



# CSM 152: NETWORKING AND INTERNET

## LESSON 3

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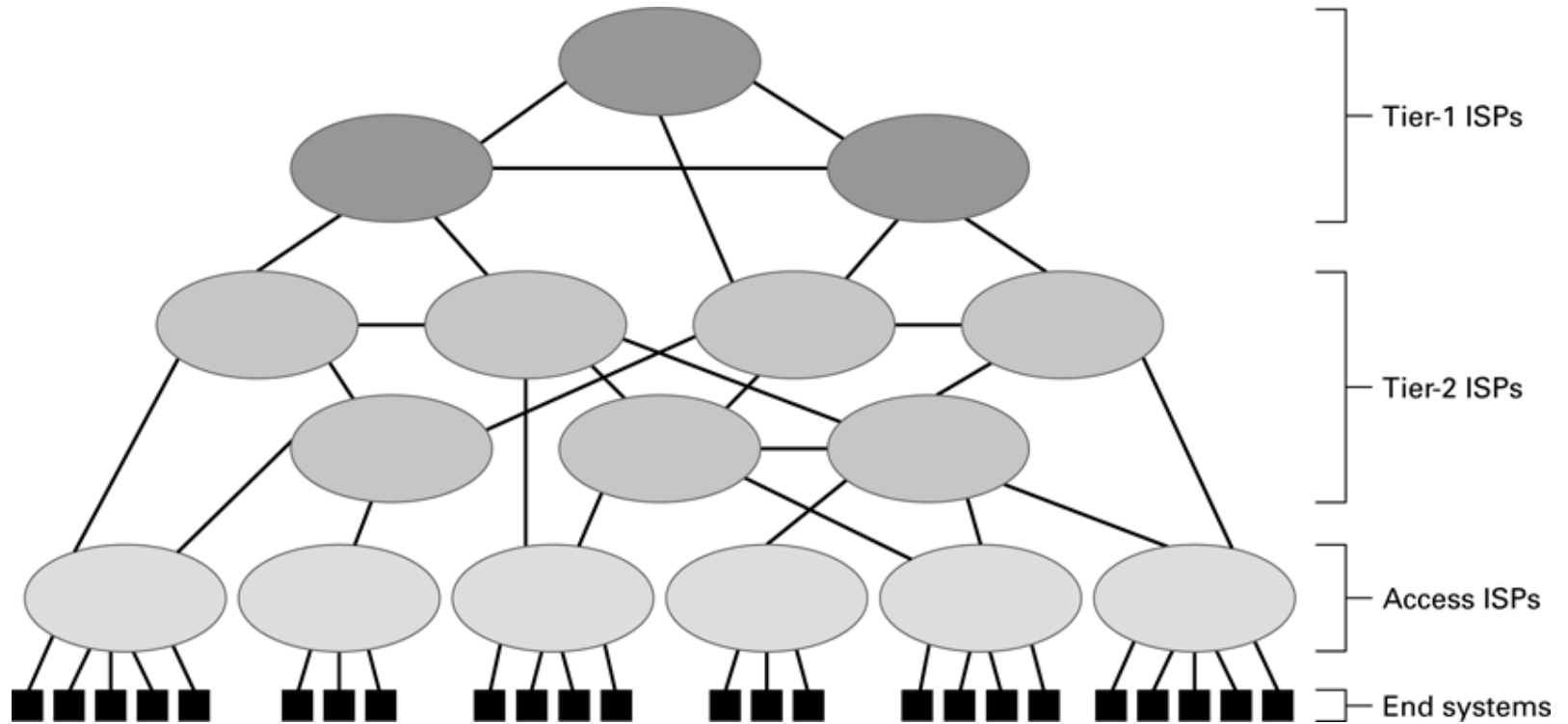
# Basic IP Addressing



# Internet Architecture

- **Internet Service Provider (ISP)**
  - **Tier-1:** consist of very high-speed, high-capacity, international WANs. These networks are thought of as the backbone of the Internet. Eg AT & T, Verizon, Telstra, British Telecom. Tier 1 ISP only exchange Internet traffic with other tier 1 providers on non-commercial basis via private settlement - free peering interconnections.
  - **Tier-2:** that tend to be more regional in scope and less potent in their capabilities. (The distinction between the tier-1 and tier-2 ISPs is often a matter of opinion.)
- **Access or tier-3 ISP:** networks of routers that collectively provide Internet connectivity/ communication infrastructure
  - Hot spot (wireless)
  - Telephone lines
  - Cable/Satellite systems DSL
  - Fiber optics

