

Question 1

The TCP/IP model is a set of rules for how computers communicate with each other over a network. The model divides the communication process into four layers,

- i. Application
- ii. Transport
- iii. Internet
- iv. Network

Application layer

The application layer is responsible for the application that is sending or receiving the data.

Transport layer

The transport layer is responsible for ensuring that the data is delivered reliably and in the correct order.

Internet layer

The internet layer is responsible for routing the data from the source to the destination.

Network layer

The network access layer is responsible for sending and receiving the data on the physical network.

The routing process in the TCP/IP model is dynamic. This means that the path that the data takes from the source to the destination can change depending on the network conditions. The routing process is managed by routers, which are devices that connect different networks together. Routers use a routing table to determine the best path for the data to take. The routing table is updated dynamically as the network conditions change.

Question 2

The OSI model and the TCP/IP model are two ways of thinking about how data moves across a network. The OSI model divides the process into seven layers, while the TCP/IP model divides it into four layers.

OSI model

1. Physical layer: This layer is responsible for the physical transmission of data over a network. It defines the electrical and mechanical specifications for the network, such as the type of cable, the connectors, and the voltage levels.

E.g.: -

This is the only tangible layer in the OSI model.

Coaxial cables, Fiber, Hubs, etc....

2. Data link layer: This layer is responsible for error detection and correction. It creates frames around the data to be transmitted, and it adds a checksum to each frame. The checksum is used to verify that the data was received without errors.

E.g.: -

Ethernet, PPP

3. Network layer: This layer is responsible for routing data from one network to another. It uses a routing table to determine the best path for the data to travel.

E.g.: -

IP, ICMP

4. Transport layer: This layer is responsible for providing a reliable connection between two hosts. It uses a variety of mechanisms to ensure that data is delivered correctly, such as sequence numbers and acknowledgments.

E.g.: -

TCP, UDP

5. Session layer: This layer is responsible for managing communication between two hosts. It establishes a session between the hosts, and it manages the flow of data between the hosts.

E.g.: -

Sockets, Win Socket

6. Presentation layer: This layer is responsible for formatting data for presentation to the user. It can encrypt data, compress data, and translate data between different formats.

E.g.: -

SSL, SSH

7. Application layer: This layer is the highest layer in the OSI model. It provides services to the user, such as file transfer, email, and web browsing.

E.g.: -

HTTP, FTP, IRC

TCP/IP

The TCP/IP model is a simpler model than the OSI model, and it is more commonly used in practice. The four layers of the TCP/IP model are:

1. **Physical layer:** This layer is responsible for the physical transmission of data over a network. It defines the electrical and mechanical specifications for the network, such as the type of cable, the connectors, and the voltage levels.
2. **Data link layer:** This layer is responsible for error detection and correction. It creates frames around the data to be transmitted, and it adds a checksum to each frame. The checksum is used to verify that the data was received without errors.
3. **Network layer:** This layer is responsible for routing data from one network to another. It uses a routing table to determine the best path for the data to travel.
4. **Transport layer:** This layer is responsible for providing a reliable connection between two hosts. It uses a variety of mechanisms to ensure that data is delivered correctly, such as sequence numbers and acknowledgments

The TCP/IP model and the OSI model are both useful tools for understanding how data moves across a network. The TCP/IP model is more commonly used in practice, but the OSI model is a more comprehensive model.

Question 3

The OSI model and the TCP/IP model are two different ways of thinking about how data moves across a network. The OSI model has seven layers, while the TCP/IP model has four layers.

The OSI model is designed with a clear separation of responsibilities, with each layer relying on the services provided by the layer below it. The TCP/IP model has a more integrated approach, where some functionalities of multiple OSI layers are combined into a single layer.

The OSI model was developed as a conceptual framework and standard by the International Organization for Standardization (ISO). It serves as a reference model for understanding and implementing network protocols. The TCP/IP model was developed based on the protocols used in the early development of the Internet. It has become the de facto standard for internet communication and is widely implemented.

While the OSI model provides a theoretical foundation for network communication, it is less commonly used in practice compared to the TCP/IP model. The TCP/IP model is extensively used and forms the basis of the modern internet. It is widely implemented in networking devices and systems.

In simpler terms, the OSI model and the TCP/IP model are like two different maps for data. The OSI model is a more detailed map, while the TCP/IP model is a more simplified map. The OSI model is used by network engineers to understand how data moves across a network, while the TCP/IP model is used by everyday users to connect to the internet.

