# Lecture 5a - IPv4 Subnetting

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| Type | Lecture |
| Materials | Empty |
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## 1. IPv4 Addresses

- **The subnet mask:**
  - **IP Addresses divided in two**
    - Network Portion
    - Host Portion
  - **Network Portion**
    - Most significant (**left-most**) bits of IP Address
    - Defines the network to which the IP Address belongs
    - All IP Addresses with an equal Network Portion are in the same subnet
  - **Host Portion**
    - Least significant (**right-most**) bits of IP Address
    - Defines a host within a subnet
- **Subnet Mask Restrictions:**
  - **The Subnet Mask**
    - Left-most bits form the network address
    - Right-most bits form the host ID
    - Subnet mask ALWAYS consists of a string of '1' bits followed by a string of '0' bits
  - **Real restrictions**
    - Need at **least eight '1' bits** (since the Internet respects Class A addresses)
    - Need at **least two '0' bits** (this equates to four host IDs of which two are unusable – '00' and '11')

## 2. Subnetting

- **Definition:**
  - We are **allocated** a Network
  - We can **break** this into **smaller subnets**
    - Borrow bits from the host ID and allocate them to the network portion
    - Internet still considers our original subnet as an entire network
    - Within our network we break this up into multiple smaller subnets
    - Achieve better usage of network addresses
    - Can logically (and physically) separate different groups of users

## 3. Slash Notation

- Traditional to write IP address and subnet mask
  - e.g. – 192.168.0.27 255.255.255.192
- Shorter and more convenient notation
  - e.g. – 192.168.0.27/26
  - Sometimes called slash notation