1. Capture and analyze ARP packets using Wireshark. Inspect the ARP request and reply frames when your device attempts to find the router's MAC address.

Discuss the importance of ARP in packet forwarding.

ARP REQUEST:

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ARP REPLY:

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IMPORTANCE OF ARP IN PACKET FORWARDING:

**MAC Address Resolution**:

* ARP is essential for mapping IP addresses to MAC addresses, enabling packet delivery within a local network.

**Facilitating Communication**:

* Without ARP, devices wouldn’t know the MAC address of the next-hop gateway (router), preventing network communication.

**Efficient Packet Forwarding**:

* Once resolved, MAC addresses are cached, reducing unnecessary ARP requests and improving efficiency.

**Security Considerations**:

* ARP spoofing/poisoning attacks can compromise network security. Tools like **Gratuitous ARP** and **Dynamic ARP Inspection (DAI)** help mitigate risks.

2. Manually configure static routes on a router to direct packets to different subnets.

Use the ip route command and verify connectivity using ping and traceroute.

Ping and traceroute command successful on PC0

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Ping and traceroute command successful on PC1

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SHOW IP ROUTE COMMAND IN ROUTER 0

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SHOW IP ROUTE COMMAND IN ROUTER 1

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NETWORK TOPOLOGY

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3. Given a network address of 10.0.0.0/24, divide it into 4 equal subnets.

Calculate the new subnet mask.

Determine the valid host range for each subnet

Assign IP addresses to devices in Packet Tracer and verify connectivity.

A notebook with writing on it

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Ping and traceroute to check connectivity

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ROUTER INTERFCE STATUS

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4.You are given three IP addresses: 192.168.10.5, 172.20.15.1, and 8.8.8.8.

Identify the class of each IP address.

Determine if it is private or public.

Explain how NAT would handle a private IP when accessing the internet.

|  |  |  |
| --- | --- | --- |
| 192.168.10.5 | ->192 | **->Class C->Private->Falls within 192.168.0.0 – 192.168.255.255** |

-

|  |  |  |
| --- | --- | --- |
| 172.20.15.1 | ->172 | **->Class B->Private->Falls within 172.16.0.0 – 172.31.255.255** |

|  |  |  |
| --- | --- | --- |
| 8.8.8.8 | ->8 | **->Class A->Public->Not in any private IP range, belongs to Google DNS** |

5. In Cisco Packet Tracer, configure NAT on a router to allow internal devices (192.168.1.x) to access the internet.

Test connectivity by pinging an external public IP.

Capture the traffic in Wireshark and analyze the source IP before and after NAT translation.

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