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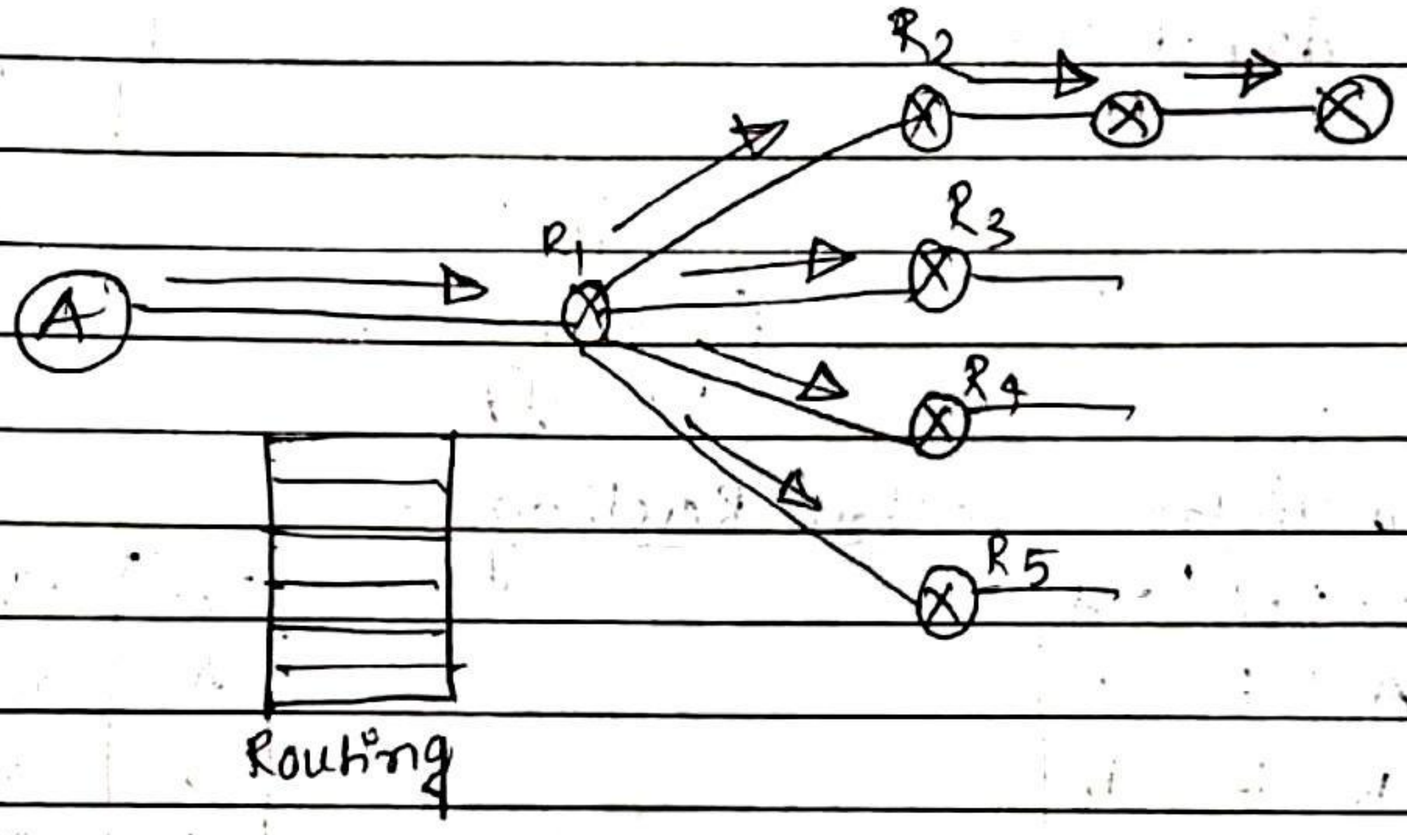
Routing

- Difference between routing and flooding -

→ The process of preparing routing table called routing.

→ flooding is forwarding by a routers of a packet from any node to every other node attached to the router except the node from which the packet arrived.



Routing	Flooding
disadv:	adv:
1) Routing table required.	1) no routing required.
2) ?	2) shortest path is garrantee.
3) It may not be reliable.	3) It is highly reliable.
adv:	disadv:
1) No Duplicate packets.	1) Duplicati packet my arrive.
2) ~~No~~ low traffing.	2) Traffic is high.

