IP Addresses for IPv4

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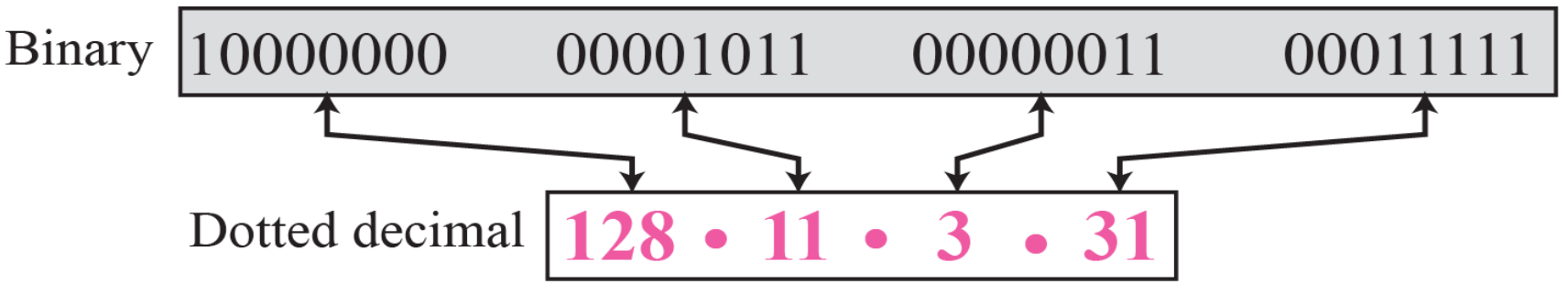
Overview

- 32 bit addresses
- Hierarchical division in IP addresses
- Network masks
- Allocating Addresses
- Use of IPv4 address
- Special IP addresses
- Address Resolution Protocol

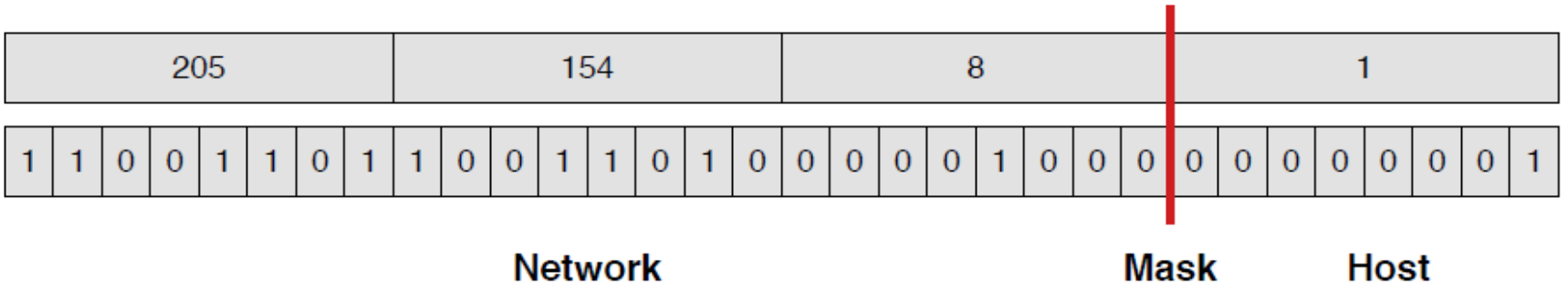
What's an IPv4 Address??

- 32 bit Number
- Divided in to four octets
- IPv4 Addresses are Unique and Universal
- Address space of IPV4 is 2^{32}



Hierarchical Division in IP Addresses

- IP address can be divided in to two parts
  - Network Part (Prefix)
  - Host Part (Host address)
- Boundary can be anywhere
  - Classes are not in use nowadays



