

Câu 1: Explain the difference between connectionless unacknowledged service and connectionless acknowledged service. How do the protocols that provide these services differ?

Câu 2. Explain the difference between connection-oriented acknowledged service and connectionless acknowledged service. How do the protocols that provide these services differ?

Câu 3: Explain the differences between PPP and HDLC.

Câu 4:

A 1.5 Mbps communications link is to use HDLC to transmit information to the moon. What is the smallest possible frame size that allows continuous transmission? The distance between earth and the moon is approximately 375,000 km, and the speed of light is 3×10^8 meters/second.

Câu 5: Suppose HDLC is used over a 1.5 Mbps geostationary satellite link. Suppose that 250-byte frames are used in the data link control. What is the maximum rate at which information can be transmitted over the link?

Câu 6:

Suppose that a multiplexer receives constant-length packet from $N = 60$ data sources. Each data source has a probability $p = 0.1$ of having a packet in a given T -second period. Suppose that the multiplexer has one line in which it can transmit eight packets every T seconds. It also has a second line where it directs any packets that cannot be transmitted in the first line in a T -second period. Find the average number of packets that are transmitted on the first line and the average number of packets that are transmitted in the second line.

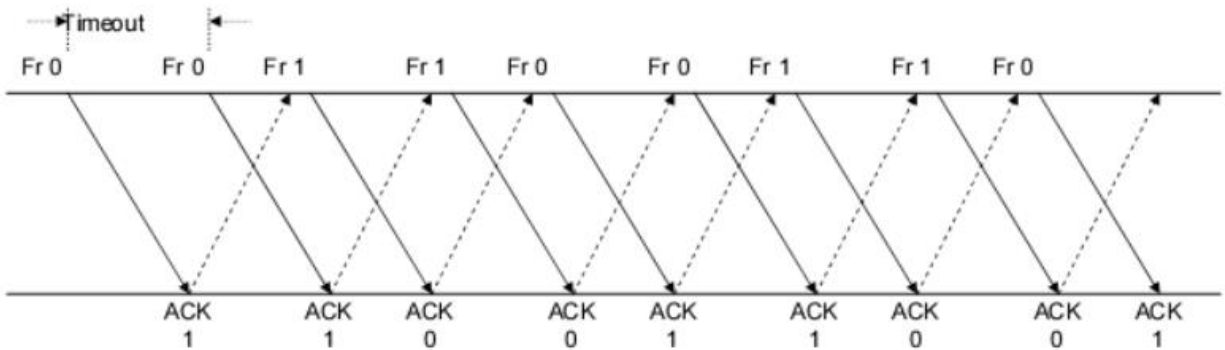
Câu 7:

Consider the transfer of a single real-time telephone voice signal across a packet network. Suppose that each voice sample should not be delayed by more than 20 ms.

- a. Discuss which of the following adaptation functions are relevant to meeting the requirements of this transfer: handling of arbitrary message size; reliability and sequencing; pacing and flow control; timing; addressing; and privacy, integrity and authentication.
- b. Compare a hop-by-hop approach to an end-to-end approach to meeting the requirements of the voice signal.

Câu 8:

Consider the Stop-and-Wait protocol as described. Suppose that the protocol is modified so that each time a frame is found in error at either the sender or receiver, the last transmitted frame is immediately resent.



- Show that the protocol still operates correctly.
- Does the state transition diagram need to be modified to describe the new operation?
- What is the main effect of introducing the immediate-retransmission feature?