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• Types of routing algorithm page —

Routing

✗ Static
manually,
Trafic & Topology
donot change

✓ Dynamic
Trafic & Topologys
change

DVR
(Distance vector Routing)

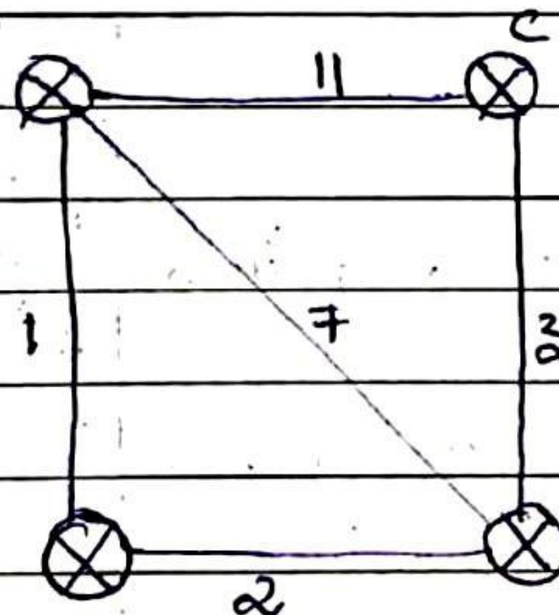
LSR
(Link state Routing)

1. Distance vector Routing —

Step -1

Des	Dis	NH
A	1	A
B	7	B
C	11	C
D	0	D

Des	Dis	NH
A	∞	-
B	3	B
C	0	C
D	11	D



destination

Des	Dis	NH
A	0	A
B	2	B
C	∞	-
D	1	D

Des	Distance	Next hop
A	2	A
B	0	B
C	3	C
D	7	D

Step-2

At A

Distance vector (DV) from B, D.

At B

DV from A, C, D

At C

DV from B, D

At D

DV from A, B, C.

At A

DV from B, D

method-1 to understand the concept.

From B

2
0
3
7

From D

1
7
11
0

New Routing table —

A to		
A	0	A
B	2	B
C	5	B
D	1	D

$A \rightsquigarrow B = \min \begin{cases} A \xrightarrow{1} D,\ D \overset{+}{\rightsquigarrow} B \\ \checkmark A \xrightarrow{2} B,\ B \overset{0}{\rightsquigarrow} B \end{cases}$

$A \rightsquigarrow C = \min \begin{cases} A \xrightarrow{1} D,\ D \overset{11}{\rightsquigarrow} C \\ \checkmark A \xrightarrow{2} B,\ B \overset{3}{\rightsquigarrow} C \end{cases}$

$A \rightsquigarrow D = \min \begin{cases} \checkmark A \xrightarrow{1} D,\ D \overset{0}{\rightsquigarrow} D \\ A \xrightarrow{2} B,\ B \overset{7}{\rightsquigarrow} D \end{cases}$

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method no.2

At A

Dv from B, D

From B

2
0
3
7

From D

1
7
11
0

new Routing table:-

A	0	A
B	2	B
C	5	B
D	1	D

AB = 2

AD = 1

✓2+0 = 2

✓2+3 = 5

2+7 = 9

1+7 = 9

1+11 = 12

✓1+0 = 1

At B.

from A

0
2
∞
1

from C

∞
3
0
11

from D

1
7
11
0

BA = 2

BC = 3

DD = 7

new routing table.

A	2	A
B	0	B
C	3	C
D	3	A

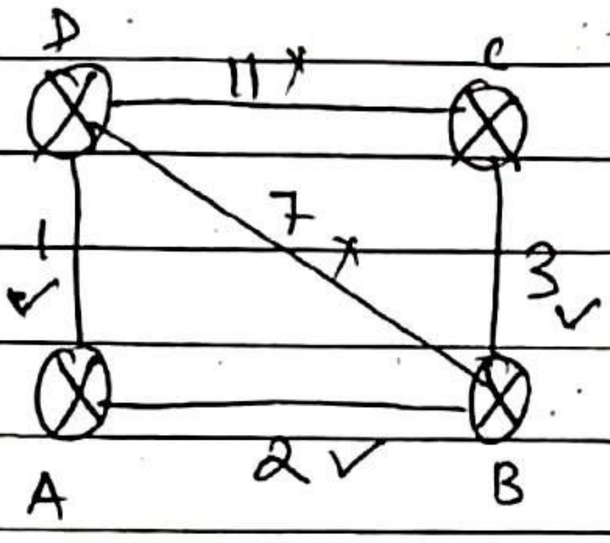
given DV

→ Q. find the new Routing table?

→ Q. After DVR which paths not used?

→ Q. find the final Routing table?

