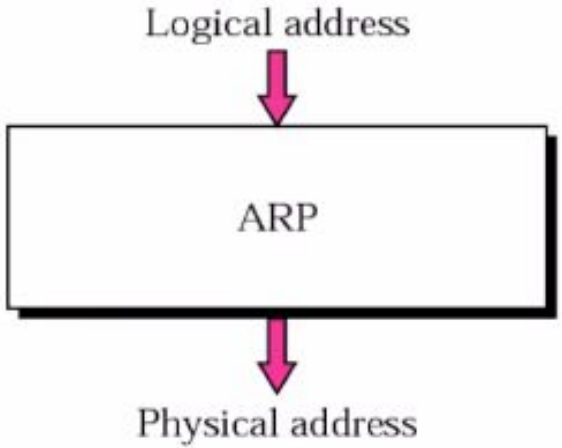
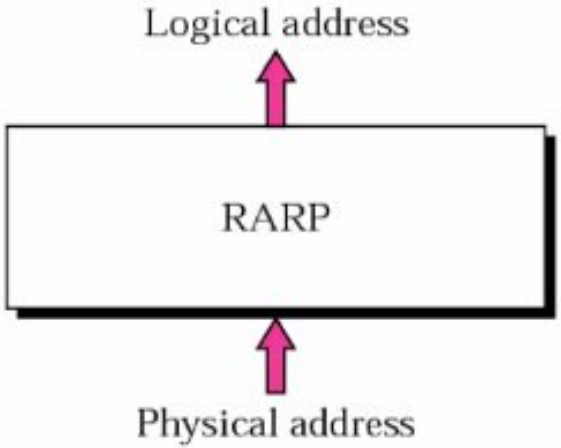
Dynamic Host Configuration Protocol (DHCP)

IT304 COMPUTER NETWORKS

ARP (Address Resolution Protocol)

