CS & IT ENGINEERING

COMPUTER NETWORKS

Routing Protocols

Lecture No- 01

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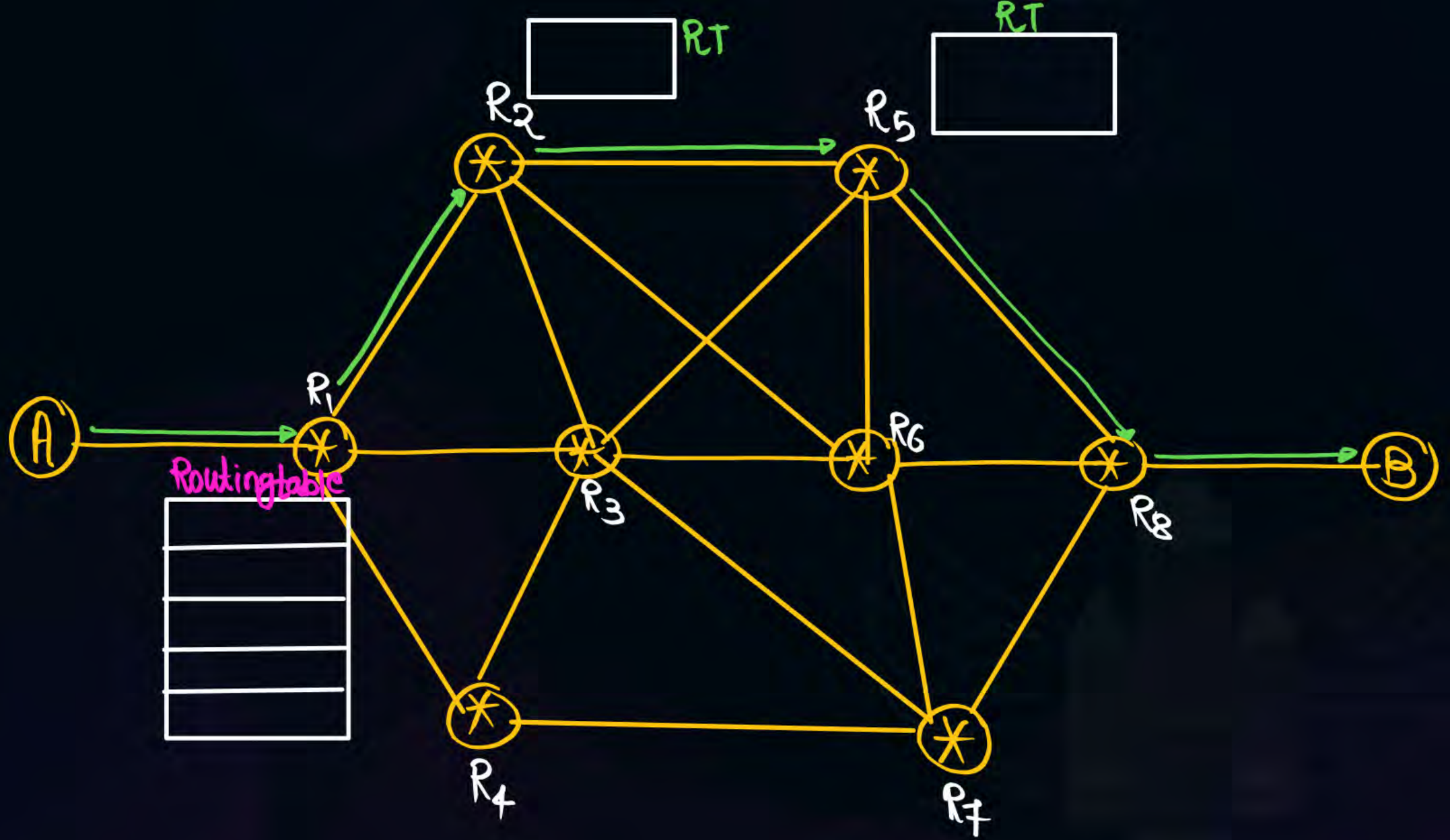
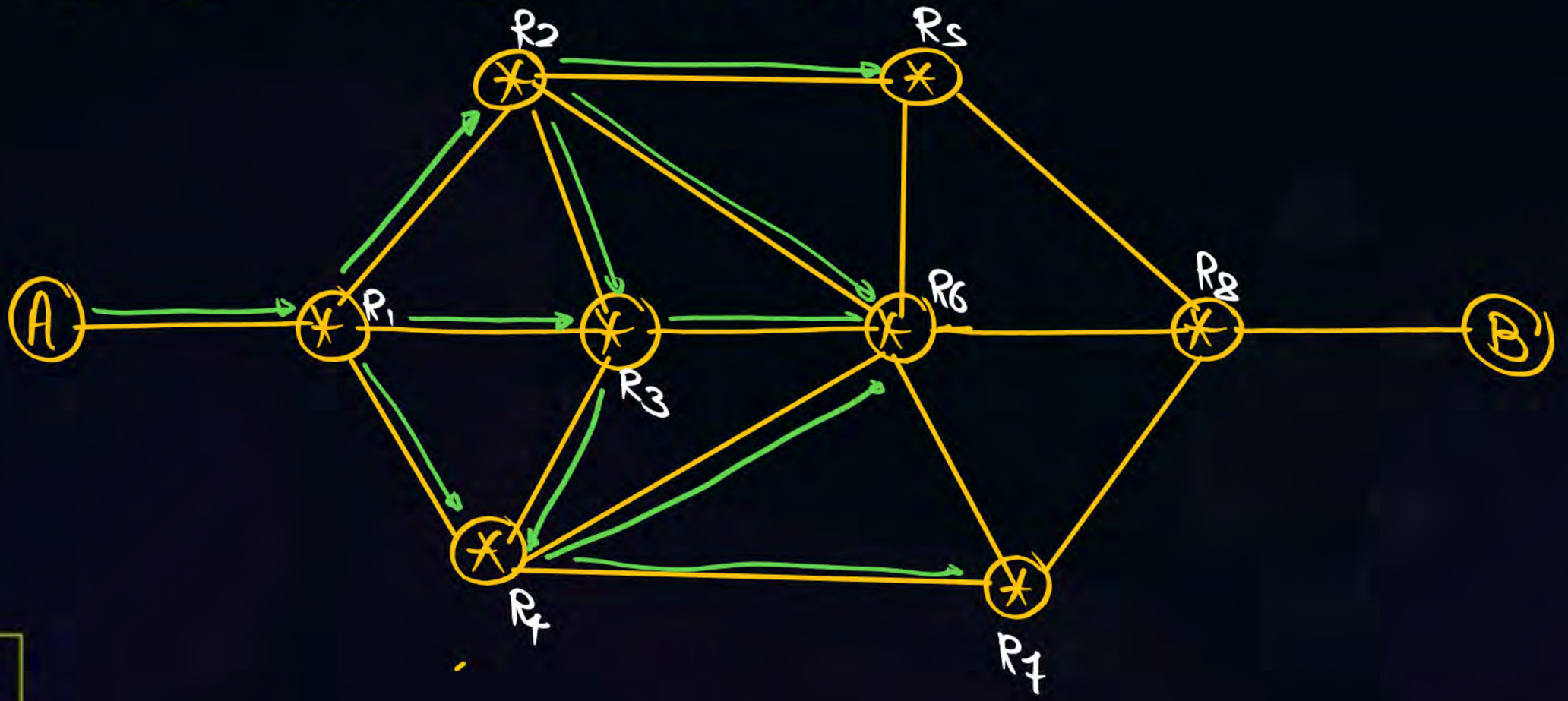
Routing Algorithms


