Introduction to TCP/IP

My PC's Internet & Gateway

Prof. Jong-Moon Chung

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

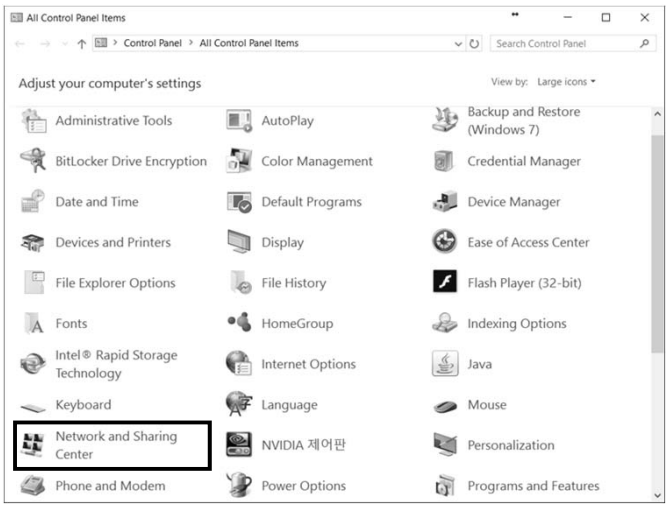
Introduction to TCP/IP

My PC's Internet & Gateway

My PC's Internet Setup

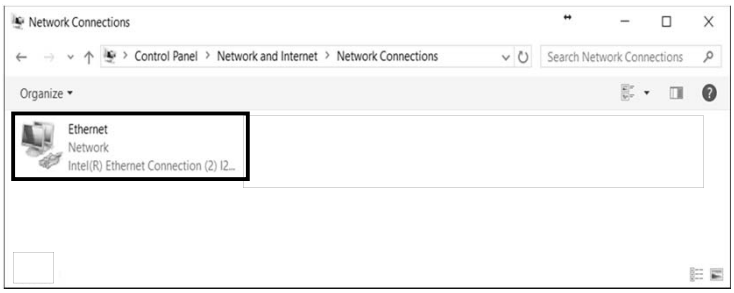
IPv4 Network Connection Setup

Control Panel



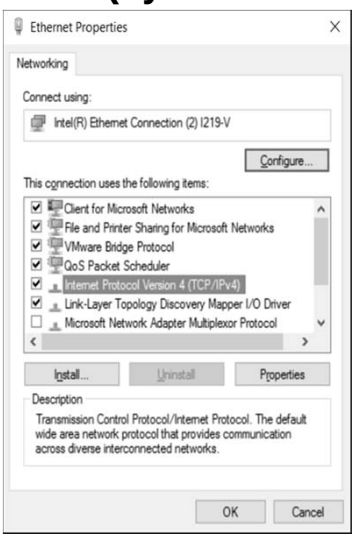
IPv4 Network Connection Setup

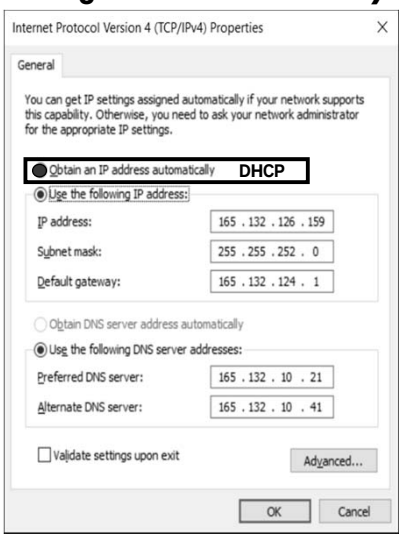
Network Connection



IPv4 Network Connection Setup

DHCP (Dynamic Host Configuration Protocol)





IPv4 Network Connection Setup

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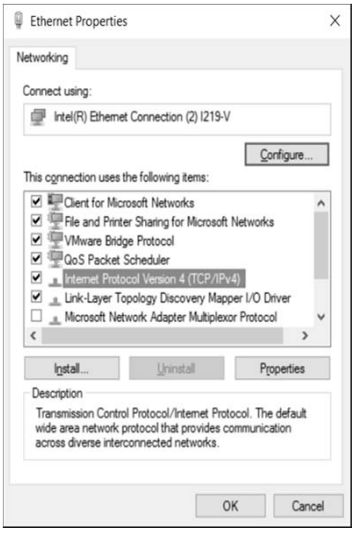
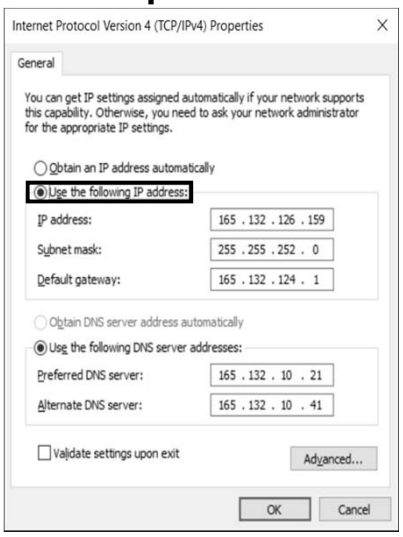
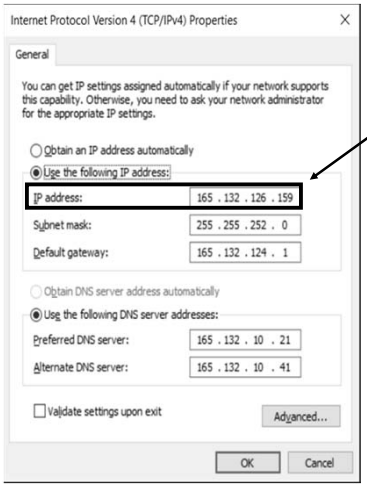