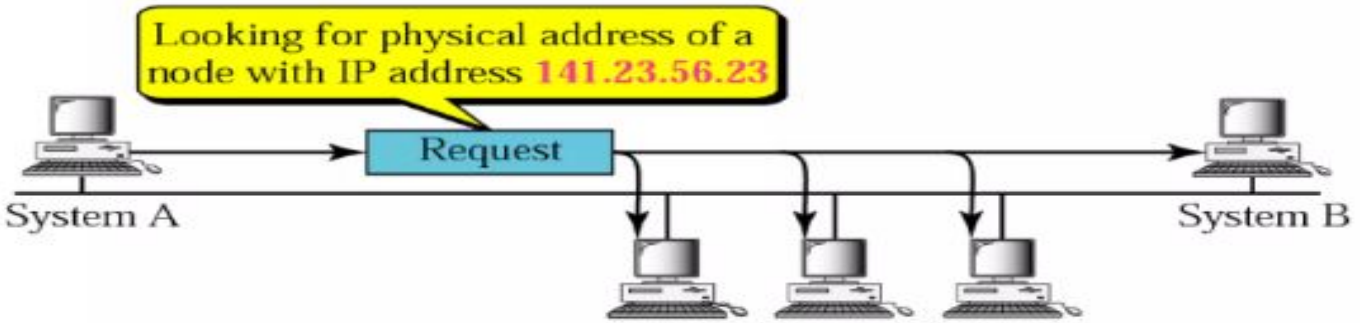




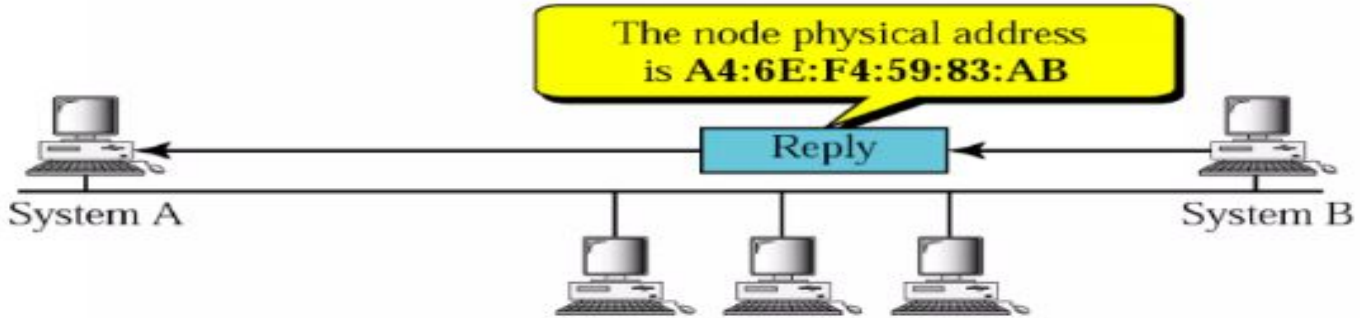
ARP (Con.)

- ARP associates an **IP address** with its **physical address**. On a typical physical network, such as a LAN, each device on a link is identified by a physical or station address that is usually imprinted on the NIC.

- Logical address to physical address translation can be done statically (not practical) or dynamically (with ARP).



a. ARP request is broadcast



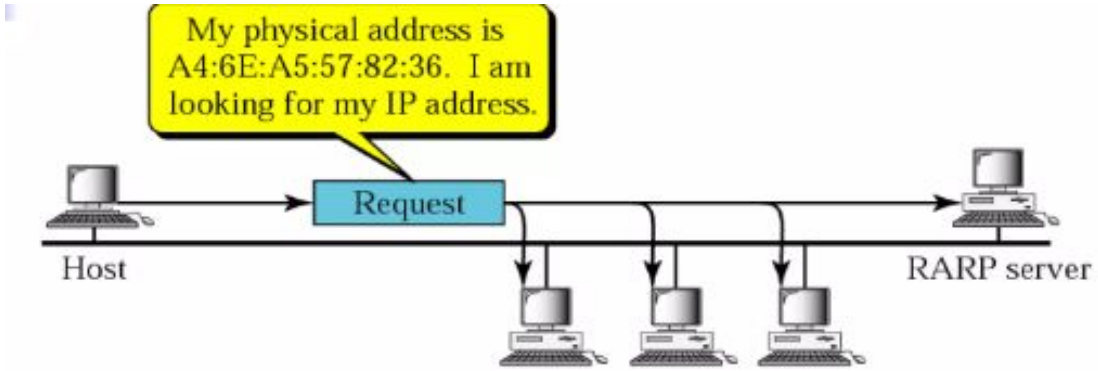
b. ARP reply is unicast

RARP (Reverse ARP)

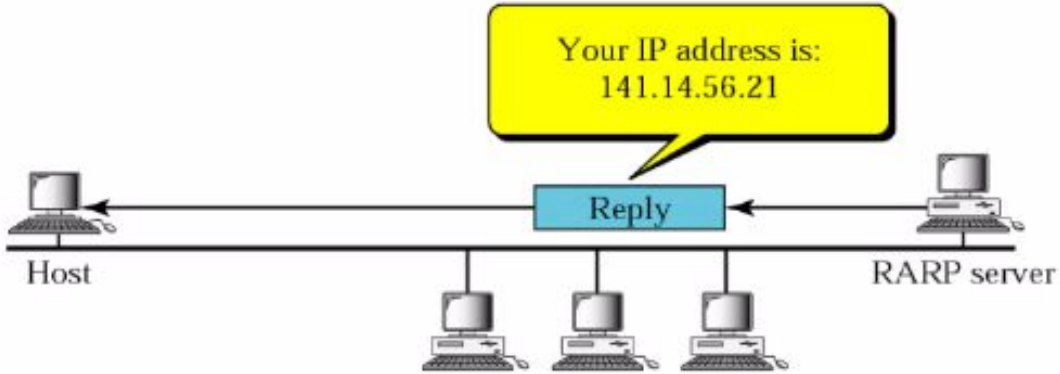
- RARP finds the logical address for a machine that only knows its physical address.