RT
RT
R2
R5
R1
A
Routingtable
R3
R6
R8
B
R4
R7

Topic : Flooding

Flooding is simple computer network Routing Algorithm in which every incoming packet is sent through every outgoing link except one it arrived on.



Topic : Advantage of Flooding

1. No Routing is required
2. Shortest path is always guarantee i.e. the packet arrives at the destination first
3. It is highly Reliable , if one path is down then the packet reach at the destination by choosing another path.

Topic : Disadvantage of Flooding

1. Traffic is very high
2. Many duplicate packets received by receiver

Topic : Advantage of Routing

1. Traffic is very less.
2. No duplicate packet received by receiver.

Topic : Disadvantage of Routing

1. Routing table is required.
2. Chosen path may be down so it is not highly Reliable.
3. Shortest path is depends on the algorithm and some algorithms fails to find the shortest path.


Routing Algorithm
Static
Dynamic
XXXXX
Distance Vector routing
1980's
Link state Routing
1990's

Distance Vector Routing

Topic : Distance Vector Routing : (1980)

Routing Table

Destination	Distance	Next Hop

Step 1:

Prepare the Routing table at every Router Based on the local knowledge.

Dest.	Dis.	NH
A	1	A
B	7	B
C	11	C
D	0	D

Dest.	Dis.	NH
A	0	A
B	2	B
C	8	-
D	1	D

Dest.	Dis.	NH
A	8	-
B	3	B
C	0	C
D	11	D

Dest.	Dis.	NH
A	2	A
B	0	B
C	3	C
D	7	D

Step 2:

At A

A Receive Distance vector from B, D

At B

B Receive Distance vector from A, C, D

At C

C Receive Distance vector from B, D

At D

D Receive distance from A, B, C

Step2:

At A

A Received Distance Vector From B, D

From-B

2
0
3
7

AB=2

From-D

1
7
11
0

AD=1

$A \to B = \min\{ A \xrightarrow{2} B + B \overset{0}{\rightsquigarrow} B$ or $A \xrightarrow[1]{} D + D \underset{7}{\rightsquigarrow} B$

$A \to B = \min\{2, 8\} = 2$

A → New Routing table

Destination	Distance	NH
A	0	A
B	2	B
C	5	B
D	1	D

$A \to C = \min\{ A \xrightarrow{2} B + B \overset{3}{\rightsquigarrow} C$ or $A \xrightarrow[1]{} D + D \underset{11}{\rightsquigarrow} C$

$A \to C = \min\{5, 12\} = 5$

$A \to D = \min\{ A \xrightarrow{2} B + B \overset{7}{\rightsquigarrow} D$ or $A \xrightarrow[1]{} D + D \underset{0}{\rightsquigarrow} D$

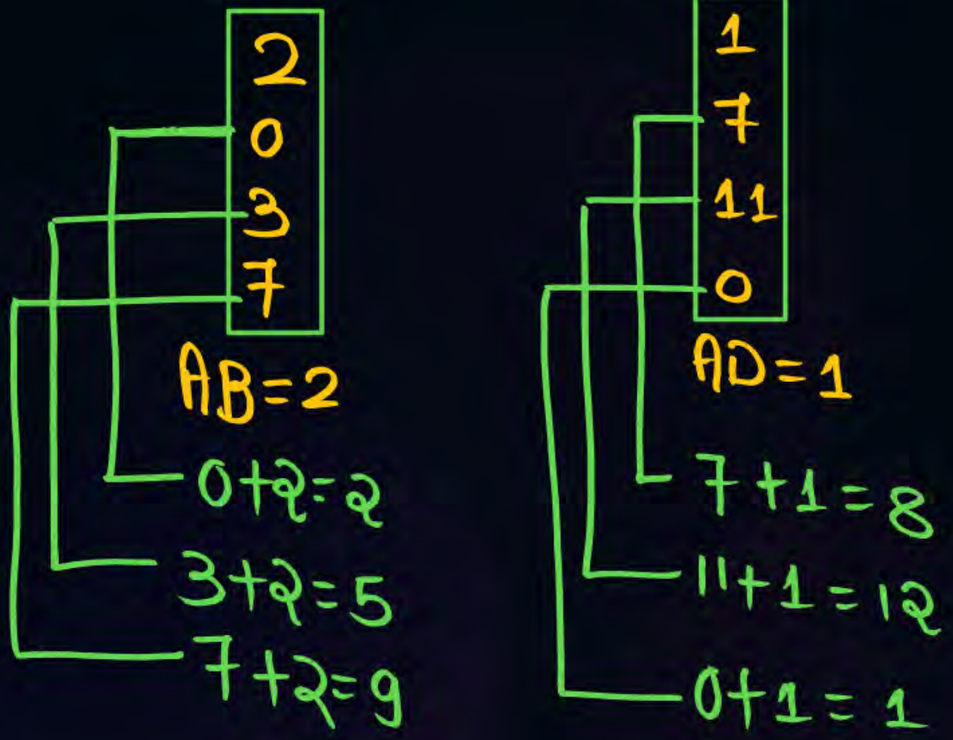
$A \to D = \min\{9, 1\} = 1$

Shortcut (AD Rule)

