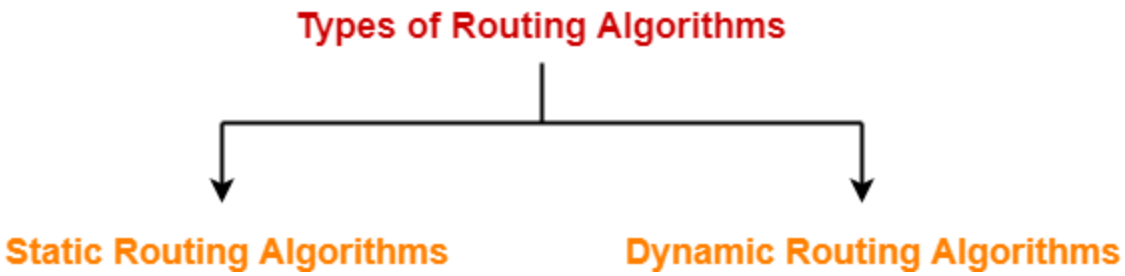
Routing Algorithms-

- **Routing Algorithms-**

- Routing algorithms are meant for determining the routing of packets in a node.
- Routing algorithms are classified as-



Distance Vector Routing Algorithm-

Step-01:

- Each router prepares its routing table. By their local knowledge. each router knows about-
    1. All the routers present in the network
    2. Distance to its neighboring routers

Step-02:

- Each router exchanges its distance vector with its neighboring routers.
- Each router prepares a new routing table using the distance vectors it has obtained from its neighbors.
- This step is repeated for (n-2) times if there are n routers in the network.
- After this, routing tables converge / become stable.

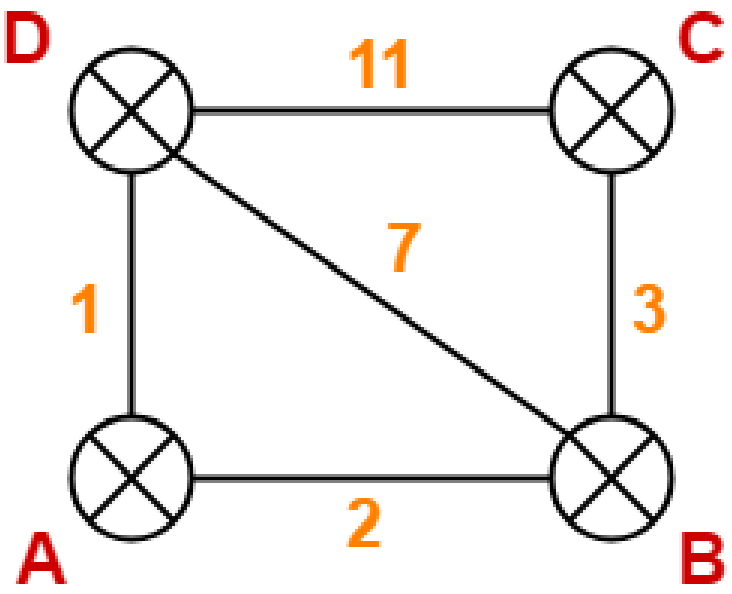
Distance Vector Routing Example-

- Consider-

  There is a network consisting of 4 routers.

  The weights are mentioned on the edges.

  Weights could be distances or costs or delays.


D
11
C
7
1
3
2
A
B

Step-01:

- Each router prepares its routing table using its local knowledge.
- Routing table prepared by each router :

At Router A-

Destination	Distance	Next Hop
A	0	A
B	2	B
C	∞	–
D	1	D

At Router B-

Destination	Distance	Next Hop
A	2	A
B	0	B
C	3	C
D	7	D

- **At Router C-**

Destination	Distance	Next Hop
A	∞	–
B	3	B
C	0	C
D	11	D

- **At Router D-**

Destination	Distance	Next Hop
A	1	A
B	7	B
C	11	C
D	0	D

Step-02:

- Each router exchanges its distance vector obtained in Step-01 with its neighbors.
- After exchanging the distance vectors, each router prepares a new routing table.