Question 4

OSI model

<u>Advantages</u>	<u>Disadvantages</u>
Provides better understanding about how data moves through the network	Difficult to understand as the layered approach is much larger
Can be adapted to new networking technologies with ease	Industries widely use TCP/IP, so It is hard to find support in the Industry
Used as a reference model for a lot of academic purposes	

TCP/IP model

<u>Advantages</u>	<u>Disadvantages</u>
Very simple to understand and implement	No as comprehensive as the OSI model so it is difficult to map the data transfers like the OSI model
Widely used in the industries	Difficult to adapt to new networking technologies
Used as the foundation for the Internet. So widely used for Internet communication	Not widely used in Academics

Question 5

Guided media travels in a physical path making it easy to travel in for very long distances. Since guided media travels in a physical media, it is not susceptible for signal interferences making it very cost effective for long range communication. Due to the nature of transmission of data in a guided network it can transfer data at a high-speed relative to unguided media.

Unguided media on the other hand transfers data in every direction as there is no direct path for the data to travel this makes the data sent by guided media susceptible to environmental conditions such as interference (Even though interference can occur in guided media it is much lower relative to that of unguided media). Due to the nature of the data transfer in unguided media it is ideal for transferring data through short distances.

Question 7

Connection oriented

These protocols are used in scenarios where the data should be ensured to be transferred. These types of connections require the connection to be established between both parties before data transfer during this process the transmitter and the receiver both agree on the data to be sent and the data to be received.

These types of connections are used in applications where the data transfer reliability is important like email etc. ...

Connectionless

Connectionless protocols are used where the reliability of the data transfer is not important. These protocols do not ensure that the data will necessarily be transmitted but rather focuses on speed.

These types of connections are used in video streaming.

Question 8

Physical layer is the only layer in the OSI model that transfers data throughout the network. The upper layers provide that data that needs to be transmitted to the physical layer which then converts the data to a format that can be transmitted throughout the network. On the other side the physical layer also receives the transmitted data and passed it back to the upper layers of the OSI model. In summary physical layer interacts with the upper layers by providing a way to transmit data through the network.

Question 9

Data link layer is the second layer in the OSI model the ensures reliable data transfer between 2 nodes in the OSI model. It achieves this using various protocol's such as MAC address, Frame Protocols and Error detection and correction.

The below shown are some examples for protocols that operate in the data link layer.

- Ethernet is a popular way to connect devices in a local area network (LAN). It uses a shared medium, such as a coaxial cable or twisted pair cable, and a MAC protocol called Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to control access to the medium.
- Token Ring is another way to connect devices in a LAN. It uses a token-passing scheme to control access to the network. A token is a special frame that is passed around the ring. When a node wants to transmit data, it waits until it has the token. The node then adds its data to the token and transmits it.
- Wi-Fi is a wireless way to connect devices in a LAN. It uses radio waves to transmit data and a MAC protocol called CSMA/CA to control access to the wireless medium.
- PPP is a point-to-point protocol that is used to connect two devices directly. It uses a variety of compression and encryption mechanisms to improve performance and security.
- HDLC is a synchronous protocol that is used to connect two devices directly. It is a reliable protocol that can be used to transmit data over a variety of media.

Question 10

Network layer is the third layer of the OSI model which is responsible for routing data between different networks.

- Internet Protocol (IP): IP is a protocol that identifies and routes data between different networks. It is the most widely used protocol in the Network Layer.
- Internet Control Message Protocol (ICMP): ICMP is a protocol that sends control messages between devices on a network. It is used for tasks such as error reporting and network diagnostics.
- Address Resolution Protocol (ARP): ARP is a protocol that resolves IP addresses to physical addresses. This is necessary for devices to communicate with each other on a network.
- Reverse Address Resolution Protocol (RARP): RARP is a protocol that resolves physical addresses to IP addresses. This is necessary for

devices to obtain an IP address when they are first connected to a network.

- Routing protocols: Routing protocols are used to determine the best path for data to travel between different networks. Some examples of routing protocols include OSPF, RIP, and BGP.

Group members (Group 100)

Member	ID
K.G.S Sandeepa	28773
Danusha	29266
D.S Karunathilaka	27227
Kavundu Dilshan	28511
P.R.S Perera	29243
Dilshan Viduranga	28527
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