

EE450 Lab 2

June 3rd, 2019



Burning Questions

- How does a host/router get the MAC address of another host/router on the same LAN?
 - Answer: Address Resolution Protocol: ARP
- How does a host get the IP address of another host across the Internet?
 - Answer : Domain Name Services: DNS
- How does a host get it's own IP address?
 - Answer: Dynamic Host Configuration Protocol (DHCP)
- How do we distinguish between two or more applications running on the same host?
 - Answer: Port Numbers/Sockets

How does a Host get an IP address?

- Answer: Dynamic Host Configuration Protocol (DHCP)

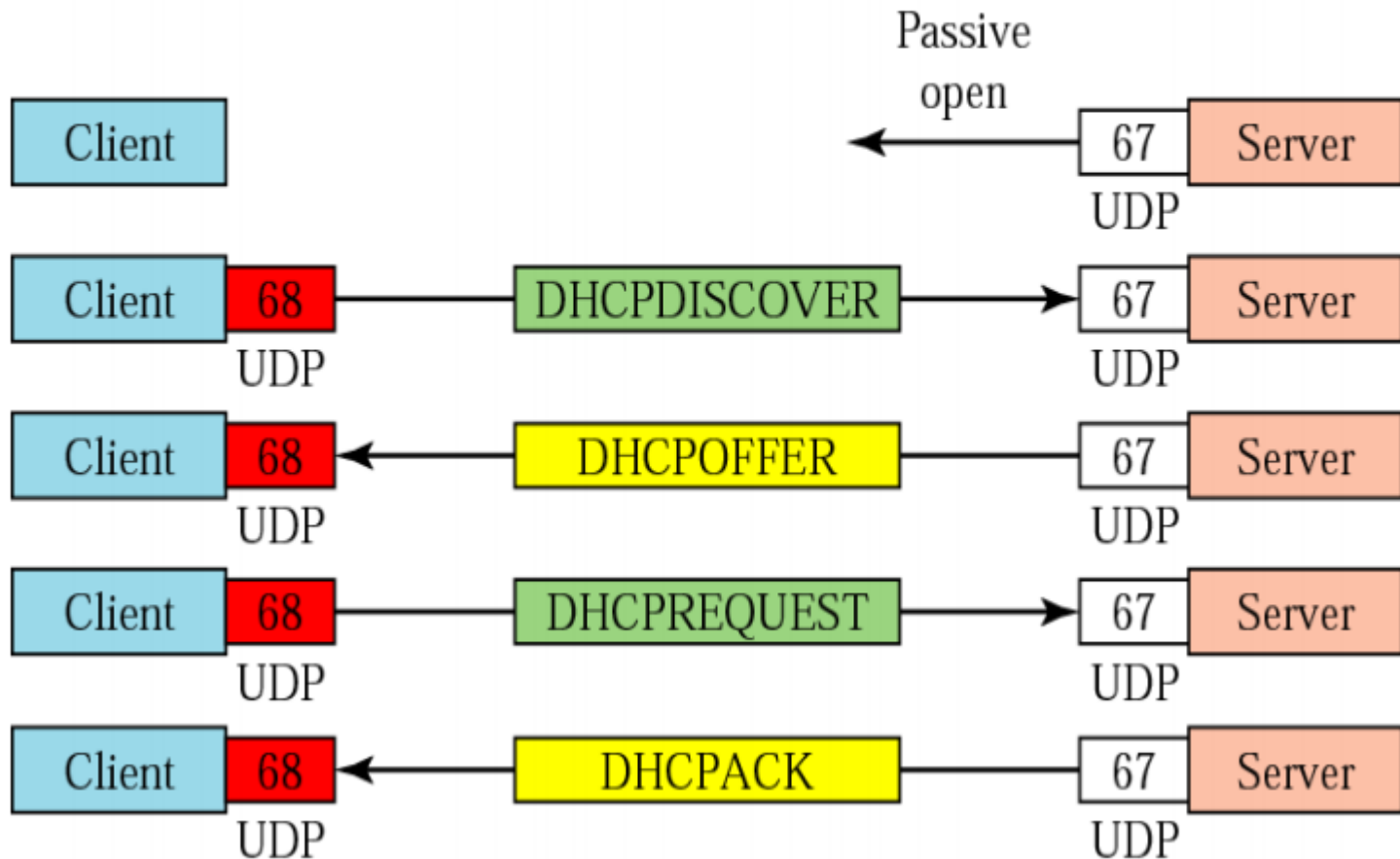
Host Configuration

- Problem of managing IP addresses within a customer network
 - Assigning IP address
 - Reclaiming IP addresses
- Manual management of IP addresses is difficult
 - Error-prone
 - Mobility of hosts

Dynamic Host Configuration Protocol (DHCP)

