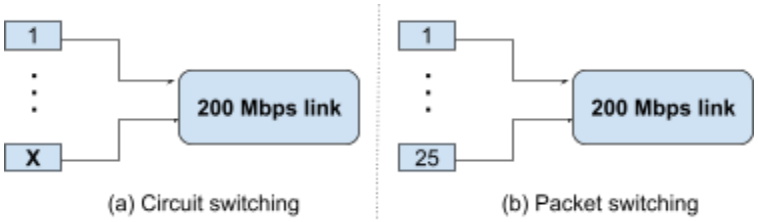
Roll. No.: _____ Name: _____ Section: ____

Quiz 1 solution
CSE232 Computer Networks
Duration-30min, Full marks-11

September 11, 2023

Q. 1. Assume each user requires a bandwidth of 20 Mbps and must share a link of capacity of 200 Mbps. You can partition the link capacity into individual channels for communication. **[1+1.5]**



(a) Circuit switching (b) Packet switching

(a) When circuit switching is used (see Figure a), what is the maximum number of simultaneous users that can be supported? i.e., X=?

Ans: Circuit switching => dedicated bandwidth

Each user requires 20 Mbps

Total bandwidth = 200 Mbps

Maximum number simultaneous users, X=200Mbps/20Mbps = 10

(b) Suppose packet switching is used (see Figure b). Assume the packet-switched user communicates only 10% of the time (i.e., does not continuously send data). Can the given packet switching network support 25 simultaneous users? Explain your answer.

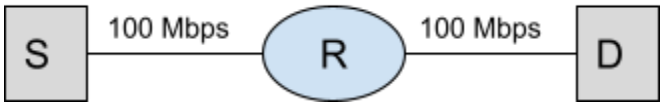
Ans: Yes

Packet switching => sharable bandwidth

Each user generates load = 10% * 20 Mbps = 2 Mbps

Average load generated by 25 users = 25 * 2 Mbps = 50 Mbps << 200 Mbps

Q.2. Consider a 100KB file that needs to be sent through a network path. The bandwidth between the sender (S) and router (R) is 100 Mbps, and router (R) and the destination host (D) is 100 Mbps. **Assume negligible processing delays. [1.5+2+1]**



(a) Assume the cable length for S–R and R–D is 1 km, and the signal speed is 10^6 meters/sec.

What is the propagation delay from S to R? _____ msec

What is the propagation delay from R to D? _____ msec

Ans: Cable length, l=10^3 m; Signal speed, s =10^6 m/s

tp (S to R) = tp (R to D) = l/s = 1 msec

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(b) Suppose the sender continuously sends data, and no packets are lost, no retransmissions, and no ACKs are required. How long does it take for the 100KB file to reach from S to D? _____ msec

Ans: L=100KB = 800Kb, R=100Mbps
Frame transmission time, tf = L/R = 8 ms
Time to send the file = tf (sender) + tp (S–R) + tf (router) + tp (R–D) = 8+1+8+1=18 ms

(c) Now, assume that 'S' sends a second file of the same size, i.e., 100KB, i**mmediately after 'S' sends the first file.** The time to send both 100KB files to reach from S to D is? _____ msec

Ans: Time to send both files = tf (sender: 1st file) + tf (sender: 2nd file) + tp + tf (router: 2nd file) + tp= 8+8+1+8+1= 26 ms

Q.3. Match the following. Choose the best answer. **[2]**

Protocol	Number of TCP connections required
(1) Non-persistent HTTP	(a) Zero
(2) DNS	(b) One
(3) SMTP	(c) Two
(4) FTP (to transfer ONE file)	(d) Greater than or equal to ONE

Ans: (1) _____ (2) _____ (3) _____ (4) _____

Ans: (1) ____d____ (2) ____a____ (3) ___b_____ (4) ____c____

Q.4. State TRUE or FALSE with justification. **[2]**

(a) HTTP is a stateless protocol, and it uses UDP for transport.

Ans: False; HTTP is a stateless protocol, and it uses TCP for transport

(b) TCP is a reliable protocol. If TCP is used, there are no packet errors and no packet losses.

Ans: False; Packet losses and errors may occur due to poor physical links, malfunctioning switches/routers, and network congestion. TCP provides reliability and helps recover from these losses.