Solutions to HW #3

Chapter 5 (6th edition), # 18, 19, 22, 23, 24, 25, 26

Chapter 6 (6th edition) #5

Problem 18

At $t = 0$ A transmits. At $t = 576$, A would finish transmitting. In the worst case, B begins transmitting at time t=324, which is the time right before the first bit of A's frame arrives at B. At time t=324+325=649 B's first bit arrives at A. Because 649> 576, A finishes transmitting before it detects that B has transmitted. So A incorrectly thinks that its frame was successfully transmitted without a collision.

Problem 19

Time, *t*	Event
0	A and B begin transmission
245	A and B detect collision
293	A and B finish transmitting jam signal
293+245 = 538	B's last bit arrives at A; A detects an idle channel
538+96=634	A starts transmitting
293+512 = 805	B returns to Step2
	B must sense idle channel for 96 bit times before it transmits A's transmission reaches B
634+245=879	

(538+512+96)

Because A's retransmission reaches B before B's scheduled retransmission time (~~805+96~~), B refrains from transmitting while A retransmits. Thus A and B do not collide. Thus the factor 512 appearing in the exponential backoff algorithm is sufficiently large.

Problem 22

i) from A to switch: Source MAC address: 00-00-00-00-00-00

Destination MAC address: 55-55-55-55-55-55

Source IP: 111.111.111.001

Destination IP: 133.333.333.003

ii) from switch to right router: Source MAC address: 00-00-00-00-00-00 **A's Mac Address**

Destination MAC address: 55-55-55-55-55-55

Source IP: 111.111.111.001 **A's IP Address**

Destination IP: 133.333.333.003

iii) from right router to F: Source MAC address: 88-88-88-88-88-88

Destination MAC address: 99-99-99-99-99-99

Source IP: 111.111.111.001 **A's IP Address**

Destination IP: 133.333.333.003

Problem 23

If all the 11=9+2 nodes send out data at the maximum possible rate of 100 Mbps, a total aggregate throughput of 11*100 = 1100 Mbps is possible.

Problem 24

Each departmental hub is a single collision domain that can have a maximum throughput of 100 Mbps. The links connecting the web server and the mail server has a maximum throughput of 100 Mbps. Hence, if the three collision domains and the web server and mail server send out data at their maximum possible rates of 100 Mbps each, a maximum total aggregate throughput of 500 Mbps can be achieved among the 11 end systems.

Problem 25

All of the 11 end systems will lie in the same collision domain. In this case, the maximum total aggregate throughput of 100 Mbps is possible among the 11 end sytems.

Problem 26

Action	**Switch Table State**	**Link(s) packet is forwarded to**	**Explanation**
B sends a frame to E	Switch learns interface corresponding to MAC address of B	A, C, D, E, and F	Since switch table is empty, so switch does not know the interface corresponding to MAC address of E
E replies with a frame to B	Switch learns interface corresponding to MAC address of E	B	Since switch already knows interface corresponding to MAC address of B
A sends a frame to B	Switch learns the interface corresponding to MAC address of A	B	Since switch already knows the interface corresponding to MAC address of B
B replies with a frame to A	Switch table state remains the same as before	A	Since switch already knows the interface corresponding to MAC address of A

Problem 5

a) The two APs will typically have different SSIDs and MAC addresses. A wireless station arriving to the café will associate with one of the SSIDs (that is, one of the APs). After association, there is a virtual link between the new station and the AP. Label the APs AP1 and AP2. Suppose the new station associates with AP1. When the new station sends a frame, it will be addressed to AP1. Although AP2 will also receive the frame, it will not process the

frame because the frame is not addressed to it. Thus, the two ISPs can work in parallel over the same channel. However, the two ISPs will be sharing the same wireless bandwidth. If wireless stations in different ISPs transmit at the same time, there will be a collision. For 802.11b, the maximum aggregate transmission rate for the two ISPs is 11 Mbps.

b) Now if two wireless stations in different ISPs (and hence different channels) transmit at the same time, there will not be a collision. Thus, the maximum aggregate transmission rate for the two ISPs is 22 Mbps for 802.11b.