United International **University** (**UIU**)

Dept. of Computer Science and Engineering (CSE)

MidTerm Assessment Year: **2021** Semester: **Summer**

Course: **CSE 323** Title: **Computer Networks (Section – A/B/C/D)**

Marks: **20** Time: **1 Hour + 15 min (for uploading)**

[Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.]

There are **4 (Four)** questions. Answer **all 4 (Four)** questions. All questions are of values indicated on the right-hand margin.

Q1. a) Assume that a router is sending data to a destination host that is **directly connected** to that router. The router is sending a **30 Mbits video file** (data), with a **bandwidth** of the network is **8 Mbps**. The **distance** between the router and the destination host is **7,000 km** and the **propagation speed** of the connection link is **2.5×10^8 m/sec**. Suppose the **processing delay is negligible**, there is a **queuing delay = 0.005 sec** at the router. Now answer the followings: **[2.5]**

i. What is the **transmission delay**?
ii. What is the **propagation delay**?
iii. What is the **total delay**?
iv. Which delay is the **dominant factor** here? What can be done to reduce that delay? **Justify your answer**.

b) In computer networking, **store and forward packet switching** is a technique where the data packets are stored in each intermediate node, before they are forwarded to the next node. Now briefly answer the followings: **[2.5]**

i. What are the major **functionalities of a router** in that mechanism?
ii. Which type of **delay is introduced** due to this mechanism?
iii. What happens to a packet when a routers **buffer is full** to its capacity?

Q.2 a) Suppose your browser (client) downloads a webpage. The **base html (master index file)** object is **200 Kbytes** in length and additionally contains **10 embedded images**, each **100 Kbytes** in length. All links have capacity of **2 Mbps**. Given the following information:

- ✓ The **base html** is stored in the **original server** and the first **5 images** are stored on the **CDN server 1** and the last **5 images** are stored on the **CDN server 2**.
- ✓ **R1** (RTT between Client and original server) = **500 ms**, **R2** (RTT between Client and CDN server 1) = **200 ms**, and **R3** (RTT between Client and CDN server 2) = **100 ms.**

Calculate the **response time** to download the entire web page for (i) **Sequential** non-persistent HTTP**, and** (ii) **Sequential** persistent HTTP. **[4]**

b) Why "**if-modified-since:**" header line is used in **web caching**? **[1]**

Q.3 a) Suppose a **client** process (Browser) in a **host** named "**UIU-lab-Pc9"** wants to communicate with the HTTP **server** process running on "**cisco.uiu.ac.bd"**. Assuming the **iterative query** process and caches at all the intermediate servers being initially **empty**:

i. **List the entries** (name to IP mappings) cached in the **local DNS server** and the **host's cache** after the process. **[2]**

ii. Suppose the user now **clicks** on a link to **another page** on the **same server**. **How many DNS** servers must be queried in order to handle this request? Assume **non-persistent HTTP**. **[1]**

b) Suppose **Mushfiq**, with a Web-based e-mail account (**mushfiq@gmail.com**), sends a message to **Mahmud** (**mahmud@yahoo.com**), who accesses his mail using **IMAP**. Discuss **how the message gets from Mushfiq's host to Mahmud's host**. Be sure to list the **series of application-layer protocols** that are used to move the message between the two hosts. **[2]**

Q4. a) Describe why an application developer might choose to run an application over UDP rather than TCP. What should the developer do to ensure reliable data transfer over UDP? **[2]**

b) Using the following figure, explain how pipelining can increase the utilization of a channel from the stop-and-wait protocols. Show necessary calculations assuming, **pipeline size n = 6**, **RTT = 3s**, **Packet Size = 100 kbits** and **Transmission Rate = 1000kbps**, **[3]**

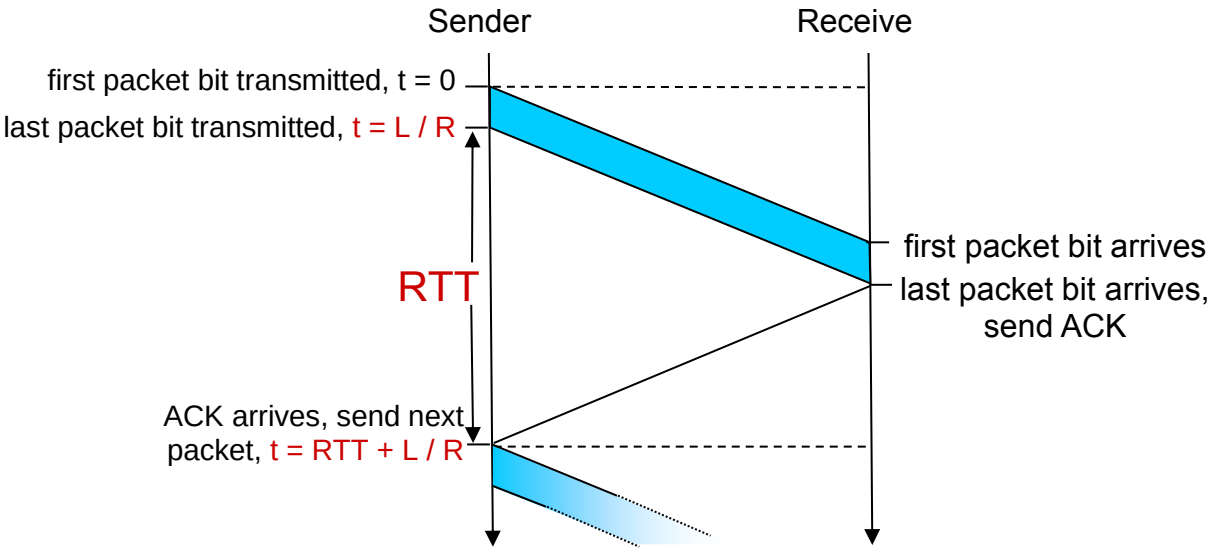

Figure: Timing diagram for non-pipelined protocols