- This if often encountered on thin-client workstations. No disk, so when machine is booted, it needs to know its IP address (don't want to burn the IP address into the ROM).

- RARP requests are broadcast, RARP replies are unicast.



a. RARP request is broadcast



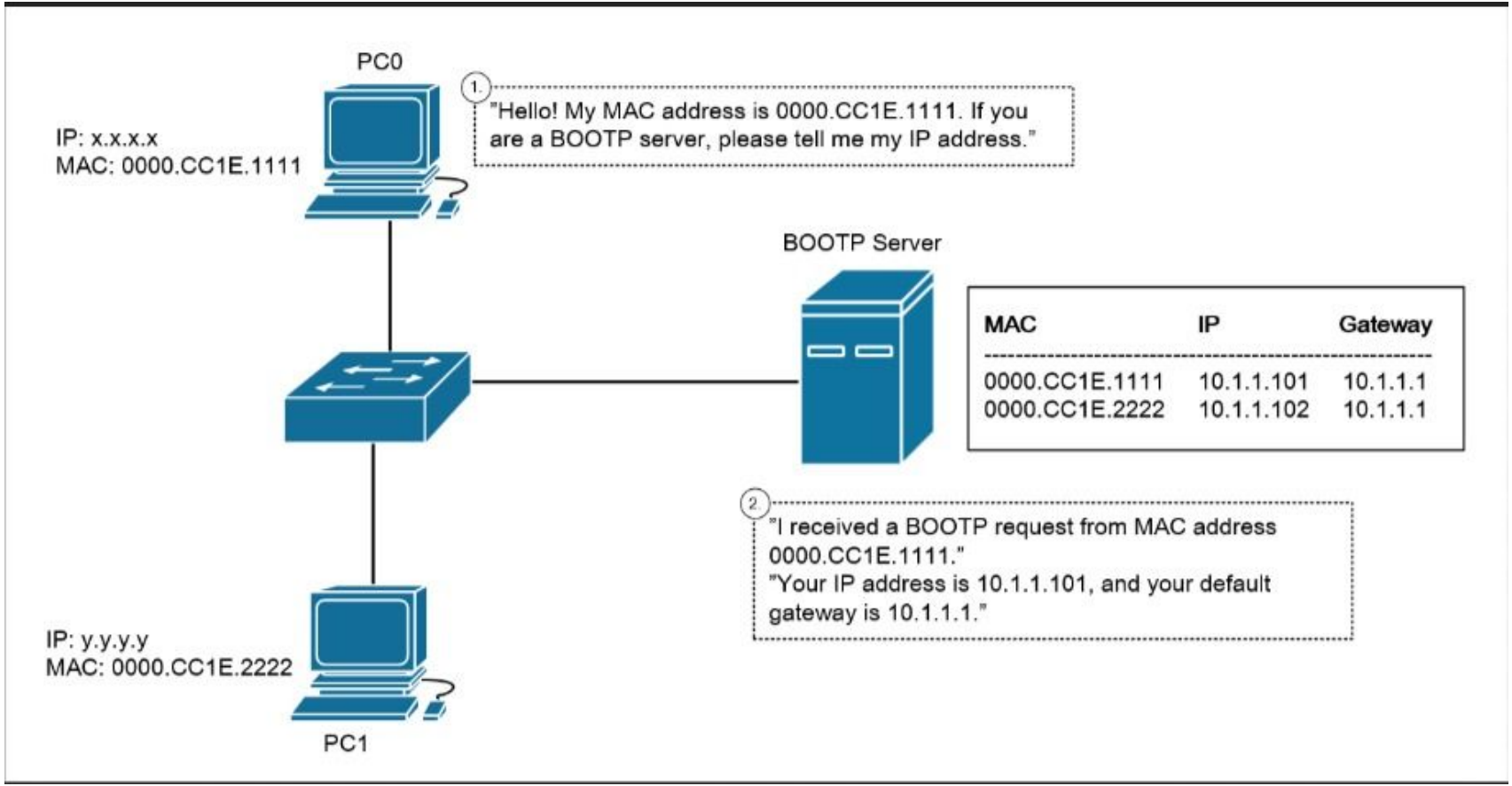
b. RARP reply is unicast

BootP (Bootstrap Protocol)

