CS & IT ENGINEERING

COMPUTER NETWORKS

Routing Protocols

Lecture No- 02

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TOPICS TO BE COVERED

Routing Algorithms

Gate 2010

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

Topic : Problem Solving on DVR

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

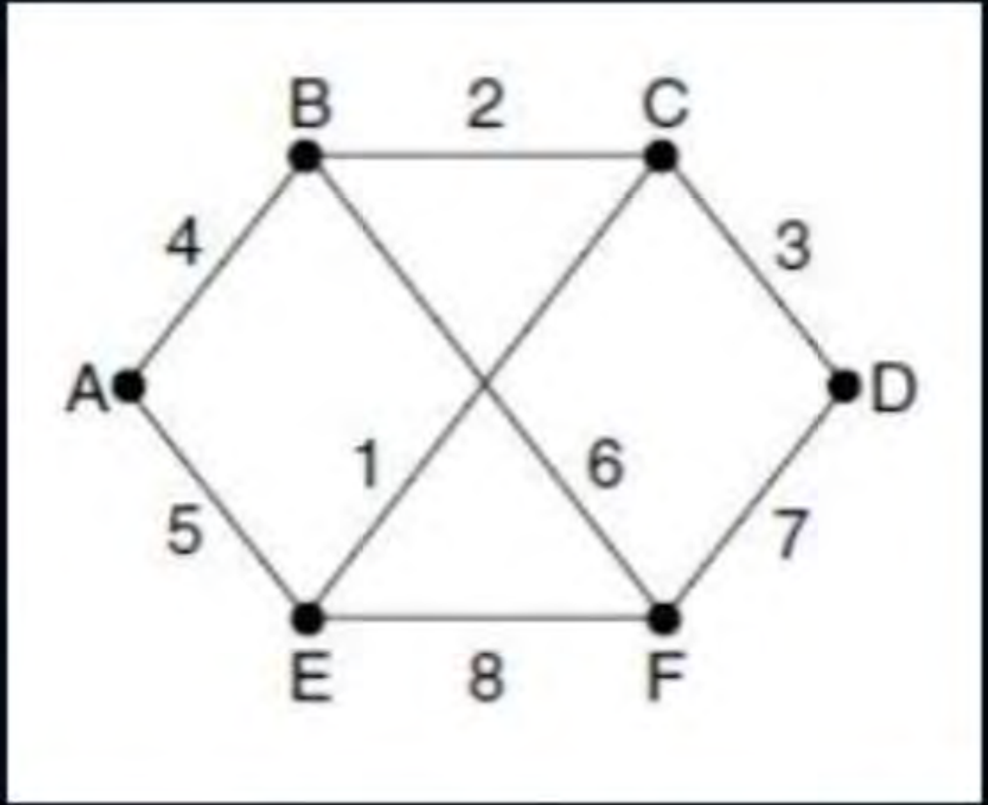
$R_5 \longrightarrow R_6$ X

Slide 6

Topic : Problem Solving on DVR

Text Book

Q. Consider the network of Figure. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The cost of the links from C to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the cost



Slide

Sol^n: **At C**

C Received Distance Vector From B, D, E

From-B	From-D	From-E
5	16	7
0	12	6
8	6	3
12	0	9
6	9	0
2	10	4

CB=6

$5+6=11$

$0+6=6$

$12+6=18$

$6+6=12$

$2+6=8$

CD=3

$16+3=19$

$12+3=15$

$0+3=3$

$9+3=12$

$10+3=13$

CE=5

$7+5=12$

$6+5=11$

$9+5=14$

$0+5=5$

$4+5=9$

C → New Routing Algorith

Destination	Distance	NH
A	11	B
B	6	B
C	0	C
D	3	D
E	5	E
F	8	B

Topic : Problem Solving on DVR

#Q. For the network given in the figure below, the routing tables of the four nodes A, E, D and G are shown.
Suppose that F has estimated its delay to its neighbors, A, E, D and G as 8, 10, 12 and 6 msec respectively and updates its routing table using distance vector routing technique. New Routing table of F ?