IPv4 Network Connection Setup

IP Address



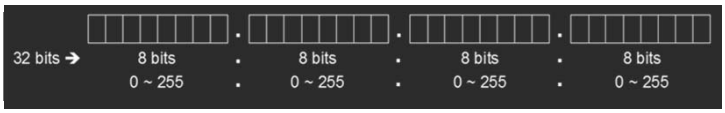
- IP Address is assigned to an Interface port

- PC's Internet Interface IP Address

165.132.126.159

- IPv4 32 bit (4 byte) address format

8 bits: 00000000 ~ 11111111 = 0 ~ 255



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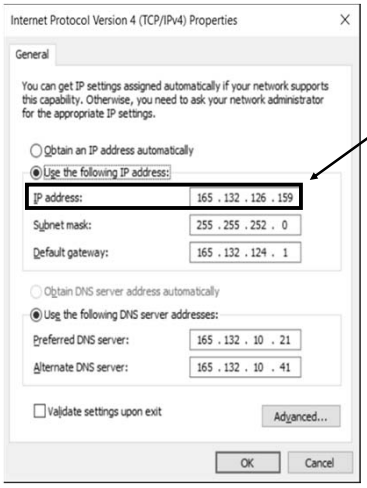
IPv4 Network Connection Setup

IP Address



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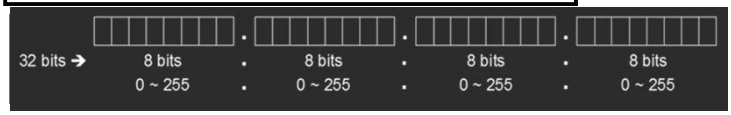

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IPv4 Network Connection Setup

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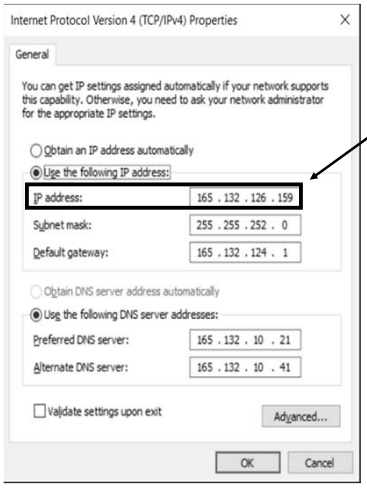

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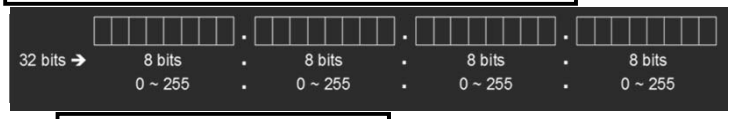

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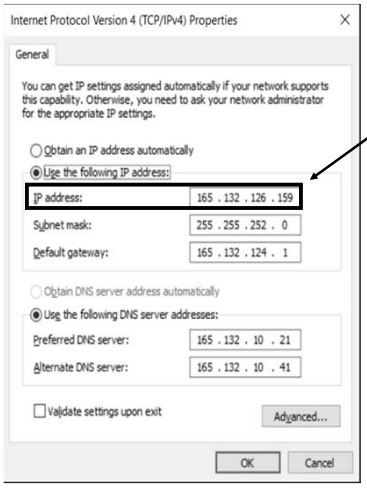
IPv4 Network Connection Setup

IP Address



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165.132.126.159

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8 bits = 1 Byte = 1 Octet

IPv4 Network Connection Setup

IP Address of the PC

- **Decimal form**
- **165 . 132 . 126 . 159**
- **10100101.10000100.01111110.10011111**
- **Binary form**

IPv4 Network Connection Setup

IP Address Assignments

- Computer or Smartphone may have multiple Interfaces and therefore may need multiple IP addresses (one IP address for each Interface)
- Smartphone example

