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CS 132 Homework 5

1. Random Access Protocols

   A. Analysis of Slotted Aloha: Problem 11

      i. $[1 - (p(1-p)^3)]^4 \cdot p(1-p)^3$

      ii. $p(1-p)^3 \cdot 4$

      iii. $[1 - 4p(1-p)^3]^2 \cdot 4p(1-p)^3$

      iv. $4p(1-p)^3$

   B. Comparing Protocols

      i. No these transmissions could not have been generated by Pure Aloha because the data would transmit as soon as it arrives.

      ii. Yes these transmission could have been generated by Slotted Aloha because M1 and M2 arrive and transmit in the same time slot and cause a collision. M3 then sends successfully. M1 has a better probability than M2 so it attempts to retransmit first and does so successfully. Then right after M2 and M4 collide with each other. Since m4 had a better probability it will successfully transmit. Then finally M2 will transmit and all four have been delivered.

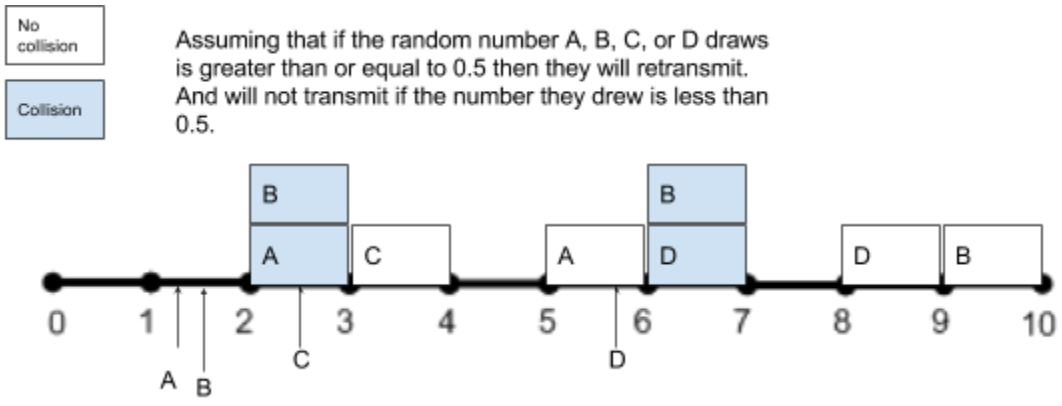
iii. No these transmissions could not have been generated by CSMA because as soon as M_1 arrives it would detect a clear line and start transmitting.

iv. No these transmissions could not have been generated by CSMA/CD for the same reason as it could not have been generated by CSMA, M_1 would send the data when it arrives because the line was free.

v. No these transmissions could not have been generated by an algorithm with exp. back off because M_1 and M_2 are colliding and would have to start transmitting data at either time = 12 or time = 16.

C. Slotted Aloha in Action

i.

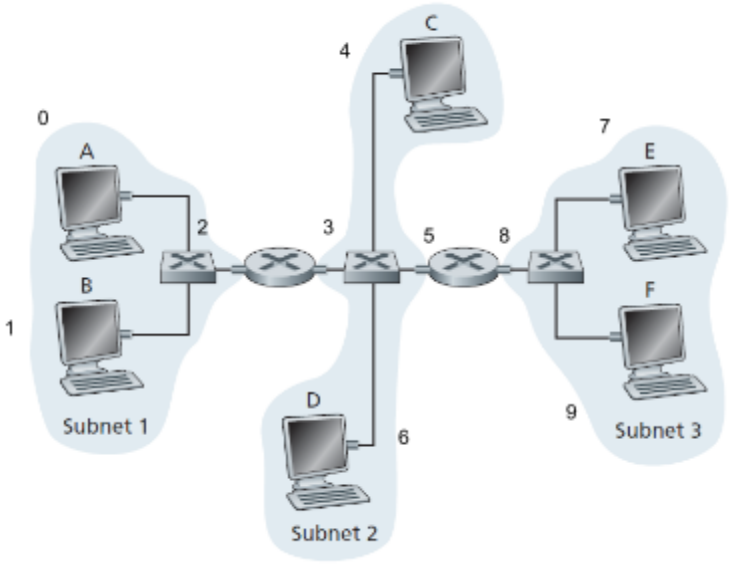


ii.

1. In order to maximize efficiency I would retransmit if the probability was less than or equal to 0.37 and wouldn't if it was greater than 0.37.
2. In order to maximize fairness I would keep the probability at greater than or equal to 0.5 would retransmit and would not transmit if less than 0.5.

2. LANs: Addresses and Switches

A. MAC and IP addresses: Problem 21



i. Source MAC: 00-00-00-00-00-00

Destination MAC: 00-00-00-00-00-02

Source IP: 1.1.1.0

Destination IP: 1.1.1.9

ii. Source MAC: 00-00-00-00-00-03

Destination MAC: 00-00-00-00-00-05

Source IP: 1.1.1.0

Destination IP: 1.1.1.9

iii. Source MAC: 00-00-00-00-00-08

Destination MAC: 00-00-00-00-00-09

Source IP: 1.1.1.0

Destination IP: 1.1.1.9

B. Learning Switches: Problem 26

i. B sends a frame to E

1. Switch table adds the MAC address of B
2. Link(s) on which the transmitted frame will be forwarded: A,C,D,E,F
3. Switch table is empty and does not know the MAC address of E so it sends packets to every link.

ii. E replies with a frame to B

1. Switch table adds the MAC address of E
2. Link(s) on which the transmitted frame will be forwarded: B
3. Switch table already knows MAC address of B so it just updates the MAC address of E.

iii. A sends a frame to B

1. Switch table adds the MAC address of A
2. Link(s) on which the transmitted frame will be forwarded: B

3. Switch table already knows the MAC address of B so it just updates the MAC address of A.

iv. B replies with a frame to A

1. Switch table doesn’t change from before
2. Link(s) on which the transmitted frame will be forwarded: A
3. Switch table already knows the MAC addresses for A and B so it doesn’t need to update.