Cairo University
Faculty of Engineering
Computer Department

Computer Networks
CMPN415-CMP405b
Fall 2022

Sheet 7-solution

1. Consider the subnet of Fig.3 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 measured delays 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 expected delay.

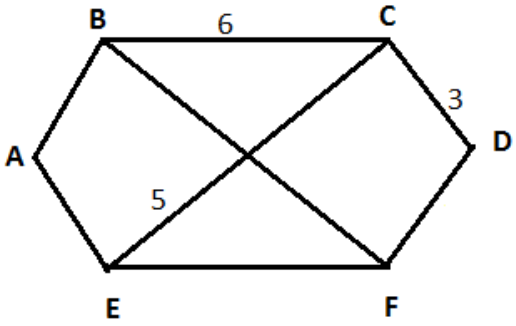


Figure 3

Solution:

	From B (+6)	From D (+3)	From E(+5)	C-delay	C-outgoing
A	5	16	7	11	B
B	0	12	6	6	B
C	8	6	3	0	-
D	12	0	9	3	D
E	6	9	0	5	E
F	2	10	4	8	B

2. In the network in Fig.4 , where distance-vector routing update is used, each link has a cost of 1, and each router initially has entries in its forwarding table only for its immediate neighbors (so A's table contains ⟨A,−,0⟩,⟨B,B,1⟩, ⟨D,D,1⟩ and B's table contains ⟨A,A,1⟩,⟨B,−,0⟩ ⟨C,C,1⟩).

   a. Suppose each router creates a report from its initial configuration and sends it to each of its neighbors. What will each router's forwarding table be after one (step) set of exchanges? The exchanges, are all conducted simultaneously; each router first sends out its own report and then processes the reports arriving from its two neighbors.

   b. What destinations, with corresponding cost values, will be added to each router's table after the simultaneous-and-parallel exchange process of part (a) is repeated the second time?

Figure 4

Solution

The initial tables

	A-delay	A-out	B-delay	B-out	C-delay	C-out	D-delay	D-out	E-delay	E-out	F-delay	F-out
A	0	-	1	A	∞	-	1	A	∞	-	∞	-
B	1	B	0	-	1	B	∞	-	∞	-	∞	-
C	∞	-	1	C	0	-	∞	-	∞	-	1	C
D	1	D	∞	-	∞	-	0	-	1	D	∞	-
E	∞	-	∞	-	∞	-	1	E	0	-	1	E
F	∞	-	∞	-	1	F	∞	-	1	F	0	-

After one step of exchange

	A-delay	A-out	B-delay	B-out	C-delay	C-out	D-delay	D-out	E-delay	E-out	F-delay	F-out
A	0	-	1	A	2	B	1	A	2	D	∞	-
B	1	B	0	-	1	B	2	A	∞	-	2	C
C	2	B	1	C	0	-	∞	-	2	F	1	C
D	1	D	2	A	∞	-	0	-	1	D	2	E
E	2	D	∞	-	2	F	1	E	0	-	1	E
F	∞	-	2	C	0	F	2	E	1	F	0	-

After two steps of exchange

	A-delay	A-out	B-delay	B-out	C-delay	C-out	D-delay	D-out	E-delay	E-out	F-delay	F-out
A	0	-	1	A	2	B	1	A	2	D	3	C
B	1	B	0	-	1	B	2	A	3	D	2	C
C	2	B	1	C	0	-	3	A	2	F	1	C
D	1	D	2	A	3	B	0	-	1	D	2	E
E	2	D	3	A	2	F	1	E	0	-	1	E
F	3	B	2	C	0	F	2	E	1	F	0	-

3. Suppose a network applying the link state protocol LSP and the routers' packets before the discovering step are shown in Fig.7.
    a. Construct the network.
    b. Suppose that a host connected to router A wants to send some packet to another host connected to router C, show the steps of choosing the best route from A to C to transmit packets.

