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Class Test-02

Question no: 01

- Define Data Link Layer. Write down the two sub-layers.
- Explain the functionality of Data-link Layer.
- Design a issues with Data link layer.

Question no: 02

- Describe the two sub layers of Data-link Layer
- Explain the relation between Data Link Layer and TCP/IP model.

Question no:03

- Discuss the three types of errors in Data-Link Layer.
- What is flow control? Write down the classified of flow control.
- Explain the techniques of flow control in Data Link Layer.

Question no:04

- Shortly describe the error control in Data Link Layer.
- Write down the ways of error control in Data Link Layer.
- Explain the ways of error controlling.

Question no: 05

- What is Network Layer? What is the function of network layers in OSI model?
- Write down the functionalities of Network Layer.
- Write down the Network Layer Features.

Question no: 06

- What happens at the network layer?
- What protocols are used at the network layer?
- How does cloudflare protect the network layer?

Question no: 07

- What are the network layers?
- How does Network Layers work?
- Design a issues with Network Layer.
- Which is not function of network layer? briefly discuss.

Question no:08

- a) What's the difference between a layer 2 and layer 3 network?
- b) Discuss the relation between Network Layer and TCP/IP model.
- c) What is the network layer concern with?

Ans to the question no:01(a)

The data link layer or layer 2 is the second layer of the seven-layer OSI model of computer network. This layer is the protocol layer that transfers data between nodes on a network segment across the physical layer.

The data link layer has two sub-layers:

- ① Logical link control (LLC)
- ② Media access control (MAC)

Ans to the question no:01(b)

Functions of Data Link Layer:

1. Framing: Frames are the streams of bits received from the network layer into manageable data

units. The division of stream of bits is done by Data Link Layer.

2. Physical Addressing: The Data Link Layer adds a header to the frame in order to define physical address of the sender or receiver of the frame, if the frames are to be distributed to different systems on the network.

3. Flow control: A flow control mechanism to avoid a fast transmitter from running a slow receiver by buffering the extra bit is provided by flow control.

4. Error control: Error control is achieved by adding a trailer at the end of the frame. Duplication of frames are also prevented by using this mechanism. Data Link Layers adds mechanism to prevent duplication frames.

b) Access Control: Protocols of the layers determine which of the services has control over the link at any given time, when two or more devices are connected to the same link.

Ans to the question no: 01(c)

Design issues with Data Link Layer:

* The issue that arises in the data link (and most of the layers as well) is how to keep a fast transmitter from drowning a slow receiver in data. Some traffic regulation mechanism is often needed to let the transmitter know how much buffer space the receiver has at the moment. Frequently the

flow regulation and the error handling are integrated.

* Broadcast networks have an additional issue in the data link layer. How to control access to the shared channel. A special sublayer of the data link layer, the Medium Access Control (MAC) sublayer, deals with this problem.

Ans to the question no: 02(a)

The data link layer has two sublayers.

Logical link control:

The uppermost sublayer, LLC multiplexes protocols running at the top of the data link layer, and optionally provides flow control, acknowledgement

and error notification. The LLC provides addressing and control of the data link. It specifies which mechanisms are to be used for addressing stations over the transmission medium and for controlling the data exchange between the originator and recipient machines.

Media access control:

MAC may refer to the sublayer that determines who is allowed to access the media at any one time. Other times it refers to a frame structure delivered based on MAC addresses inside.

There are generally two forms of media access

control distributed and centralized. Both of these may be compared to communication between people.

In a network made up of people speaking, i.e. a conversation, they will each pause a random amount of time and then attempt to speak again, effectively establishing a long and elaborate game of saying "no, you first."

The Media Access Control sublayer also performs frame synchronization, which determines the start and end of each frame of data in the transmission bitstream. It entails one of several methods: timing based detection, character counting, byte stuffing and bit stuffing.

Ans to the question no: 02(b)

In the internet protocol suite (TCP/IP), OSI's data link layer functionality is contained within its lowest layer, the link layer. The TCP/IP link layer has the operating scope of the link a host is connected to and only concerns itself with hardware issues to the point of obtaining hardware (MAC) addresses for locating hosts on the link and transmitting data frames onto the link. The link-layer functionality was described. The TCP/IP model is not a top-down

comprehensive design reference for networks. It was formulated for the purpose of illustrating the logical groups and scopes of functions needed in the design of the suite of internetworking protocols TCP/IP, as needed for the operation of the internet. TCP/IP does not dictate a strict hierarchical sequence of encapsulation requirements as is attributed to OSI protocols.