Routing Table of A	
A	0
B	40
C	14
D	17
E	21
F	9
G	24

Routing Table of D	
A	20
B	8
C	30
D	0
E	14
F	7
G	22

Routing Table of E	
A	24
B	27
C	7
D	20
E	0
F	11
G	22

Routing Table of G	
A	21
B	24
C	22
D	19
E	22
F	10
G	0

~~a.~~

A	8
B	8
C	7
D	12
E	10
F	0
G	6

~~b.~~

A	21
B	8
C	7
D	19
E	14
F	0
G	22

~~c.~~

A	8
B	20
C	17
D	12
E	10
F	16
G	6

d. ✓

A	8
B	20
C	17
D	12
E	10
F	0
G	6

At F

F Received Distance Vector From A, D, E, G

From-A	From-D	From-E	From-G
0	20	24	21
40	8	27	24
14	30	7	22
17	0	20	19
21	14	0	22
9	7	11	10
24	22	22	0

FA = 8
0+8=8
40+8=48

FD = 12
20+12=32
8+12=20

FE = 10
24+10=34
27+10=37

FG = 6
21+6=27
24+6=30

F → New Routing table

Destination	Distance	NH
A	8	A
B	20	D
C		
D		
E		
F	0	F
G		

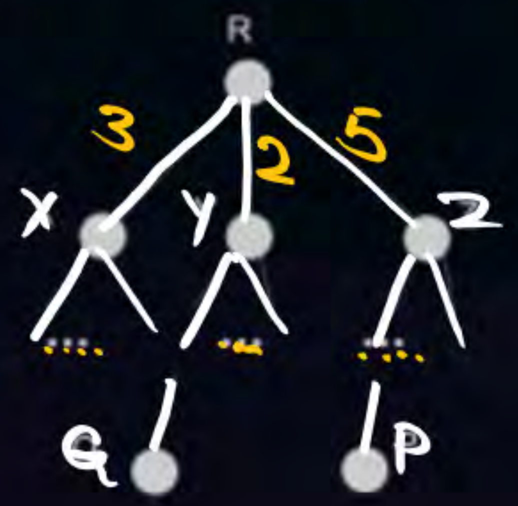
Topic : Problem Solving on DVR

Gate-२०२१-(२m) MSQ

#Q. Consider a computer network using the distance vector routing algorithm in its network layer. The partial topology of the network is as shown below.

The objective is to find the shortest-cost path from the router R to routers P and Q. Assume that R does not initially know the shortest routes to P and Q. Assume that R has three neighbouring routers denoted as X, Y, and Z. During one iteration, R measures its distance to its neighbours X, Y, and Z as 3, 2, and 5, respectively. Router R gets routing vectors from its neighbours that indicate that the distance to router P from routers X, Y, and Z are 7, 6 and 5, respectively.

R to P
R to Q



Topic : Problem Solving on DVR

#Q. The routing vector also indicates that the distance to router Q from routers X, Y, and Z are 4, 6, and 8, respectively. Which of the following statement(s) is/are correct with respect to the new routing table of R, after updation during this iteration?