- **BOOTP (Bootstrap Protocol) is an internet protocol that lets a network user automatically be configured to receive an IP address and have an operating system booted without user involvement.**

- **The BOOTP server, managed by a network administrator, automatically assigns the IP address from a pool of addresses for a certain duration of time.**

- **Today, BOOTP is executed using User Datagram Protocol (UDP) and is the basis for Dynamic Host Configuration Protocol (DHCP).**


PC0
IP: x.x.x.x
MAC: 0000.CC1E.1111
1.
"Hello! My MAC address is 0000.CC1E.1111. If you are a BOOTP server, please tell me my IP address."
BOOTP Server
MAC IP Gateway
0000.CC1E.1111 10.1.1.101 10.1.1.1
0000.CC1E.2222 10.1.1.102 10.1.1.1
2.
"I received a BOOTP request from MAC address 0000.CC1E.1111."
"Your IP address is 10.1.1.101, and your default gateway is 10.1.1.1."
IP: y.y.y.y
MAC: 0000.CC1E.2222
PC1

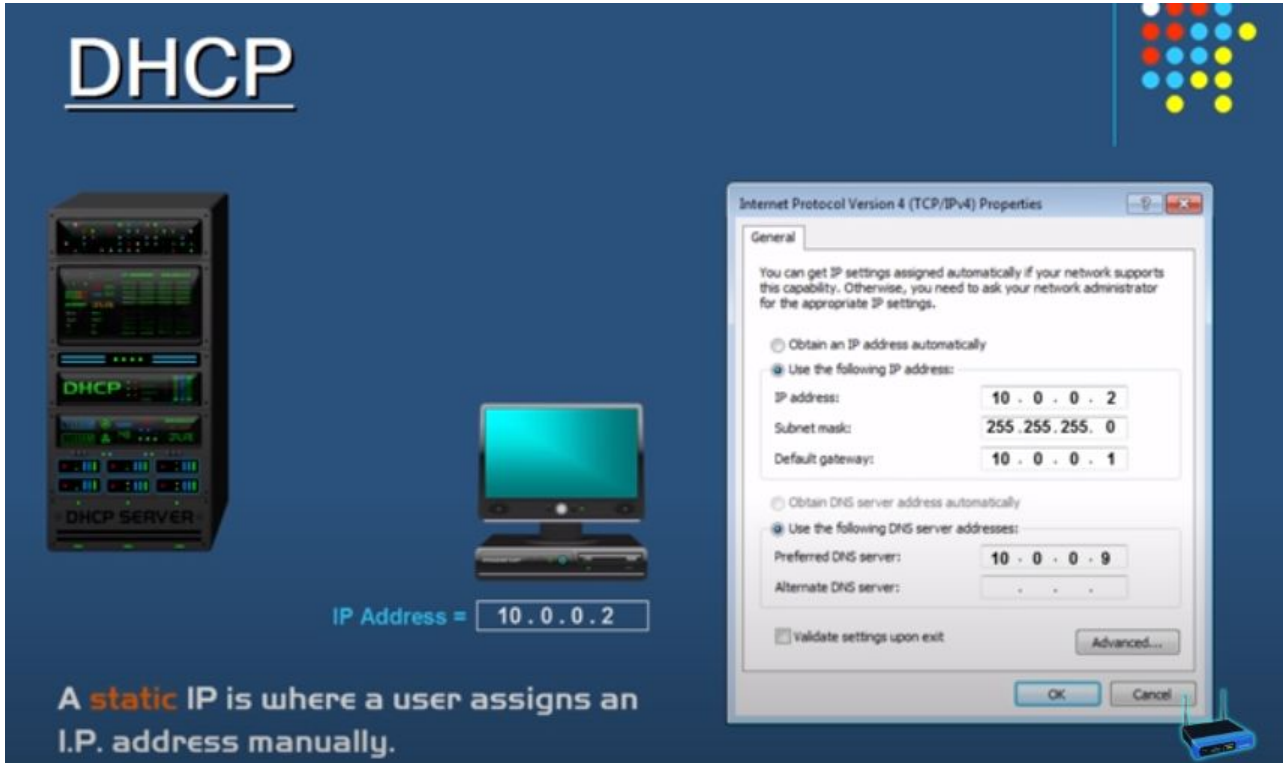
DHCP (Dynamic Host Configuration Protocol)

