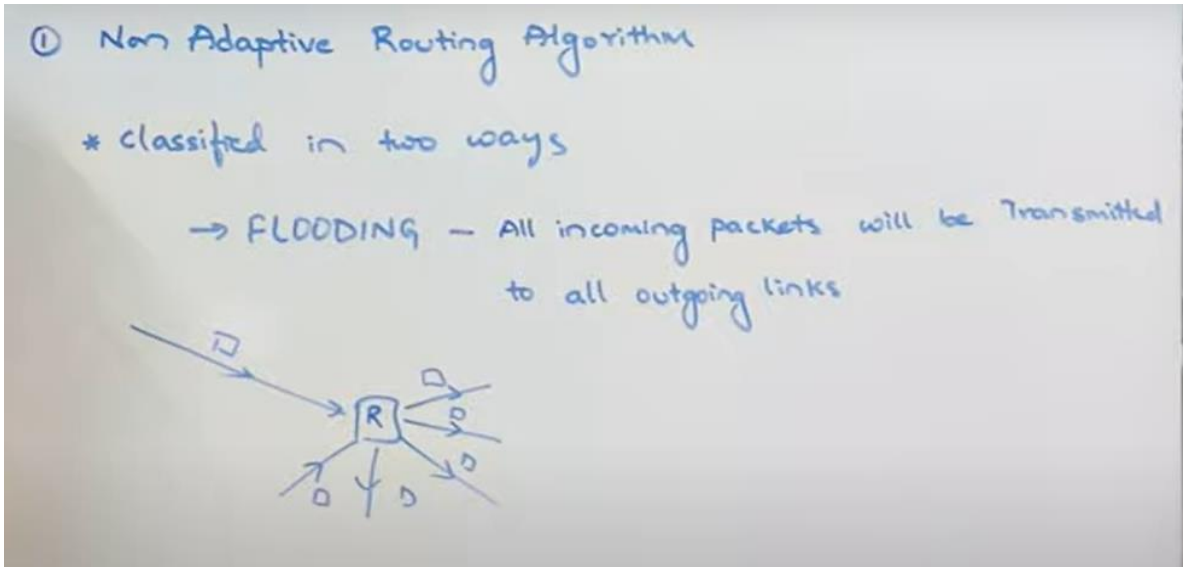
Routing Algorithms







Non Adaptive Routing Algorithm

* classified in two ways

→ FLOODING – All incoming packets will be Transmitted to all outgoing links

* Multiple copies of packets

→ Random Walk – Income packet will be Transmitted to the neighbour links randomly

* Best for alternative path

Adaptive Routing Algorithm

* Dynamic Routing Algorithm
* Routing will change dynamically based on Change in TOPOLOGY & TRAFFIC
* parameters – Hop Count
  Distance
  Transmit Time
* classified into 3 types
  → Centralized
  → Isolation
  → Distributed

1. Non Adaptive Routing (Static)
   - * Shortest-Path
   - * Flooding
   - * Flow Based
2. Adaptive Routing (Dynamic)
   - * Link State Routing
   - * Distance Vector
3. Hierarchical Routing
4. Routing in Mobile Hosts
5. Broad Cast Rooting
6. Multicast Routing

