

Introduction to TCP/IP

# My PC's Internet & Gateway

Prof. Jong-Moon Chung

Introduction to TCP/IP

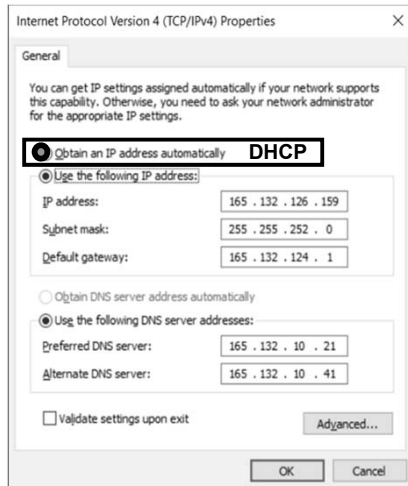
My PC's Internet & Gateway

## Automatic Internet Setup using DHCP

(Dynamic Host Configuration Protocol)

## DHCP (Dynamic Host Configuration Protocol)

### DHCP (Dynamic Host Configuration Protocol)



- DHCP enables a Computer/Smartphone to automatically contact the local DHCP Server and request for an IP address and networking parameters to connect to the Internet

## DHCP (Dynamic Host Configuration Protocol)

### DHCP Characteristics

- Local DHCP Server must exist
- When DHCP is used, setup is automatic, so there is no need to contact the local network administrator to have the Internet connection setup manually
  - This is why mobile devices commonly use DHCP
- DHCP is used for IPv4 and IPv6 connections

## DHCP (Dynamic Host Configuration Protocol)

### DHCP Services

- To enable Internet access, the DHCP Server dynamically assigns the following
  - IP Address (for your PC or Smartphone)
  - Subnet Mask
  - Default Gateway's IP Address
  - DNS Server's IP Address
  - and other Internet configuration parameters

## DHCP (Dynamic Host Configuration Protocol)

### Importance of DHCP

- DHCP is so easy to use ➔ All Automatic
- DHCP enables reuse of IP addresses
  - Only a Computer/Smartphone that needs Internet connection at that time is assigned an IP address to use
  - After the Internet connection ends, that IP address can be reused by another device
    - Effective for Subnets

## DHCP (Dynamic Host Configuration Protocol)

### Importance of DHCP

- Reuse of IP addresses is especially important for IPv4 networks (due to shortage in IPv4 addresses)
  - IPv4 IP addresses are 32 bits long
  - $2^{32} < 4.3$  Billion IP addresses
  - Currently there are much more than 4.3 Billion device interfaces connected to the Internet
  - This is why DHCP and IPv6 are needed!

## DHCP (Dynamic Host Configuration Protocol)

### DHCP Operations

- DHCP operates on a Client-Server model
- DHCP server manages the following
  - Pool of IP Addresses
  - Client (e.g., PC, Smartphone) information is kept on the DHCP server
    - ✓ Default Gateway
    - ✓ Domain Name
    - ✓ Name Servers
    - ✓ Time Servers

## DHCP (Dynamic Host Configuration Protocol)

### DHCP Setup Messages & Operation

1. Client (e.g., Computer, Smartphone, etc.) connects to the network
2. DHCP uses UDP (User Datagram Protocol) with Client port 68 and DHCP Server port 67
3. Client's DHCP program broadcasts a "Server Discovery" message requesting for network information

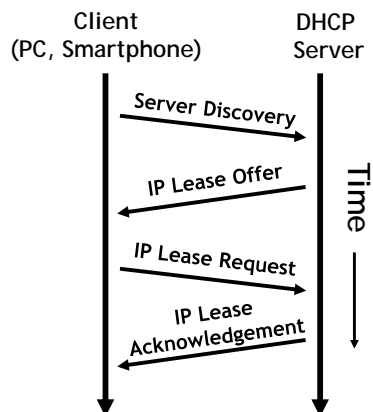
## DHCP (Dynamic Host Configuration Protocol)

### DHCP Setup Messages & Operation

4. Any DHCP Server on the network can provide service by replying an "IP Lease Offer" message to the Client
5. Client will send an "IP Lease Request" back to the DHCP Server that sent the "IP Lease Offer" message
6. That DHCP Server will send back an "IP Lease Acknowledgement" enabling use of an IP Address and network parameters for a limited time duration

## DHCP (Dynamic Host Configuration Protocol)

### DHCP Setup Messages & Operation



## DHCP (Dynamic Host Configuration Protocol)

### DHCP Setup Messages & Operation

- When a Client tries to Reconnect to the Internet
  - If a Computers/Smartphone needs an IP address again, the DHCP Server tries to give the same IP address that was used before by that Computer/Smartphone
  - However, a different IP address may be assigned if that IP address is being used by some other device or due to the Network Administrator's assignment policies

## Introduction to TCP/IP

### My PC's Internet & Gateway

1. My PC's Internet Setup
  - IP Address, Subnet Mask, Default Gateway, DNS Server
2. Automatic Internet Setup using DHCP
  - DHCP (Dynamic Host Config. Protocol)
3. IP Gateway/Router Configuration
  - IP Address Assignment
  - Subnet & Subnet Mask Setup
4. IP Routing Table