UNIVERSITY OF CENTRAL PUNJAB

(Faculty of IT)

Computer Communications and Networks (CCN)

Assignment No 1 **Date : 29 March 2023**

Total Marks: 100 **Due Date : 05 April 2023**

1. Draw the 5-layer **Internet Architecture** and name the major protocols used at different layers. Also, explain in your own words the major functions performed by each of the layers.

2. What is the basic difference between **circuit switching** and **packet switching**. Given at least one real example of both. What are suitable situations where we should use circuit switching? Why does the Internet use packet switching?

3. What do you understand by the term "**protocol**"? Can you list 4 protocol names and where they are used?

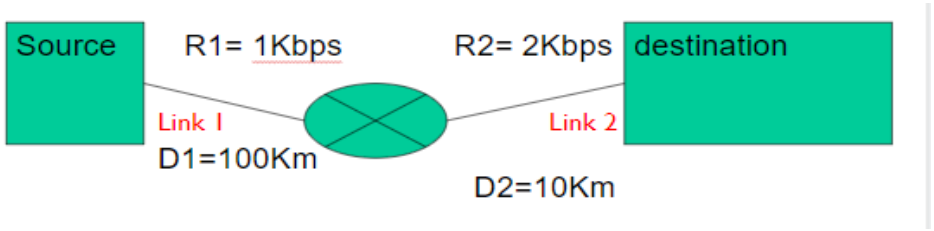
4. What is the difference between **Statistical** and **Time division Multiplexing**?

5. Differentiate between **throughput** and **data rate**?

6. A TDM frame has 8 slots, and each slot can carry 8 bits of data.
   a. If the Frame rate is 4 frames/sec, determine the data rates of a single TDM channel and the complete TDM line.
   b. What is the data rate of a single channel and the whole TDM line if frame rate is 8 frames/sec.
   c. Calculate both data rates for frame rate 4000 frames/sec.
   d. How much time is required if User A wants to send 6000 KB data to User B; assume frame rate of 4000 frames/sec.

7. A TDM link has line rate of 1.536 Mbps. If an individual session requires 64 kbps, how many simultaneous sessions can the link carry. Also, compute the delay to transfer 1.92 MB file using this link. Neglect the propagation, processing & queuing delays, and assume that it takes 50 ms to establish the circuit before data transmission.

8. We want to send a file of size 4000 MB from Source to Destination, using the network path given below.



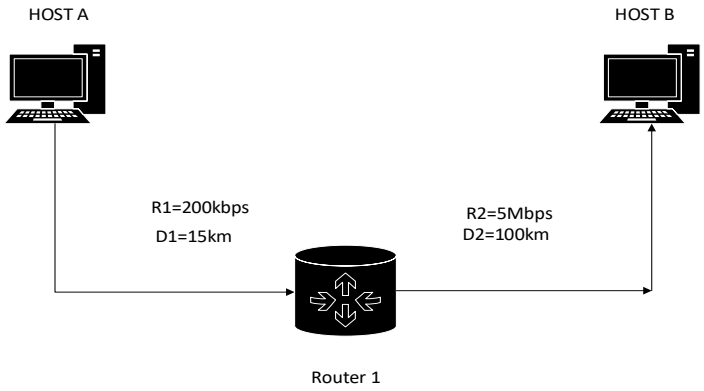
Assume speed of propagation to be $3x10^8$ m/sec, and find out the following?

a. Transmission delay at Link 1; Transmission delay at Link 2; Total Transmission delay
b. What will be the effect on total transmission delay if we change D2=100 KM?
c. Propagation delay on link 1; Propagation delay on link 2; Total propagation delay
d. What will be the effect on total propagation delay if we change R1 to 4 Kbps
e. Ignoring all other delays, what is the total (end-end) delay
f. What is the throughput achieved

9. Consider the given scenario where Host A wants to send a file to host B. Calculate the **end to end delay** between Host A and Host B, when the propagation speed at each link is approximately $2x10^8$ m/sec, and the processing and queuing delays at the router are 10 msec and 25 msec, respectively, when:

   (a) File size is 1500 bytes and only one packet is sent.

   (b) File size is 6000 bytes and four packets are sent (1500 bytes in each packet).



Assignment Guidelines:

*Assignment is to be done **individually**.*

Assignment should be submitted on portal only, as a single file.

You should write Assignment in MS word, first page should mention your ID, Name, Section and Assignment number.

*The answers should be in your **own words**; there should be **no copying** from any source.*

The neatness of the assignment will also carry marks.

*Assignments will **NOT be accepted after the due date.***

***Marking Criteria:**30% marks will be awarded for complete submission of assignment; 70% evaluation will be based on Assignment Test, to be conducted in class.*