Applied Network

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Homework 4

1. 500 KBps = 4000 Kbps = 4 Mbps > 3.5 Mbps. 500 KBps is faster than 3.5 Mbps.
2. a. The highest residential bandwidth is provided by AT&T. The price is $60 per month and raises to $80 per month after one year. The bandwidth is up to 940 Mbps download. b. The ISP who provides the cheapest internet is XFINITY. Their coverage costs $40 per month and the bandwidth is up to 100 Mbps download. c. AT&T’s 940Mbps download plan is the best in terms of speed to cost ratio. While the price is one and a half to two times higher than the lower priced plans, the speed is almost ten times as fast. The price is $60 and increases to $80, but the speed is up to 940 Mbps.
3. a. The highest business bandwidth is offered by Spectrum. Their plan is $45 per month and guarantees 100 to 940 Mbps download. b. The lowest priced business plan (that is not the previously mentioned Spectrum plan) is $60 per month and offers peak download speeds of 500 Mbps. c. The best performance to cost ratio is Spectrum’s plan mentioned in part a. Frankly, this plan is far superior to any of the others listed. Not only is it the cheapest plan listed, but it is also the fastest. This plan probably skyrockets in price after a few months because the price for this much speed is too good to be true.
4. a. Circuit switching will be used when the bandwidth would not be able to a lot enough bandwidth to a user for them to continuously use. Therefore, in this scenario, circuit switching would be used once three users transmit data at once. Since each user transmits 20 percent of the time, 5 users can share a megabit via circuit switching. Therefore, this network could support 10 users at once. b. Since the network has enough bandwidth for two users to have packets constantly being transmitted, there will be essentially no queueing delay while only two users are transmitting over the network. However, once more than two users begin transmitting over the network, the packets being transmitted over the network must be queued for transmission. The packets must wait their turn to be transmitted, causing delays.
5. Firstly, the packets must undergo the process of nodal processing. During processing, delay is caused by the processor searching for bit-level errors in the packets. Next, the packets must queue for transmission. During the queueing phase, delay is caused by network congestion. After waiting to be queued, transmission takes place. During transmission, delay is caused by the process of actually putting bits on the wire. Additionally, propagation delay also occurs. The propagation delay is the time it takes for bits to reach their destination. Processing is variable due to packet size. Queueing is variable due to network congestion. Transmission is variable due to packet size. And propagation is constant for any specific path.
6. Since propgation time is distance/propagation speed, the 1000 bit packet propagate in 10^-8 seconds. The packet of length L would propagate in d/s seconds. This delay does not depend on packet length or transmission rate since only propagation speed is being considered. Total time the packets take to reach the destination would depend on all of the previously mentioned delays.
7. The five layers of the Internet protocol stack and their principal responsibilities are: 1. Physical – deals with actual communication over physical wires, 2. Link – connects two systems and divides packets into frames, 3. Network – routes data between systems and divides messages into packets, 4. Transport – deals with flow control and error detection and correction, and 5. Application – deals with data on the user level.
8. The difference between a virus and a worm is that viruses require a program or human to help them reproduce, while viruses can replicate on their own.