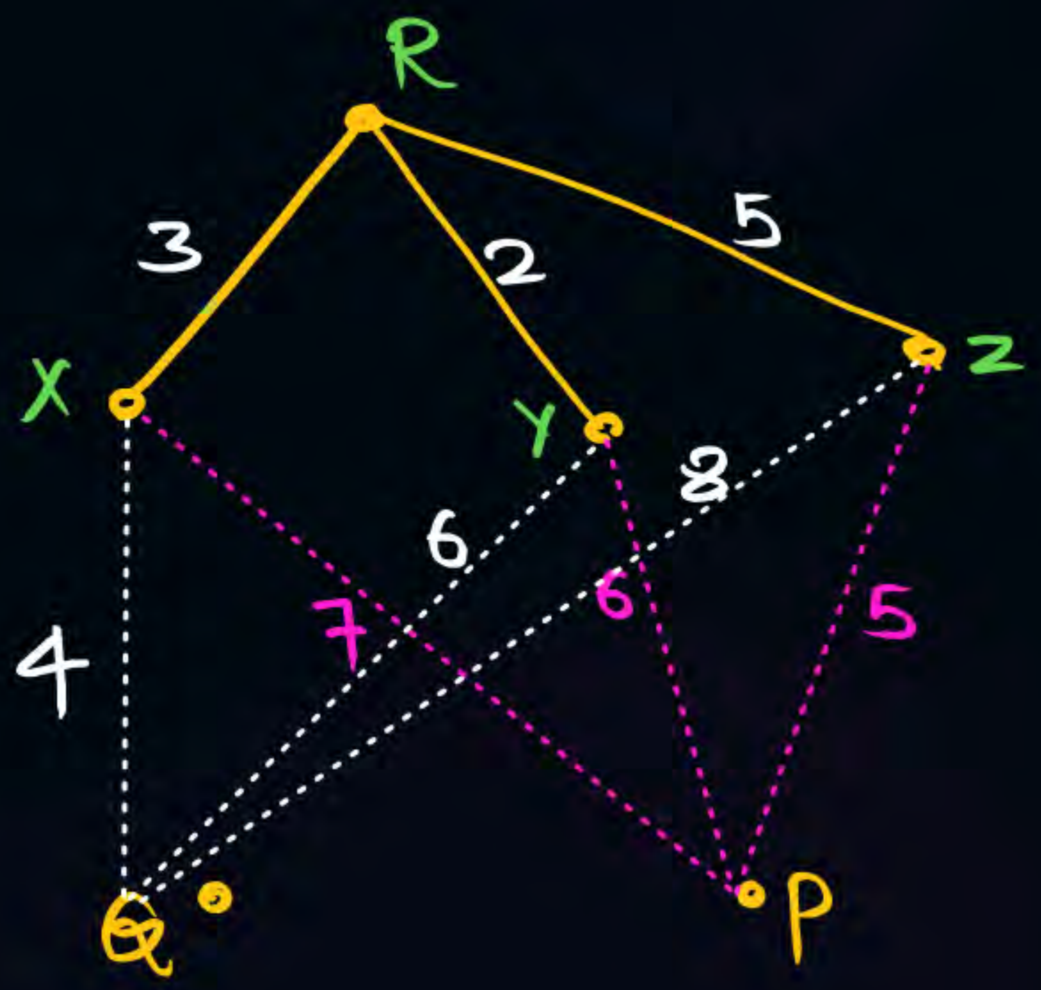
A. The distance from R to P will be stored as 10.

B. The next hop router for a packet from R to P is Y.

C. The next hop router for a packet from R to Q is Z.

D. The distance from R to Q will be stored as 7.

(B, D)



I. R to P $= \min\{\underbrace{R\text{-}X\text{-}P}_{3+7},\ \underbrace{R\text{-}Y\text{-}P}_{2+6},\ \underbrace{R\text{-}Z\text{-}P}_{5+5}\}$

$= \min\{10, 8, 10\}$

R to P $= 8$ (through Y)

II. R to Q $= \min\{\underbrace{R\text{-}X\text{-}Q}_{3+4},\ \underbrace{R\text{-}Y\text{-}Q}_{2+6},\ \underbrace{R\text{-}Z\text{-}Q}_{5+8}\}$

R to Q $= \min(7, 8, 13)$

R to Q $= 7$ (through X)

Topic : Disadvantage of DVR

Disadvantage of DVR [Count to infinity problem]