- DHCP Stands for Dynamic Host Configuration Protocol

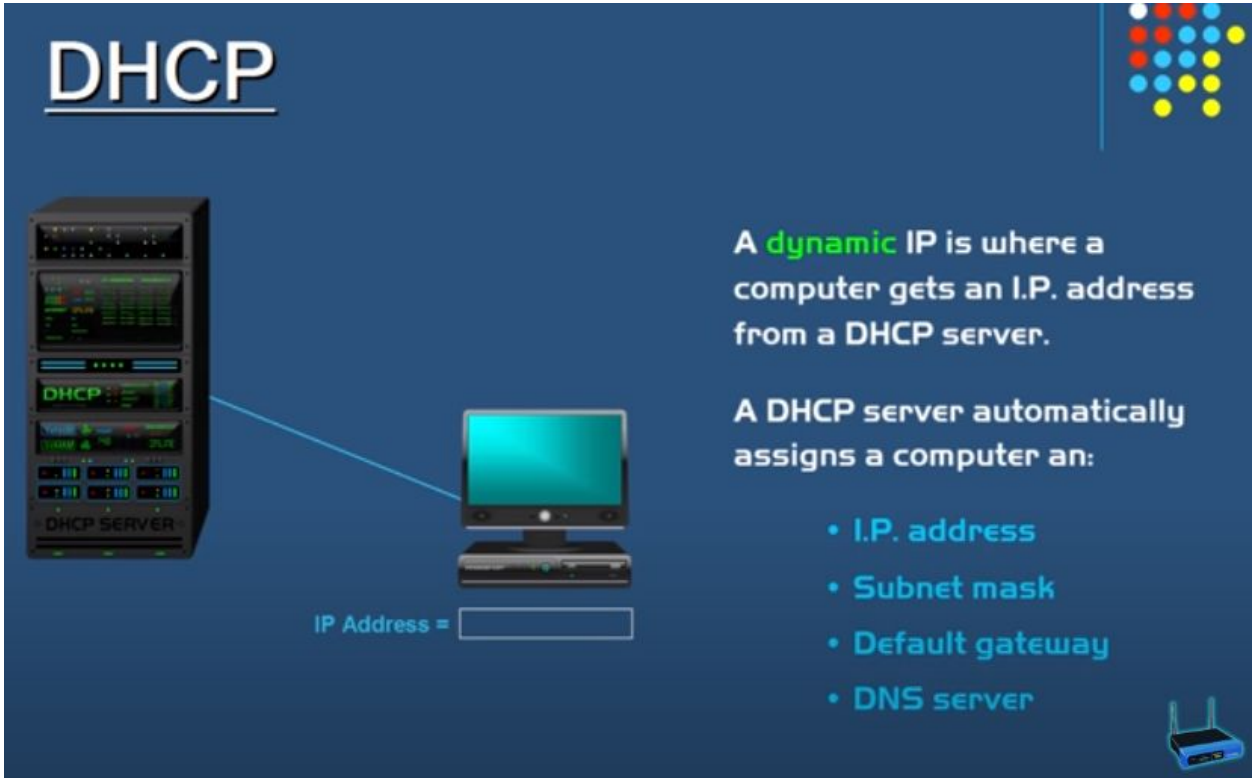
- DHCP is a protocol that automatically provides an IP host with its IP address and other related configuration information (subnet mask default gateway DNS etc.)

- Works on Protocol UDP port no 67 and 68.

