Routing Protocols (N/w. Layer Continued)

These protocols are used by routers to communicate with each other.

Types of Routing Protocols:-

(1) Intra Domain Routing Protocols:
When 2 routers of same network communicate with each other, it is called as intra domain routing.

(a) Distance Vector Routing (DVR)
It works on principle of Bellman Ford Algorithm, it defines a protocol RIP (Routing Informatn Protocol)

(b) Link State Routing (LSR)
It works on principle of Djikstra's Algorithm and defines a protocol OSPF (Open Shortest Path First)

(2) Inter Domain Routing Protocols:
When 2 routers of different network communicate with each other it is called inter domain routing.

(a) Path Vector Routing (PVR)
It works similar to DVR and defines BGP (Border Gateway Protocol).

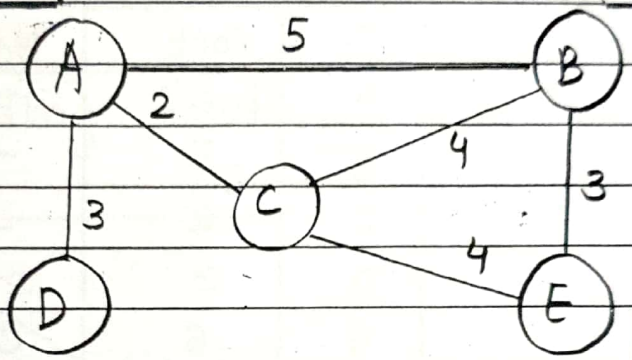
DISTANCE VECTOR ROUTING (BELLMAN FORD):
The Bellman Ford Algorithm works in following 3 steps:

(i) Initialisation:
Every Router will create a Routing Table

that will have entry to those routers to which it is directly connected, for the rest the cost will be set to ∞. Eg:- A to E

To	Cost	Next
A	0	-
B	5	-
C	2	-
D	3	-
E	∞	

To	Cost	Next
A	5	-
B	0	-
C	4	-
D	∞	
E	3	-



To	Cost	Next
A	3	-
B	∞	
C	∞	
D	0	-
E	∞	

To	Cost	Next
A	2	-
B	4	-
C	0	-
D	∞	
E	4	-

To	Cost	Next
A	∞	
B	3	-
C	4	-
D	∞	
E	0	-

(2) Sharing: Every Router will share its routing table with neighbours.

(3) Updating: Based on neighbouring routing table every router will update the routing table on its own.

For eg: A updating routing table with it's routing table.

To	Cost
A	2
B	4
C	0
D	∞
E	4

→

To	Cost	Next
A	2 +2 = 4	C
B	4 +2 = 6	C
C	0 +2 = 2	C
D	∞ +2 = ∞	
E	4 +2 = 6	C

COMPARE

To	Cost	Next
A	0	-
B	5	-
C	2	-
D	3	-
E	∞	

To	Cost	Next
A	0	-
B	5	-
C	2	-
D	3	-
E	6	C

Keep the entry with minimum cost in new table, if entry is same while comparison, keep the entry from old table

Link State Routing (LSR) :-

It works on Dijkstra's Algorithm and uses two data structures:

(1) Permanent list.

(2) Temporary list

Step 1: Set root node of the router whose routing table is to be created.

Step 2: Move the route node to tentative list with cost

Step 3 : If tentative list
(a) Go to step 7 else
(b) Go to step 4

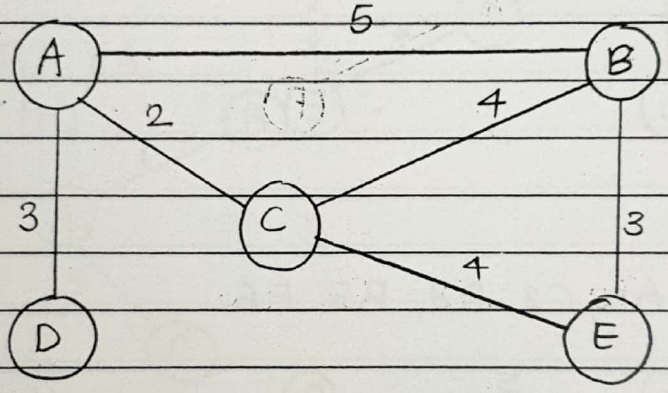
Step 4 : Find the entry in a tentative list with minimum cost and move it to PL.