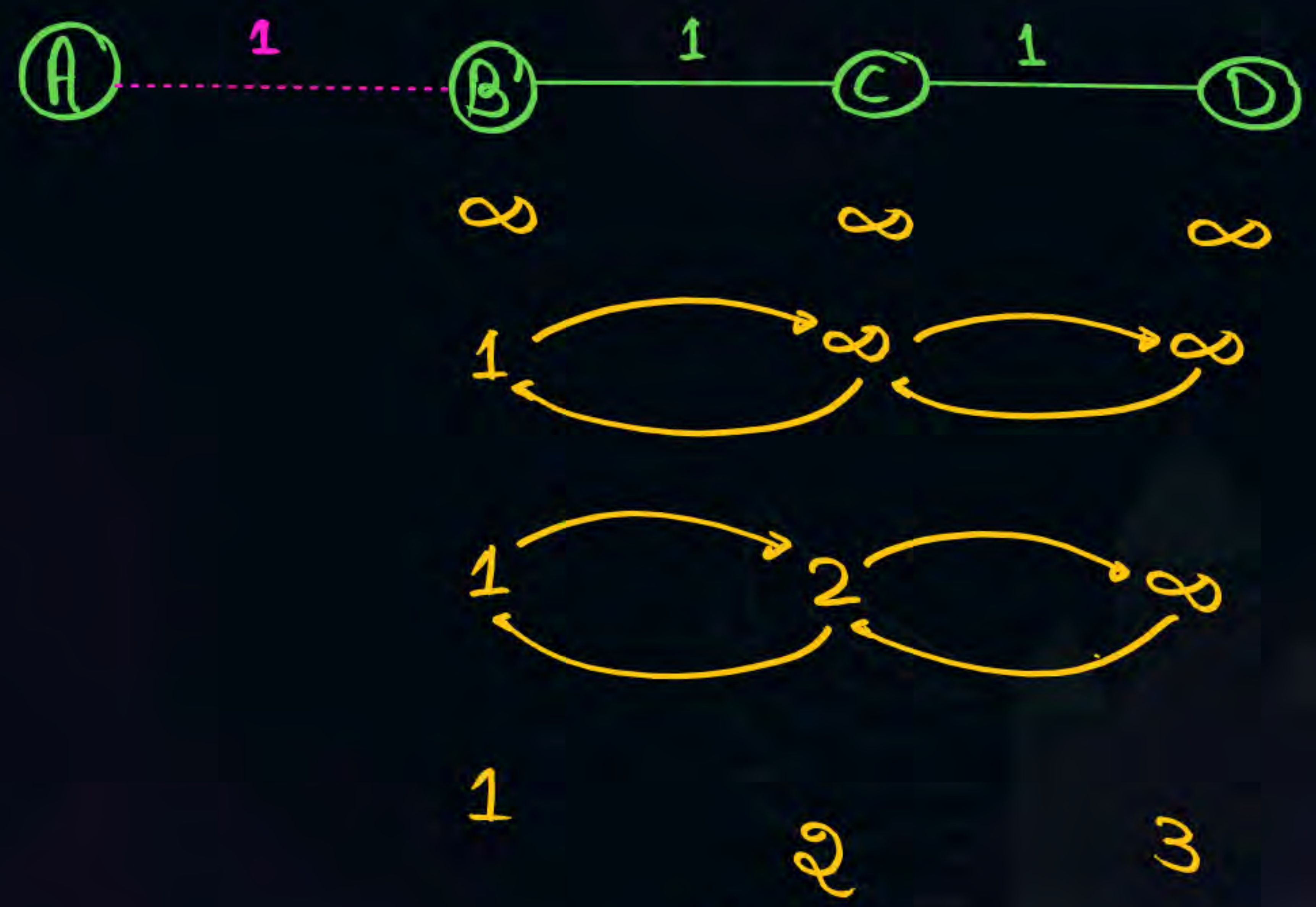
1. Bad News spreads slow
2. Good News spreads Fast