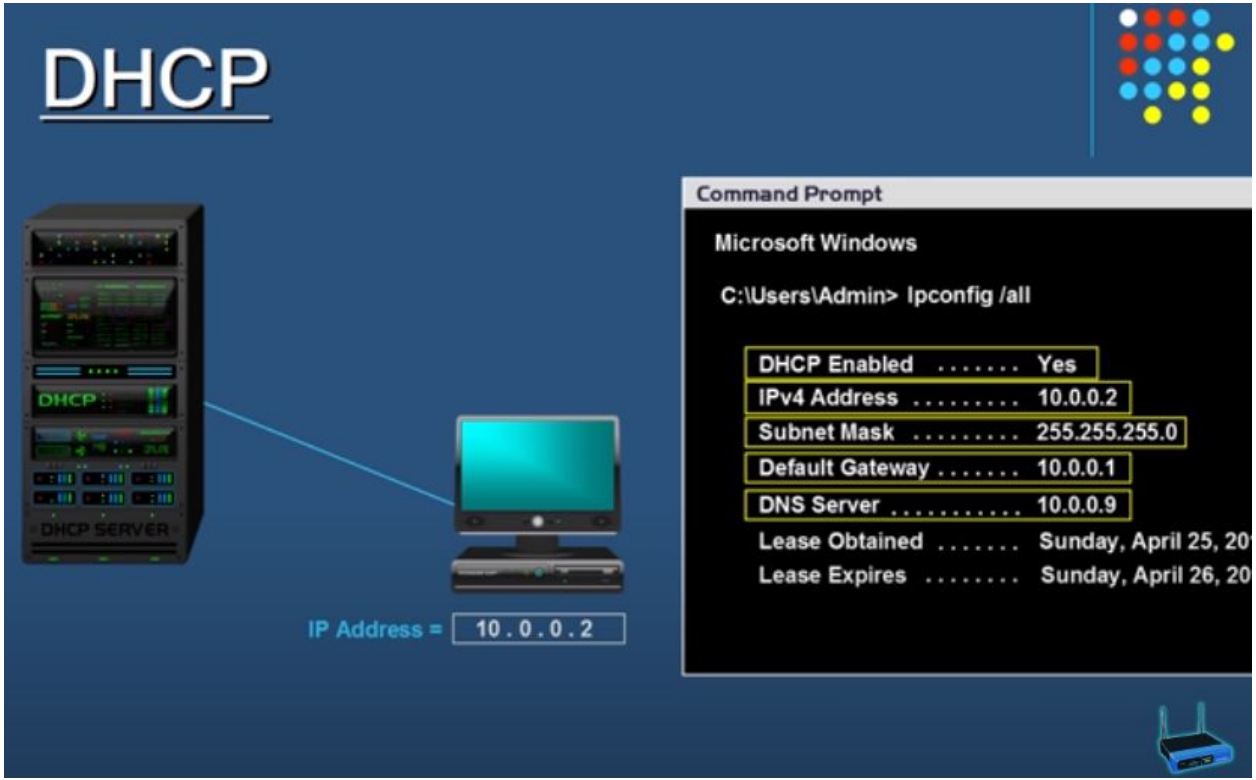
Static IP


DHCP
DHCP
DHCP SERVER
IP Address = 10.0.0.2
A static IP is where a user assigns an I.P. address manually.
Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 10 . 0 . 0 . 2
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 10 . 0 . 0 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 10 . 0 . 0 . 9
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel

