Chapter - 21

Two common methods for calculating the shortest path between the routers are —

1. Distance Vector Routing
2. Link State Routing

Distance Vector Routing — Each router periodically shares its knowledge about the entire network with its neighbours

The three keys to understand about how ~~network~~ this algorithm works —

1. Knowledge about the whole network :- Each router shares its knowledge about the entire network.
2. Routing only to neighbours — Each router periodically sends its knowledge about the network only to those routers to which it has direct links.

3. Information Sharing at regular intervals -

For example, every 30 seconds each router sends its information about the whole network to its neighbours.

Fig. below shows the 1st step in the algorithm. The text boxes indicate the relationships of the routers to their neighbours.

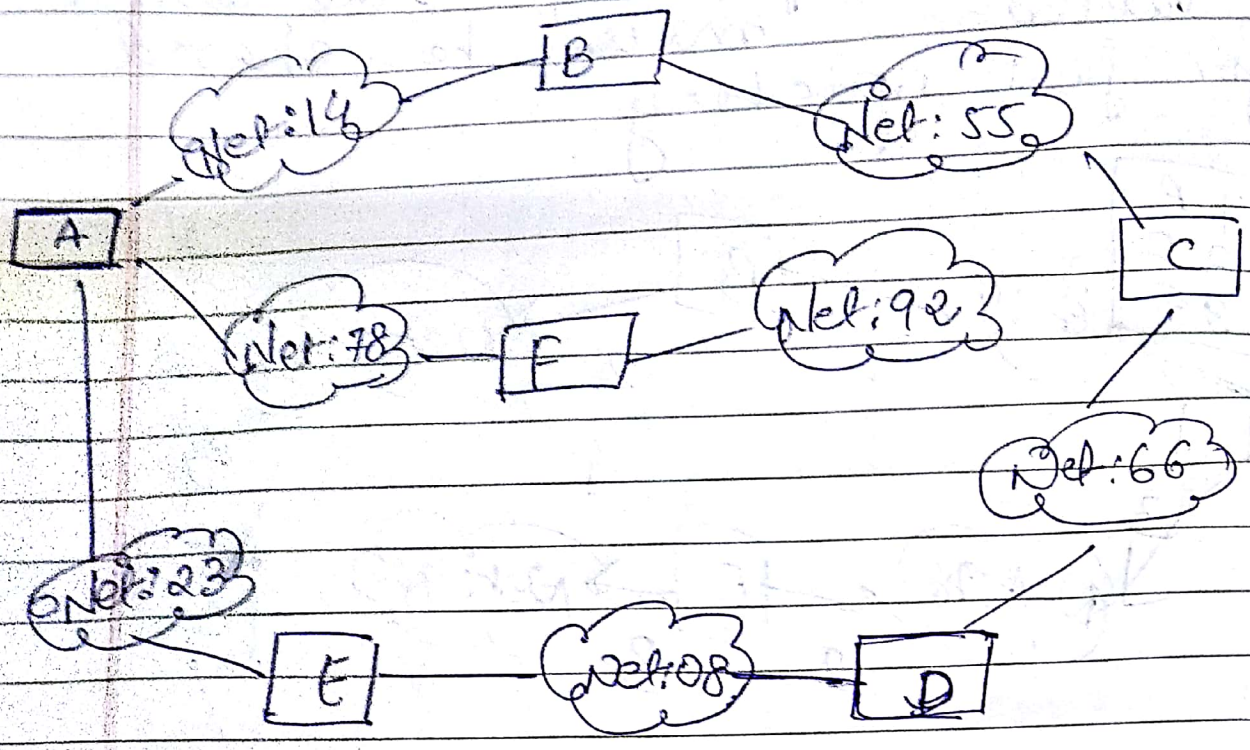
Each router sends its information about the internetwork only to its neighbours (immediate). How do then other routers learn about each other & share knowledge?

