

National University of Computer and Emerging Sciences, Lahore Campus  
**Quiz .....1 [BSCS: Section C] Fall 2022**

**Computer Networks (Code: CS3001)**

**Quiz Date: September 07, 2022**

**Total Marks: 12**

**Duration: 20 -Minutes**

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Name ----- Roll #----- Section -----

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**Instructions:** Attempt all questions on this sheet. You can make use of rough sheet (do not attach to this sheet).

**Q1:** Describe the most popular wireless Internet access technologies today. Compare and contrast them.  
(2 Marks) [CLO 2]

**Q2: Solve the following questions:** (5+5 = 10 Marks) [CLO 4]

(A) Assume that you are downloading an MP3 file of 24 million bits (assume 1 million =  $10^6$  bits) from a server with one router between client host and server host. The transmission rate of the link from router to server i.e.,  $R_s$  is 8 Mbps while transmission rate of your access link i.e.,  $R_c$  is 6 Mbps. What will be the throughput? What is the required time to transfer the file considering that all delays except transmission delay are negligible? (2+3 = 5 Marks)

(B) Ten digital sources (channels) are multiplexed using TDM. If each input channel sends **5 kbps** (assume  $1\text{ k} = 10^3$ ) and each output slot carries 8 bits from each digital source. Then for this link, find the (i) frame size in bits, (ii) frame rate, and (iii) bit duration? (2+2+1 = 5 Marks)

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**Start writing your Answers from here and then use backside of this sheet.**

**Answer Q1:**

There are two popular wireless Internet access technologies today: **Wifi (802.11) and 3G and 4G wide-area wireless access networks**

**Wifi (802.11)** In a wireless LAN, wireless users transmit/receive packets to/from a base station (i.e., wireless access point) within a radius of few tens of meters. The base station is typically connected to the wired Internet and thus serves to connect wireless users to the wired network.

**3G and 4G wide-area wireless access networks.** In these systems, packets are transmitted over the same wireless infrastructure used for cellular telephony, with the base station thus being managed by a telecommunications provider. This provides wireless access to users within a radius of tens of kilometers of the base station

**Solution Q2:**

**(A)** Here, the only delay component is transmission delay.

Transmission rate of server =  $R_s = 8 \text{ Mbps} = 8 * 10^6 \text{ bps}$

Transmission rate of access link =  $R_c = 6 \text{ Mbps} = 6 * 10^6 \text{ bps}$

File size =  $L = 24 \text{ million bits} = 24 * 10^6 \text{ bits}$

Throughput is equal to the transmission rate of bottleneck link i.e.,  $\min \{R_c, R_s\} = R_c = 6 * 10^6 \text{ bps}$

Having determined the throughput, delay i.e., time required to transfer the file =  $L / \min \{R_c, R_s\}$

$$= L / R_c = 24 * 10^6 / 6 * 10^6 = 4 \text{ sec}$$

**(B)**

(i) Frame Size: # of digital sources \* data from each source in a frame =  $10 * 8 = 80 \text{ bits}$

(ii) Frame rate = bit rate / frame size

However, the bit rate of output link is equal to the bit rate of each digital source multiplied by the number of input sources i.e.,  $5 * 10^3 * 10 = 50000 \text{ bps}$

So Frame rate =  $50000 / 80 = 625 \text{ frames/sec}$

(iii) bit duration =  $1 / \text{bit rate} = 1 / 50000 = 0.00002 \text{ seconds}$