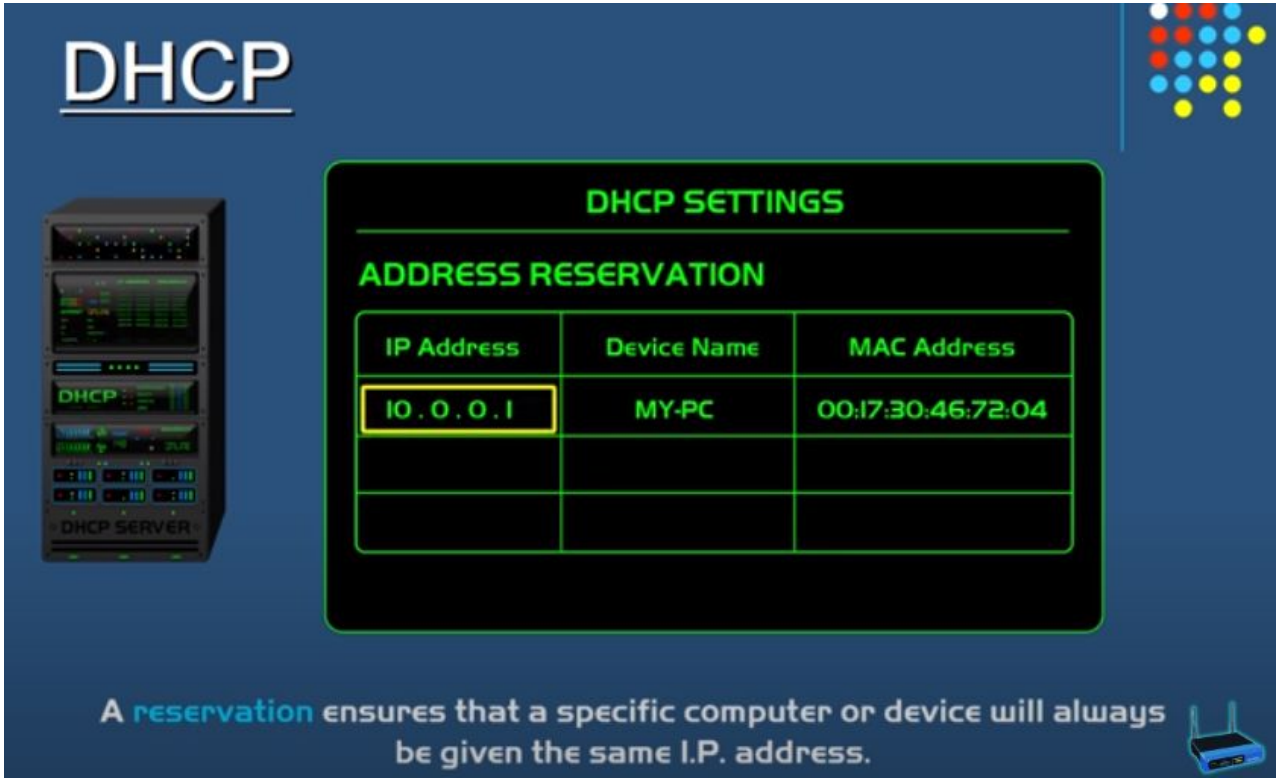
Dynamic IP


DHCP
DHCP
DHCP SERVER
IP Address =
A dynamic IP is where a computer gets an I.P. address from a DHCP server.
A DHCP server automatically assigns a computer an:
• I.P. address
• Subnet mask
• Default gateway
• DNS server