A	1	A
B	3	A
C	6	A
D	0	D



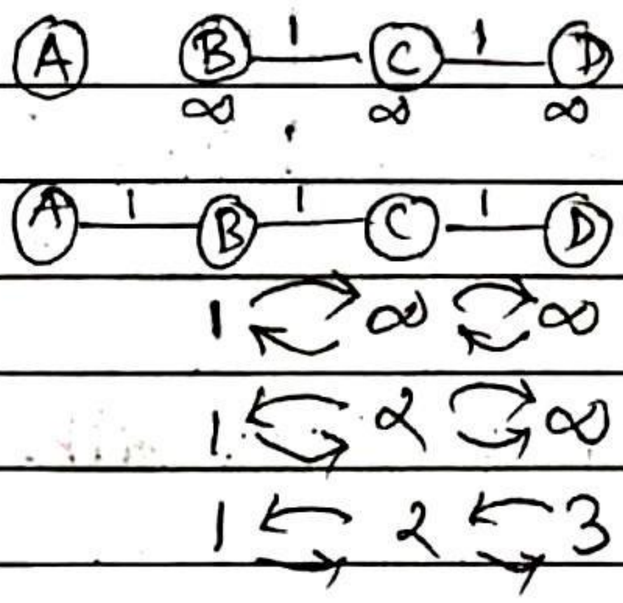
Des	Dis	NH
A	2	B
B	3	B
C	0	C
D	6	B

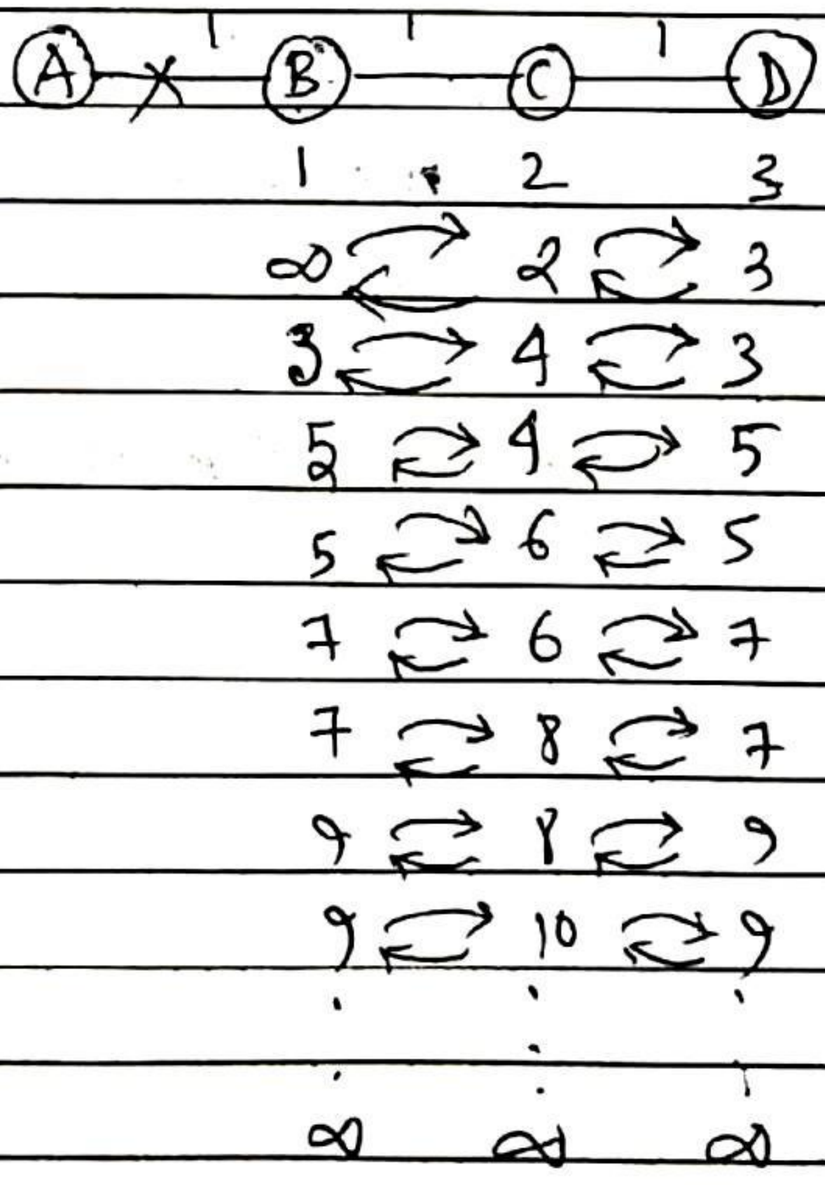
A	0	A
B	2	B
C	5	B
D	1	D

A	2	A
B	0	B
C	3	C
D	2	A

- **Count to Infinity problem –**

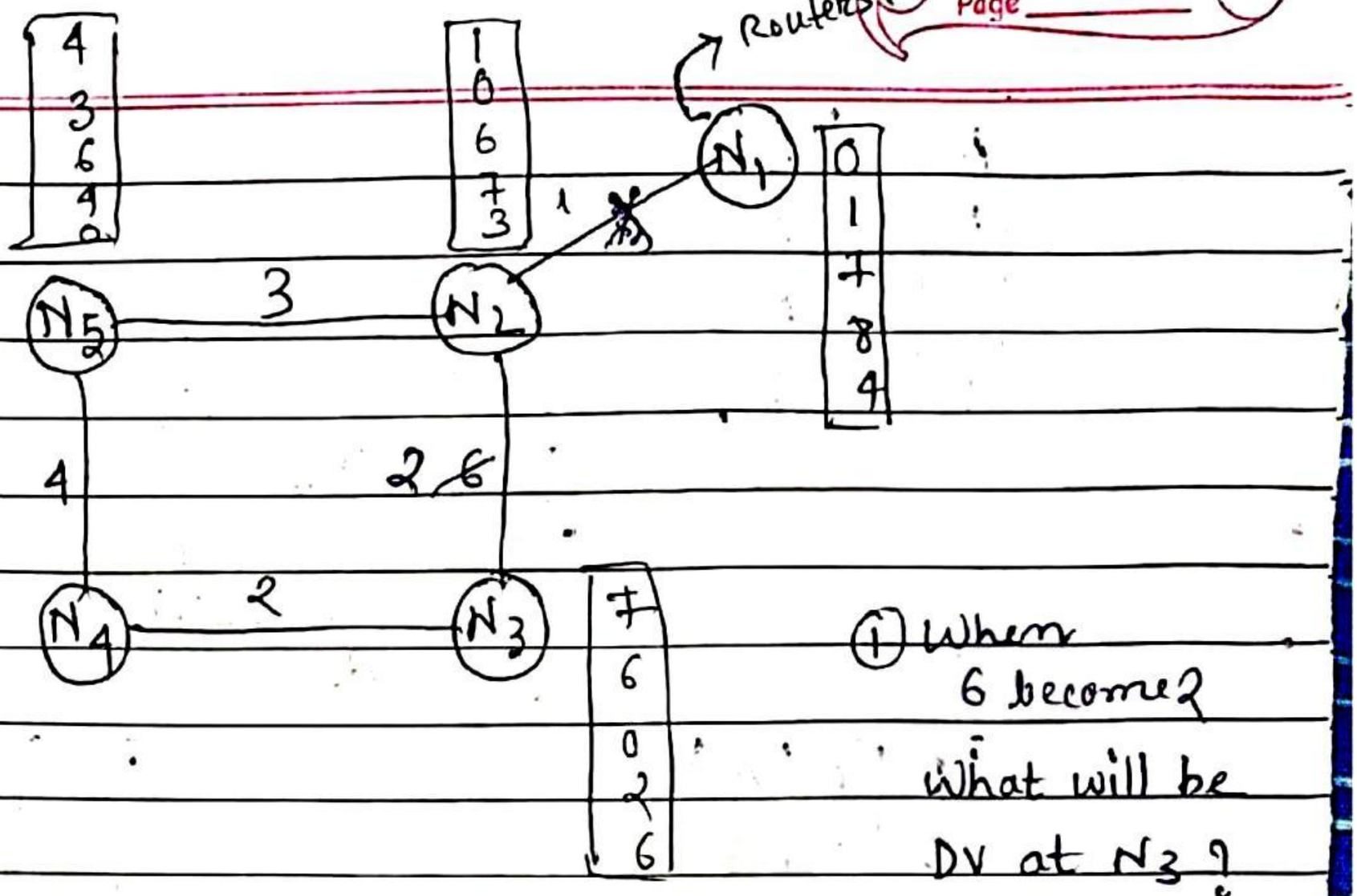
→ In DVR ("Bad news spreads slow, Good news spreads fast")





Routers

8.1



① When 6 become 2 What will be DV at N_3 ?

⟹ At N_3

From N_2

1
0
6
7
3

From N_4

8
7
2
0
4

new routing table.

N_1	3	N_2
N_2	2	N_2
N_3	0	N_3
N_4	2	N_4
N_5	5	N_2

$N_2N_3 = 2$

$N_3N_4 = 2$

⇒ ~~When N_2N_1 edge~~ path will be lost.

