

John F. Lake, Jr.
Computer Networks
Homework #1

1.)

- a. Propagation Delay = $4000 \text{ m} / 2.0 \times 10^8 \text{ m/s} = \mathbf{2.0 \times 10^{-5} \text{ seconds}}$
- b. For 100 bytes:
 - i. Transmit = $2.0 \times 10^{-5} \text{ s} = 800 \text{ bit/Bandwidth}$
 - ii. **Bandwidth = 40 Mb/s**
- c. For 512 bytes:
 - i. Transmit = $2.0 \times 10^{-5} \text{ s} = 4096 \text{ bit/Bandwidth}$
 - ii. **Bandwidth = 204.8 Mb/s**

2.)

eth1 is connected to the network.

3.)

- 1.) John Lake (jlake2)
- 2.) Jesse Hamilton (jhamilt5)

4.)

- a.) RTT Time (Round Trip Time)
 - i.) Propagation Time = $385,000,000 \text{ m} / 3.0 \times 10^8 \text{ m/s} = 1.283 \text{ s}$
 - ii.) **RTT = $2 \times 1.283 = 2.57 \text{ s}$. (There and back)**
- b.) **DBP = $2.57 \text{ s} \times 1 \text{e}9 \text{ Gb/s} = 2.57 \text{e}9 \text{ bits} = 2.57 \text{ Gb} = 321.3 \text{ MB}$**
- c.) DBP is the number of bits "in transit" at any given time between one node and another node.
- d.)
 - i.) $25 \text{ MB} = 25 \times 10^6 \text{ bits}$.
 - ii.) $\text{RTT} = 2.57$
 - iii.) Transmit time = $25 \times 10^6 / 1 \text{ Gb/s} = 2.5 \times 10^{-2} \text{ s}$.
 - iv.) **Total latency = 2.595 s. (Assumes request packet is small.)**

5.)

a.) Peak bandwidth is important. Latency isn't as important as other applications. Loss tolerance is critical, as files need to be intact when they are being uploaded and downloaded. Jitter also isn't as much of a concern here.

b.) Here, jitter is important so that all of the information is printed at once. Bandwidth is quite important so that the data can all get to the printer within a reasonable amount of time. Loss tolerance is important so that the entirety of files are printed. Peak bandwidth is important so that it can service multiple users, but on average the bandwidth won't need to be that large.

c.) Peak and average bandwidth is very important here because many people will use the application. Depending on the media, jitter control is critical, so that movies/audio are intact. Loss tolerance is also important, but latency isn't as important.

d.) Here, average bandwidth isn't as important because there won't be as many users. Jitter also isn't a concern, as the data doesn't need to be collected or streamed in real time. Loss tolerance is important, however, so that the weather readings are accurate.

e.) Jitter is very important because you don't want the voice to be broken up into fragments. Loss tolerance can be more lenient, as you can still understand a voice even if some data is missing. Bandwidth is more important than latency here, as this is a larger application needing more data transfer.

f.) Jitter and Bandwidth are the most important here for the same reasons as voice. You need real time streaming in order to keep tabs on the waiting room.

g.) Bandwidth and jitter is absolutely huge here. You can't break up the data because the TV needs to be broadcasted constantly, and with many viewers you will have a lot of data. Loss tolerance doesn't need to be as important because some data can be lost without much of a problem.