Netmask

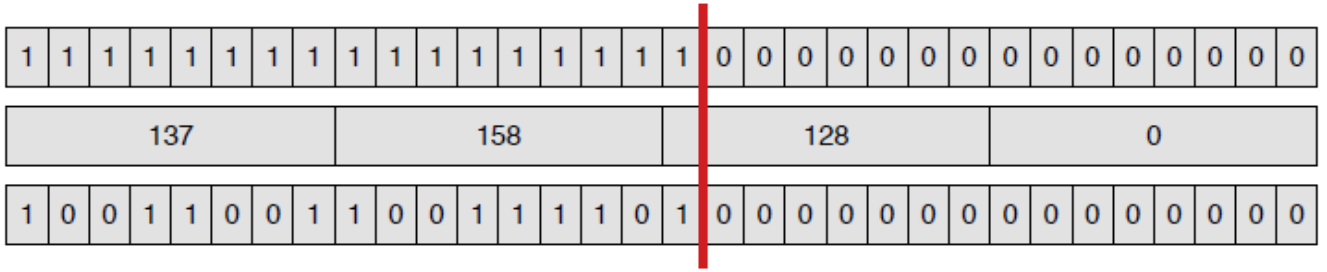
- 32-bit number of contiguous 1's followed by contiguous 0's
- Help define which bits are used for the network and which bits are used for the hosts
- Different representations exists
  - Decimal dot notation

    255.255.255.0
  - Number of network bits

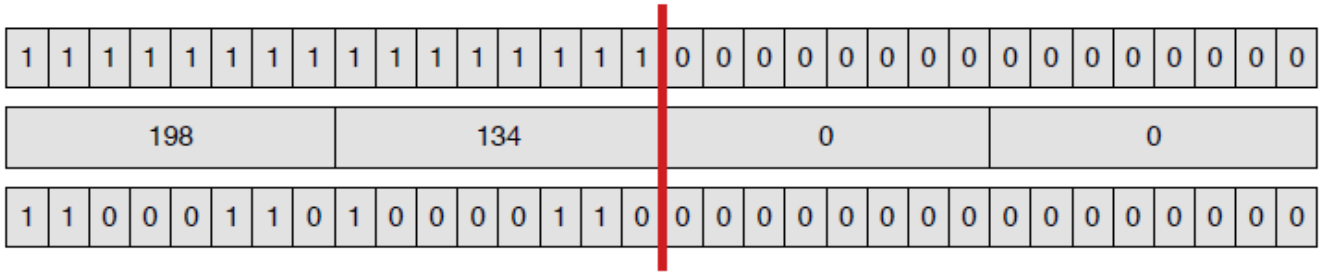
    /24
- Binary AND of 32 IP address and the Netmask will give you the network address

Sample Netmasks

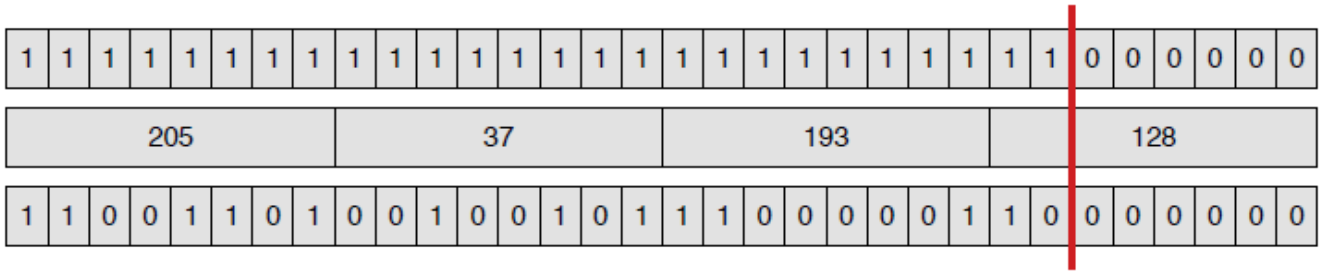
137.158.128.0/17 (netmask 255.255.128.0)



198.134.0.0/16 (netmask 255.255.0.0)



205.37.193.128/26 (netmask 255.255.255.192)



