SC2008-CE3005-CZ3006 (Computer Network)

Part I: Tutorial – 4

1. What is the principal difference between connectionless communication and connection-oriented communication?

2. Packet switched networks route each packet as a separate unit, independent of all others. Virtual-circuit networks do not have to do this, since each data packet follows a predetermined route. Does this observation mean that virtual-circuit networks do not need the capability to route isolated packets from an arbitrary source to an arbitrary destination? Explain your answer.

3. Consider a packet switched network. Two nodes, node S and node D, are connected through an intermediate node I. A message of size 1000 bytes is transmitted from node S to node D. The message is fragmented into four packets each with a 50-byte header. All links run the same data rate. If propagation delay is negligible, determine the minimum data rate of the links to achieve 100ms of total transmission delay. (Hint: *pipeline effect*)

4. A factor in the delay of a store-and-forward packet switched network is how long it takes to store and forward a packet through a switch. If switching time is 10 μsec, is this likely to be a major factor in the response of a client-server system where the client is in New York and the server is in California? Assume the propagation speed in copper and fiber to be 2/3 the speed of light in vacuum.

5. Compare the delay in sending an x-bit message over a k-hop path in a circuit switched network and in a (lightly loaded) packet switched network. The circuit set up time is s seconds, the propagation delay is d seconds per hop, the packet size is p bits, and the data rate is b bps. Under what conditions does the packet switched network have a lower delay?