Assignment #12

Due 04/27/2021

1. (**10 points**) Assuming signal propagation at 80% of speed of light, tabulate delay x bandwidth product for a 100 miles long link with following speeds:
    a) 1 Kbps
        i 100 miles = 160934 meters
        ii Propagation speed = 80% of light speed = 0.8*3*10^8m/s = 2.4*10^8 m/s
        iii Propagation time = distance/speed = 160934/2.4*10^8 = 0.671ms
        iv Delay*bandwidth product = propagation * bandewidth
        = 0.671ms *1kbps = 0.671 bits
    b) 1 Mbps
        i Delay*bandwidth product = round trip time * bandewidth
        = 0.671ms *1Mbps = 671 bits
    c) 1 Gbps
        i Delay*bandwidth product = round trip time * bandewidth
        = 0.671ms *1Gbps = 671000 bits
    d) 100 Gbps
        i Delay*bandwidth product = round trip time * bandewidth
        = 0.671ms *100Gbps = 67100000 bits
    e) 1 Tbps
        i Delay*bandwidth product = round trip time * bandewidth
        = 0.671ms *1Tbps = 671000000 bits
2. (**10 points**)
    i. What is socket?
    A socket is a process where sends messages into and receives messages from the network through a software interface.
    ii. What is multiprogramming?
    Multiprogramming is when a computer runs multiple programs at once
    iii. What does socket consist of?
    A socket consists of an IP address and a port number
    iv. What is the difference between a NULL and a void pointer?
    A NULL pointer points to nothing while a void Pointer points to a memory location which doesn't have a specific data type.
    v. How does congestion spread to other nodes in the network?
    Congestion spreads when there is a lack of resources on one path of the network which causes slow traffic on other paths that have suitable amount of resources
    vi. How can spread of congestion be avoided?
    Congestion avoidance can be implemented by doing things such as increasing the value of cwnd by a single MSS for every RTT

vii. What is happening at the time of congestion collapse?

Traffic comes more limited as the collapse squeezes choke points in the network

viii. What is head of line blocking?

Head of line blocking is when packets get held-up by other packets and this causes the packets that are supposed to go to ports not in use to get hold up if they are behind a held-up packet.

ix. What are key differences between congestion problem and flow control problem?

Congestion control is traffic controlled that is entering the system and flow control is traffic controlled between senders and receivers.

x. What is TCP pipelining?

TCP pipelining is when multiple packets are sent to a single socket without waiting for an acknowledgement in the data-link layer.