HW #4: Networking

Due: Thursday, April 7, 2016
Submit hard copy before class begins

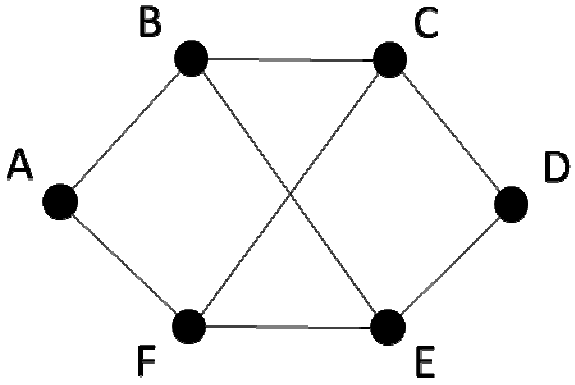
1. **Packet Switching vs. Circuit Switching.** Assume that one network endpoint is sending a stream of packets to a destination endpoint. Consider how those packets are treated differently in a packet switched vs. circuit switched network implementation. List and briefly describe each of the differences that arise in how packets are handled and routed due to the two different implementations.

2. **Framing.** The following character encoding is used in a data link protocol.
   A: 01000111; B: 11100011; FLAG: 01111110; ESC: 11100000
   Show the bit sequence transmitted (in binary) for the four-character frame: A B ESC FLAG when each of the following framing methods are used:

   (a) Character count.
   (b) Flag bytes with byte stuffing
   (c) Starting and ending flag bytes, with bit stuffing.

3. **Error Detection.** A bit stream 10011101 is transmitted using the CRC method. The divisor polynomial (referred to as C(x) in lecture notes) is $x^3 + 1$. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end.

4. **Distance Vector Routing.** Consider the subnet shown below. Distance vector routing is used, and the following vectors have just come in to router C: from **B**: (5, 0, 8, 12, 6, 2); from **D**: (16, 12, 6, 0, 9, 10); and from **E**: (7, 6, 3, 9, 0, 4). The measured delays from C to **B**, **D**, and **E** are 6, 3, and 5, respectively. What will C's new routing table be after this update? Show both the outgoing line to use and the expected delay.



5. **TCP Bandwidth.** A TCP machine is sending full windows of 65,536 bytes over a 1-Gbps channel that has a 10-msec one-way delay. What is the maximum throughput achievable? What is the line efficiency?