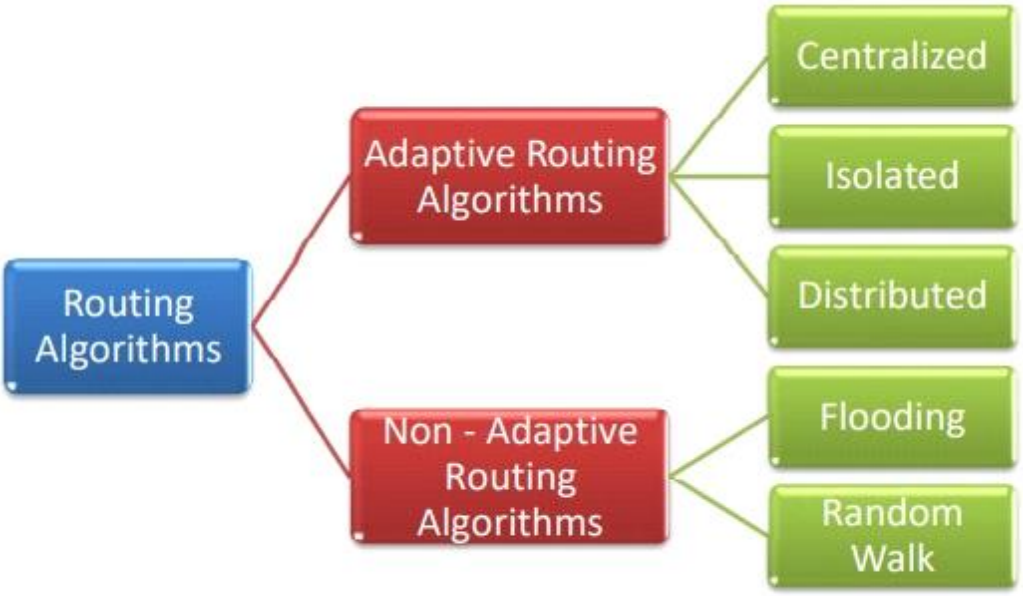
Routing algorithm

- In order to transfer the packets from source to the destination, the network layer must determine the best route through which packets can be transmitted.
- Whether the network layer provides datagram service or virtual circuit service, the main job of the network layer is to provide the best route. The routing protocol provides this job.
- The routing protocol is a routing algorithm that provides the best path from the source to the destination. The best path is the path that has the "least-cost path" from source to the destination.
- Routing is the process of forwarding the packets from source to the destination but the best route to send the packets is determined by the routing algorithm.

Classification of a Routing algorithm

The Routing algorithm is divided into two categories:

- Adaptive Routing algorithm
- Non-adaptive Routing algorithm



Adaptive Routing algorithm

- An adaptive routing algorithm is also known as dynamic routing algorithm.
- This algorithm makes the routing decisions based on the topology and network traffic.
- The main parameters related to this algorithm are hop count, distance and estimated transit time.

An adaptive routing algorithm can be classified into three parts:

- **Centralized algorithm:** It is also known as global routing algorithm as it computes the least-cost path between source and destination by using complete and global knowledge about the network. This algorithm takes the connectivity between the nodes and link cost as input, and this information is obtained before actually performing any calculation. **Link state algorithm** is referred to as a centralized algorithm since it is aware of the cost of each link in the network.
- **Isolation algorithm:** It is an algorithm that obtains the routing information by using local information rather than gathering information from other nodes.
- **Distributed algorithm:** It is also known as decentralized algorithm as it computes the least-cost path between source and destination in an iterative

and distributed manner. In the decentralized algorithm, no node has the knowledge about the cost of all the network links. In the beginning, a node contains the information only about its own directly attached links and through an iterative process of calculation computes the least-cost path to the destination. A Distance vector algorithm is a decentralized algorithm as it never knows the complete path from source to the destination, instead it knows the direction through which the packet is to be forwarded along with the least cost path.

Non-Adaptive Routing algorithm

- Non Adaptive routing algorithm is also known as a static routing algorithm.
- When booting up the network, the routing information stores to the routers.
- Non Adaptive routing algorithms do not take the routing decision based on the network topology or network traffic.

The Non-Adaptive Routing algorithm is of two types:

