

CSE 3213: Computer Networks

Assignment # 1

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Review probability and chapters 1 and 2 before attempting the assignment. For instructions on submission and due date, please refer to the home page of the course.

Problem 1: In telephone networks one basic network is used to provide worldwide communications. In the Internet a multiplicity of networks are interconnected to provide global connectivity. Compare these two approaches, namely a single network versus an internetwork, in terms of the range of services that can be provided and the cost of establishing a worldwide network.

Problem 2: Give two reasons for using layered protocols.

Problem 3: Match the following to one (or more) of the five Internet layers:

- a) Route determination
- b) Flow control
- c) Mechanical and electrical interface
- d) Reliable process-to-process data transportation
- e) Reassembly of data packets
- f) Error correction and retransmission

Problem 4: The Internet is roughly doubling in size every 18 months. Approximate estimates put the number of hosts on it at 7 million in January 1996. Use this data to compute the expected number of Internet users in the year 2008.

Problem 5: Suppose an application layer entity wants to send an L -byte message to its peer process, using an existing TCP connection. The TCP segment consists of the message plus 20 bytes of header. The segment is encapsulated into an IP packet that has an additional 20 bytes of header. The IP packet in turn goes inside an Ethernet frame that has 18 bytes of header and trailer. What percentage of the transmitted bits in the physical layer corresponds to the message information if $L = 100$ bytes? 500 bytes? 1000 bytes?

Problem 6: Suppose client A initiates a Telnet session with server S. At about the same time, client B also initiates a Telnet session with server S. Provide possible but consistent source and destination port numbers for:

- (a) the segments sent from A to S.
- (b) the segments sent from B to S.
- (c) the segments sent from S to A.
- (d) the segments sent from S to B.
- (e) If A and B are different hosts, is it possible that the source port number in the segments from A to S is the same as that from B to S? Why or why not?
- (f) How does your answer to part (e) change if A and B are client programs on the same host?

In answering (a) to (f), you may assume that the range for assigned ports managed by the IANA is 0 – 1023, with Telnet-server application given a port number of 23.

Problem 7: For each of the following services, discuss which of the following type of services:

Reliable vs unreliable

Connectionless vs connection-oriented

would you prefer. To receive full credit, present valid reasoning.

- (a) Internet Radio
- (b) File transfer
- (c) Ping
- (d) Telnet
- (e) Electronic Mail