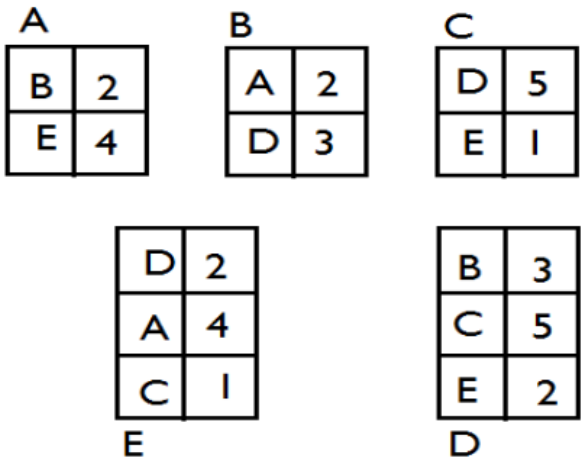
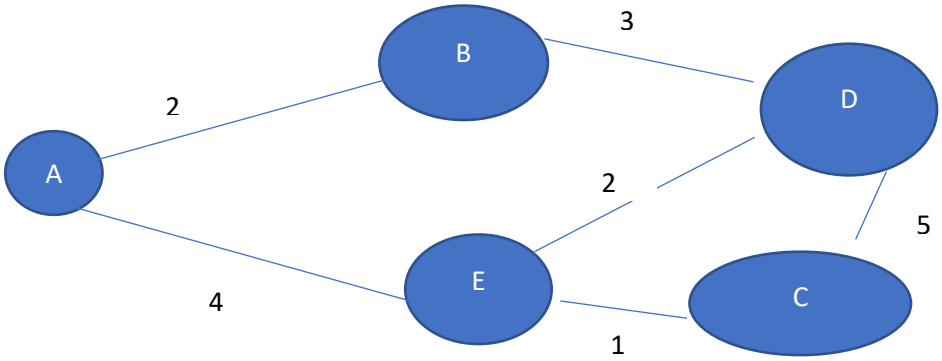


Figure 7



The steps:

1- Flood LSP hello messages all over the network

2- Each node builds the shortest bath to each other destination

3- Nodes forward the message through the shortest path route

4. Suppose for the same network in Fig.2, and applying the LSP. tell how many hops worth of bandwidth it consumes during the initial network discovery phase assume that all routers do this at the same time.

Number of hops for each router= 11 hop exactly as no waste of bandwidth using the modified LSP flooding.

For the total discovery phase I.e. for all the routers = 8 *11 =88.

5. Consider the subnet of Fig.8 and that the Link state routing protocol is used. Suppose that Router C has a previous list of the most recent LSP's showed in the table.

Source Router ID of LSP	Age	Seq
A	50	21
B	45	19
D	52	15
E	52	25
F	23	13

Suppose the following link state packets have just come in to router C and all of them are not processed yet. Mark each accepted message of them and show which packet will be propagated from C to its neighbors. Show the updated LSP database of router C after processing all the pending LSPs (i.e. after one step in time).

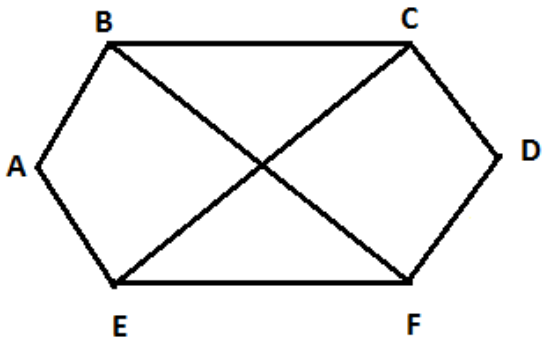


Figure 8

Source Router ID of LSP	The direct sending router	Age	Seq	Action: accept/reject	ACK to:	Forward to:
B	E	30	18	REJECT(Old Info)	E	----
B	B	59	23	ACCEPT	B	E,D
A	E	59	22	ACCEPT	E	D (not B as per the next line contains the same info from B)
A	B	59	22	REJECT(Repeated info)	B	----
E	E	60	0	REJECT(Old Info)	E	-----
D	D	60	16	ACCEPT	D	E,B

The updated database

Source Router ID of LSP	Age	Seq
A	58	22
B	58	23
D	59	16
E	51	25
F	22	13