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COURSE: WEB API

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ASSIGNMENT 1

1. **EXPLAIN THE OPEN SYSTEMS INTERCONNECTION (OSI) MODEL AND THE PROTOCOLS FOUND IN EVERY LAYER.**

The OSI model defines seven layers that computer systems use to communicate over a network and was the first standard model for network communications, adopted by all major computer and telecommunication companies in the early 1980s

This Model also outlines a logical network that describes computer packet transfer by using various layers of protocols.

Below is the brief history about the OSI Model

- In the late 1970s, the ISO conducted a program to develop general standards and methods of networking.
- In 1973, an Experimental Packet Switched System in the UK identified the requirement for defining the higher-level protocols.
- In the year 1983, OSI model was initially intended to be a detailed specification of actual interfaces.
- In 1984, the OSI architecture was formally adopted by ISO as an international standard

OSI model is a layered server architecture system in which each layer is defined according to a specific function to perform and these seven layers work collaboratively to transmit the data from one layer to another.

The OSI layers "top down" from the application layer that directly serves the end user, down to the physical layer are the following.

Layer 7 – Application Layer

The application layer is used by end-user software such as web browsers and email clients. It provides protocols that allow software to send and receive information and present data to users.

Protocols used in this layer are the HTTP, FTP, POP, SMTP, DNS, SNMP.

Layer 6 – Presentation Layer

This layer defines how two devices should encode, encrypt, and compress data so it is received correctly on the other end. The presentation layer takes any data transmitted by the application layer and prepares it for transmission over the session layer.

Protocols in this layer are MPEG, ASCH, SSL, TLS

Layer 5 – Session Layer

Session layer creates communication channels, called sessions, between devices. It ensures they remain open and functional while data is being transferred. It then closes them when communication ends. The session layer can also set checkpoints during a data transfer that is, if the session is interrupted, devices can resume data transfer from the last checkpoint.

The protocols are NetBIOS, SAP

Layer 4 – Transport Layer

The said layer takes data transferred in the session layer and breaks it into segments on the transmitting end.

It collects the segments on the receiving end, turning it back into data that can be used by the session layer. As the name imply, the transport layer carries out flow control, sending data at a rate that matches the connection speed of the receiving device, and error control, checking if data was received incorrectly and if not, requesting it again.

The protocols are TCP, UDP

Layer 3 – Network Layer

The layer stated has two main functions and these are;

i. Breaking up segments into network packets.

ii. Reassembling the packets on the receiving end.

The other is routing packets by discovering the best path across a physical network which uses network addresses to route packets to a destination node.

Protocols used here are IPV5, IPV6, ICMP, IPSEC, ARP, MPLS.

Layer 2 – Data Link Layer

The data link layer establishes and terminates a connection between two physically-connected nodes on a network. It breaks up packets into frames and sends them from source to destination.

This layer has two parts which are;

a. Logical Link Control (LLC), that finds network protocols, performs error checking and synchronizes frames,

b. Media Access Control (MAC) which uses MAC addresses to connect devices and define permissions to transmit and receive data.

The protocols are RAPA, PPP, Frame Relay, ATM, Fiber Cables, etc

Layer 1 – Physical Layer

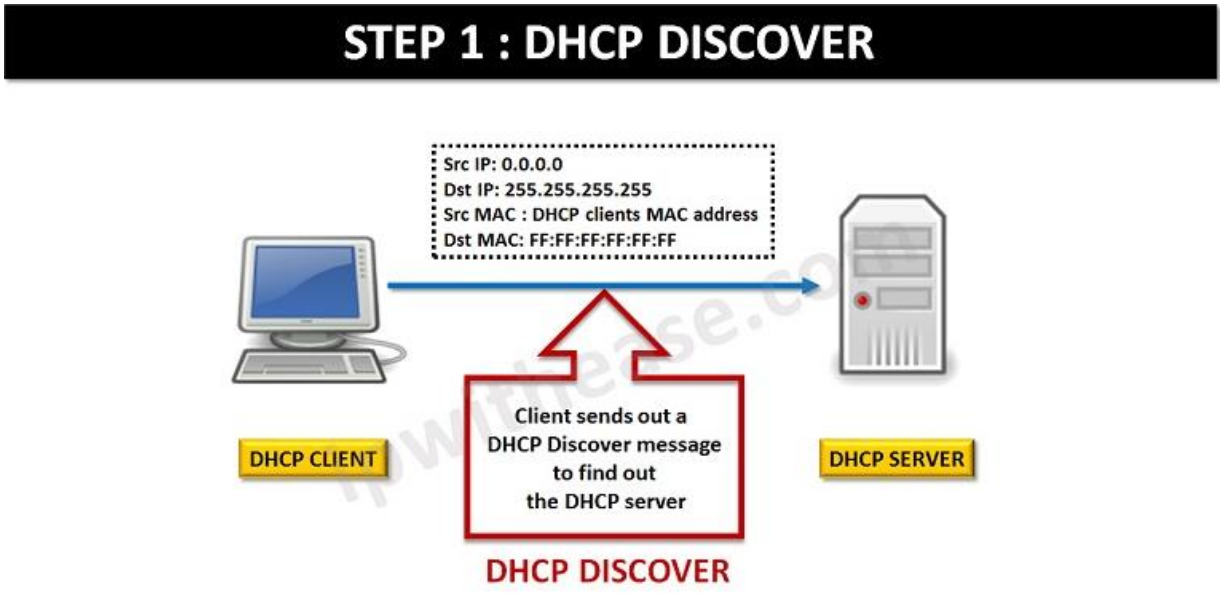
This layer is purely responsible for the physical cable or wireless connection between network nodes. It describes the connector, the electrical cable or wireless technology connecting the devices, and is responsible for transmission of the raw data, which is simply a series of 0s and 1s, while taking care of bit rate control.

