

Homework 4

1. Please compare which is faster, 500KBps and 3.5Mbps? You must provide calculations to justify your answer.

500KBps times 1024 to convert to bytes, times 8 to convert to bits and divided by 1,000,000 to convert to Mbps gives us 4.1Mbps. Since 4.1Mbps is greater than 3.5Mbps, 500KBps is faster.

2. Find out the residential access available in downtown Charleston area and answer the following questions:
 - a. Who provides the highest Bandwidth? What is the price and bandwidth?

AT&T provides the highest bandwidth at 1,000Mbps. This will cost \$80 per month.

- b. Who provides the lowest Price? What is the price and bandwidth?

Xfinity from Comcast provides the lowest cost at \$30 per month for a bandwidth of 15Mbps.

- c. Who provides the best Performance/Cost ratio? What is the price and bandwidth?

AT&T gives you the best performance/cost ratio. They provide the fastest speed at 1,000Mbps and are at a middle ground price of \$80 per month.

3. Find out the business access available in downtown Charleston area and answer the following questions:

- a. Who provides the highest Bandwidth? What is the price and bandwidth?

Xfinity provides the highest bandwidth at 2,000Mbps which cost \$300 per month.

- b. Who provides the lowest Price? What is the price and bandwidth?

Xfinity from Comcast provides the lowest cost at \$30 per month for a bandwidth of 15Mbps.

- c. Who provides the best Performance/Cost ratio? What is the price and bandwidth?

The Gigabit plan by Xfinity is the best performance/cost ratio. It gives the half the bandwidth of the 2,000Mbps plan but only cost a third of what that plan does.

4. Suppose users share a 2Mbps link. Also suppose each user transmits continuously at 1Mbps when transmitting, but each user transmits only 20 percent of the time.
 - a. When circuit switching is used, how many users can be supported?

By using circuit switching, only one user at a time can be supported.

- b. For the remainder of this problem, suppose packet switching is used. Why will there be essentially no queuing delay before the link if two or fewer users transmit at the same time? Why will there be a queuing delay if three users transmit at the same time?

With two or fewer users transmitting at the same time, the amount of data transmitted is still under the 2Mbps link. If three users attempt to transmit at the same time, they would be attempting to transmit 3Mbps which is over the 2Mbps link, so one user would have to be queued to wait, giving that user a queuing delay.

5. Consider sending a packet from a source host to a destination host over a fixed route. List the delay components in the end-to-end delay. Which of these delays are constant and which are variable?

The four delay components in the end-to-end delay are nodal processing, queuing, transmission delay, and propagation delay. Queuing delays are variable but the others, nodal processing, transmission, and propagation, are constant.

6. How long does it take a packet of length 1,000 bytes to propagate over a link of distance 2,500 km, propagation speed 2.5×10^8 m/s, and transmission rate 2 Mbps? More generally, how long does it take a packet of length L to propagate over a link of distance d , propagation speed s , and transmission rate R bps? Does this delay depend on packet length? Does this delay depend on transmission rate?

It takes the packet 10 milliseconds to propagate this distance. In general, the time it takes to propagate a distance is the distance divided by the propagation speed. The delay does not depend on the packet length or the transmission rate.

7. What are the five layers in the Internet protocol stack? What are the principal responsibilities of each of these layers?

The five layers of the Internet protocol stack are application, transport, network, link, and physical. The application layer is used to support network application. The transport layer completes process-to-process data transfer. The network layer routes datagrams from source to destination. The link layer is the data transfer between neighboring network elements. The physical layer is bits on the wire.

8. What is the difference between a virus and a worm?

Viruses require a host file to spread the virus. A worm on the other hand, does not require any file to help it spread as it is a standalone software.