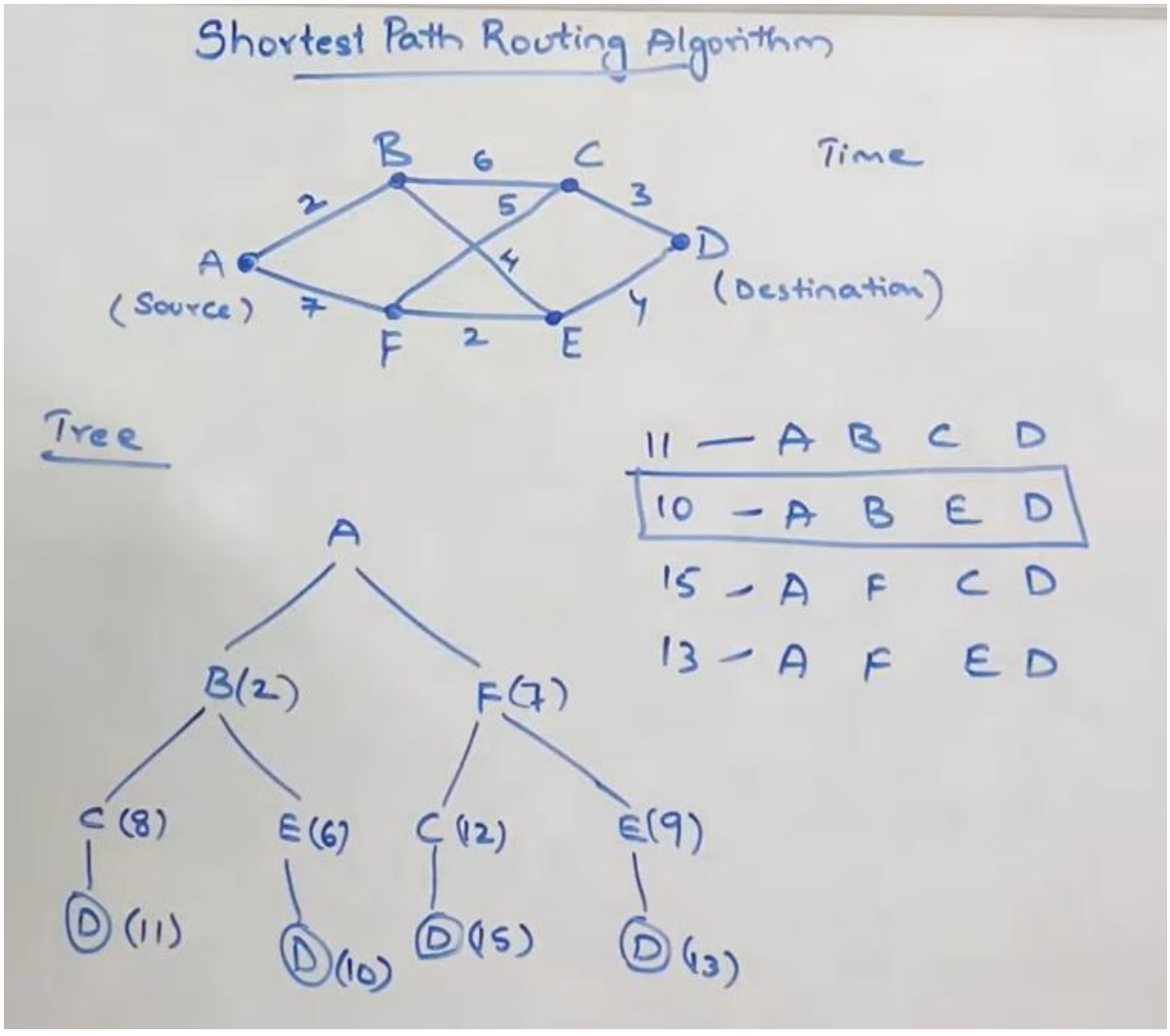
Flooding: In case of flooding, every incoming packet is sent to all the outgoing links except the one from it has been reached. The disadvantage of flooding is that node may contain several copies of a particular packet.

