King Saud University
College Of Computer & Information Sciences
Department Of Computer Sciences

Tutorial 5 Spring 15

(Computer Networks CSC 329)

Q1.

1. Briefly describe how Ethernet's exponential backoff works. What is one reason why Ethernet's exponential backoff might be better than randomizing retransmission attempts over a fixed-length time interval?
2. What is the main difference between the Aloha protocols and CSMA protocols?
3. What is the main difference between the CSMA and CSMA/CD protocols?
4. Why is there no concept of acknowledgment (ACK) in the CSMA/CD protocol?
5. Explain the difference between CSMA/CD and CSMA/CA.
6. Suppose nodes A, B, and C each attach to the same broadcast LAN (through their adapters). If A sends thousands of IP datagrams to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process these frames? If so, will C's adapter pass the IP datagrams in these frames to the network layer in C?

Briefly describe how Ethernet's exponential backoff works. What is one reason why Ethernet's exponential backoff might be better than randomizing retransmission attempts over a fixed-length time interval?

Answer: Ethernet maintains an interval of time T over which is will randomize when it will attempt a retransmission. After each collision for the same packet, it doubles the length of T up to some fixed max. This is better than just a single, fixed value of T since when there are a lot of collisions the interval over which randomization is done will be large, allowing just one node to successfully being transmitting. When there are only a small number of colliding nodes, the retransmission will be randomized initially over a small T, allowing a node to transmit more quickly.

b. Suppose nodes A, B, and C each attach to the same broadcast LAN (through their adapters).

If A sends thousands of IP datagrams to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process these frames? If so, will C's adapter pass the IP datagrams in these frames to the network layer in C? How would your answer change if A sends frames with the MAC broadcast address?
Answer: C's adapter will process the frames, but the adapter will not pass the datagrams up the protocol stack. If the LAN broadcast address is used, then C's adapter will both process the frames and pass the datagrams up the protocol stack.

c. Suppose there are three routers between source host and destination host. Ignoring fragmentation, an IP datagram sent from the source host to the destination host will travel over how many interfaces? How many forwarding tables will be indexed to move the datagram from the source to the destination? Answer: 8 interfaces; 3 forwarding tables

d. Explain the difference between CSMA/CD and CSMA/CA. Answer: In CD, collisions are detected as they occur. Senders do not signal their intent to transmit but simply start transmitting if they sense no other ongoing transmission. In CA, collisions are avoided because each node signals its intent to transmit before actually doing so.

e. Briefly explain the two methods through which a wireless 802.11 node learns about access points it can communicate with. Answer: i) Passive scanning, beacon frame from AP, association from node, reply from AP. ii) Active scanning, probe request from node, probe responses from APs, association request from node, reply from AP.

f. Mention three different techniques that are used in the switching fabric of a router that manage the actual switching of packets from an input port to an output port. Answer: Switching via memory, bus, or interconnection network

Q2.

A BSS (Basic Service Set) has only two nodes as shown in the figure below: an AP and one laptop with a WiFi interface with a physical-layer transmission rate of 1 Mbps.

Problem 1: Quickies (32 Points (4 each), 25 minutes)

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b. Suppose nodes A, B, and C each attach to the same broadcast LAN (through their adapters). If A sends thousands of IP datagrams to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process these frames? If so, will C's adapter pass the IP datagrams in these frames to the network layer in C? How would your answer change if A sends frames with the MAC broadcast address?
Answer: C's adapter will process the frames, but the adapter will not pass the datagrams up the protocol stack. If the LAN broadcast address is used, then C's adapter will both process the frames and pass the datagrams up the protocol stack.

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Answer: 8 interfaces; 3 forwarding tables

d. Explain the difference between CSMA/**CD** and CSMA/**CA**.
Answer:
In CD, collisions are detected as they occur. Senders do not signal their intent to transmit but simply start transmitting if they sense no other ongoing transmission.
In CA, collisions are avoided because each node signals its intent to transmit before actually doing so.

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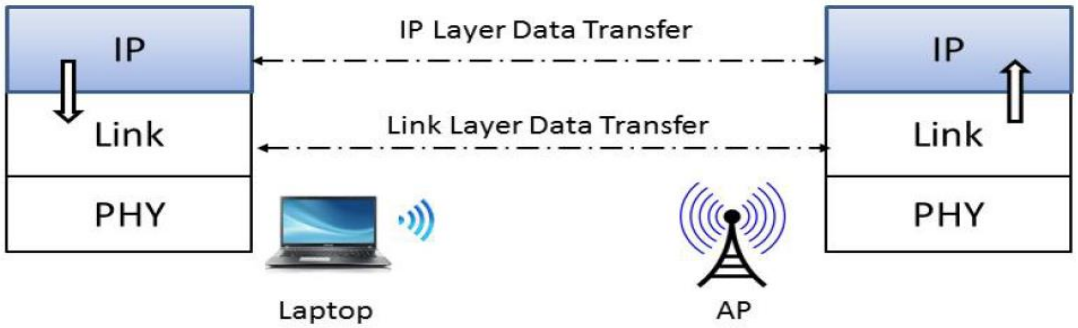
f. Mention three different techniques that are used in the switching fabric of a router that manage the actual switching of packets from an input port to an



Assume that the laptop is transmitting DATA frames containing 118 bytes of IP layer data. The lengths of RTS, CTS, and ACK frames are 20, 14, and 14 bytes, respectively. The total length of all the control information in the header of a DATA frame is 34 bytes. Assume that the lengths of SIFS and DIFS are equal respectively to 20 µs and 40 µs .

1. Explain the concept of hidden station in IEEE 802.11

a. What is a hidden terminal problem? What is the solution to address the problem? Why is the hidden terminal problem so common in wireless network but not in wired network?

In wireless networking, the hidden node problem or hidden terminal problem occurs when a node is visible from a wireless access point (AP), but not from other nodes communicating with said AP. This leads to difficulties in media access control.

In a wireless network, it is likely that the node at the far edge of the access point's range, which is known as A, can see the access point, but it is unlikely that the same node can see a node on the opposite end of the access point's range, B. These nodes are known as hidden. The problem is when nodes A and B start to send packets simultaneously to the access point. Since node A and B can not sense the carrier, Carrier sense multiple access with collision avoidance (CSMA/CA) does not work, and collisions occur, scrambling data. To overcome this problem, handshaking is implemented in conjunction with the CSMA/CA scheme. The same problem exists in a MANET.

2. Explain the role of the Network Allocation Vector.
3. What is the value of the duration field in the CTS frames transmitted by the laptop?