Step 5 : The node last moved to permanent list find its unprocessed neighbour and move it to TL, if already present then consider entry with least cost.

Step 6 : Go to step 3

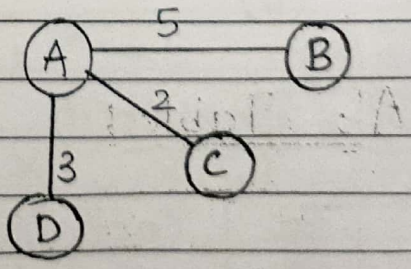
Step 7 : Stop

For eg: finding Routing Table for A

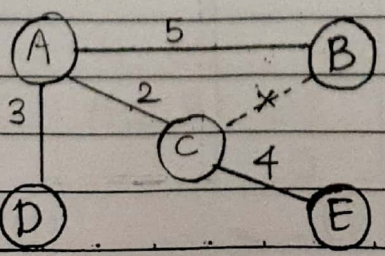


Step 1: TL : A0
PL :

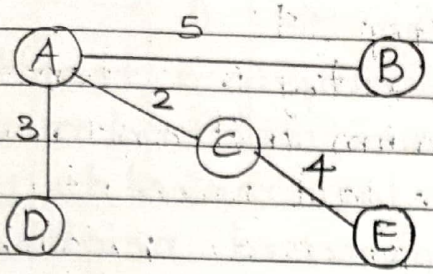
Step 2: TL : C2, D3, B5
PL : A0



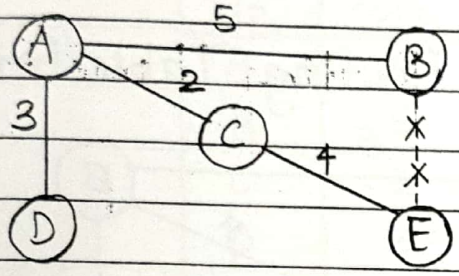
Step 3: TL : D3, B5, E6
PL : A0, C2



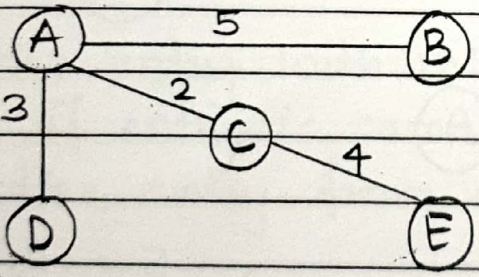
Step 4: TL: B5, E6
PL: ~~A0~~, C2, D3



Step 6: TL: E6
PL: ~~A0~~, C2, D3, B5



Step 6: TL:
PL: ~~A0~~, C2, D3, B5, E6



Ans: Table:

To	Cost	Next
A	0	
B	5	
C	2	
D	3	
E	6	C

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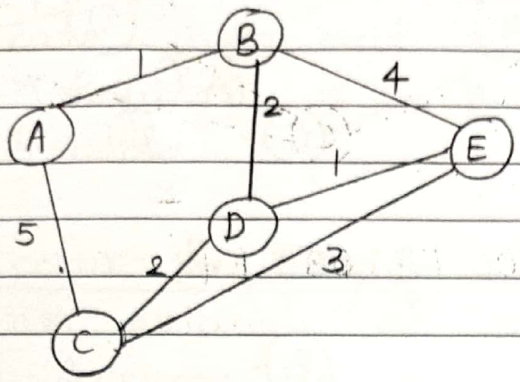
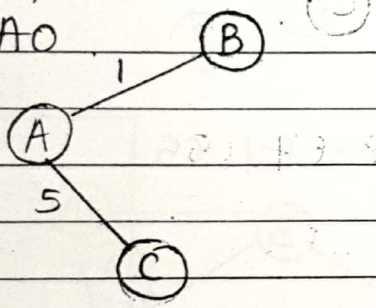
Find the shortest path from A to E using Djikstra's Algorithm Assuming A as Root