# Figure 4.7 Internet Composition



# Internet Addressing

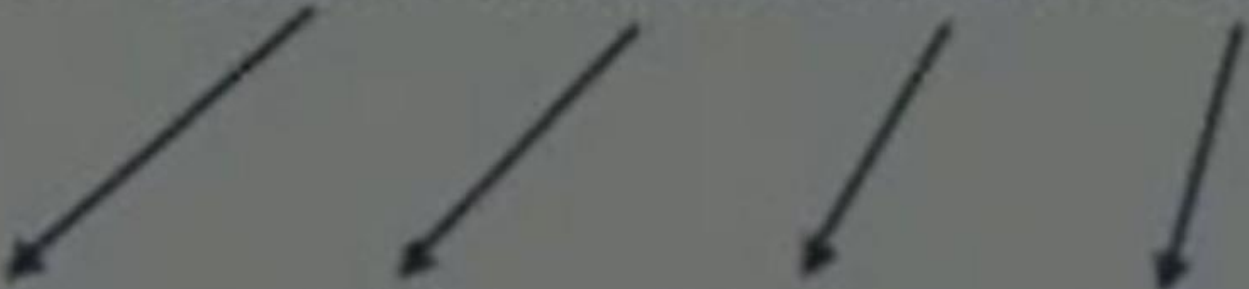
- IP address: pattern of 32 or 128 bits often represented in dotted decimal notation

# Basic IP Addressing

- Each host connected to the Internet is identified by a unique IP address.
- An IP address is a 32-bit quantity.
  - Expressed as a dotted-decimal notation W.X.Y.Z, where dots are used to separate each of the four octets of the address.
  - Consists of two logical parts:
    - A network number
    - A host number
  - This partition defines the *IP address classes*.

# Dotted Decimal notation

IP address: 01000010 10001000 00110000 01111110



01000010 10001000 00110000 01111110

(66) (134) (48) (126)

Dotted Decimal Notation: 66.134.48.126

# Hierarchical Addressing

- A computer on the Internet is addressed using a two-tuple:
  - The network number
    - Assigned and managed by central authority.
  - The host number
    - Assigned and managed by local network administrator.
- When routing a packet to the destination network, only the network number is looked at.



# IP Address Classes

- There are five defined IP address classes.
  - Class A      UNICAST
  - Class B      UNICAST
  - Class C      UNICAST
  - Class D      MULTICAST
  - Class E      RESERVED
- Identified by the first few bits in the IP address.
- There also exists some special-purpose IP addresses.

# IP Address Class (Cont.)

- The class-based addressing is also known as the **classful model**.
  - Different network classes represent different network-to-hosts ratio.
  - Lend themselves to different network configurations.



# Class A Address



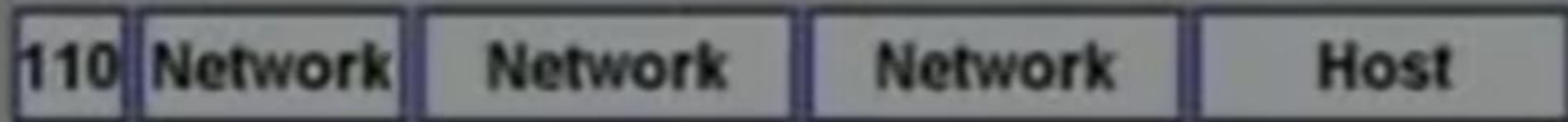
- Network bits : 7
  - Number of networks =  $2^7 - 1 = 127$
- Host bits: 24
  - Number of hosts =  $2^{24} - 2 = 16,777,214$
- Address range:
  - 0.0.0.0 to 127.255.255.255

# IP Class B

10	Network	Network	Host	Host
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- Network bits : 14
  - Number of networks =  $2^{14} - 1 = 16,383$
- Host bits: 16
  - Number of hosts =  $2^{16} - 2 = 65,534$
- Address range:
  - 128.0.0.0 to 191.255.255.255

# Class C Address



- Network bits : 21
  - Number of networks =  $2^{21} - 1 = 2,097,151$
- Host bits: 8
  - Number of hosts =  $2^8 - 2 = 254$
- Address range:
  - 192.0.0.0 to 223.255.255.255



- Note:
- Class A was designed for large networks
- Class B was designed for medium networks
- Class C was designed for small networks



# Class D Address

1110	Multicast Address
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- Address range:

➤ 224.0.0.0 to 239.255.255.255