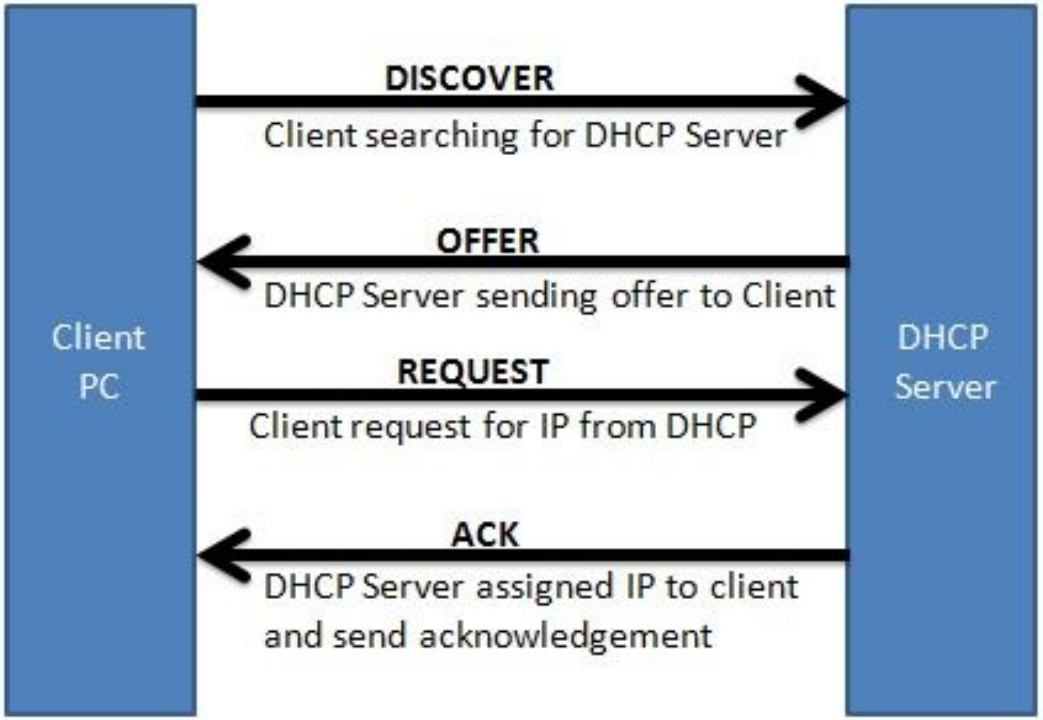
Dynamic IP


DHCP
DHCP
DHCP SERVER
IP Address = 10 . 0 . 0 . 2
Command Prompt
Microsoft Windows
C:\Users\Admin> Ipconfig /all
DHCP Enabled . . . . . Yes
IPv4 Address 10.0.0.2
Subnet Mask 255.255.255.0
Default Gateway 10.0.0.1
DNS Server 10.0.0.9
Lease Obtained . . . . . Sunday, April 25, 20
Lease Expires . . . . . Sunday, April 26, 20

Reservation of IP in DHCP



DHCP Working Flow



DHCP Message Types

DHCP Message	Use
DHCPDISCOVER	Client broadcast to locate available servers
DHCPOFFER	Server to client response offering configuration parameters
DHCPREQUEST	Client broadcast requesting offered parameters
DHCPDECLINE	Client to server notification that IP address is in use
DHCPACK	Server to client response confirming a request
DHCPNAK	Server to client response denying a request
DHCPRELEASE	Client to server request to relinquish IP address
DHCPINFORM	Client to server request for configuration parameters

DHCP Client Table

Client Name	Interface	IP Address	MAC Address	Expires Time
WirelessComp-02	Wireless	192.168.1.117	68:09:27:38:D1:67	23:11:26
WirelessComp-01	Wireless	192.168.1.149	C0:C1:C0:5B:8E:63	19:26:17
Computer-02	LAN	192.168.1.143	E0:69:95:C7:0C:75	19:54:28

Advantages of DHCP

- To implement DHCP requires no additional costs.
- Duplicated IP addresses are prevented.
- Reduces the amount of time you spend configuring computers on your network.
- DHCP servers only allocate IP addresses to clients when they request them.

Questions :

(1) What service is DHCP an extension of?

A. TFTP
B. BOOTP
C. RARP
D. DNS

(2) What is the function of ARP?

A. Find the hardware address of destination.
B. Find the IP address of destination.
C. Find the hardware address of source.
D. Find the IP address of source.

Questions :

(3) What happens to the IP address if the client has not received an extension?

A. DHCPOFFER is sent
B. DHCPNAK is sent from the server
C. The client drops the IP
D. DHCPDISCOVER is sent from the server

(4) What is used for the first 24 bits of a hardware address?

A. IP address
B. Vendor Code
C. Serial number
D. Network portion

Questions :

(5) Who controls/configures DHCP servers?

A. Router software
B. Network administrators
C. Clients through DHCP options
D. Microsoft personnel

(6) What is DHCP?

A. Creates IP pools to conserve address
B. Used to configure PCs over the network
C. Assigns configuration info dynamically
D. All of the above