CSE421

Lab-02

Homework Questions on

*HTTP, ARP, TCP, Email and DNS*

1. What is the main difference between ARP and DNS requests?

Answer: ARP (Address Resolution Protocol) is used to map an IP address to a MAC address, while DNS (Domain Name System) is used to map a domain name to an IP address.

1. By checking which section of a TCP packet one can identify if it is a TCP packet for opening the connection or closing the connection? Explain how?

Answer: The flags section of a TCP packet is used to indicate the purpose of the packet. The SYN flag is used to initiate a connection, while the FIN flag is used to terminate a connection. Therefore, by checking the flags section of a TCP packet, one can identify if it is a TCP packet for opening or closing the connection.

1. How can you resolve an ARP IP Address to an Ethernet MAC address?

Answer: To resolve an ARP IP Address to an Ethernet MAC address, the device can broadcast an ARP request packet to the local network asking for the MAC address of the device with the specific IP address. The device with the matching IP address will respond with its MAC address.

1. How does a router help the communication and interchange of information between a pc from a network with a web server from a different network?

Answer: A router connects different networks and forwards data packets between them. When a PC from one network wants to communicate with a web server from a different network, the router forwards the data packets from the PC to the web server and vice versa.

1. Suppose, you want to access facebook.com and your PC does not know its local DNS server. Which protocol between ARP and DNS will be executed first and why?

Answer: DNS will be executed first as it is used to map domain names to IP addresses. ARP is used to map IP addresses to MAC addresses and is only necessary for devices on the same local network.

1. For the same scenario mentioned above, what will be the destination/target IP address?

Answer: The destination/target IP address will be the IP address of the DNS server that is responsible for resolving the domain name of facebook.com.

1. After establishing a connection with the local DNS server PC1 now knows the IP and MAC addresses of PC2. Suppose PC1 [IP Address: 192.168.2.1, MAC Address: 0010.1191.A946] is sending an ARP packet to PC2 [IP Address: 192.168.2.2, MAC Address: 0110.1290.AD23]. What will be written in the target MAC address before the packet reaches PC2.

Answer: The target MAC address will be the MAC address of PC2, which is 0110.1290.AD23.

1. How can you tell the difference between an ARP request packet and an ARP reply packet as the Ethernet type field on both packets is identical?

Answer: ARP request packets have a specific opcode value of 1, while ARP reply packets have a specific opcode value of 2. By checking the opcode value in the ARP packet, one can identify if it is an ARP request or an ARP reply.

1. What is HTTP response and in which layer of OSI model does HTTP work?

Answer: An HTTP response is the data sent by a web server to a client in response to an HTTP request. HTTP works in the application layer of the OSI model.

1. If the flag section of the TCP packet contains 00010000, what type of TCP packet will that be?

Answer: It is a TCP ACK packet.

1. How many TCP packets does the Client PC send to the server in the process of an HTTP request?

Answer: A client PC sends multiple TCP packets to the server in the process of an HTTP request, including a SYN packet to initiate the connection, one or more data packets containing the actual HTTP request, and a FIN packet to close the connection when the request is complete.

1. Why does email need both SMTP and POP3 protocols? And how do they work together?

Answer: SMTP is used for sending email messages, while POP3 is used for retrieving email messages from a server. They work together to enable the complete process of sending and receiving email messages.

1. In a TCP packet coming back from the server, the sequence number is written as 1 and the acknowledgement is written as 1. What do you understand from this scenario? Explain.

Answer: In a TCP packet, the sequence number is the byte number of the first data byte in the segment, and the acknowledgement number is the next expected sequence number. When a packet comes back from the server with a sequence number of 1 and an acknowledgement number of 1, it means that the server has received the first byte of data and is expecting the second byte. The acknowledgement number means that the client is expecting the second byte.

1. Why is it necessary to map an IP address to a MAC address? Why can't the Ip address be used to represent the MAC address?

Answer: IP addresses are used to identify devices on a network, while MAC addresses are used to identify the unique hardware addresses of the devices. The IP address is used to route data packets between devices, while the MAC address is used to identify the specific device that should receive the data packet.

1. In an outbound PDU packet, what does source port: 1025 and destination port: 80 means?

Answer: In an outbound PDU packet, port 1025 represents the port number used by the sender to send the packet, while port 80 represents the port number used by the receiver to receive the packet.

1. How does your laptop know it’s local DNS server?

Answer: It would be received from the ISP by configuring the DHCP in the router.