Câu 9:

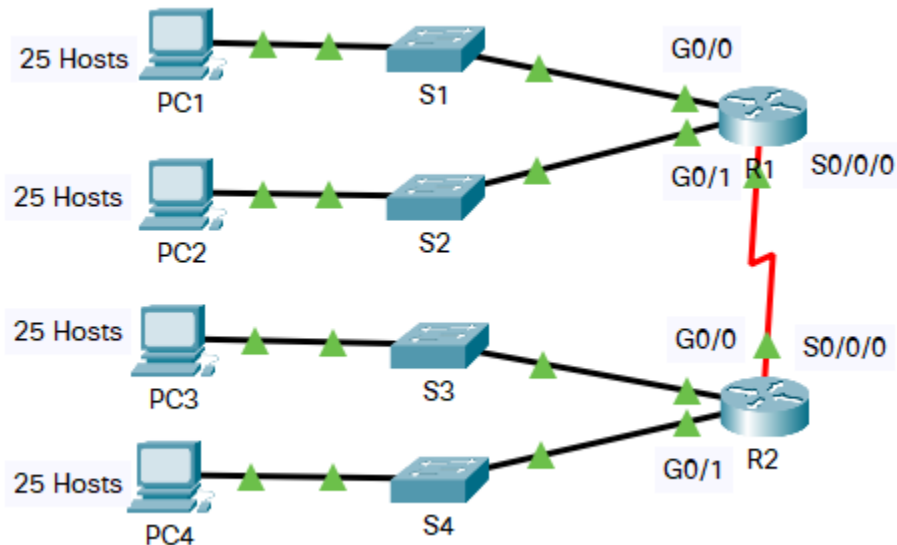
Suppose that two peer-to-peer processes provide a service that involves the transfer of discrete messages. Suppose that the peer processes are allowed to exchange PDUs that have a maximum size of M bytes including H bytes of header. Suppose that a PDU is not allowed to carry information from more than one message.

Câu 10:

A 1 Mbyte file is to be transmitted over a 1 Mbps communication line that has a bit error rate of $p = 10^{-6}$.

- What is the probability that the entire file is transmitted without errors? Note for n large and p very small, $(1 - p)^n \approx e^{-np}$.
- The file is broken up into N equal-sized blocks that are transmitted separately. What is the probability that all the blocks arrive correctly without error? Does dividing the file into blocks help?
- Suppose the propagation delay is negligible, explain how Stop-and-Wait ARQ can help deliver the file in error-free form. On the average how long does it take to deliver the file if the ARQ transmits the entire file each time?

Câu 11:

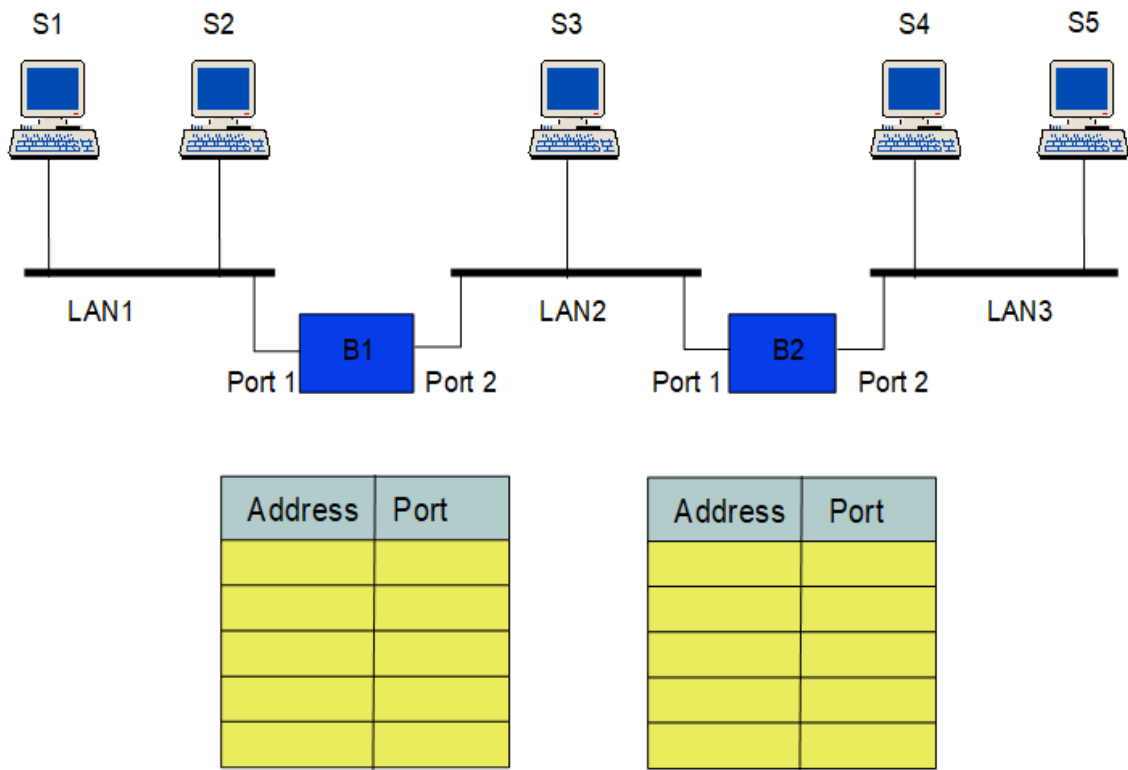


In this activity, you are given the network address of 192.168.1.0/24 to subnet and provide the IP addressing for the Packet Tracer network. Each LAN in the network requires at least 25 addresses for end devices, the switch and the router. The connection between R1 to R2 will require an IP address for each end of the link.

- Based on the topology, how many subnets are needed?
- How many bits must be borrowed to support the number of subnets in the topology table?
- How many subnets does this create?
- How many usable hosts does this create per subnet?

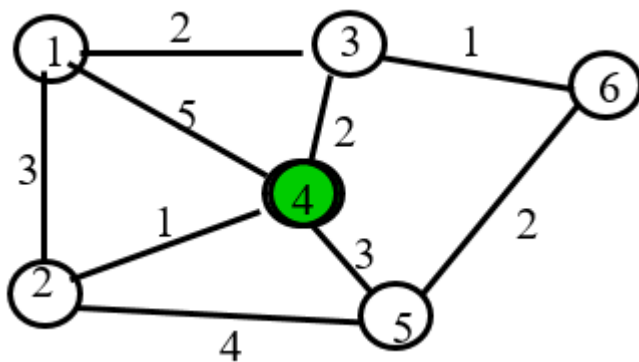
Câu 12:

Five stations (S1-S5) are connected to an extended LAN through transparent bridges (B1-B2), as shown in the following figure. Initially, the forwarding tables are empty. Suppose the following stations transmit frames: S1 transmits to S5, S3 transmit to S2, S4 transmits to S3, S2 transmits to S1, and S5 transmits to S4. Fill in the forwarding tables with appropriate entries after the frames have been completely transmitted.



Câu 13:

1. Consider the network in Figure.



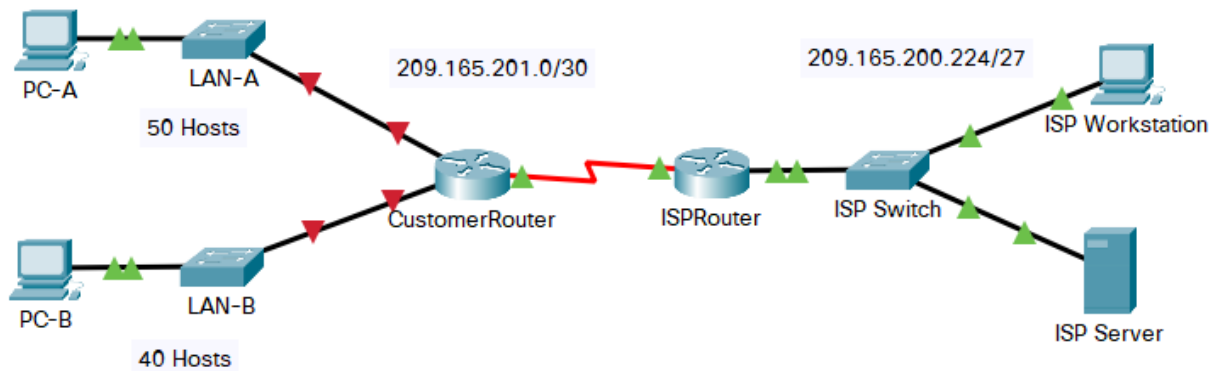
- a) Use the Dijkstra algorithm to find the set of shortest paths from node 4 to other nodes.

