



CSE 421: COMPUTER NETWORKS

Lab 02 Homework

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CSE421

Lab-02

Homework Questions on

HTTP, ARP, TCP, Email and DNS

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

Ans: ARP (Address Resolution Protocol) and DNS (Domain Name System) are both network protocols used to resolve addresses, but they operate at different network layers and serve different purposes. ARP is used to map IP addresses to MAC addresses on a local network, while DNS is used to map domain names to IP addresses on the Internet.

2. 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?

Ans: To identify if a TCP packet is for opening or closing a connection, we need to examine the TCP flags field in the TCP header. The SYN flag set to 1 in the TCP header of the first packet sent by the client indicates the opening of a connection, and the FIN flag set to 1 in the TCP header of the packet sent by the client indicates the closing of a connection.

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

Ans: One way to resolve an ARP IP address to an Ethernet MAC address is to use the ping command on a local network. The device asks for the MAC address linked to the IP address using ARP, and gets the MAC address back as a response.

4. 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?

Ans: By directing traffic and performing address translation, a router facilitates communication and information exchange between a PC from one network and a web server from another network.

5. 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?

Ans: ARP will be executed first since a PC has to know the MAC address of the network's default gateway (router) before it can submit any DNS requests to determine the IP address

of facebook.com. To do this, packet transfers on a local network will use ARP, while DNS is not required but makes things simpler by translating domain names to IP addresses online.

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

Ans: The default gateway (router) on the local network's IP address will be the destination/target IP address. This is due to the fact that PC must first send a DNS query packet to the router because it does not yet know the IP address of facebook.com.

7. 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.

Ans: Before the ARP packet reaches PC2, the target MAC address in the packet will be the MAC address of the local default gateway or router in the network.

8. 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?

Ans: The Opcode field in an ARP request packet and an ARP reply packet distinguishes them from one another. This field's value in an ARP request packet is 1, while its value in an ARP reply packet is 2. The Opcode field describes the kind of operation the sender is carrying out.

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

Ans: An HTTP response is the data a server sends back to a client (such as a web browser) after receiving an HTTP request. HTTP works in the application layer (layer 7) of the OSI model.

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

Ans: If the flag section of the TCP packet contains 00010000, it is a TCP acknowledgement packet.

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

Ans: Upon making an HTTP request, the client PC sends the server a number of TCP packets. The precise number of packets delivered is dependent on a variety of factors, including the

quantity of the data being sent, the state of the network, and the TCP/IP implementation being used. In a typical HTTP request/response exchange, at least three packets are involved: a SYN packet, an ACK packet, and a data packet carrying the HTTP request.

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

Ans: SMTP and POP3 protocols are required for email since they serve different purposes during the communication process. Emails are transferred from the sender's device to the recipient's mail server via the SMTP (Simple Mail Transmission Protocol) protocol. POP3 (Post Office Protocol version 3) is in charge of getting emails off the receiver's mail server and onto the receiver's device. They work together by using different ports and directions of communication. POP3 pulls emails from the mail server, whereas SMTP pushes emails to the mail server.

13. 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.

Ans: A sequence number of 1 and an acknowledgement of 1 in a TCP packet from the server indicates that the server has received the first byte of data from the client and is acknowledging it. This guarantees consistent data flow between the server and client.

14. 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?

Ans: Because MAC addresses identify devices based on their hardware address but IP addresses identify devices based on their network location, it is essential to map an IP address to a MAC address. It is important to utilize ARP to map IP addresses to the matching MAC addresses because IP addresses can't be used to determine a device's hardware address.

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

Ans: The sending application communicates over port 1025, while the receiving application listens on port 80 for HTTP traffic.

16. How does your laptop know it's local DNS server?

Ans: The information provided by the DHCP server during network configuration allows the laptop to identify its local DNS server.