

 20 minutes

Quiz 1 (06/03/2023)

Topics: (i) the definitions of Packet Switching and Circuit Switching and their differences; (ii) performance metrics (packet loss, delay, and throughput); and (iii) the Internet's protocol stack and the layers' services

* Required

* This form will record your name, please fill your name.

1. [General Introduction] What is the Internet? There are some correct answers (and many wrong answers!). Your grade is proportional to how much you can elaborate your answer in terms of the descriptions from our first class. * (2 Points)

2. [Internet's Protocol Stack] Find the best match between services (left column) and network layers (top row). * (2 Points)

	Application Layer	Transport Layer	Network Layer	Link Layer	Physical Layer
Transfer of a bit into and out of a transmission media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transfer of data between neighboring network devices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transfer of data between one process and another process (typically on different hosts).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Delivery of datagrams from a source host to a destination host (typically)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
End-to-end addressing and routing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. [Circuit Switching – Multiplexing] Consider $N=10$ users in a circuit switching network. Each transmission takes place at least at 100.0 Mbps and lasts for 12s. We observe the network for 1 minute and the switch outbound data rate is 1.0 Gbps. Regarding FDM and TDM: which scheme would accommodate the largest number of users transmitting simultaneously and why? Which scheme would provide the largest amount of total transmitted data per user (for the entire 1-minute observation time) and why? * (2 Points)

4. [Performance Metrics – Queuing Delay] In circuit switching systems, queuing delay is heavily impacted by the "traffic intensity". Assume that a switch has an outbound transmission rate of 1.0 Gbps and packets have length of 200 bits. What is the maximum tolerated input packet rate (in packets/s) for the network not to crash (i.e., packets experience an "infinite" queuing delay)? * (2 Points)

5. [Circuit Switching vs. Packet Switching] Why does the Internet deploy packet switching instead of circuit switching? * (2 Points)

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