Good News

Initially
A is not connected to B so

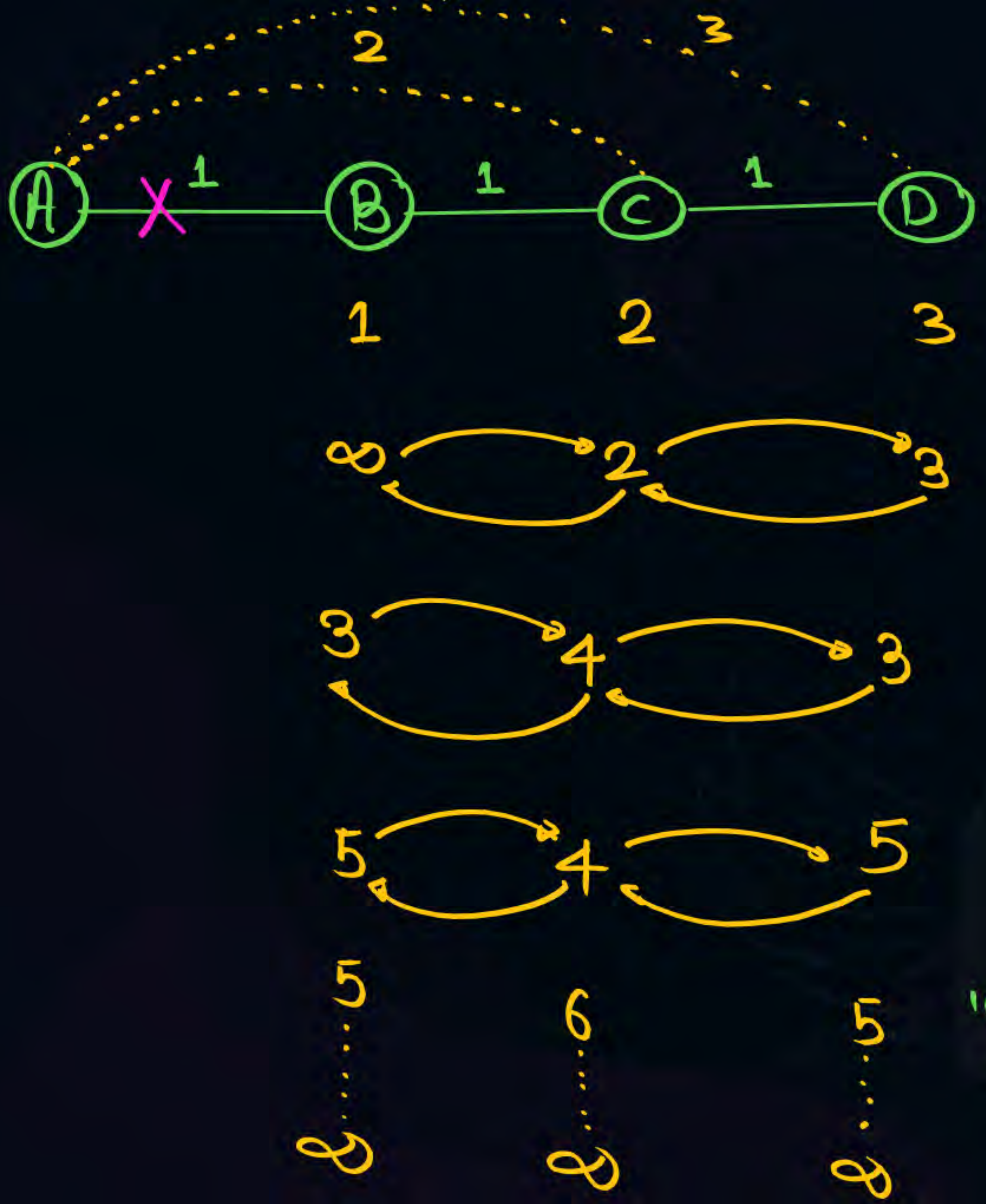
B to A = ∞
C to A = ∞
D to A = ∞

- After some time A is connected to B with the cost (1)



(Good News)