A router sends its knowledge to its neighbours. The neighbours add this knowledge to their own knowledge & send the whole table to their own neighbours. In this way, the 1st router gets its own information back plus new information about its neighbour's other neighbours

Each of these neighbours add its knowledge & sends the update table on to its neighbours! (to neighbours of neighbours of neighbours of the original router) & so on ...

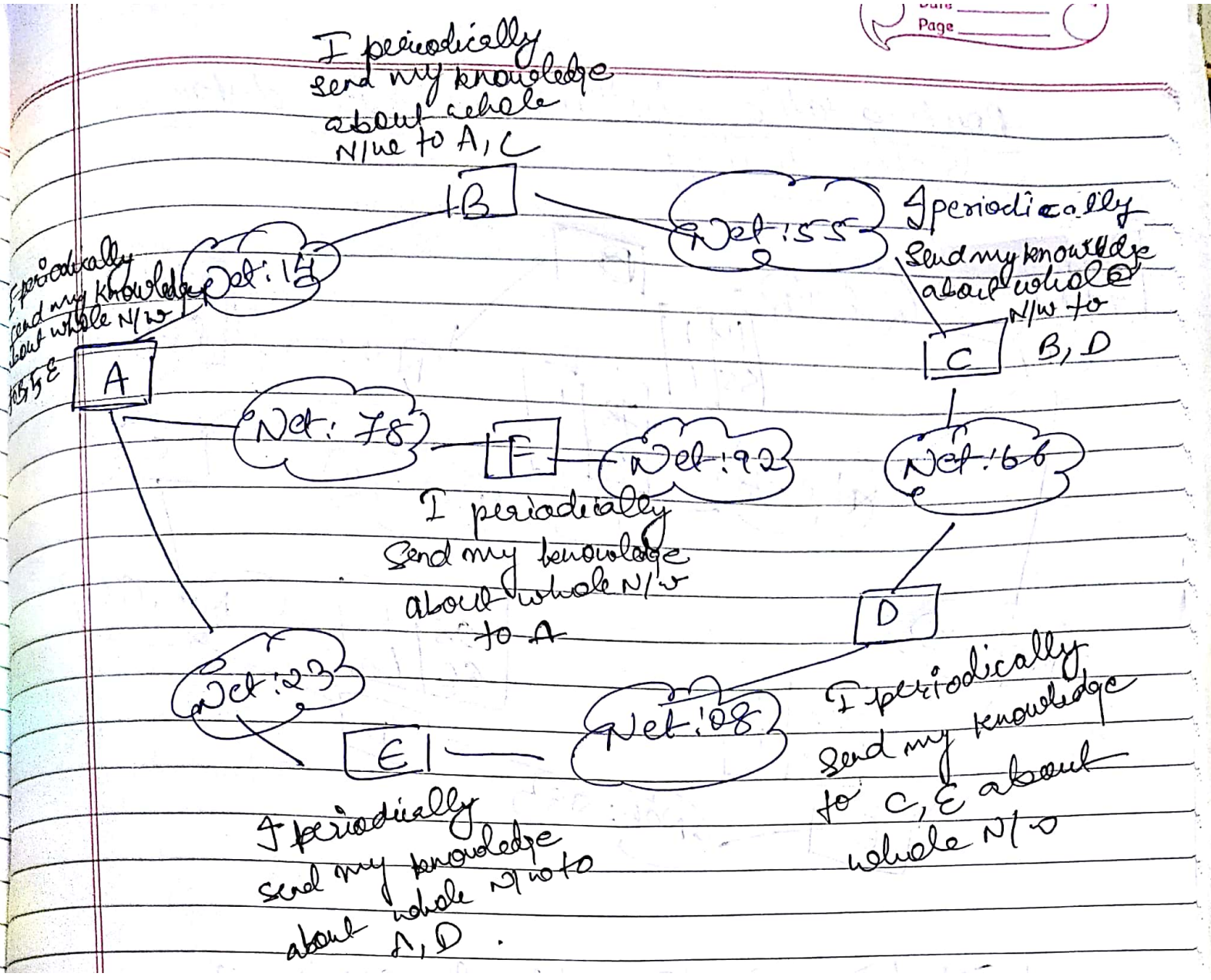
Eventually every router knows about every other router in the internetwork

Fig



In this example, clouds represents Local Area Networks (LANs). The number inside each cloud is that LAN's network ID.

