CS 372 Lecture #28

Assigning IP addresses

- DHCP
- IP address distribution

Note: Many of the lecture slides are based on presentations that accompany *Computer Networking: A Top Down Approach,* 6th edition, by Jim Kurose & Keith Ross, Addison-Wesley, 2013.

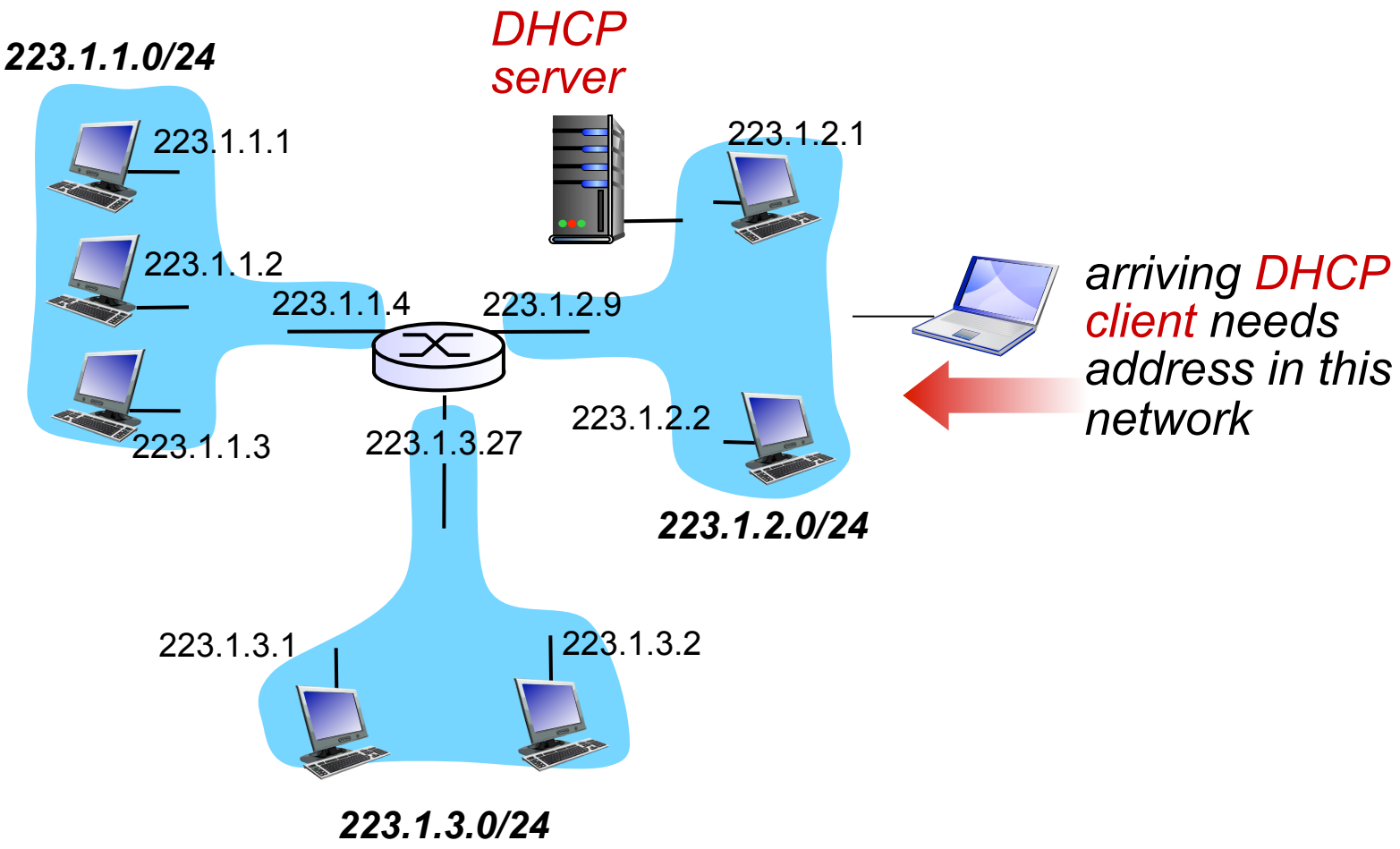
Host IP address assignment

- system admin can hard-code IP address for each host

- DHCP: Dynamic Host Configuration Protocol:
  - application layer protocol, DHCP client-server
  - dynamically "lease" IP address from a server when joining the network
  - IP address can be reused by other hosts if released
  - IP lease can be renewed while still connected

- View the assigned IP address (examples)
  - Windows: command prompt > **`ipconfig /all`**
  - Linux: **`ifconfig`**
  - Mac: System Preferences, Network, etc.

DHCP client-server



DHCP: Dynamic Host Configuration Protocol

- arriving host has no IP address
  - broadcasts "DHCP discover" with hardware address
- DHCP server responds to host hardware address
  - "DHCP offer"
- host requests IP address
  - "DHCP request"
- DHCP server sends complete IP address (network address + host number)
  - "DHCP acknowledgement"
  - records IP/hardware address in local server IP table
- DHCP also returns:
  - address of first-hop router for client
  - name and IP address of DNS sever
  - *netmask*

OSU IP addresses

- Oregon State has a single /16 IP address block: 128.193.0.0
- All hosts at OSU have 128.193 prefix
- E.G.:
  - ns1.oregonstate.edu 128.193.0.10
- Suffix bits are used to determine subnets and individual hosts
- Individual host addresses assigned by subnet system administrators
  - may be static or DHCP address assignment
  - subnets: engr, eecs, business …

IP address allocation

- Addresses in the Internet are not used efficiently
  - Less than 20% of possible addresses are actually assigned
- Concerns about IPv4 address space being exhausted
  - 2.4 billion users
  - 4.2 billion addresses (many reserved)

- OSU is like most organizations, using 8,000-10,000 out of possible 2^{16} (= 65,536) available addresses

Possible solutions

- IP address sharing
  - Use one IP address for multiple hosts
    - Network Address Translation (NAT … more later)
- IPv6 (more later)

Summary Lecture #28

- DHCP
- IP address distribution
  - concerns about IPv4 address space exhaustion