Ans to the question no: 03(a)

There are three types of errors:

single bit error:

sent

1	0	1	1	0	0	1	1
---	---	---	---	---	---	---	---

Received

1	0	1	1	0	1	1	1
---	---	---	---	---	---	---	---

In a frame, there is only one bit, anywhere though which is corrupt.

Multiple bit error:

sent

1	0	1	1	0	0	1	1
---	---	---	---	---	---	---	---

Received

1	0	1	0	1	1	1
---	---	---	---	---	---	---

Frame is received with more than one bits in corrupted state.

Bitset error:

sent

1	0	1	1	0	0	1	1
---	---	---	---	---	---	---	---

Received

1	1	0	0	1	1	1
---	---	---	---	---	---	---

Ans to the question no: 03(b)

Flow control: Flow control is a technique that allows two stations working at different speeds to communicate with each other. In data link layer, flow control restricts the number of frames the sender can send before it waits for an acknowledgment from the receiver.

The types of flow control are:

1. Stop and wait
2. Sliding window
3. Comparison
4. Transmit flow control
5. Open-loop flow control
6. Closed-loop flow control

Ans to the question no: 3 (c)

There are basically two types of techniques being developed to control the flow of data-

1. Stop-and-Wait Flow control: This method is the easiest and simplest form of flow control.

In this method, basically message or data is broken down into various multiple frames and then receiver indicates its readiness to receive frame of data. When acknowledgment is received, then only sender will send or transfer the next frame.

This process is continued until sender transmits EOT (End of Transmission) frame.

2. Sliding Window Flow Control: This method is required where reliable in order delivery of packets or frames is very much needed like in data link layer. It is point to point protocol that assumes that none of the other entity tries to communicate until current data or frame transfer get completed.

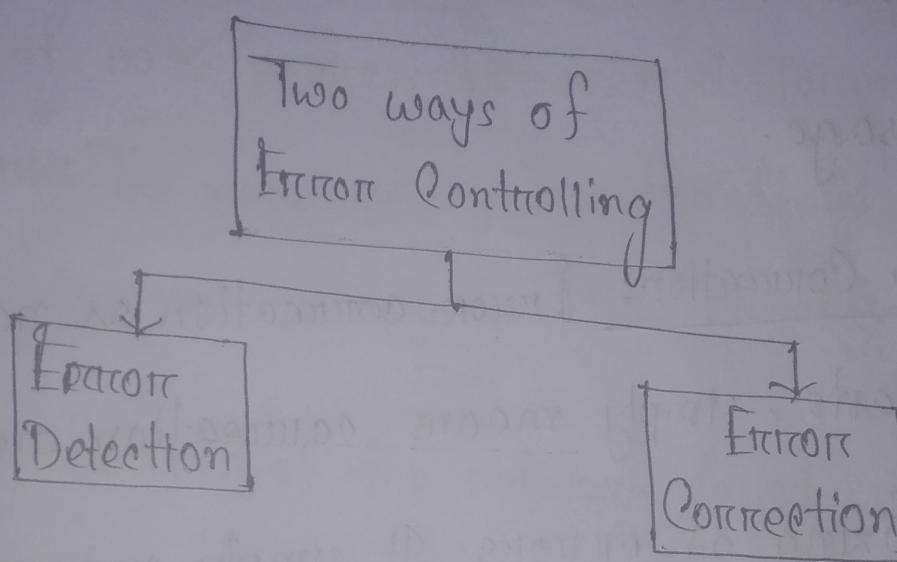
In this method sender transmits or sends various frames or packets before receiving any acknowledgment.

Ans to the question no: 04(a)

Error control in data link layer is the process of detecting and correcting data frames that have been corrupted or lost during transmission. In case of lost or corrupted frames, the receiver does not receive the correct data-frame and sender is ignorant about the loss.

Ans to the question no: 4(b)

There are basically two way of doing error control as give below:



Ans to the question no: 4(a)

The ways of error controlling are:

Error Detection: Error detection as name suggests, simply means detection or identification of errors.

These errors may cause due to noise or any

other impairments during transmission, from transmitter to the receiver, in communication system. It is class of technique for detecting garbled i.e. unclear and distorted data or message.

Error Correction: Error correction as name suggests, simply means correction or solving or fixing of errors. It simply means reconstruction and rehabilitation of original data that is error-free. But error correction method is very costly and very hard.

Ans to the question no: 5(a)

Network Layer: The network layer is a portion of online communications that allows for the connection and transfer of data packets between different devices or networks. The network layer is the third level of the Open Systems Interconnection Model (OSI Model).