At A

A Received Distance Vector From B, D

From- B



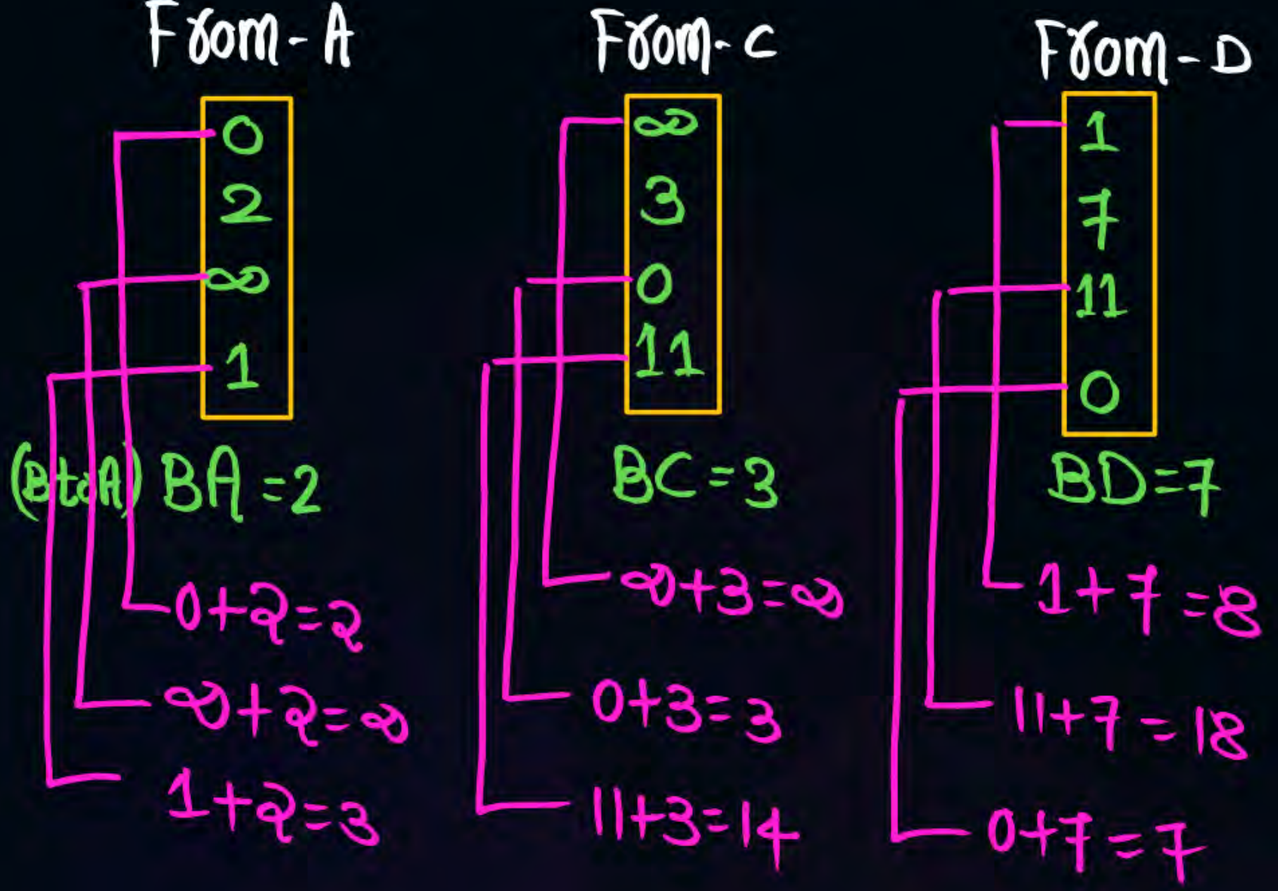
From- D

A→ New Routing table

Destination	Distance	NH
A	0	A
B	2	B
C	5	B
D	1	D

At B

B Received Distance Vector From A, C, D



B New Routing table

Destination	Distance	NH
A	2	A
B	0	B
C	3	C
D	3	A

At C: New Routing table

Dest.	Dis	NH
A	5	B
B	3	B
C	0	C
D	10	B

At D: New Routing table

Dest.	Dis	NH
A	1	A
B	3	A
C	10	B
D	0	D

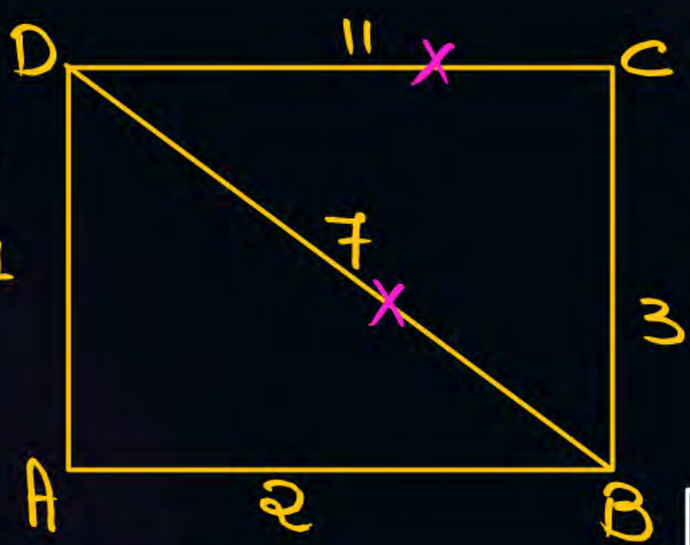
Slide

Step 3:

At A

A Received Distance Vector From

Final Routing table in one step



Dest.	Dis.	NH
A	1	A
B	3	A
C	6	A
D	0	D

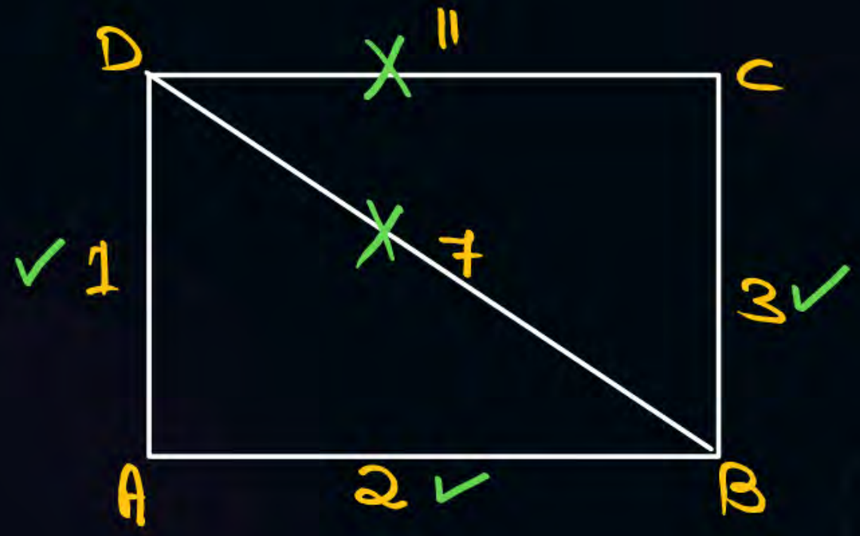
Dest.	Dis.	NH
A	5	B
B	3	B
C	0	C
D	6	B

Dest.	Dis.	NH
A	0	A
B	2	B
C	5	B
D	1	D

Dest.	Dis.	NH
A	2	A
B	0	B
C	3	C
D	3	A

" edges which are Not included in any Routing table"

Q:



edges which are Not included

Problem Solving
On
DVR

Gate 2010

HW

Consider a network with 6 routers R1 to R6 connected with links having weights as shown in the following diagram

At R1

R1 to R2, R3, R4, R5, R6

At R2

R2 to R3, R4, R5, R6

At R3

R3 to R4, R5, R6

At R4

R4 to R5, R6

At R5

R5 to R6

Topic : Problem Solving on DVR

Common data Question

Q. All the routers use the distance vector-based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbor with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data?

A. 4

B. 3

C. 2

D. 1

Topic : Problem Solving on DVR

Q. Suppose the weights of all unused links in the previous question are changed to 2 and the distance vector algorithm is used again until all routing tables stabilize. How many links will now remain unused?

A. 0

B. 1

C. 2

D. 3

Topic : Problem Solving on DVR

Q. Consider the following subnet. If distance vector routing is used, how many link can never by used after all the routing table. Are stabilized ?

THANK YOU!