Protocols in this layer are RS232, 100BaseTX, ISDN, 11.

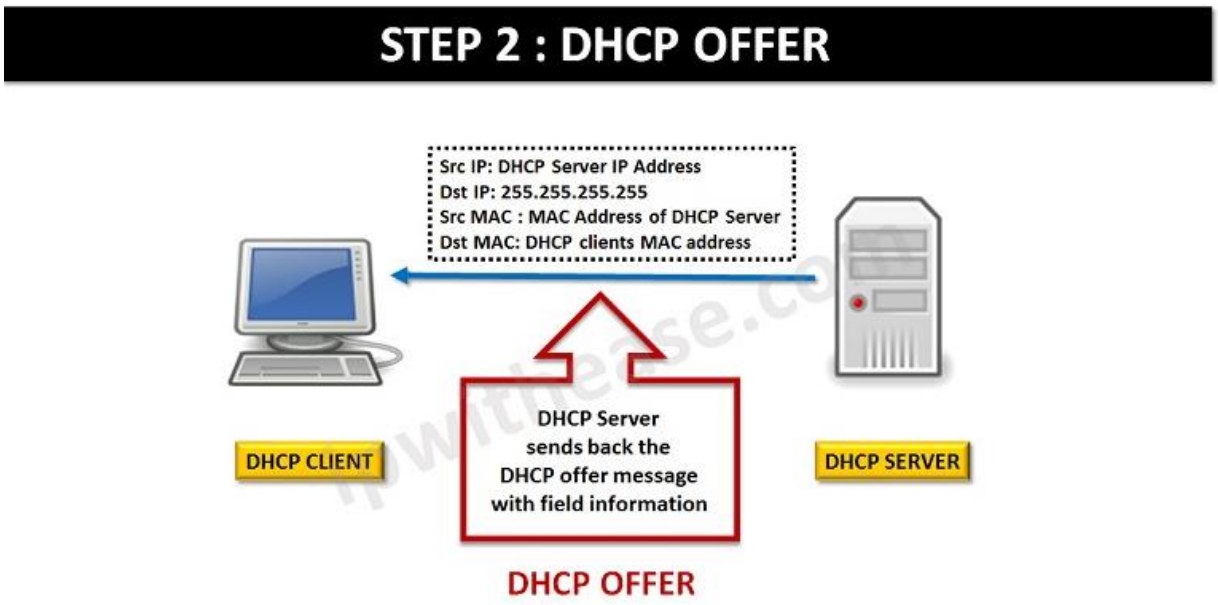
2. EXPLAIN DORA, GIVE EXAMPLE AND HOW IT WORKS.

Before you understand DORA, you need to also know about DHCP which is used to provide IP addresses to client/host computers in a network.
DORA is the sequence of messages exchanged between a DHCP server and a client which is also used to obtain an IP Address using DHCP.
It has four main stages which are Discover, Offer, Request and Acknowledge.

