Homework 1

Due: November 22, by mail to lboloni@eecs.ucf.edu

Problem 1: Queuing theory (30pt)

Consider a router modeled as an M/M/1 queue. Consider each packet to be 1000 bytes long. The processing rate is 1Gbit / sec, corresponding to 128,000 packets / sec. The packet arrival and the service time are both Markovian.

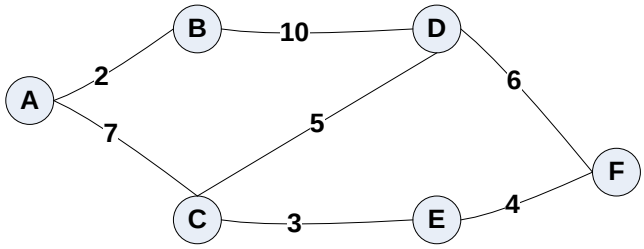
Calculate the

- average delay of the packets
- the average length of the queue
- the packet loss percentage if the buffer is 100 packets long

for the following traffic conditions:

(a) 500 MBit/sec
(b) 700 MBit/sec
(c) 900 MBit/sec
(d) 990MBit/sec

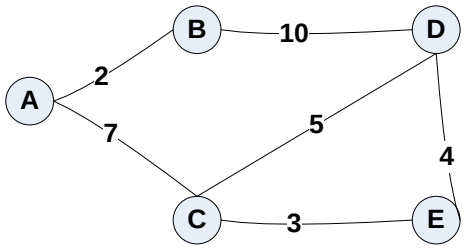
Problem 2: Link state routing (30pts)



The network above uses Link State Routing.

- Trace Dijkstra's shortest path algorithm to find the shortest path from B to all the other nodes. (Explicitly show what happens in each step: just showing the shortest paths earns 0 points!)
- Show B-s routing table.

Problem 3: Distance vector routing (30 pts)



The network above uses Distance Vector Routing.

- Write down the initial routing tables of all the nodes (t=0)
- Write down the routing tables at t=1 of all the nodes after each of them had sent its routing table at time t=0 to its neighbors
- Write down the routing tables of all the nodes after they sent the routing tables at t=1 to their neighbors.

Problem 4: Routing address space (30pts):

- Classless inter-domain routing (CIDR) has eased the problem of running out of IPv4 addresses. Why?
- Network address translation (NAT) has eased the problem of running out of IPv4 addresses. Why?
- IPv6 has a 128 bit address. Try to imagine a scenario in which we would still run out of address space?