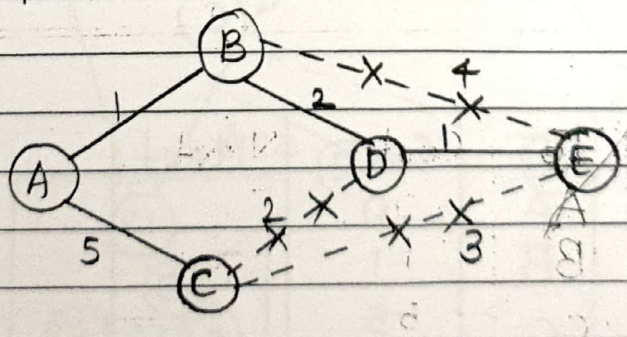


Step 1: TL: A0
PL: B1,

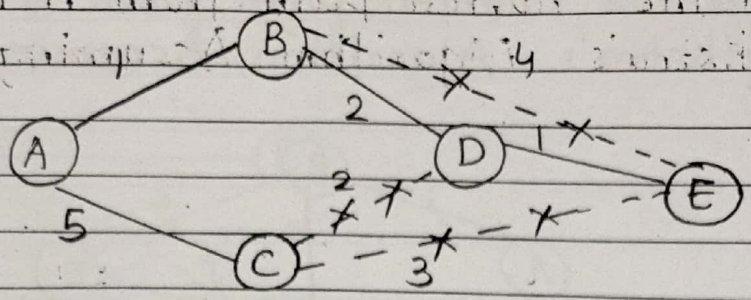
Step 2: TL: B1, C5
PL: A0



Step 3: TL: C5, D3, E4
PL: A0, B1

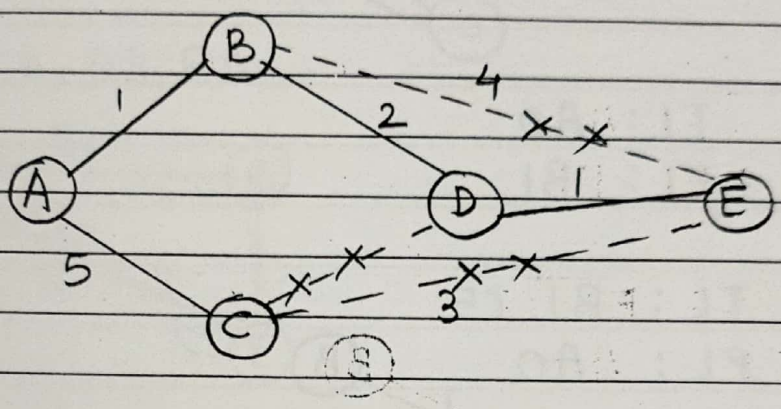


Step 4: TL: E4, C5
PL: A0, B1, D3



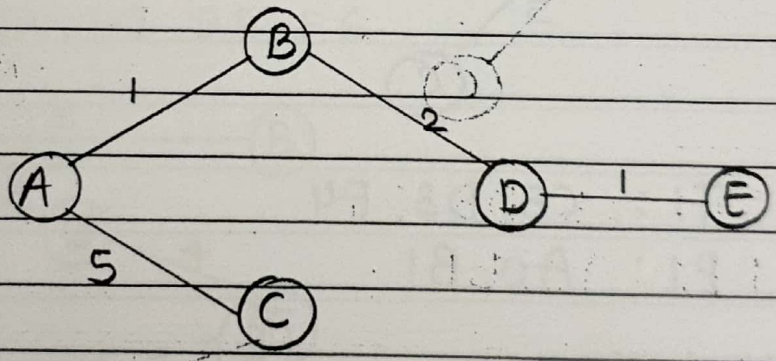
Step 5: TL: C5

PL: A0, B1, D3, E4



Step 6: TL:

PL: A0, B1, D3, E4, C5



To	Cost	Next
A	0	
B	1	
C	5	
D	3	B
E	4	D

Shortest Path from A to E is A-B-D-E

Cost = 4

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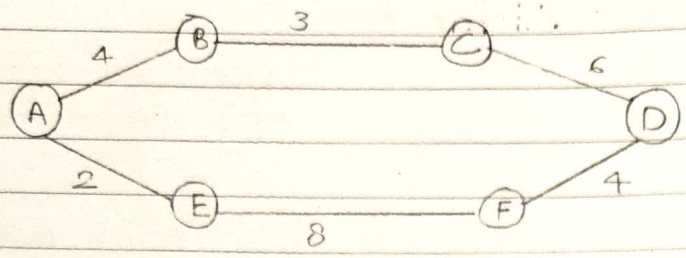
Find the shortest path between A and D



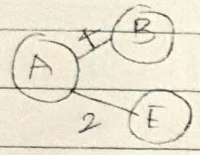
Routing table for A –

I.] (A)

TL: A0

PL:

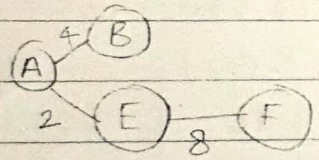
II.]



TL: B4, E2

PL: A0

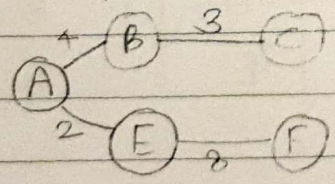
III.]



TL: B4, F10

PL: A0, E2

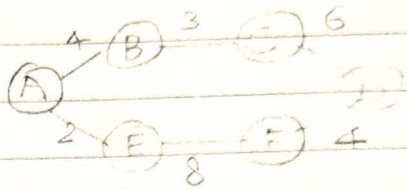
IV.]



TL: F10, C7

PL: A0, E2, B4

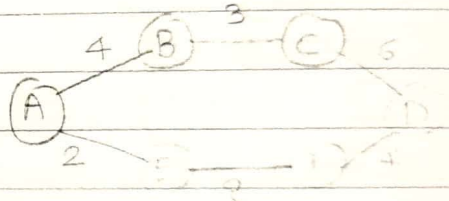
V.]



TL: F10, D13

PL: A0, E2, B4, C7

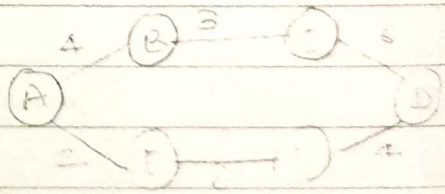
VI.]



TL: D13

PL: A0, E2, B4, C7, F10

VII.]



TL:

PL: A0, E2, B4, C7, F10, D13

To	cost	Next
A	0	–
B	4	–
C	7	B
D	13	B
E	2	–
F	10	E

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Inter Domain Routing Protocol

When 2 routers of different n/w when communicate with each other (Border Gateway Router), it is known as inter domain routing.