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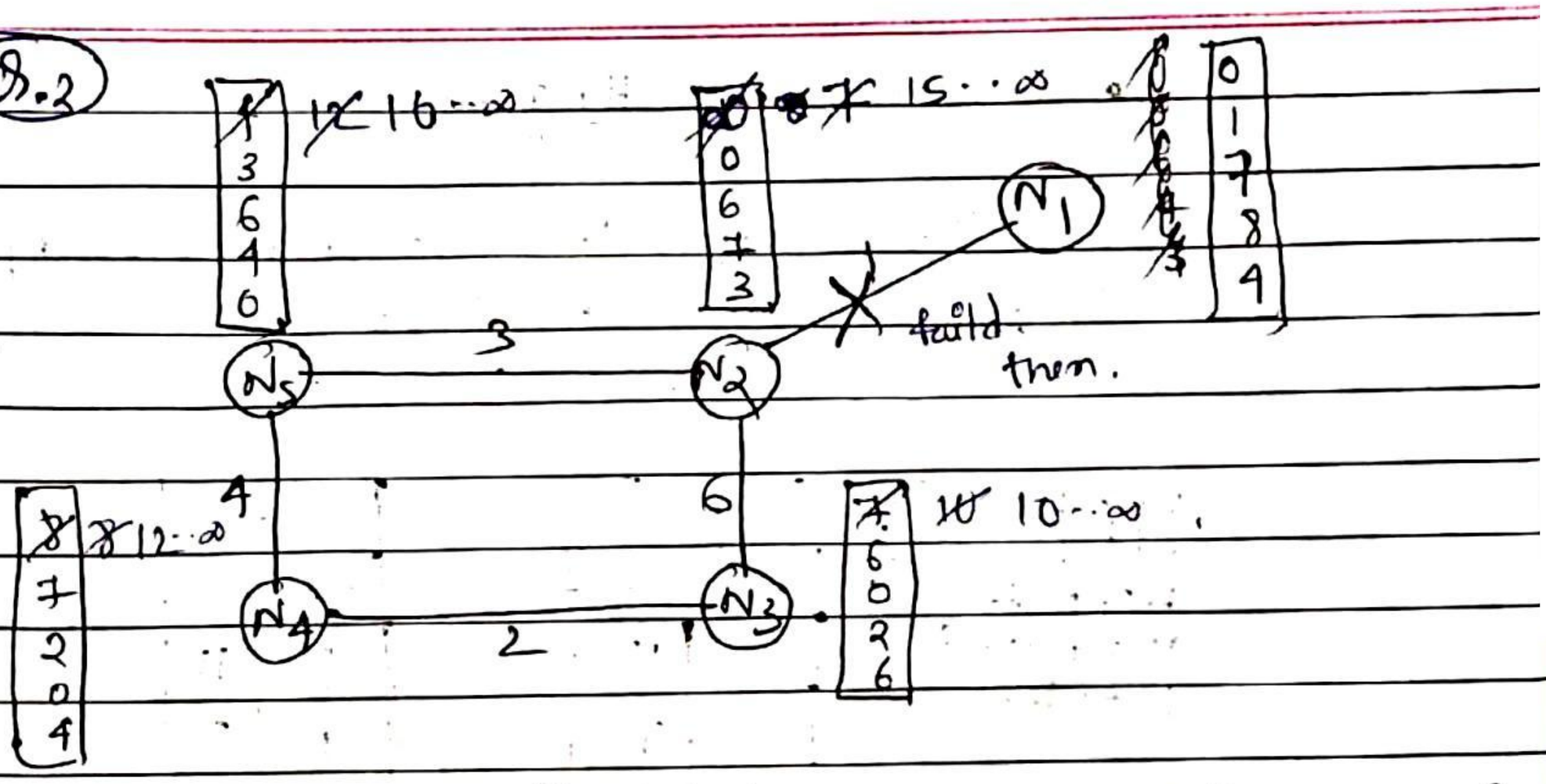
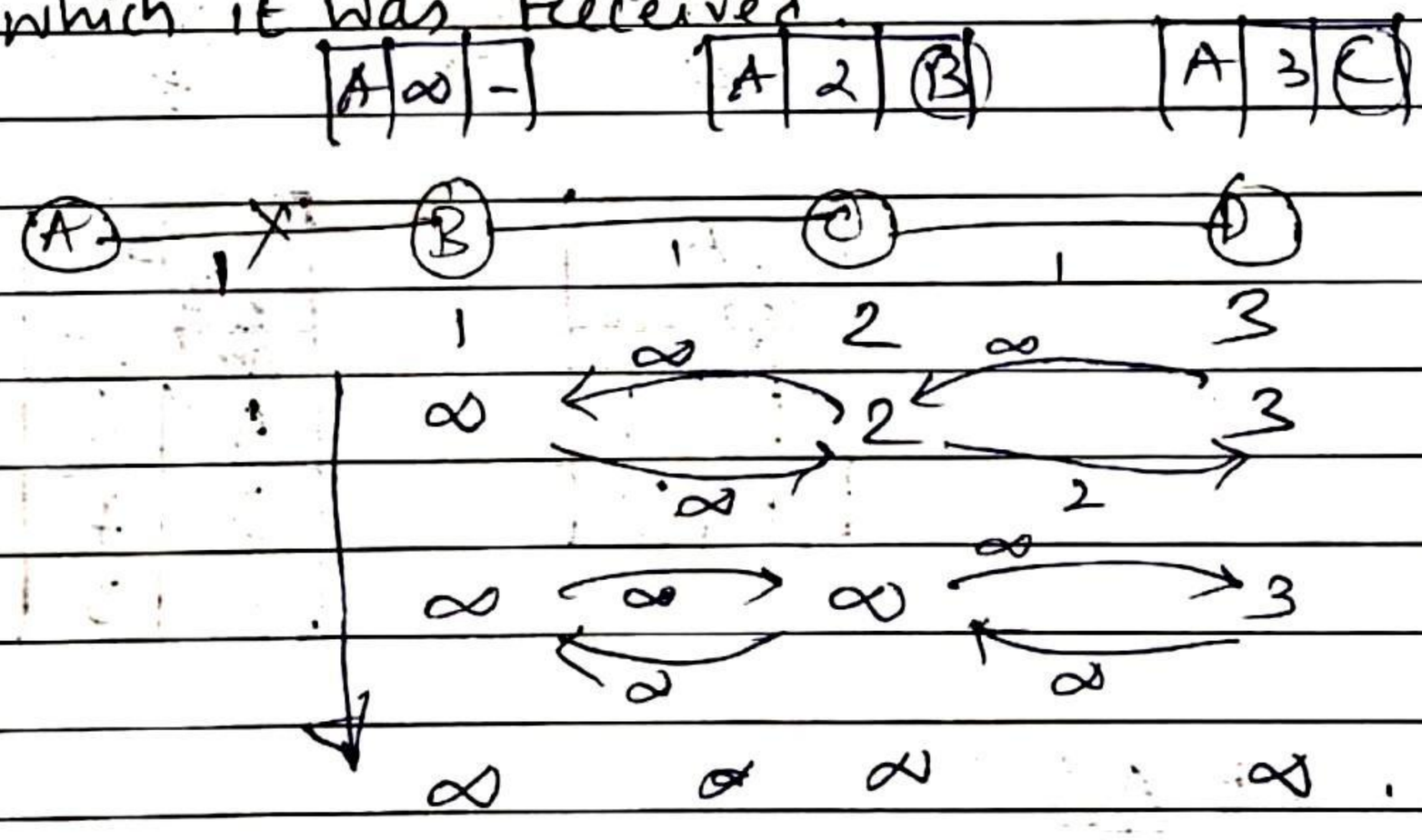
Q.2



