CHAPTER 3

2. The following table is cumulative; at each part the VCI tables consist of the entries at that part and also all previous entries. Note that at stage (d) we assume that VCI 0 on port 0 of switch 4 cannot be reused (it was used for a connection to H in part (a)). This would correspond to the case where VCIs are bidirectional, as they commonly are.

Exercise Part	Switch	Input		Output	
		Port	VCI	Port	VCI
(a)	1	0	0	1	0
	2	3	0	1	0
	4	3	0	0	0
(b)	2	0	0	1	1
	3	3	0	0	0
	4	3	1	1	0
(c)	1	1	1	2	0
	2	1	2	3	1
	4	2	0	3	2
(d)	1	1	2	3	0
	2	1	3	3	2
	4	0	1	3	3
(e)	2	0	1	2	0
	3	2	0	0	1
(f)	2	1	4	0	2
	3	0	2	1	0
	4	0	2	3	4

14. The following list shows the mapping between LANs and their designated bridges.
B1 dead
B2 A,B,D

B3 E,F,G,H
B4 I
B5 idle
B6 J
B7 C

16. All bridges see the packet from D to C. Only B3, B2, and B4 see the packet from C to D. Only B1, B2, and B3 see the packet from A to C.

B1	A-interface : A	B2-interface : D (not C)	
B2	B1-interface : A	B3-interface : C	B4-interface : D
B3	C-interface : C	B2-interface : A,D	
B4	D-interface : D	B2-interface : C (not A)	

27. Since the I/O bus speed is less than the memory bandwidth, it is the bottleneck. Effective bandwidth that the I/O bus can provide is 1000/2 Mbps because each packet crosses the I/O bus twice. Therefore, the number of interfaces is $(500/100) = 5$.

37. By definition, path MTU is 576 bytes. Maximum IP payload size is $576 - 20 = 556$ bytes. We need to transfer $1024 + 20 = 1044$ bytes in the IP payload. This would be fragmented into 2 fragments, the first of size 552 bytes (because the fragment needs to be a multiple of 8 bytes, so it can't be exactly 556) and the second of size $1044 - 552 = 492$ bytes. There are 2 packets in total if we use path MTU. In the previous setting we needed 3 packets.

47. (a)

Information Stored at Node	Distance to Reach Node					
	A	B	C	D	E	F
A	0	2	∞	5	∞	∞
B	2	0	2	∞	1	∞
C	∞	2	0	2	∞	3
D	5	∞	2	0	∞	∞
E	∞	1	∞	∞	0	3
F	∞	∞	3	∞	3	0

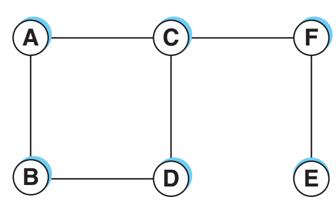
(b)

Information Stored at Node	Distance to Reach Node					
	A	B	C	D	E	F
A	0	2	4	5	3	∞
B	2	0	2	4	1	4
C	4	2	0	2	3	3
D	5	4	2	0	∞	5
E	3	1	3	∞	0	3
F	∞	4	3	5	3	0

(c)

Information Stored at Node	Distance to Reach Node					
	A	B	C	D	E	F
A	0	2	4	5	3	6
B	2	0	2	4	1	4
C	4	2	0	2	3	3
D	5	4	2	0	5	5
E	3	1	3	5	0	3
F	6	4	3	5	3	0

53. The following is an example network topology.



56. Apply each subnet mask and, if the corresponding subnet number matches the SubnetNumber column, then use the entry in Next-Hop.
   (a) Applying the subnet mask 255.255.254.0, we get 128.96.170.0. Use interface 0 as the next hop.
   (b) Applying subnet mask 255.255.254.0, we get 128.96.166.0. (Next hop is Router 2.) Applying subnet mask 255.255.252.0, we get 128.96.164.0. (Next hop is Router 3.) However, 255.255.254.0 is a longer prefix, so use Router 2 as the next hop.

(c) None of the subnet number entries match, so use default Router R4.
(d) Applying subnet mask 255.255.254.0, we get 128.96.168.0. Use interface 1 as the next hop.
(e) Applying subnet mask 255.255.252.0, we get 128.96.164.0. Use Router 3 as the next hop.

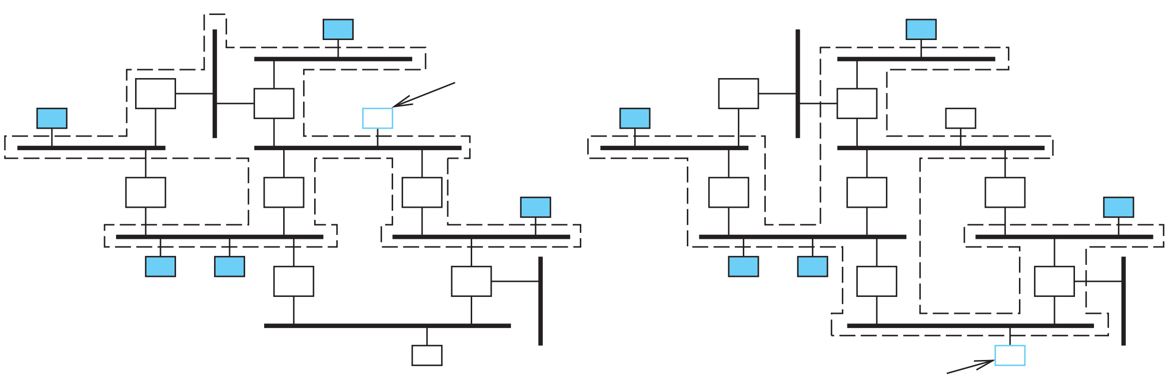
63.

Step	Confirmed	Tentative
1	(A,0,-)	
2	(A,0,-)	(B,1,B) (D,5,D)
3	(A,0,-) (B,1,B)	(D,4,B) (C,7,B)
4	(A,0,-) (B,1,B) (D,4,B)	(C,5,B) (E,7,B)
5	(A,0,-) (B,1,B) (D,4,B) (C,5,B)	(E,6,B)
6	(A,0,-) (B,1,B) (D,4,B) (C,5,B) (E,6,B)	

73. **(a)** F **(b)** B **(c)** E **(d)** A **(e)** D **(f)** C

CHAPTER 4

15. The following figures illustrate the multicast trees for sources D and E.



CHAPTER 5

10. The advertised window should be large enough to keep the pipe full; delay (RTT) $\times$ bandwidth here is 140 ms $\times$ 1 Gbps = 10 Mb = 17.5 MB of data. This requires 25 bits ($2^{25} = 33,554,432$) for the