### 50380778

# Tejaswini Damodara kannan

### Problem1

Given Link Transmission rate R = 2Mbps = 2\*10<sup>6</sup> bps

Propagation speed s =2.5\*108 m/sec

Length between hosts = 2000km = 2\*10<sup>6</sup> m

- a. Propagation delay d  $_{prop} = d/s = (2*10^6)/(2.5*10^8) = 2/250 = 0.008 sec$
- b. Bandwidth-delay product = R x  $d_{prop}$  =  $2*10^6*0.008$  = 16000 bits
- c. Bandwidth-delay product = R x  $d_{prop} = 10^{2}*10^{6}*0.008 = 800000$  bits

## Problem2

01001100 01101001

01101110 01101011

10111010 11010100

00100000 01001100

110111011 0010000

01100001 01111001

1 00111100 10011001

Since there are 17bits, the MSB needs to be wraparound

00111100 10011001

1

00111100 10011010

01100101 01110010

10100010 00001100

The checksum is obtained by taking 1's compliment of above. The result is 01011101 11110011

# Problem3

RTT is time for a small packet to travel from client to server and back

### Non persistent

Client initiates TCP connection for every object including the html file, meaning it requires 2 RTTs for one object. Client needs to access the HTML file which references 4 objects on same server.

Hence 1 TCP connection and 1 HTTP connection for HTML page => 2 RTT

1TCP and 1 HTTP for each if the 4 objects => 2\*4 => 8 RTT

Total RTTs needed are 10.

#### Persistent

TCP connection is established only once and then one RTT for each object when there is no pipelining.

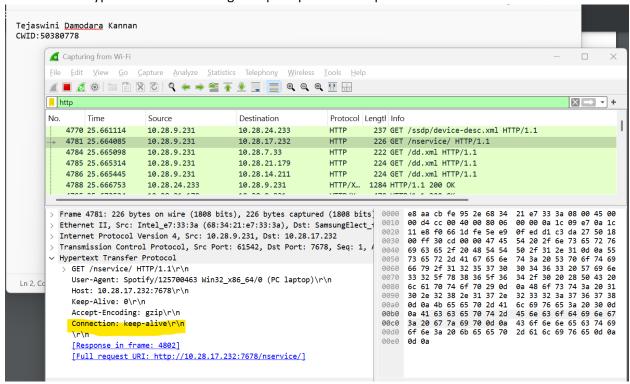
Hence 1 TCP connection and 1 HTTP connection for HTML page => 2 RTT

1 HTTP for each if the 4 objects => 1\*4 => 4 RTT

Total RTTs needed are 6.

## **Problem 4**

a. connection type here for the HTTP get request packet is keep-alive.



b. Source port 403

Destination port 60762

Sequence number 1

#### ACK number 440

# Header length 20 bytes