- **At Router A-**

- Router A receives distance vectors from its neighbors B and D.
- Router A prepares a new routing table as-

From B

2
0
3
7

Cost(A→B) = 2

From D

1
7
11
0

Cost(A→D) = 1

Destination	Distance	Next hop
A	0	A
B		
C		
D		

New Routing Table at Router A

- Cost of reaching destination B from router A = min { 2+0 , 1+7 } = 2 via B.
- Cost of reaching destination C from router A = min { 2+3 , 1+11 } = 5 via B.
- Cost of reaching destination D from router A = min { 2+7 , 1+0 } = 1 via D.

- Thus, the new routing table at router A is-

Destination	Distance	Next Hop
A	0	A
B	2	B
C	5	B
D	1	D

- **At Router B-**

- Router B receives distance vectors from its neighbors A, C and D.
- Router B prepares a new routing table as-

From A

0
2
∞
1

Cost (B→A) = 2

From C

∞
3
0
11

Cost (B→C) = 3

From D

1
7
11
0

Cost (B→D) = 7

Destination	Distance	Next hop
A		
B	0	B
C		
D		

New Routing Table at Router B

- Cost of reaching destination A from router B = min { 2+0 , 3+∞ , 7+1 } = 2 via A.
- Cost of reaching destination C from router B = min { 2+∞ , 3+0 , 7+11 } = 3 via C.
- Cost of reaching destination D from router B = min { 2+1 , 3+11 , 7+0 } = 3 via A.

- Thus, the new routing table at router B is-

Destination	Distance	Next Hop
A	2	A
B	0	B
C	3	C
D	3	A

- **At Router C-**

- Router C receives distance vectors from its neighbors B and D.
- Router C prepares a new routing table as-

From B

2
0
3
7

Cost (C→B) = 3

From D

1
7
11
0

Cost (C→D) = 11

Destination	Distance	Next hop
A		
B		
C	0	C
D		

New Routing Table at Router C

- Cost of reaching destination A from router C = min { 3+2 , 11+1 } = 5 via B.
- Cost of reaching destination B from router C = min { 3+0 , 11+7 } = 3 via B.
- Cost of reaching destination D from router C = min { 3+7 , 11+0 } = 10 via B.

- Thus, the new routing table at router C is-

Destination	Distance	Next Hop
A	5	B
B	3	B
C	0	C
D	10	B

- **At Router D-**

- Router D receives distance vectors from its neighbors A, B and C.
- Router D prepares a new routing table as-

From A

0
2
∞
1

Cost (D→A) = 1

From B

2
0
3
7

Cost (D→B) = 7

From C

∞
3
0
11

Cost (D→C) = 11

Destination	Distance	Next hop
A		
B		
C		
D	0	D

New Routing Table at Router D

- Cost of reaching destination A from router D = min { 1+0 , 7+2 , 11+∞ } = 1 via A.
- Cost of reaching destination B from router D = min { 1+2 , 7+0 , 11+3 } = 3 via A.
- Cost of reaching destination C from router D = min { 1+∞ , 7+3 , 11+0 } = 10 via B.

Destination	Distance	Next Hop
A	1	A
B	3	A
C	10	B
D	0	D

Step-03:

- Each router exchanges its distance vector obtained in Step-02 with its neighboring routers.
- After exchanging the distance vectors, each router prepares a new routing table.

- This is shown below-

- **At Router A-**

- Router A receives distance vectors from its neighbors B and D.
- Router A prepares a new routing table as-

From B

2
0
3
3

Cost(A→B) = 2

From D

1
3
10
0

Cost(A→D) = 1

Destination	Distance	Next hop
A	0	A
B		
C		
D		

New Routing Table at Router A

Destination	Distance	Next Hop
A	0	A
B	2	B
C	5	B
D	1	D

- Final B

Destination	Distance	Next Hop
A	2	A
B	0	B
C	3	C
D	3	A

- Final c

Destination	Distance	Next Hop
A	5	B
B	3	B
C	0	C
D	6	B

- Final D

Destination	Distance	Next Hop
A	1	A
B	3	A
C	6	A
D	0	D

In Distance Vector Routing,

- Only distance vectors are exchanged.
- “Next hop”values are not exchanged.
- This is because it results in exchanging the large amount of data which consumes more bandwidth.
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- Distance Vector Routing suffers from count to infinity problem.
- Distance Vector Routing uses UDP at transport layer.