The primary function of the network layer is to permit different networks to be interconnected. It does this by forwarding packets to network routers, which relay on algorithms to determine the best paths for the data to travel. These paths are known as virtual circuits.

Ans to the question no: 5(b)

Devices which work on Network Layer mainly focus on routing. Routing may include various tasks aimed to achieve a single goal. These can be:

- * Addressing devices and networks
- * Populating routing tables or static routes
- * Internetworking between two different subnets.
- * Delivering packets to destination with best efforts.
- * Provides connection oriented and connection less mechanism.

Ans to the question no:5(c)

With its standard functionalities, Layer 3 can provide various features are:

1. Quality of service management.
2. Load balancing and link management.
3. Security
4. Interrelation of different protocols and subnets with different schema.
5. Different logical network design over the physical network design.
6. LB VPN tunnels can be used to provide end to end dedicated connectivity.

Ans to the question no: 06(a)

Anything that has to do with inter-network connections take place at the network layer.

This includes setting up the routes for data packets to take, checking to see if a server

In another network is up and running and addressing and receiving IP packets from another networks. This last process is perhaps the most important, as the vast majority of internet traffic is sent over IP.

Ans to the question no: 06(b)

A protocol is an agreed-upon way of formating data so that two or more devices are able to communicate with and understand each other. A number of different protocols make connection, testing, routing and encryption possible at the network layer including:

- * IP
- * IPsec
- * ICMP
- * IGMP
- * GRE

Ans to the question no: 6(c)

Because they are exposed to the rest of the Internet, network layer infrastructure is vulnerable to external attacks, especially disrupted denial of service attacks. Routers, switches and other network interfaces can all be overwhelmed or compromised by malicious network traffic, and almost any of the above network protocols can be used in an attack.

Cloudflare Magic Transit protects networking infrastructure using the same technology

that keeps more than 25,000,000 web properties up and running in the face of vulnerability, exploits and DDoS attacks. It extends the protection of Cloudflare to on-premise and data center networks, keeping organizations secure from network layer attacks.

Ans to the question no; 07(a)

The primary function of the network layer is to permit different networks to be interconnected. It does this by forwarding packets to network routers, which rely on algorithms to determine the best paths for the data to travel.

Ans to the question no: 07(b)

As we talk through an example, keep in mind that the network layers models are not strictly linear. One layer doesn't finish its processes before the next one begins. Rather, they work in tandem.

Ans to the question no: 07(c)

Design issues with Network Layer:

- * A key design issue is determining how packets are routed from source to destination. Routers can be based on static tables that are wired into the network and rarely changed. They can also be highly dynamic.

- * If too many packets are present in the subnet at the same time, they will get into one another's way, forming bottlenecks. The control of such congestion also belongs to the network layer.
- * Moreover the quality of service provided is also a network layer issue.
- * When a packet has to travel from one network to another to get to its destination.
- * It is up to the network layer to overcome all these problems to allow heterogeneous networks to be interconnected.

Ans to the question no: 07(d)

In the OSI model, network layer is the third layer and it provides data routing paths for network communication. Error control is a function of the data link layer and the transport layer.

Ans to the question no: 08(a)

LAYER 2

1. Operate on layer 2 (Data link) of OSI model.
2. Send "frames" to destination on the basis of MAC address.
3. Work with MAC address

LAYER 3

1. Operate on layer 3 (Network Layer) of OSI model.
2. Router packet with help of IP address.
3. Can perform functions of both 2 layer and 3 layer switch.

LAYER 2

LAYER 3

- 4. Used to reduce traffic on local network.
- 5. It has single broadcast domain can communicate within a network only.
- 4. Mostly used to implement (Virtual VLAN (Virtual Local area network))
- 5. It ~~as~~ has multiple broadcast domain.
- 6. Can communicate within or outside network.

Ans to the question no: 08(b)

The TCP/IP model describes the protocols used by the internet. The TCP/IP model has a layer called the internet layer, located above the link layer. In many textbooks and other secondary references,

the TCP/IP Internet layer is equated with OSI network layer. However, this comparison is

misleading, as the allowed characteristics of

protocols (whatever they are connection-oriented or connection-less) placed into these layers

are different in two models. The TCP/IP Internet layer is in fact only a subset of

functionality of the network layer. It

describes only one type of network architecture, the internet,

Ans to the question no: 08(c)

In the OSI model, network layer is the third and it provides data routing paths for network communications. Error control is a function of data link layer and the transport layer. In computer networks the data from the application layer is sent to the transport layer and is converted to segments. These segments are then transferred to the network layer and these are called pack