- Split Horizon (to avoid count to infinity problem)

→ Split horizon is a method of preventing a routing loop in network.
information about the routing for a particular packet is never sent back in the direction from which it was received.



Dis adv of DVR :-

✓ (1) → Count to infinity problem.
(2) → Convergency very very slow.
✓ (3) → there could be loops.
using Split Horizon we can solve problem (1) & (3).

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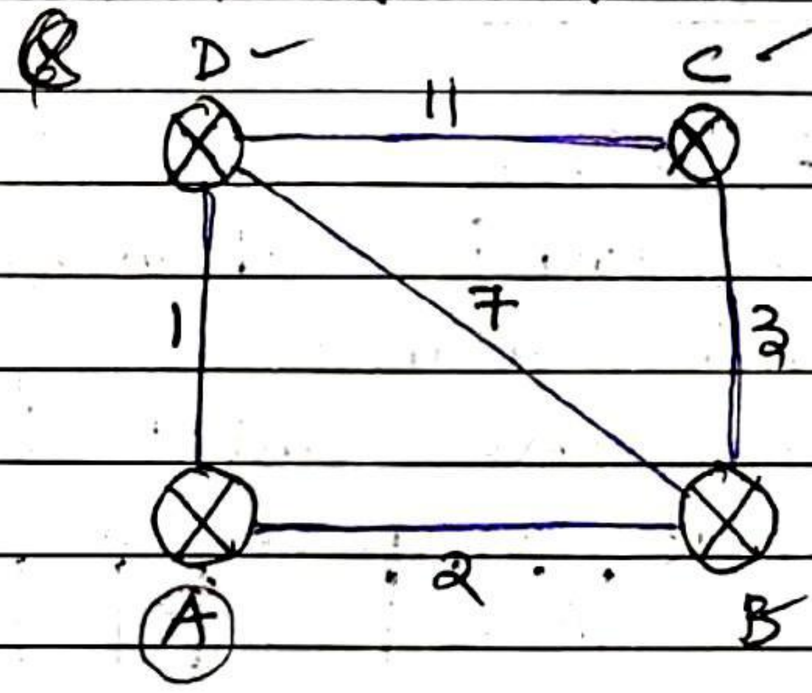
2. Link state routing —