- DHCP is a client/server application designed to provide a centralized approach to configuring and maintaining IP addresses
- Four basic steps involved in obtaining an IP address:
 - Discovery Phase
 - Offer Phase
 - Request Phase
 - Acknowledgement Phase

DHCP Exchange Messages



New client, N will go to the **discovery phase** (initiated by N) to discover the DHCP server's IP address. There can be multiple DHCP servers in the company. There is a pool of IP addresses inside each DHCP server; some IPs are permanent and some temporary

In the following figure, the client can be connected to the network by cable, DSL, etc. In any case, the DHCP server may be located in the same network, or can be on some other network

Offer Phase:

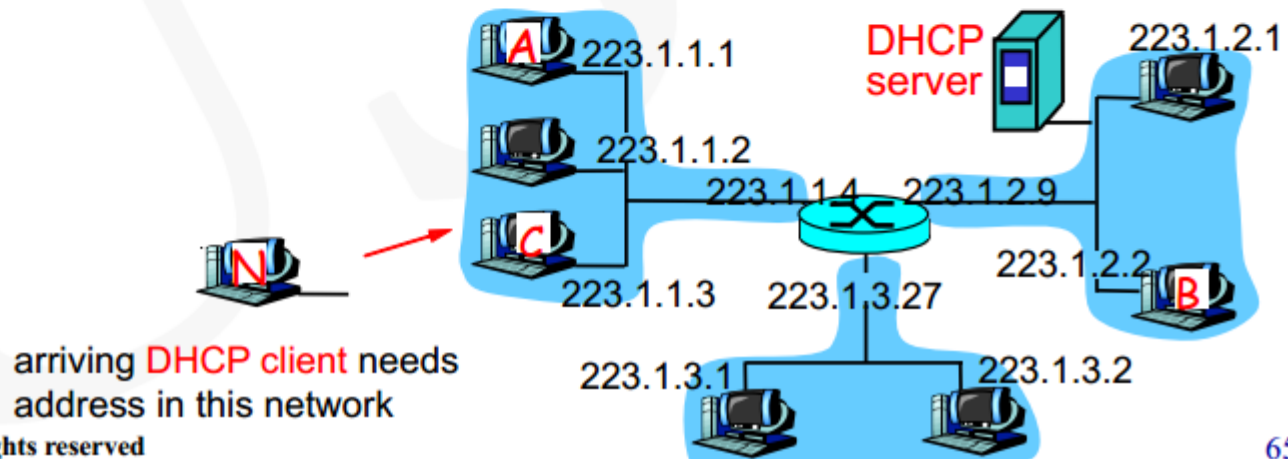
- DHCP server will send (offer) an IP address to the host which requested it (here N) in the offer phase
- **Offer phase** packet by DHCP server: source IP address is DHCP's IP, and destination's IP address is still 255.255.255.255
- However inside the offer message: DHCP server offers N the IP address x.y.z.w and a lease time, e.g., 24 hours
- This is just an offer, now if N wants it, it needs to request it
- Note that multiple DHCP servers may respond to N, so N will have multiple offers with possibly different lease times

- **Request phase:** The new client (N) sends a packet (broadcasts the request) in case N received multiple DHCP offers; however if there was only one offer, then destination IP address is the DHCP server's IP address
- In case of multiple DHCP offers, N needs to broadcast the request to let all DHCP servers know which offer N is choosing, so that other DHCP servers whose offers, N did not select, can take the IP address they offered to N, back to the pool of the available IP addresses
- The frame is broadcasted
- The request message that N sends implies that N likes the offer (IP address: x.y.z.w with the offered lease time,) however the IP is not N's yet. DHCP needs to send an acknowledgement to N, and then that IP is finally N's

- **ACK-phase** is by the DHCP server. The packet has source IP address of DHCP server and destination is still a broadcast address. The message implies to N that the IP address that was offered and N requested is given to N. N can then start using that certain IP

DHCP Sever and New Client on Different Networks

- The new client's discovery packet (that was broadcasted) won't be received by the DHCP server, but the router receives the message that N is trying to discover DHCP server's IP
- The router then relays the message but unicasts the message to the DHCP server, because the router has the IP address of the DHCP server that is configured in it
- The DHCP replies, then the router relays that to N, so it's as if the router is a proxy router standing in btm N and DHCP server
- Most of the times the DHCP service is implemented in the router itself, meaning the router will assign the hosts, the IP addresses



DHCP Client-Server Scenario

It is possible multiple hosts request IP addresses simultaneously, so a transaction ID is required (a random number chosen by the client, used by the client and server to associate messages and responses b/n them)

DHCP offer is then broadcasted as well, and it echoes the transaction ID

In DHCP request: Myaddr: 223.1.2.4, means N wants it

In DHCP ACK: Myaddr: 223.1.2.4 means it's N's IP from now on

