

King Fahd University of Petroleum and Minerals  
 College of Computer Sciences and Engineering  
 Department of Computer Engineering

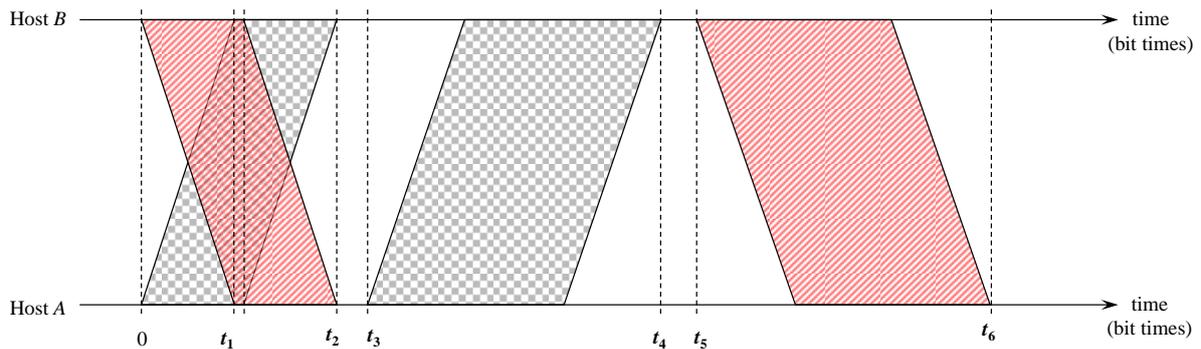
COE 344 – Computer Networks (T131)

Homework # 05 (due date & time: Sunday 15/12/2013 during class period)

**Late homework submission will NOT be accepted**

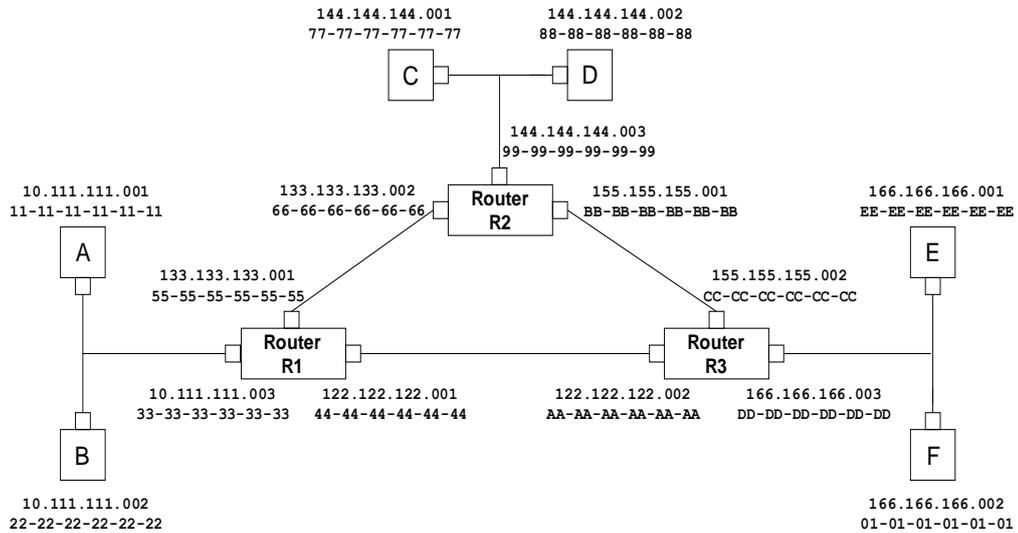
\*\*\* Show all your work. No credit will be given if work is not shown! \*\*\*

**Problem # 1 (55 points):** Consider the following exchange of Ethernet frames between nodes *A* and *B* over the same Ethernet segment. Assume the propagation delay between the two nodes is 240 bit times, and that both *A*'s frame and *B*'s frame have a size equal to 576 bits.



1. **(5 points)** Based on the exchange displayed above, and assuming that the collision between the frames sent by *A* and *B* occurs for the first time, find the exponential backoff values selected by *A* and *B* (i.e.,  $K_A$  and  $K_B$ ). Justify your answer.
2. For each of the following, calculate the exact time (in bit times) when:
  - a) **(5 points)** *A* senses a collision (i.e.,  $t_1$ ).
  - b) **(10 points)** The last bit of *B*'s jam signal reaches *A* (i.e.,  $t_2$ ).
  - c) **(5 points)** *A* starts retransmission of the frame (i.e.,  $t_3$ ).
  - d) **(10 points)** The last bit of *A*'s retransmitted frame reaches *B* (i.e.,  $t_4$ ).
  - e) **(10 points)** *B* finishes the exponential backoff period.
  - f) **(5 points)** *B* starts retransmission of the frame (i.e.,  $t_5$ ).
  - g) **(5 points)** The last bit of *B*'s retransmitted frame reaches *A* (i.e.,  $t_6$ ).

**Problem # 2 (45 points):** Consider the following network where host *A* wants to send a TCP segment to host *C*. The TCP segment sent by host *A* will pass through R1, then R3, then R2 before reaching host *C*. Assume that all ARP tables are complete except for router R2 (i.e., router R2 ARP table is *empty*). Complete the following table pertaining to the TCP segment sent from *A* to *C*. Note that the possible frame types are ARP Query, ARP Response, and data. Note also that the source and destination IP addresses refer to the IP addresses contained in the payload of each frame. (*Hint: There are a total of 6 frames that will be generated*)



Frame	Frame type	Source MAC	Destination MAC	Source IP	Destination IP
①					
②					
③					
④					
⑤					
⑥					