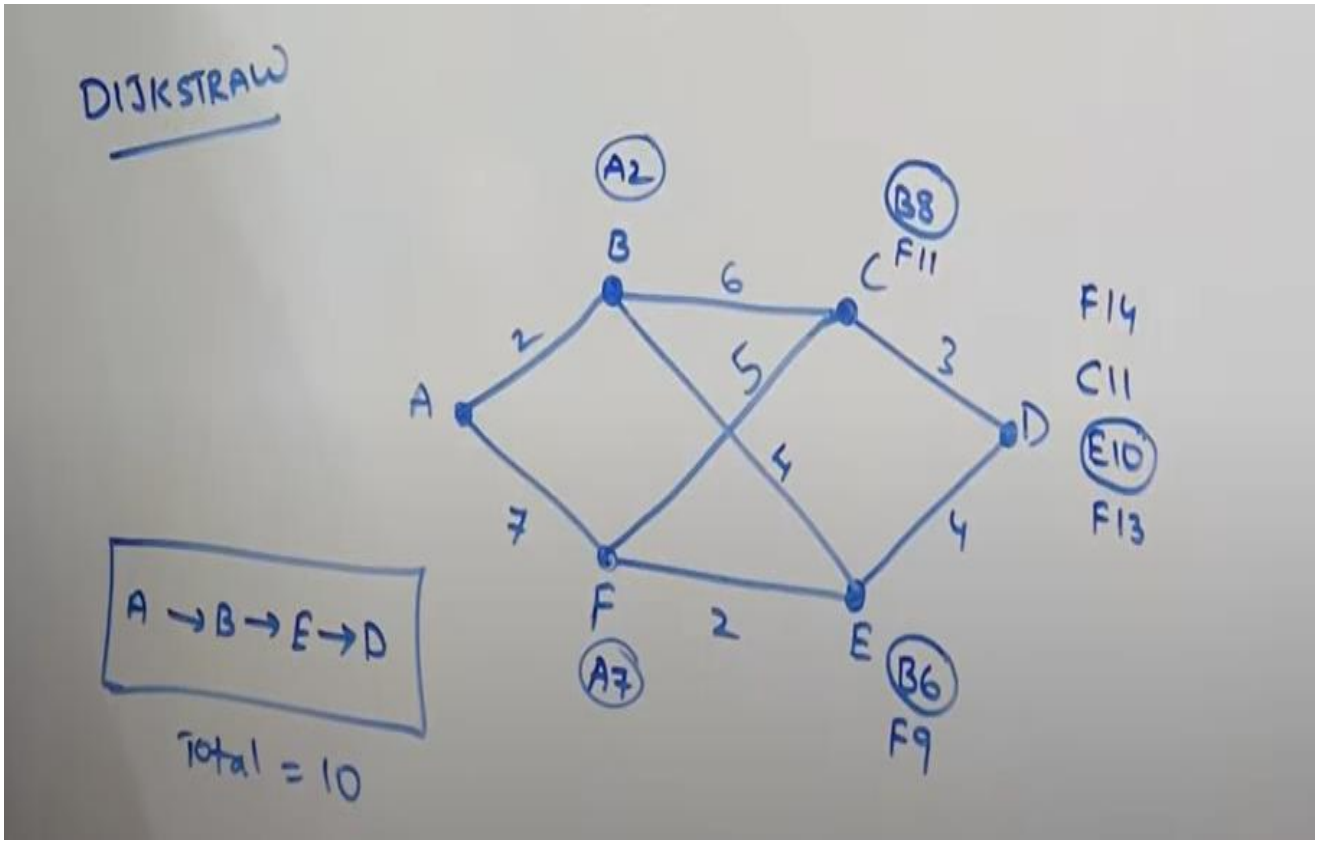
Random walks: In case of random walks, a packet sent by the node to one of its neighbors randomly. An advantage of using random walks is that it uses the alternative routes very efficiently.