These LANs can be of any type (Ethernet, Token Ring, FDDI, etc). The LANs ~~can be of any~~ are connected by Routers represented by boxes labeled A, B, C, D, E & F.


I periodically send my knowledge about whole N/w to A, C
B
Net: 55
Net: 15
I periodically Send my knowledge about whole N/w to A
A
C
I periodically Send my knowledge about whole N/w to B, D
Net: 78
F
Net: 92
Net: 66
I periodically Send my knowledge about whole N/w to A
D
Net: 23
Net: 08
E
I periodically send my knowledge about whole N/w to A, D.
I periodically Send my knowledge to C, E about whole N/w

Routing table –

N/W ID	Cost	Next hop

Updating the table –

When A receives a routing table from B, it uses the info to update its own table. It says to itself "B has sent me a table that shows how its packets can get to networks 55 & 14.

~~I know that my packets~~

I know that B is my neighbor, so my packet I can reach B in one hop.

So if I add one hop to all the costs shown in B's table, the sum will be my cost for reaching those other networks.

Updating Routing table for router A

A's old table

14	1	—
23	1	—
78	1	—

14	1
55	1

+ one hop

Received from B.

=

14	2	B
55	2	B

After adjustment

→

14	1	—
14	2	B
23	1	—
55	2	B
78	1	—

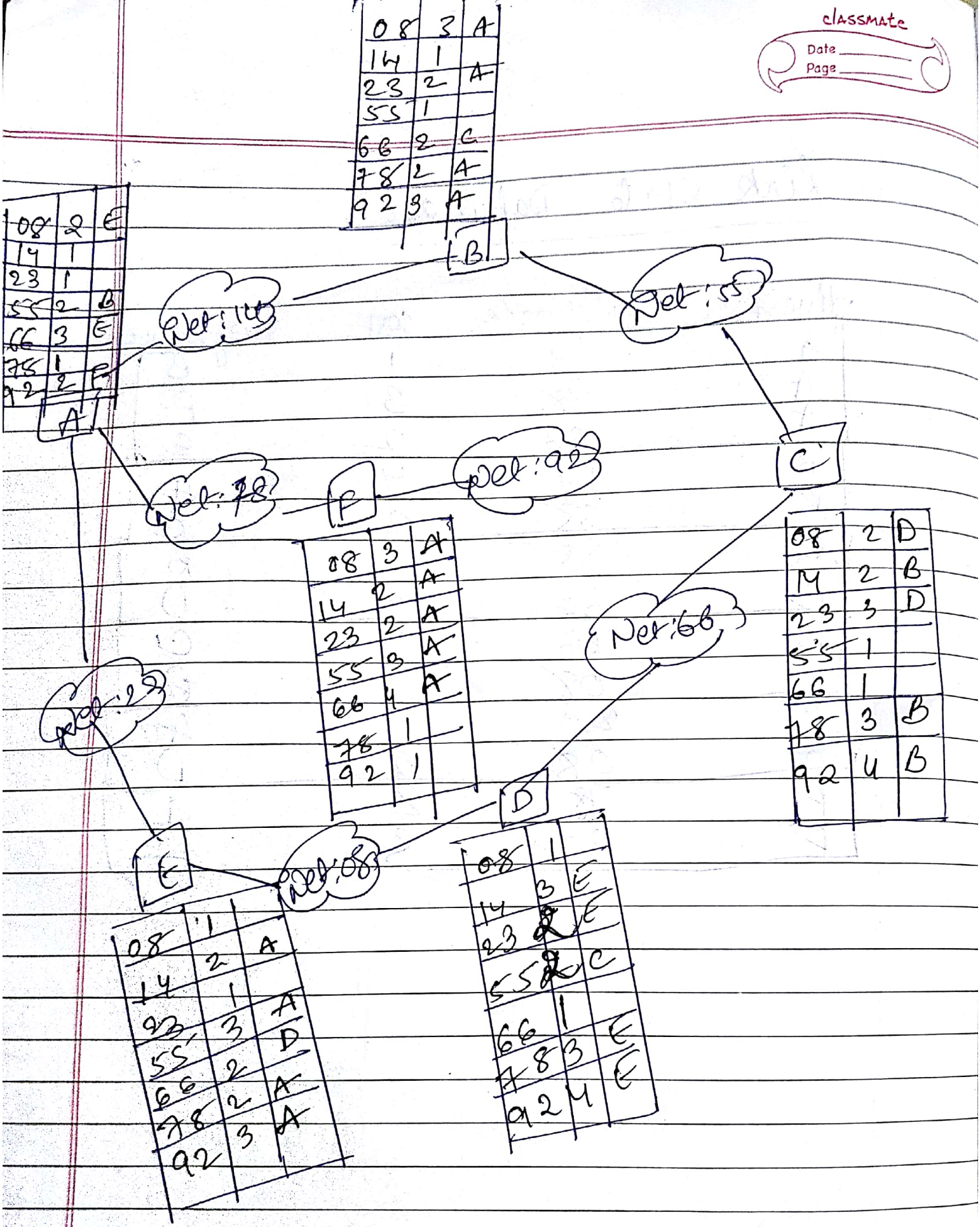
Combined

→

14	1	—
23	1	—
55	2	B
78	1	—

A's new table

This combined table may contain duplicate data for some n/w destinations. Router A : finds & purges any duplications & keeps advertised network shows the lowest cost.



