ECEn 426: Link Layer Homework

1. (10 points) Did you do spend at least 30 minutes on the Ethernet and ARP Wireshark lab (http://www-net.cs.umass.edu/wireshark-labs/Wireshark_Ethernet_ARP_v8.0.pdf)?

   ○ Yes

   ○ No

2. (3 points) Read the Wikipedia article on ARP spoofing (https://en.wikipedia.org/wiki/ARP_spoofing) and answer the following questions.

   (a) Describe how an attacker would perform ARP spoofing to perform a person-in-the-middle attack.

   (b) Assuming a device has been on a network for awhile, devise a scheme where that device could detect that ARP spoofing is happening on the network and alert the network administrator.

   (c) If you could make any modifications to the link layer, what would you change or add to protect against ARP spoofing? Would that approach be feasible in real use?

3. (5 points) List **at least 7 protocols** and the **order they would be used** when a user connects a new device to a network and goes to a webpage on their web browser for the first time. You can assume that no caching has previously been performed.

4. (5 points) In this problem, we explore the use of small packets for Voice-over-IP applications.

   (a) Consider sending a digitally encoded voice source directly. Suppose the source is encoded at a constant rate of 128 kbps. Assume each packet is entirely filled before the source sends the packet into the network. The time required to fill a packet is the **packetization delay**. What is the packetization delay in milliseconds, assuming that the packet is **L bytes** long?

   (b) Packetization delays greater than 20 ms can cause a noticeable and unpleasant echo. Determine the packetization delay for **L = 1,500 bytes** (roughly corresponding to a maximum-sized Ethernet packet) and for **L = 50** (corresponding to an ATM packet).
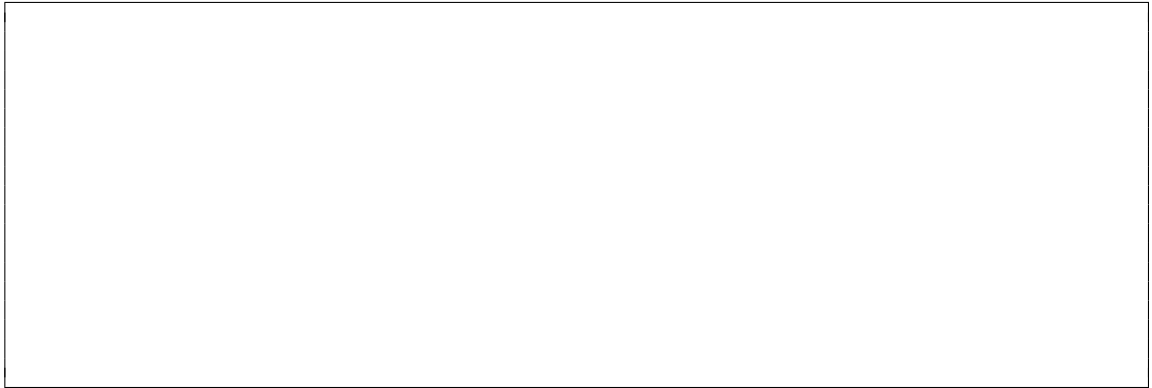
   (c) What is the percent overhead associated with packets **L = 1,500 bytes** long and for **L = 50 bytes** long when the packet header is **20 bytes**? Assume that L includes the header.

   (d) Calculate the transmission delay at a single switch for a link rate of **R = 600 Mbps** for **L = 1,500 bytes**, and for **L = 50 bytes**.
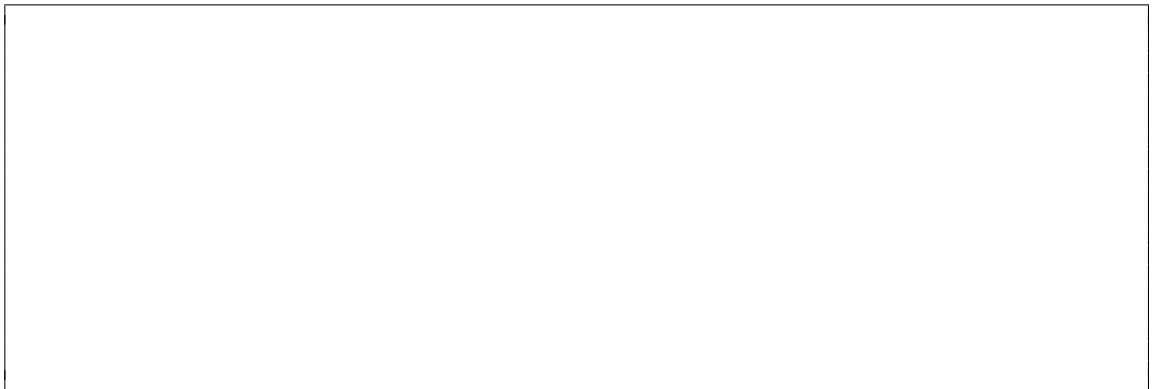
   (e) What are the advantages/disadvantages of using a small packet size?

5. (3 points) What are the advantages and drawbacks of the following multiple access protocols?
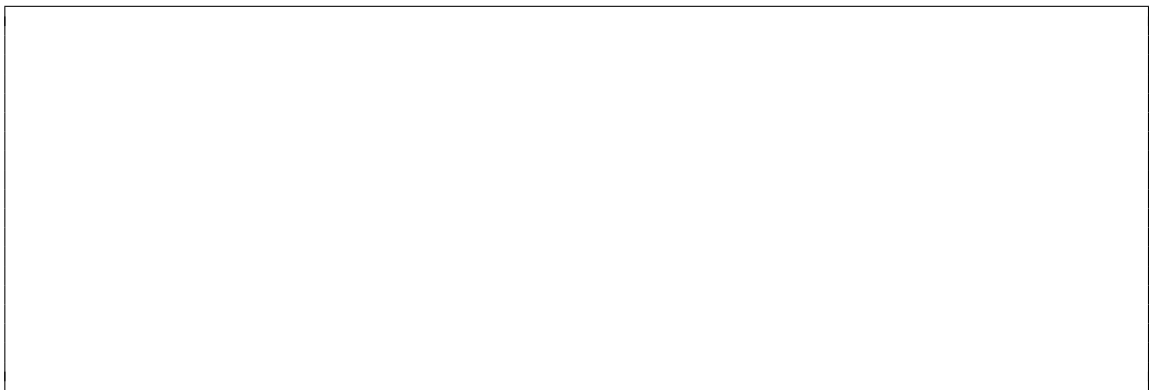
   (a) Channel partitioning

   (b) Random access

   (c) Taking turns