Bad News

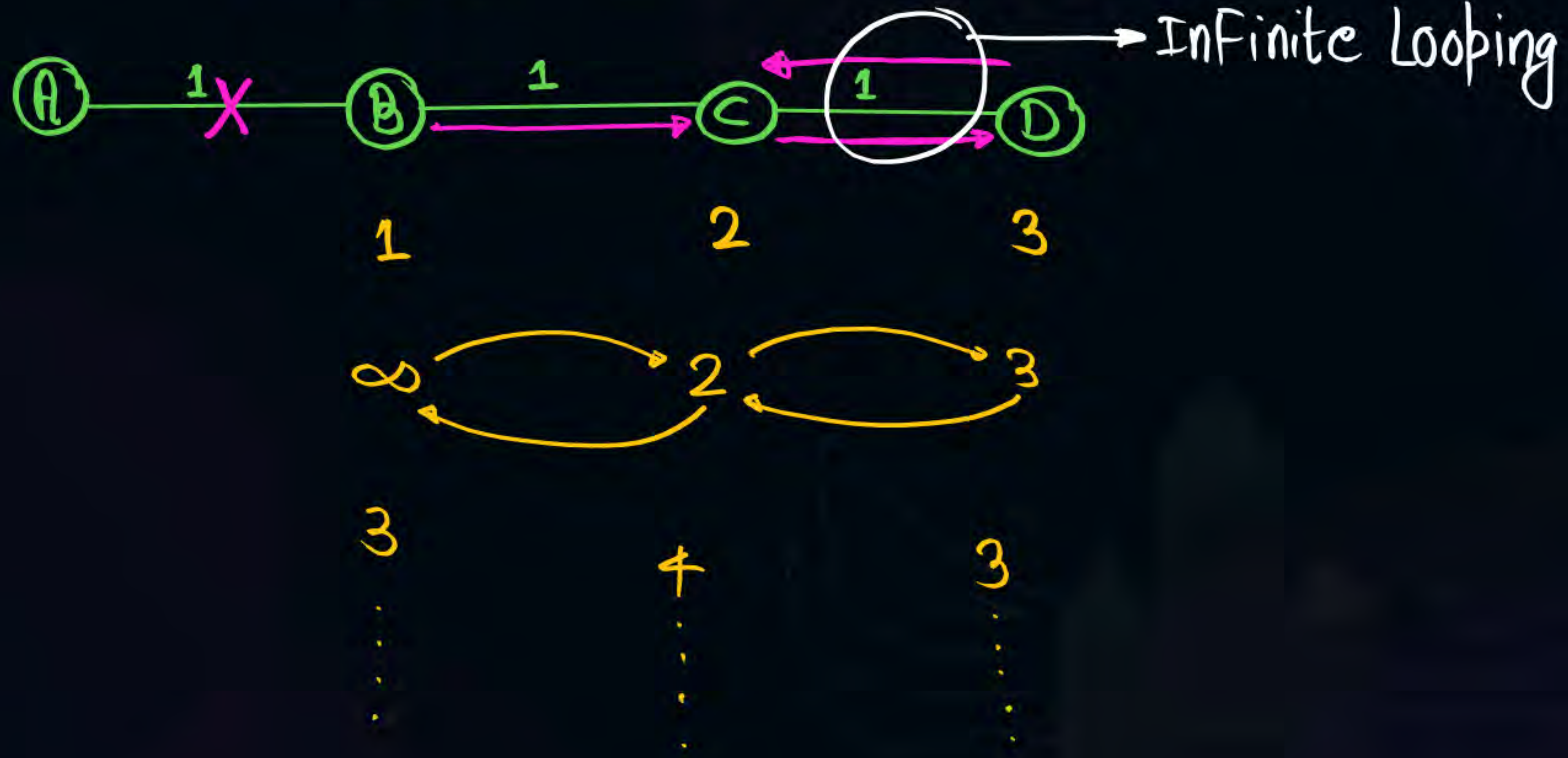


"Count to infinity Problem"

