
Exercises Sheet #2 : OSI and TCP/IP reference models

Communication Networks
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Exercise #1 : Network Topology

1. Assume six devices are arranged in a mesh topology.
 - a. How many cables are needed?
 - b. How many ports are needed for each device?
2. For each of the following four networks, discuss the consequences if a connection fails.
 - a. Five devices arranged in a mesh topology
 - b. Five devices arranged in a star topology (not counting the hub)
 - c. Five devices arranged in a bus topology
 - d. Five devices arranged in a ring topology
3. In the ring topology, what happens if one of the stations is unplugged?
4. In the bus topology, what happens if one of the stations is unplugged?
5. Draw a hybrid topology with a star backbone and three ring networks.
6. Draw a hybrid topology with a ring backbone and two bus networks.
7. Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?
 - a. Sending an e-mail
 - b. Copying a file
 - c. Surfing the Internet

Exercise #2 :

List the seven layers of the OSI model and the encapsulation unit used to describe the data grouping at each layer. Also, list the networking devices that operate at each layer, if applicable.

Layer #	Name	Encapsulation unit or PDU name	Devices that operate at this layer
7			
6			
5			
4			
3			
2			
1			

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Exercise #3 :

According to the OSI model, which networking layers are responsible for the following operations:

Building frames	
Determining the route for the transmitted data	
End-to-end Error detection and correction	
Data encoding	
Communication synchronization	

Exercise #4 : Choose the right answer:

- In which OSI layer packets are encapsulated into frames?
 - Physical layer
 - Data link layer
 - Transport layer
- The set of rules that determines the format and the data transmission is called:
 - Standard
 - Protocol
 - Model
- That data added by protocols of every layer during the process of encapsulation is called:
 - Frame
 - Packet
 - PDU
 - Header
 - Trail
- In which OSI layer images are encoded?
 - Application
 - Presentation
 - Session
 - Physical
- Which layer is the network layer in the OSI 7 layer model?
 - 1
 - 2
 - 5
 - 3
- Explain the differences between TCP and UDP.
- Describe two examples, where using the Transport Layer protocol TCP makes sense.
- Describe two examples, where using the Transport Layer protocol UDP makes sense.
- What network device(s) is (are) used to . . .
 - Connect networks with different logical address ranges?
 - Transmit signals over long distances by modulating them to a carrier frequency in the ultra-low frequency band?
 - Connect physical networks?
 - Extend the range of LANs?
 - Connect wireless network devices in the infrastructure mode?
 - Enable communication between networks, which use different protocols?