EE3009 Tutorial 7
(Ethernet, CSMA/CD, Wi-Fi, and Hub)

Review Question

- What does it mean for a wireless network to be operating in "infrastructure mode"? If the network is not in infrastructure mode, what mode of operation is it in, and what is the difference between that mode of operation and infrastructure mode?

Problems:

1. Suppose nodes A and B are on the same 10 Mbps Ethernet segment, and the propagation delay between the two nodes is 225 bit times. Suppose node A begins transmitting a frame and before it finishes, node B begins transmitting a frame. Can node A finish transmitting before it detects that node B has transmitted?

2. Recall that with the CSMA/CD protocol, the adapter waits $K \times 512$ bit times after a collision, where K is drawn randomly. For $K = 100$, how long does the adapter wait until returning to Step 2 for a 10 Mbps Ethernet? For a 100 Mbps Ethernet?

3. Suppose an 802.11b station is configured to always reserve the channel with the RTS/CTS sequence. Suppose this station suddenly wants to transmit 1,000 bytes of data, and all other stations are idle at this time. As a function of SIFS and DIFS, and ignoring propagation delay and assuming no bit errors, calculate the time required to transmit the frame and receive the acknowledgement.

Computer Exercise

4. In this exercise, you will observe the effects of collisions in a shared media environment. Open the file "`Collisions_Hub.pka`".
   a) Perform Task 1 according to the instructions. Why does each PC generate an ARP request before sending the ICMP ping request?
   b) Then perform Task 2. (In Step 3, you may skip Scenario 1 if you don't have enough time). Answer the following questions regarding Scenario 2.
      i. What is the destination MAC address of the ARP request frame?
      ii. Why does only PC6 respond to the ARP request sent by PC1?
      iii. Explain why the ping request can be transmitted successfully in Scenario 2 but not in Scenario 0.