DVR Based on → ~~G~~ local Knowledge.
LSR " " → Global Knowledge.

help to avoid old packet
help to avoid looping problem

D	
Sequence	
Time to live	
C	11
B	7
A	2

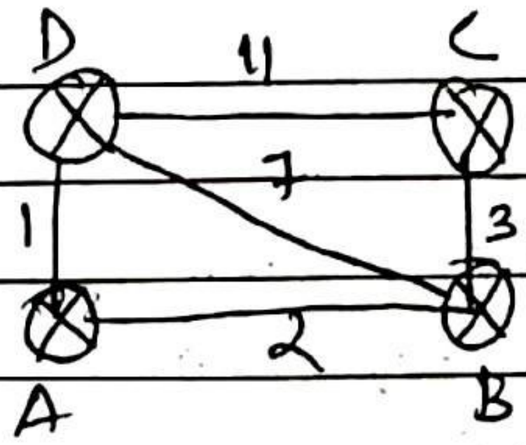
C	
Seq no	
TTL	
D	11
B	3



A	
Seq no	
TTL	
D	1
B	2

B	
Seq no.	
Time to leave	
A	2
D	7
C	3

At A:



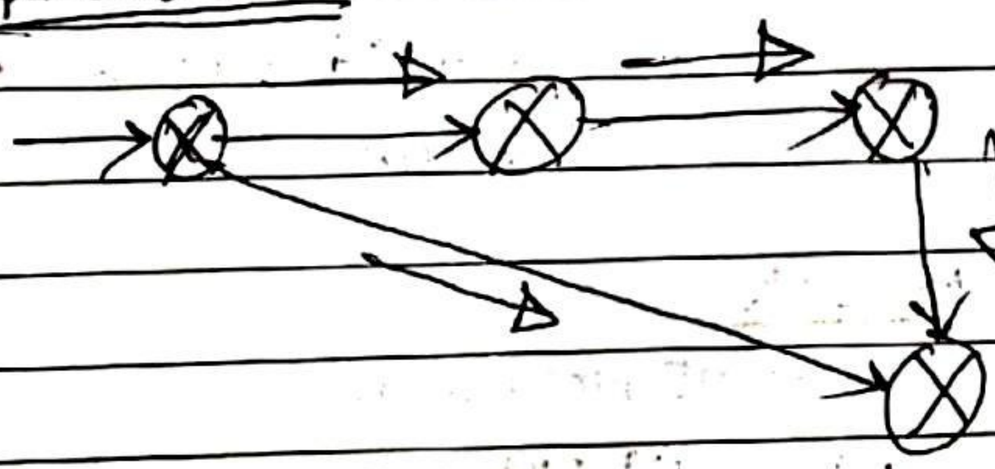
A will apply single source shortest path algorithm (Dijkstra algo)

Routing table - (this table made by Dijkstra algo)

Destination (Des)	Distance (Dis)	Next hop (NH)
A	0	A
B	2	B
C	5	B
D	1	D

→ Converges faster than DVR

Problems -



At A -

Data Base ←

Router	latest	LT/validity → life time	Seq no
B	15		(B, 8) X
C	20		(B, 15) ✓
D	30		(B, 11) X
			(B, 15) X
			(D, 31) ✓

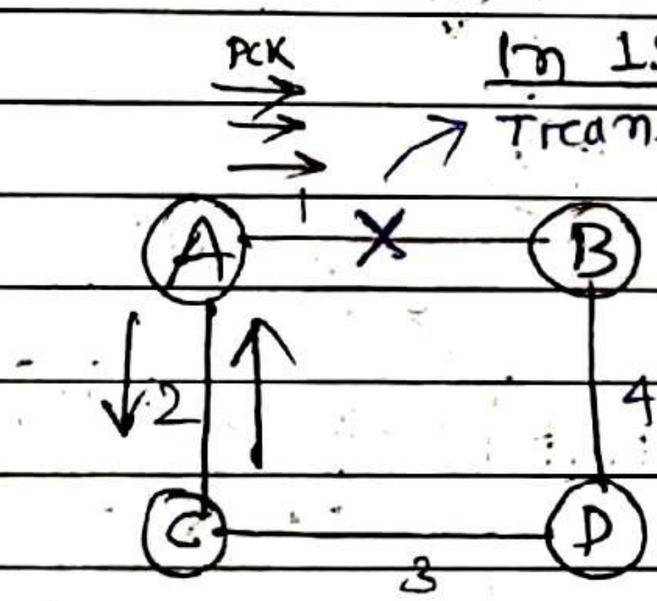
Duplicate will discarded.
→ latest packet will accepted.
→ old " " discarded.