FINAL ROUTING TABLES

Link State Routing :- The following are true of link state routing -

1. Knowledge about the neighbourhood

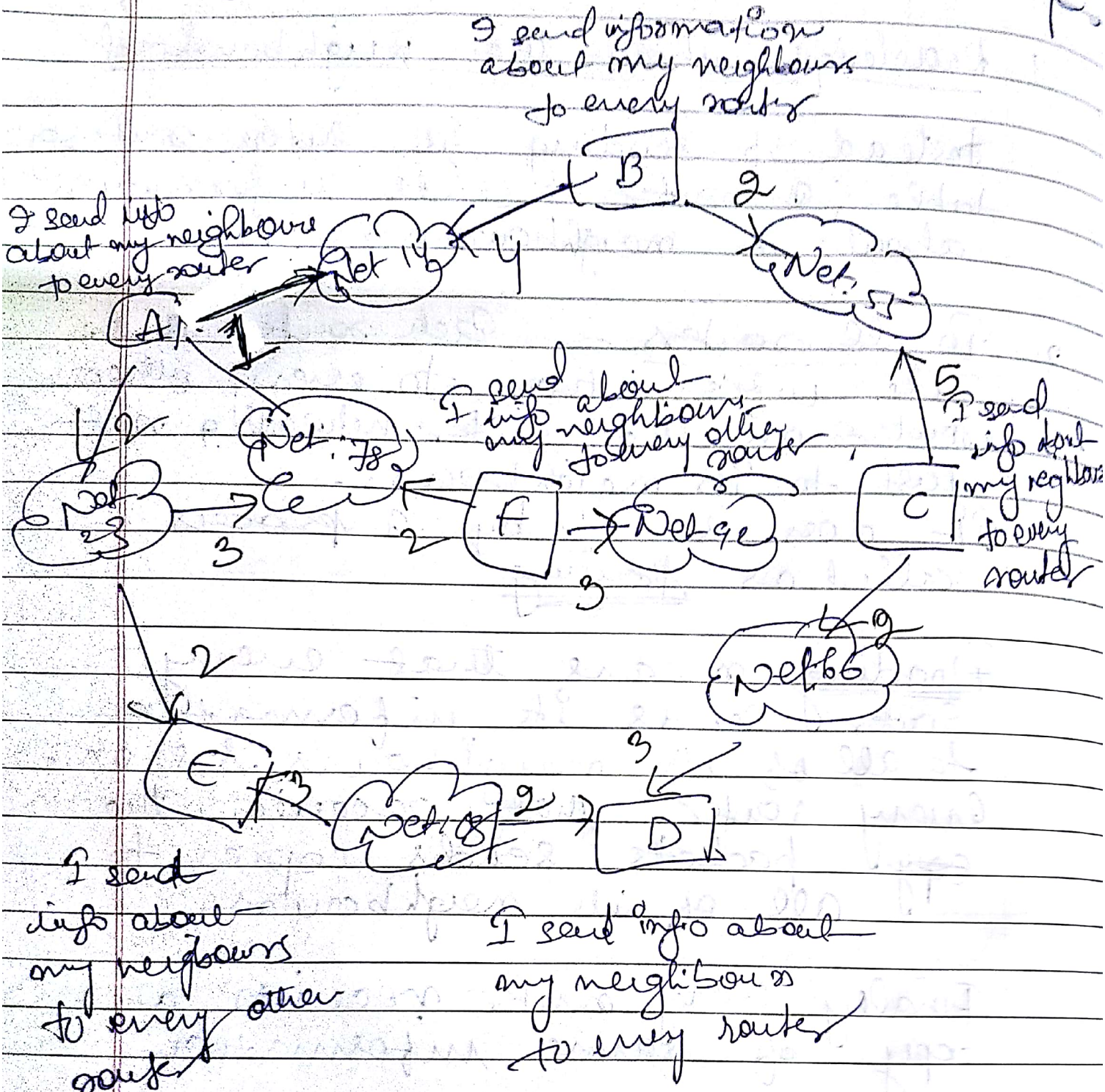
Instead of sending its entire routing table, a router sends information about its neighbourhood only.

2. To all routers - Each router sends its information to every other router on the internetwork, not just to its neighbours. It does so by a process called as flooding

Flooding means that every router sends its information to all of its neighbours. & so on. Every router that receives the ~~copy~~ packets sends copies to all of its neighbours.

Finally every router receives a copy of same information

2. Information Sharing when there is a change - Each router sends out information about the neighbours when there is a change.



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The first step in the link state routing is information sharing as shown in fig. each G. router sends its knowledge about its neighbourhood to every other router

Packet Cost — On LSR, cost is a weighted value based on the variety of factors such as security, traffic, etc. — .

The cost of link from router A to network 14 might be different from cost from A to 23.

Link State Packet —

Advertiser	Network	cost	Neighbours

Getting information about neighbour

A router gets its information about its neighbours by periodically sending them a short greeting packet.

If the neighbour responds to the greeting packet, it is assumed to be alive & functioning.