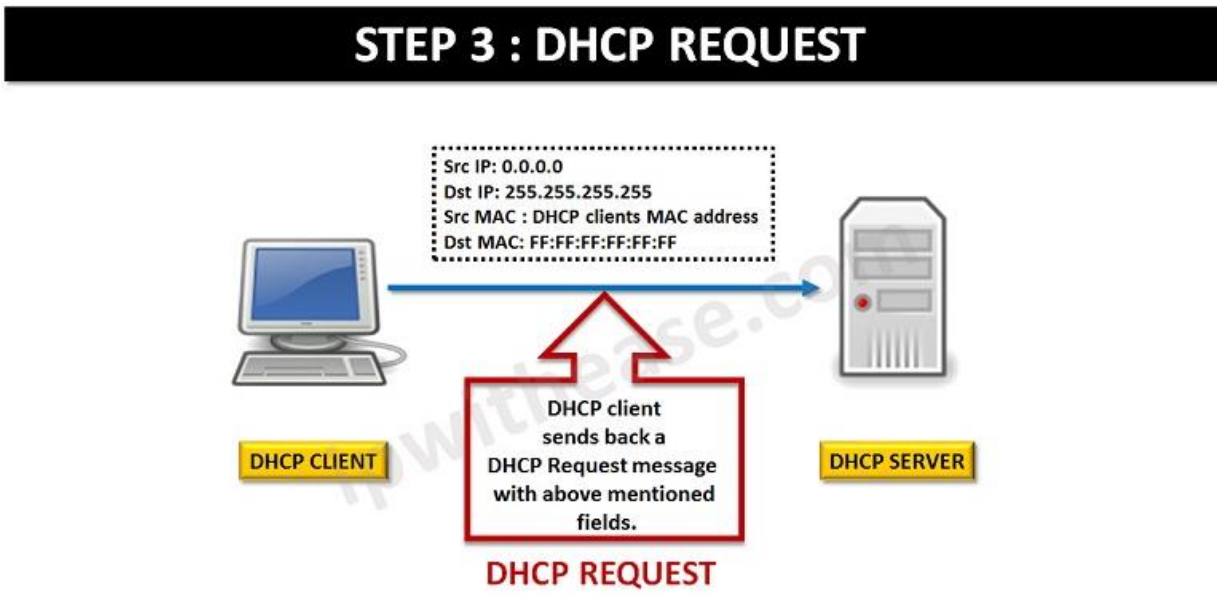
Discover is the first message sent by a DHCP client to search for a DHCP server in the network and is broadcast on the network and data link layer.



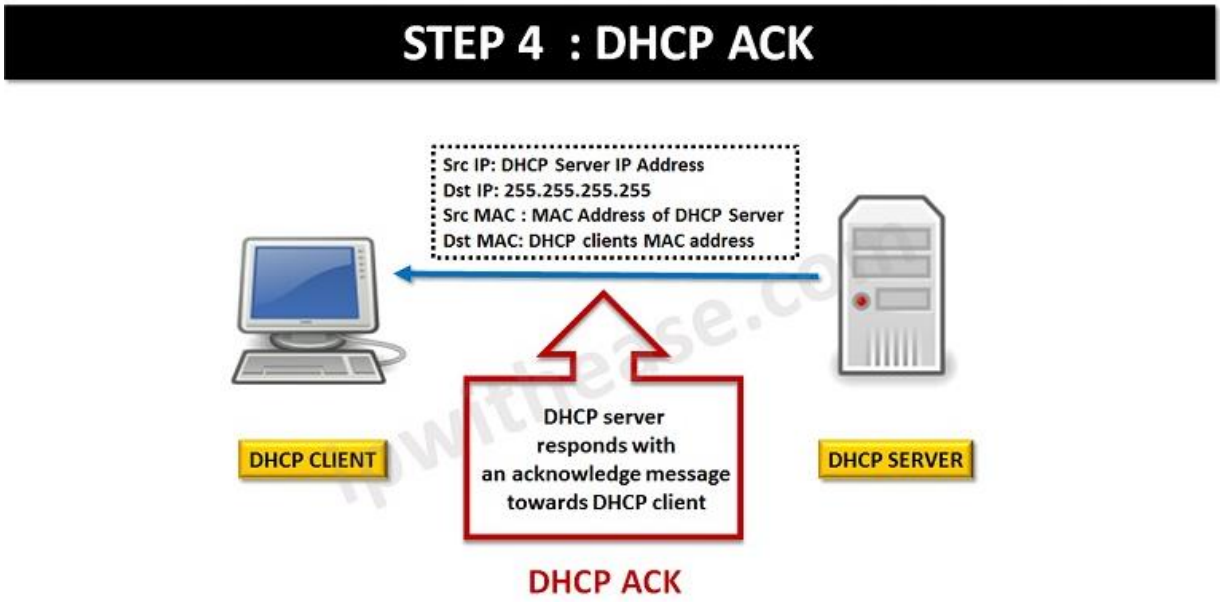
Offer is when the DHCP server sends the DHCP offer message to the DHCP client. In this message, the DHCP server provides an IP address to the DHCP client. This message is Unicast on the data link layer but is broadcast on the network layer.



Request is the message sent from the DHCP client to the DHCP server to request for IP address. This message is direct on the data link layer but is broadcast on the network layer.



Acknowledge is the last message of the DHCP DORA process where DHCP server sends message to the DHCP client.



Below is an example