Samsung Galaxy S7 Edge

IPv4 Network Connection Setup

IP Address Assignments

- Smartphone Example
  - Smartphones need multiple IP addresses for multiple interfaces
  - Mobile Communication
    - ✓ 2G (GSM)
    - ✓ 3G (UMTS, TD-SCDMA)
    - ✓ 4G (LTE FDD, TDD)
  - Wi-Fi
    - IEEE 802.11 a/b/g/n/ac (2.4, 5 GHz)
  - Bluetooth v4.2

IPv4 Network Connection Setup

Subnet Mask

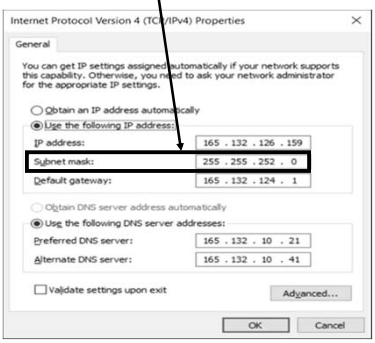
- Internet is divided into Subnets, and Subnets are divided into smaller Subnets
- Subnet Mask is based on the size of the Subnet that the Client (PC) is connected to
- IPv4 Subnet Mask is formed by 32 bits
  - 1s or 0s in a sequence from Left (MSB) to Right (LSB)
    - ✓ MSB: Most Significant Bit
    - ✓ LSB: Least Significant Bit

IPv4 Network Connection Setup

- Subnet Mask is used to mask (filter) the IP address (of IP packets) to easily determine if the packet belongs to this subnet or not
- 255.255.252.0 =

  1111111.11111111.11111100.00000000

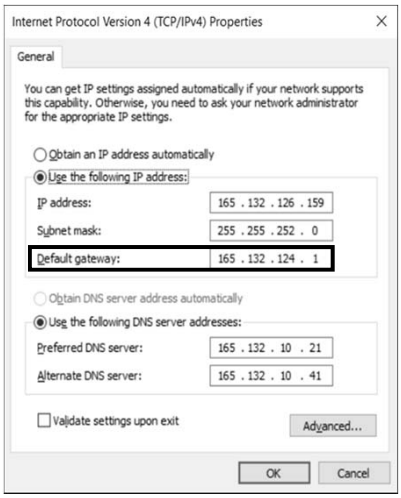
  10 zeros



- Subnet Mask can be used to find the Subnet size
- 2^{10} = 1,024 IP addresses are on this subnet
  - But not all addresses can be used for Clients (PCs) ➔ Why?
  - This will be explained in the following lectures

IPv4 Network Connection Setup

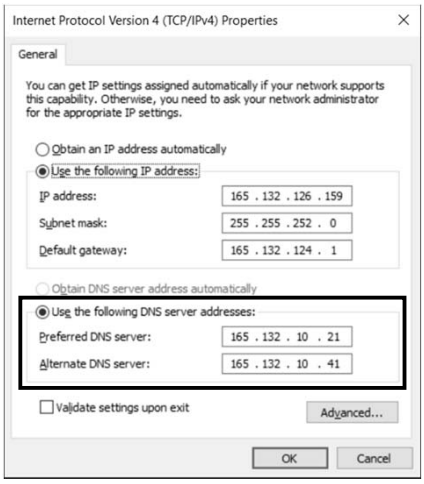
Default Gateway



- **Default Gateway is the dedicated Internet Router that will send and receive all Internet IP packets for this PC**
- **PC will access the Internet (i.e., send and receive all IP packets) through this Gateway**

IPv4 Network Connection Setup

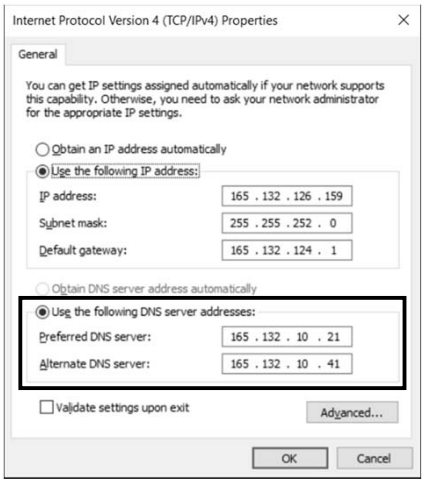
DNS (Domain Name Server)



- **DNS is a server that converts hostnames in to IP addresses**
- **Hostname examples**
  - **E-mail address**
    - **???@gmail.com**
  - **Website address**
    - **www.facebook.com**

IPv4 Network Connection Setup

DNS (Domain Name Server)



- **DNS operation example**
  - **Website address**

    www.facebook.com

    ⬇

    173.252.110.27
  - **IP address**
- **Preferred is the main**
- **Alternate is the backup**

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   - **Subnet & Subnet Mask Setup**
4. **IP Routing Table**