

National University of Singapore  
School of Computing

CS2105

**Tutorial 8**

Semester 2 AY18/19

1. **[KR, Chapter 5, R6]** In CSMA/CD, after the fifth collision, what is the probability that a node chooses  $K = 4$ ? The result  $K = 4$  corresponds to a delay of how many microseconds on a 10 Mbps Ethernet?
  
2. **[Modified from KR, Chapter 5, P26]** Let's consider the operation of a learning switch in the context of a network in which 4 nodes, labeled  $A$  through  $D$ , are star connected into an Ethernet switch (refer to the diagram on Lecture 9 notes page 32).

Suppose that the following events happened in sequence,

- i.  $B$  sends a frame to  $D$
- ii.  $D$  replies with a frame to  $B$
- iii.  $D$  sends a frame to  $A$

The switch table is initially empty. Show the state of the switch table after each of the above events (ignore TTL field). For each event, identify the link(s) on which the transmitted frame will be forwarded, and briefly justify your answers.

Event	Switch table after event	Link(s) a frame is forwarded to
$B$ sends a frame to $D$		
$D$ replies with a frame to $B$		
$D$ sends a frame to $A$		

3. Refer to the diagram on Lecture 9 notes page 11. Suppose nodes  $A$ ,  $B$  and  $R$  are star connected into a switch  $S$ .  $A$ ,  $B$  and  $R$  are aware of the IP addresses of each other.
  - a) Consider sending an IP datagram from Host  $A$  to Host  $B$ . Suppose all of the ARP tables and switch table are up to date. Enumerate all the steps the host and switch take to move the packet from  $A$  to  $B$ .

- b) Repeat the problem in a), assuming that ARP table in the sending host is empty, but all other tables are up to date.
- c) Repeat the problem in a), assuming that all tables in all nodes are empty.
- d) Suppose *A* sends an IP datagram to a host in another subnet. All of the ARP tables and switch table are up to date. Enumerate all the steps the host, switch and router take to move the packet to another subnet.

#### 4. Wireshark: Ethernet

Do the following:

1. Make sure your browser's cache is empty. To do this, Clear Recent History.
2. Start up the Wireshark packet sniffer.
3. Enter the following URL into your browser <http://gaia.cs.umass.edu/wireshark-labs/HTTP-ethereal-lab-file3.html>.
4. Stop Wireshark packet capture.

Answer the following questions:

1. Based on the contents of the Ethernet frame containing the HTTP GET message:
  - a. What is the 48-bit Ethernet address of your computer?
  - b. What is the 48-bit destination address in the Ethernet frame? Is this the Ethernet address of gaia.cs.umass.edu? What device has this as its Ethernet address?
2. Based on the contents of the Ethernet frame containing the first byte of the HTTP response message:
  - a. What is the value of the Ethernet source address? Is this the address of your computer, or of gaia.cs.umass.edu. What device has this as its Ethernet address?
  - b. What is the destination address in the Ethernet frame? Is this the Ethernet address of your computer?