Dest.	Dis.	NH
A	~~1~~ ~~∞~~ 3	~~A~~ C

Dest.	Dis.	NH
A	~~2~~ 4	B D

Dest.	Dis.	NH
A	3	C



Note

At B

B Received DV From-C

From-C

$\boxed{2}$

BC=1

2+1=3

At C

C Received DV From B, D

From B

$\boxed{\infty}$

CB=1

$\infty+1=\infty$

From-D

$\boxed{3}$

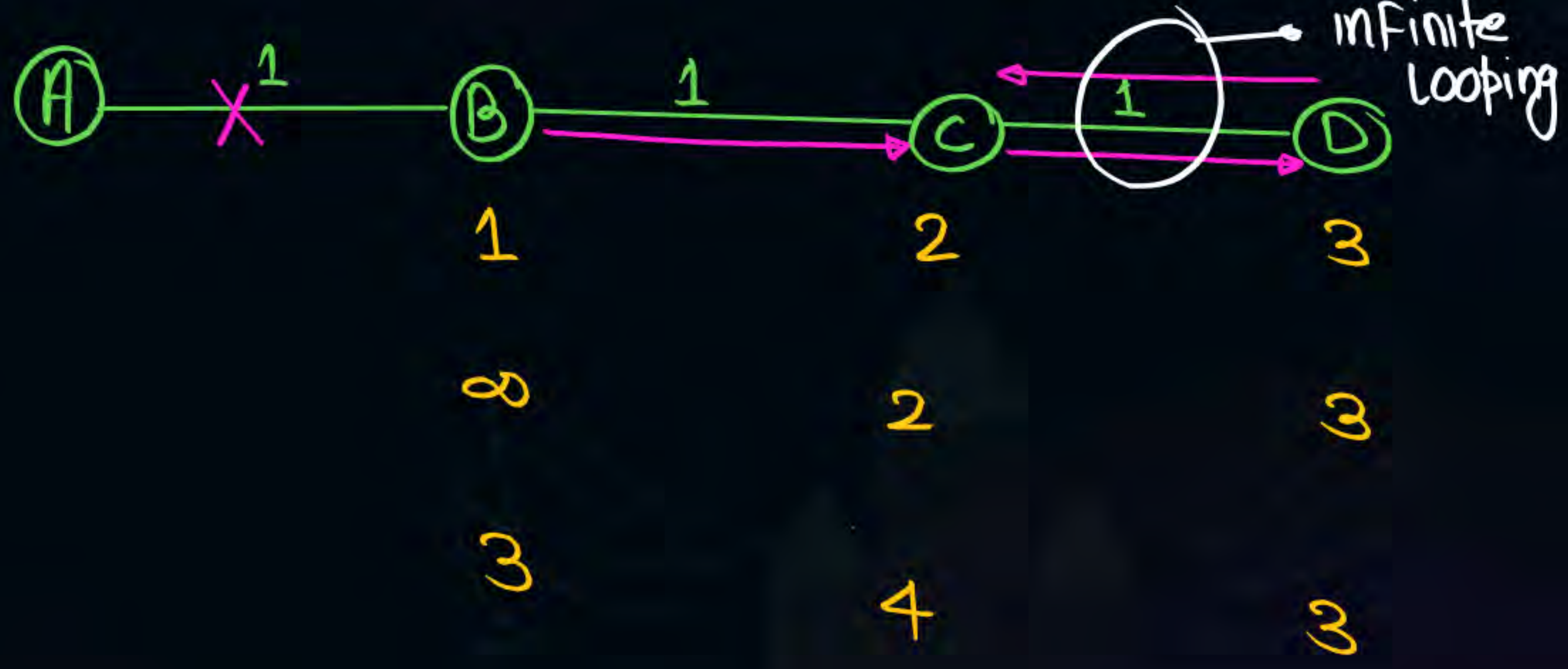
CD=1

3+1=4

Dest.	Dis.	NH
A	~~1~~ ~~∞~~ 3	A – C

Dest.	Dis.	NH
A	~~2~~ 4	B D

Dest.	Dis	NH
A	3	C



At D

D Received DV From-C

From-C

$\boxed{2}$

DC = 1

2+1 = 3

Disadvantage of DVR

1. Count to infinity Problem
2. Infinite looping
3. Convergence is very slow

Note: Solution of count to infinity Problem is given by split Horizon.

Split Horizon solution

THANK YOU!