

Problem Set 1

ELEC 331 Computer Communications

Due Date: Tuesday, January 22, 2019, at 9:30 am

Please submit the hard copy at the beginning of class

Problem 1: Go to IETF's website, www.ietf.org, to see what they are doing. Select a project you are interested in and write a half-page summary on the problem and the proposed solution.

Problem 2: For the following, assume that no data compression is done (although this would in practice almost never be the case). For (a) – (b), calculate the bandwidth or sending rate necessary for transmitting in real-time.

- (a) HDTV high-definition video at a resolution of 1920×1080 , 24 bits/pixel, 30 frames/sec.
- (b) Plain old telephone service (POTS) voice audio of 8-bit samples at 8 kHz.

Problem 3: Calculate the bandwidth \times delay product for the following links. Use one-way delay, measured from the first bit sent to the first bit received.

- (a) A 10 Mbps Ethernet with a delay of 10 μ s.
- (b) A 1.5 Mbps T1 link with a transcontinental one-way delay of 50 ms.
- (c) What is the significance of the bandwidth \times delay product?

Problem 4: Calculate the latency (from the first bit sent to the last bit received) for

- (a) A 1 Gbps Ethernet with a single store-and-forward switch in the path, and a packet size of 5000 bits. Assume that each link introduces a propagation delay of 10 μ s and that the switch begins retransmitting immediately after it has finished received the packet.
- (b) Same as (a) but with three switches.
- (c) Same as (b) but assume the switch implements cut-through switching; it is able to begin retransmitting the packet after the first 128 bits have been received. Is there a significant advantage to use cut-through switching?

Problem 5

Question P6 from our textbook (Kurose and Ross, 7th edition), pp. 71.

Problem 6

Question P18 from our textbook (Kurose and Ross, 7th edition), pp. 73.

Problem 7

Question P31 from our textbook (Kurose and Ross, 7th edition), pp. 76.