Sequence Number → used to distenguish between old packet and new packet.

Time to leave (TTL) → used to avoid looping problem.

Life time (LT)/validity → used if data is curapted then to solve this problem.

ex:
→ LT = 10 min
one entry not will be valid for a long time.



In ISR
→ Transient problem.
(i) pkt sended by A to B fall in Black hole.
(ii) looping.

In DVR
→ looping is persistent.
solution : split horizon method (SH)

- Difference b/w DVR and LSR —

DVR - algorithm	LSR
1) Used in 1980's	1) 1990's
2) Band Width (BW) required is less.	2) BW required is high.
3) Based on local knowledge. (Local Database)	3) Global Knowledge. (global database)
4) Bellman - Ford. algo.	4) Dijkstra's algo used.
5) Traffic is less.	5) Traffic is very high.
6) periodic updates are done	6) periodic updates are done.
7) converges slowly	7) converges fastere
8) problem of count to infinity.	8) NO ~~cost~~ count to infinity.
9) problem of persistent loops.	9) Transient looping.
10) DVR implement using (RIP) (Routing Information protocol) protocol.	10) (OSPF)

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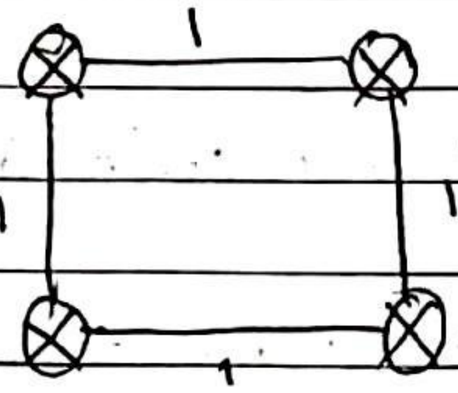
$\infty \rightarrow 16$

RIP — Routing Info protocol.
DVR — Distance vector routing

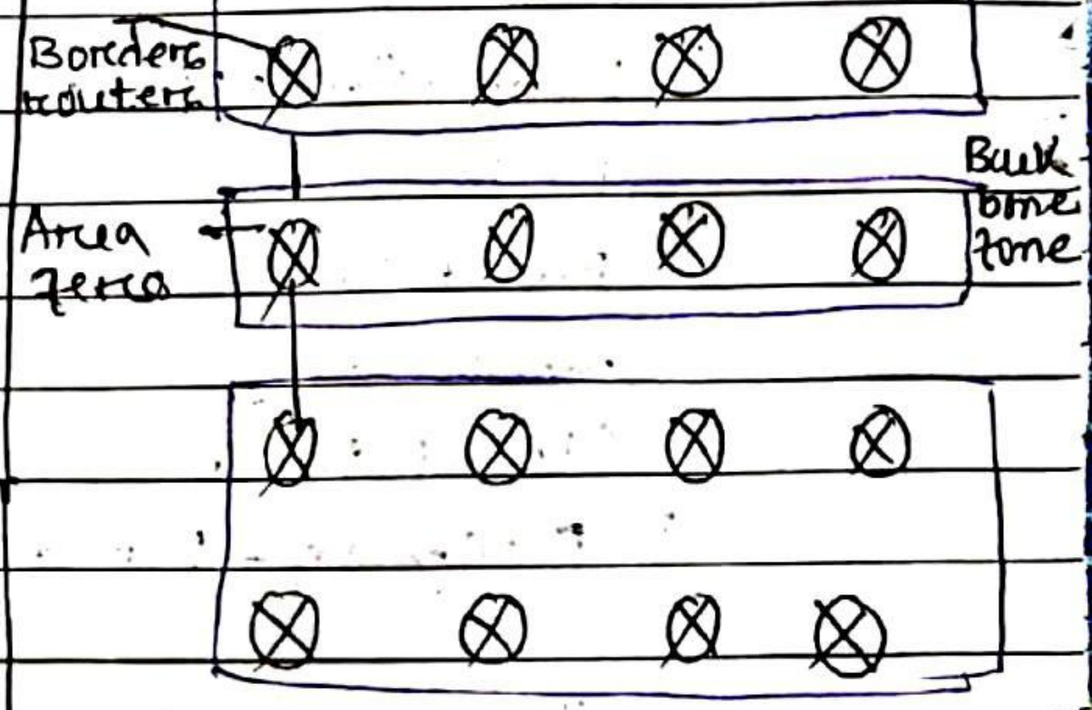
RIP → DVR (computation simple.)

metric — Hop count



∞ — "16"

OSPF → LSR (computation complex.)



EIGRP → combination of OSPF & RIP.