Differences b/w Adaptive and Non-Adaptive Routing Algorithm

Basis Of Comparison	Adaptive Routing algorithm	Non-Adaptive Routing algorithm
Define	Adaptive Routing algorithm is an algorithm that constructs the	The Non-Adaptive Routing algorithm is an algorithm that constructs the

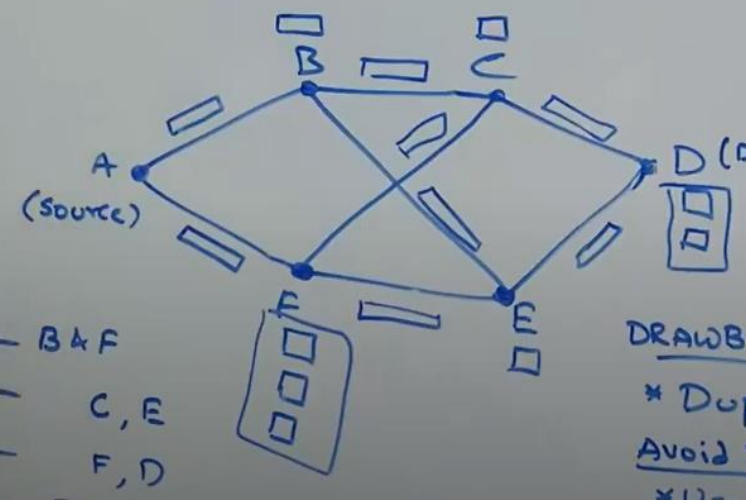
	routing table based on the network conditions.	static table to determine which node to send the packet.
Usage	Adaptive routing algorithm is used by dynamic routing.	The Non-Adaptive Routing algorithm is used by static routing.
Routing decision	Routing decisions are made based on topology and network traffic.	Routing decisions are the static tables.
Categorization	The types of adaptive routing algorithm, are Centralized, isolation and distributed algorithm.	The types of Non Adaptive routing algorithm are flooding and random walks.
Complexity	Adaptive Routing algorithms are more complex.	Non-Adaptive Routing algorithms are simple.




DIJKSTRAW
A2
B8
F11
B
C
6
F14
C11
2
5
3
A
D
E10
F13
4
7
4
F
2
E
A7
B6
F9
A → B → E → D
Total = 10

* Broadcast the packet

* Sends the packet to all outgoing links except to the link from which it was received.



□ - Received

A — B & F
B — C, E
C — F, D

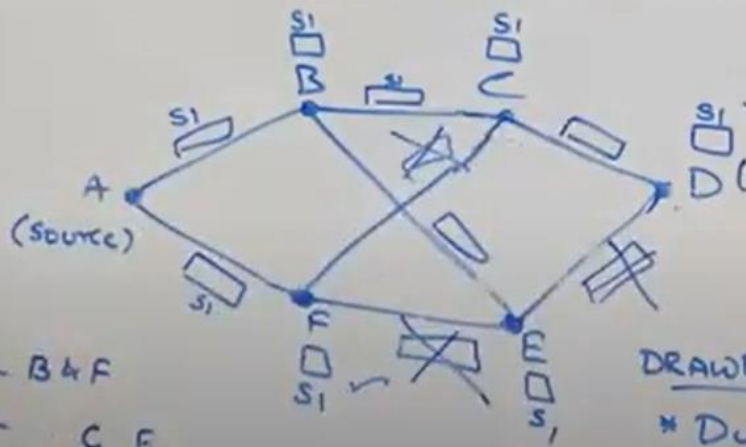
DRAWBACK

* Duplicate Packets

Avoid Duplicates

* Broadcast the packet

* Sends the packet to all outgoing links except to the link from which it was received.