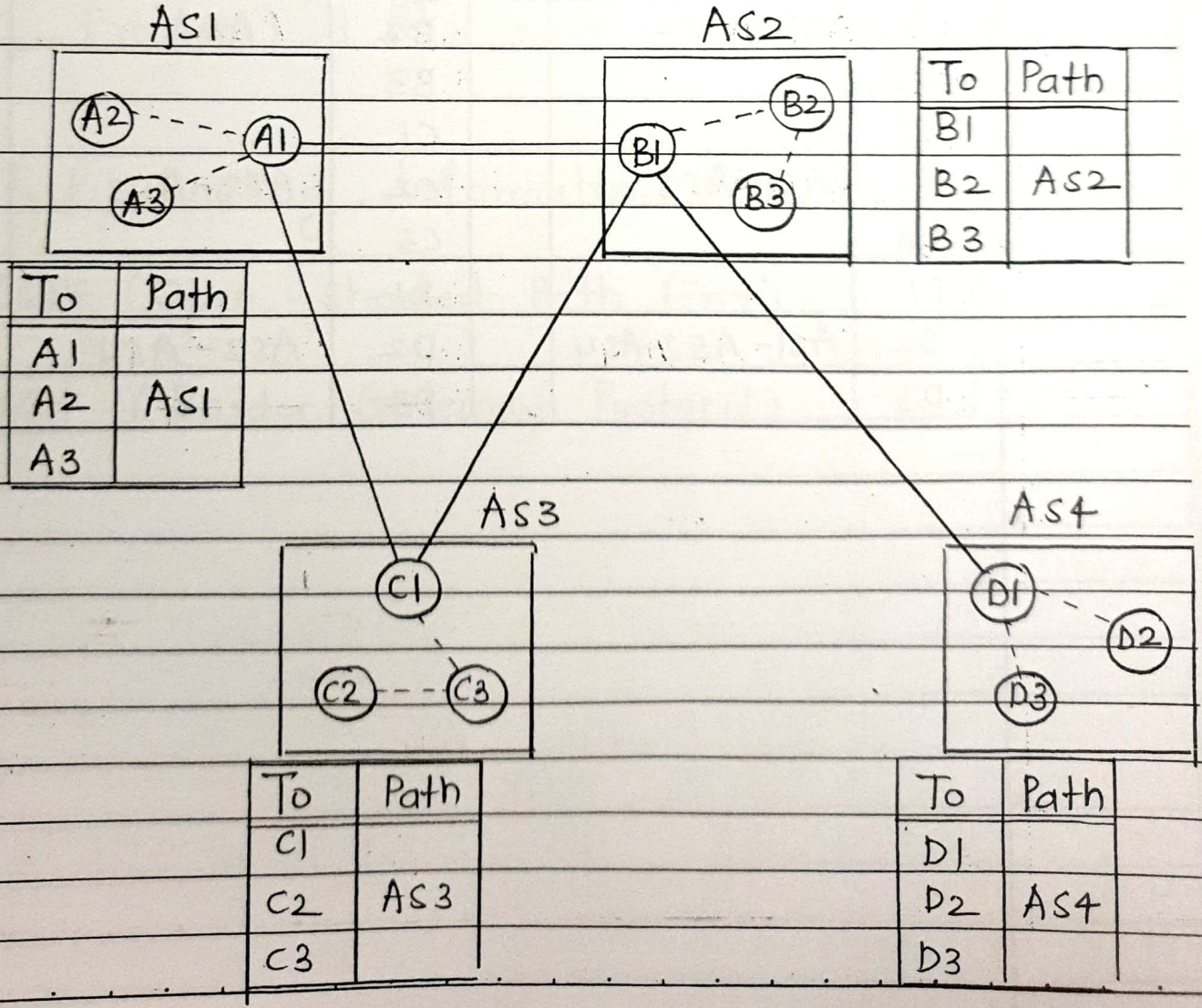
Path Vector Routing (PVR)

Works on principle of DVR

For eg:- Assume a n/w with 4 autonomus system.

Step 1: Initialisation

Every speaking node (BGR) will now create Routing Table only for its own AS.



To	Path
A1	
A2	AS1
A3	

To	Path
B1	
B2	AS2
B3	

To	Path
C1	
C2	AS3
C3	

To	Path
D1	
D2	AS4
D3	

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Step 2: Sharing
Every speaking node will share its routing table with neighbouring speaking node periodically.

Step 3:- Now every speaking node after sharing will update its routing table in such a way that it will have entry for all the routers.

To	Path
A1	
A2	AS1
A3	
B1	
B2	AS1-AS2
B3	
C1	
C2	AS1-AS3
C3	
D1	
D2	AS1-AS2-AS4
D3	

To	Path
AS1	
A2	AS2-AS1
A3	
B1	
B2	AS2
B3	
C1	
C2	AS2-AS3
C3	
D1	
D2	AS2-AS4
D3	

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To	Path
A1	
A2	AS3 - AS1
A3	
B1	
B2	AS3 - AS2
B3	
C1	
C2	AS3
C3	
D1	
D2	AS3 - AS2 - AS4
D3	

To	Path
A1	
A2	AS4 - AS2 - AS1
A3	
B1	
B2	AS4 - AS2
B3	
C1	
C2	AS4 - AS2 - AS3
C3	
D1	
D2	AS4
D3	