Iteration	N	D1	D2	D3	D5	D6
Initial	{}					
1	{}					
2	{}					
3	{}					
4	{}					

- b) Find the set of associated routing table entries (Destination, Next Hop, Cost)

Destination	Cost	Next Hop

14)



You are a network technician assigned to install a new network for a customer. You must create multiple subnets out of the 192.168.0.0/24 network address space to meet the following requirements:

- The first subnet is the LAN-A network. You need a minimum of 50 host IP addresses.
- The second subnet is the LAN-B network. You need a minimum of 40 host IP addresses.
- You also need at least two additional unused subnets for future network expansion.

Note: Variable length subnet masks will not be used. All of the device subnet masks should be the same length.

Answer the following questions to help create a subnetting scheme that meets the stated network requirements:

- a. How many host addresses are needed in the largest required subnet?
- b. What is the minimum number of subnets required?
- c. The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?
- d. The subnet mask is made up of two portions, the network portion, and the host portion. This is represented in the binary by the ones and the zeros in the subnet mask.

In the network mask, what do the ones and zeros represent?

- e. When you have determined which subnet mask meets all of the stated network requirements, derive each of the subnets. List the subnets from first to last in the table. Remember that the first subnet is 192.168.0.0 with the chosen subnet mask.

Subnet Address	Prefix	Subnet Mask

Câu 15:

Suppose that Selective Repeat ARQ is modified so that ACK messages contain a list of the next m frames that it expects to receive.

- a. How does the protocol need to be modified to accommodate this change?
- b. What is the effect of the change on protocol performance?

Q.16. (2 marks)

Suppose the size of an uncompressed text file is 1 megabyte

Note: *Explain your answer in details.*

- a. How long does it take to download the file over a 32 kilobit/second modem?
- b. How long does it take to take to download the file over a 1 megabit/second modem?
- c. Suppose data compression is applied to the text file. How much do the transmission times in parts (a) and (b) change?

Q17. (2 marks)

Let $g(x)=x^3+x+1$. Consider the information sequence 1001. Find the codeword corresponding to the preceding information sequence. Using polynomial arithmetic we obtain

Note: *Explain your answer in details.*

Q.18. (2 marks)

A router has the following CIDR entries in its routing table:

Address/mask Next hop

135.46.56.0/22 Interface 0

135.46.60.0/22 Interface 1

192.53.40.0/23 Router 1

default Router 2

(a) What does the router do if a packet with an IP address 135.46.63.10 arrives?

(b) What does the router do if a packet with an IP address 135.46.57.14 arrives?

Câu 19:

A Large number of consecutive IP address are available starting at 198.16.0.0.

Suppose four organizations, A, B, C, D request 4000, 2000, 4000, and 8000 addresses, respectively. For each of these organizations, give:

1. the first IP address assigned
2. the last IP address assigned
3. the mask in the w.x.y.z/s notation

The start address, the ending address, and the mask are as follows:

Câu 20:

The ability to work with IPv4 subnets and determine network and host information based on a given IP address and subnet mask is critical to understanding how IPv4 networks operate. The first part is designed to reinforce how to compute network IP address information from a given IP address and subnet mask. When given an IP address and subnet mask, you will be able to determine other information about the subnet.

Fill out the tables below with appropriate answers given the IPv4 address, original subnet mask, and new subnet mask.

Given:	
Host IP Address:	192.135.250.180
Original Subnet Mask	255.255.255.0
New Subnet Mask:	255.255.255.248
Find:	
Number of Subnet Bits	
Number of Subnets Created	
Number of Host Bits per Subnet	
Number of Hosts per Subnet	
Network Address of this Subnet	

IPv4 Address of First Host on this Subnet	
IPv4 Address of Last Host on this Subnet	
IPv4 Broadcast Address on this Subnet	

Note:

- **Students have to follow the steps and complete the tasks in details in order to have the results. If the students only write the result, that is, that result is not marked or recorded.**
- **Students do examination on word file and answer by English**