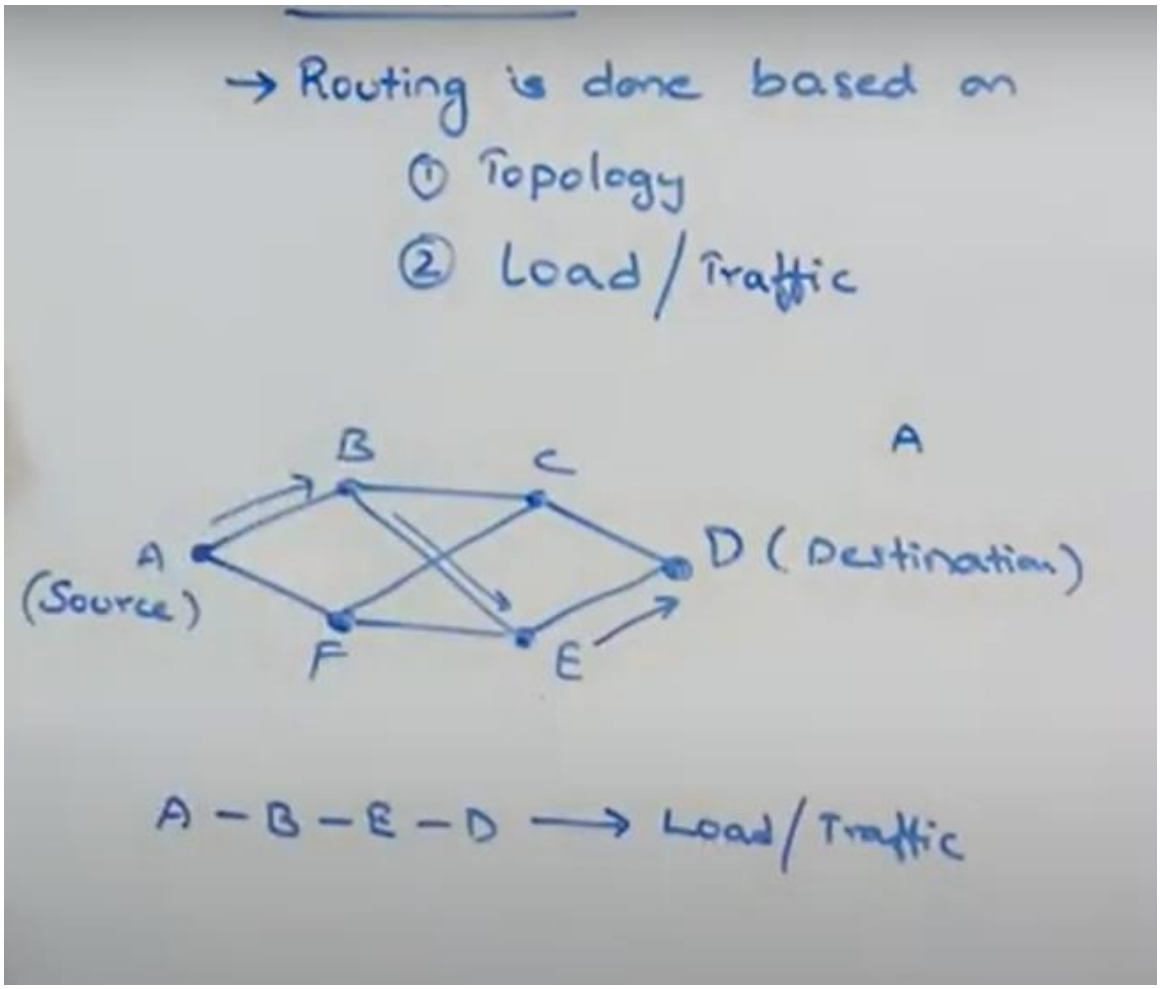
□ - Received

A — B & F
B — C, E
C — F, D

DRAWBACK

* Duplicate Packets

Avoid Duplicates



AT N2 New Routing Table N2

N1	N3	N5
0	∞	∞
1	6	3
∞	0	∞
∞	2	4
∞	∞	0

Desti	Dist	Nxt hp
N1	1	N1
N2	0	N2
N3	6	N3
N4	7	N5,N4
N5	3	N5

N2→N2 = 0

N2->N1, N1->N1

1+0=1

N2->N3, N3->N3

6+0=6

N2->N5,N5->N4

3+ 4=7

N2->N3,N3-N4

6+2=8

N2->N5,N5->N5

3+0=3

N2->N3,N3->N5

6+∞=∞

AT N3

N2	N4
1	∞
0	∞
6	2
∞	0
3	4

New Routing Table N3

Desti	Dist	Nxt hp
N1	7	N2,N1
N2	6	N2
N3	0	N3
N4	2	N4
N5	6	N4,N5