

QUIZ 1 – INTRODUCTION

Date: March 09th, 2024

Student name: _____ ID: _____

Multiple choice questions (60 points)

Q1. Match the following descriptions to the “nuts-and-bolts” or “service” view of the Internet?

- A. A "network of networks"
- B. A platform for building network applications.
- C. A place I go for information, entertainment, and to communicate with people.
- D.** A collection of hardware and software components executing protocols that define the format and the order of messages exchanged between two or more communicating entities, as well as the actions taken on the transmission and/or receipt of a message or other event.
- E. A collection of billions of computing devices, and packet switches interconnected by links.

Q2. Which of the following human scenarios involve a protocol?

- A. A person reading a book.
- B.** A student raising her/his hand to ask a really insightful question, followed by the teaching acknowledging the student, listening carefully to the question, and responding with a clear, insightful answer. And then thanking the student for the question, since teachers love to get questions.
- C. A person sleeping.
- D. One person asking, and getting, the time to/from another person.
- E. Two people introducing themselves to each other.

Q3. Match the access network with the approximate speeds that a subscriber might experience.

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|----------------------------|------------------------------|
| A. 4G LTE | 1. Up to 100 Mbps downstream |
| B. Ethernet | 2. Up to 1 Gbps downstream |
| C. 802.11ac WiFi | 3. Up to 100 Mbps |
| D. Cable access network | 4. Up to 1 Gbps |
| E. Digital subscriber line | 5. Up to 10 Gbps |

Q4. When we say that the Internet is a “network of networks,” we mean? Check all that apply (choose 2).

- A.** The Internet is made up of access networks at the edge, tier-1 networks at the core, and interconnected regional and content provider networks as well.
- B. The Internet is the largest network ever built.
- C. The Internet is the fastest network ever built.
- D.** The Internet is made up of a lot of different networks that are interconnected to each other..

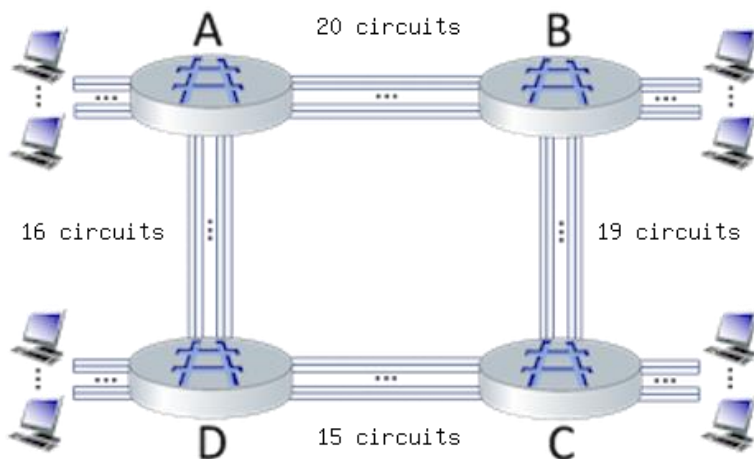
Q5. Match the following characteristics to the technique of **packet switching** (PW) or **circuit switching** (CW)?

- A.** This technique is used in the Internet.
- B.** Reserves resources needed for a call from source to destination.
- C.** This technique was the basis for the telephone call switching during the 20th century and into the beginning of this current century.
- D.** Congestion loss and variable end-end delays are possible with this technique.
- E.** Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM) are two approaches for implementing this technique.

F. Data may be queued before being transmitted due to other user's data that's also queueing for transmission.

G. Resources are used on demand, not reserved in advance.

Q6. Consider the circuit-switched network shown in the figure below, with four circuit switches A, B, C, and D. Suppose there are 20 circuits between A and B, 19 circuits between B and C, 15 circuits between C and D, and 16 circuits between D and A.



What is the maximum number of connections that can be ongoing in the network at any one time?

- A.** 70 B. 16 C. 20 D. 31 E. 39

Q7. Choose one the following two definitions that makes the correct distinction between routing versus forwarding.

- A. Routing is the local action of moving arriving packets from router's input link to appropriate router output link, while forwarding is the global action of determining the source-destination paths taken by packets.
- B. Forwarding is the local action of moving arriving packets from router's input link to appropriate router output link, while routing is the global action of determining the source-destination paths taken by packets.

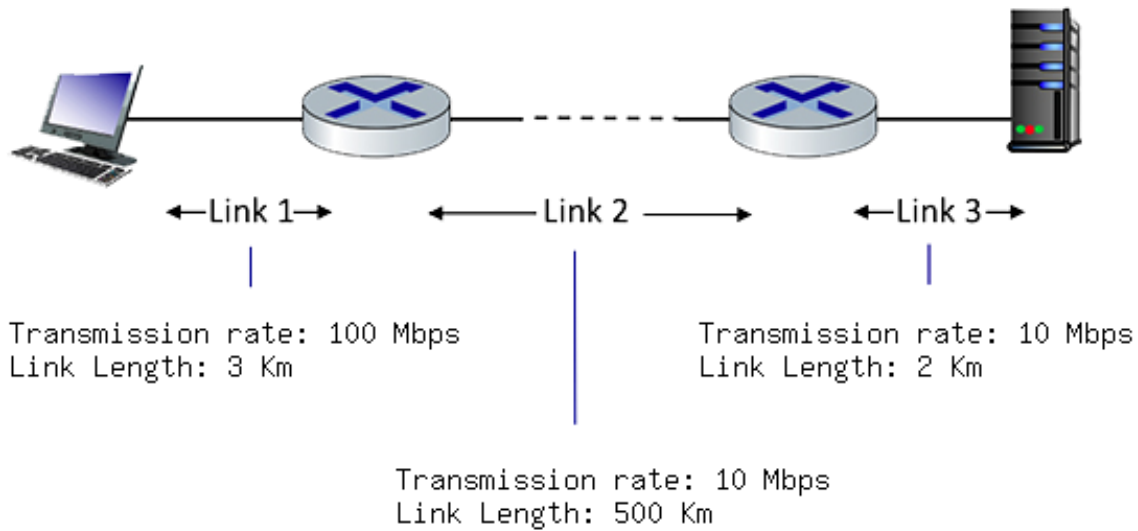
Q8. Match the access network with the approximate speeds that a subscriber might experience.

- A. Wireless. Up to 10's Mbps per device.
- B. Wired. Up to 100's Gbps per link.
- C. Wireless. 10's to 100's of Mbps per device.
- D. Wired. Up to 10's to 100's of Mbps downstream per user.
- E. Wired. Up to 10's of Mbps downstream per user.

1. Ethernet 2. 802.11 WiFi 3. Cable access network 4. Digital subscriber line 5. 4G LTE

Long- answer question (40 points)

Q9. Consider the figure below, with three links, each with the specified transmission rate and link length.



Assume the length of a packet is 16000 bits. The speed of light propagation delay on each link is 3×10^8 m/sec. Show your calculation steps lead to the results.

- What is the transmission delay of link 1?
- What is the propagation delay of link 1?
- What is the total delay of link 1?
- What is the total delay?

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