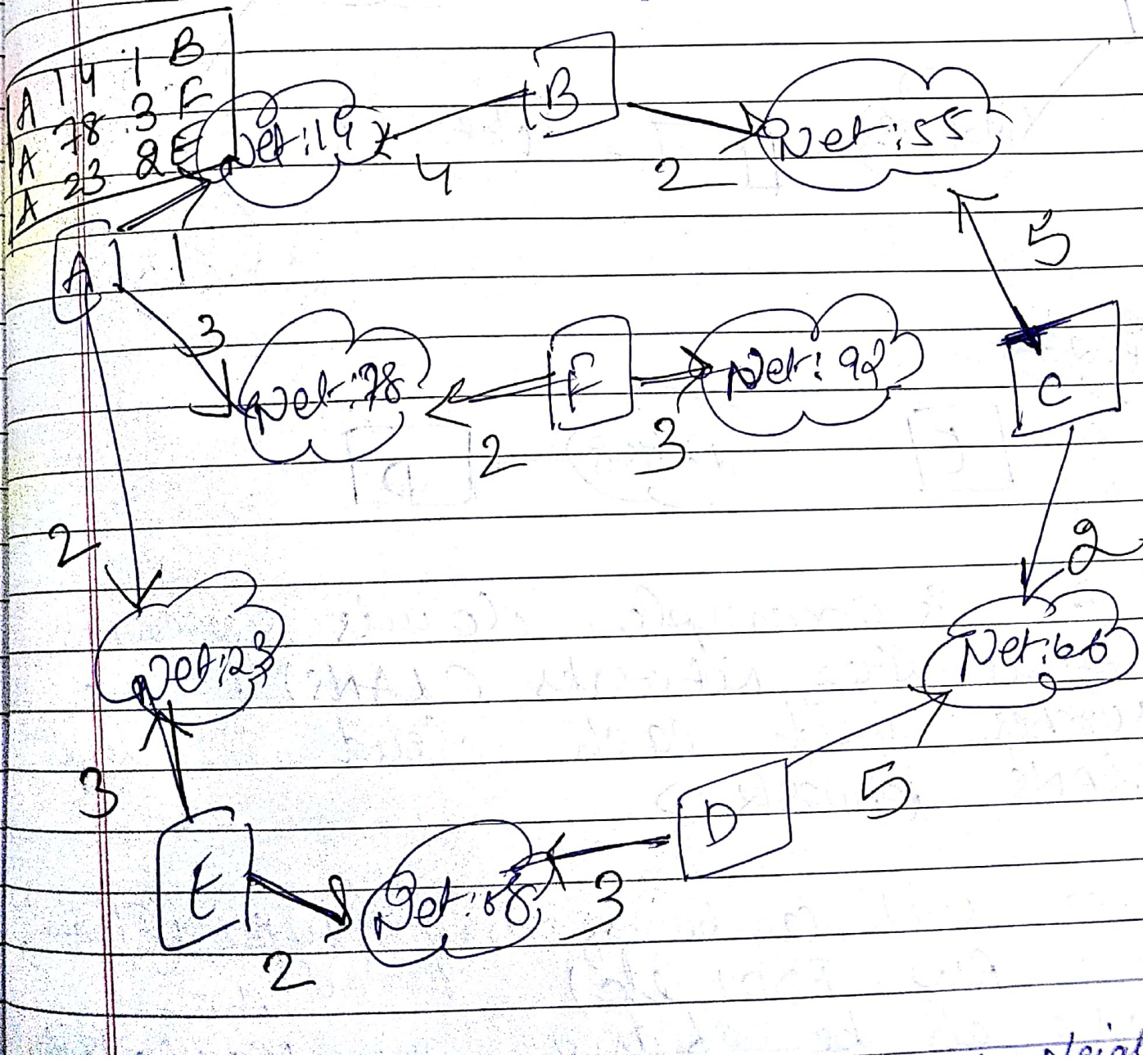
If it does not, a change is assumed to have occured & the sending router then alerts the rest of the network in the next LSP.

Link State Database - Every

Router receives every LSP & puts the information into LSD.

Because every router receives the same LSPs, every router builds the same database. It stores this database on its disk and uses it to calculate its routing table

If the router is added or deleted from the system the whole database must be shared for fast updating.



Link State Database

Advertiser	Network	Cost	Neighbour
A	14	1	B
A	28	3	F
A	23	2	E
B	14	4	A
B	55	2	C
C	55	5	B
C	66	2	D
D	66	5	C
D	08	3	E
E	23	3	A
E	08	2	D
F	78	2	A
F	92	3	—