Special Addresses

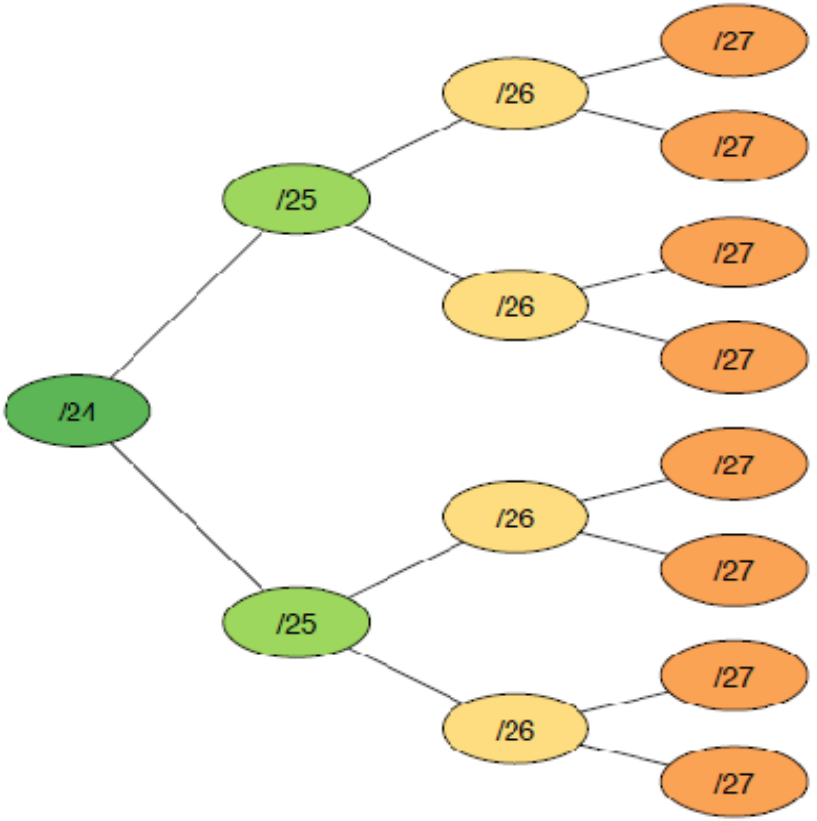
- Network address
  - The first address in a block is normally not assigned to any device; it is used as the network address that represents the organization to the rest of the world.
- Broadcast address
  - The last address in a block is used for broadcasting to all devices under the network

Allocating IP Addresses

- If the mask is given in decimal dot notation convert it to number of network bits (255.255.255.224 = /27)
- Find the number of hosts bit (32 – 27 = 5)
- Find the complete IP address range ($2^5 = 32$)
- Get the usable IP addresses by removing the special IP addresses (32 – 2 = 30)

Use of IPv4 Address

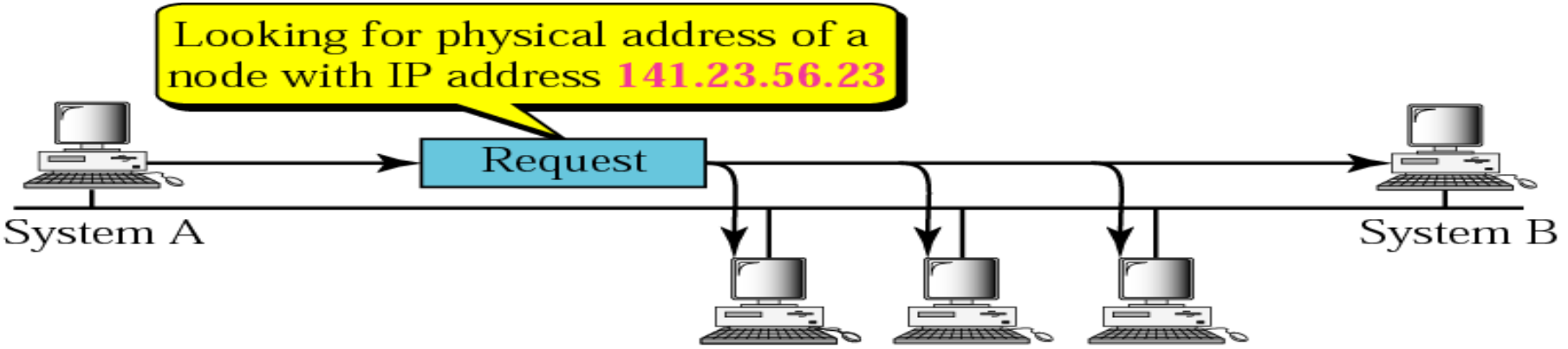
- Subnetting
  - Divide a large address block into smaller sub-groups.
  - Use of flexible net mask.



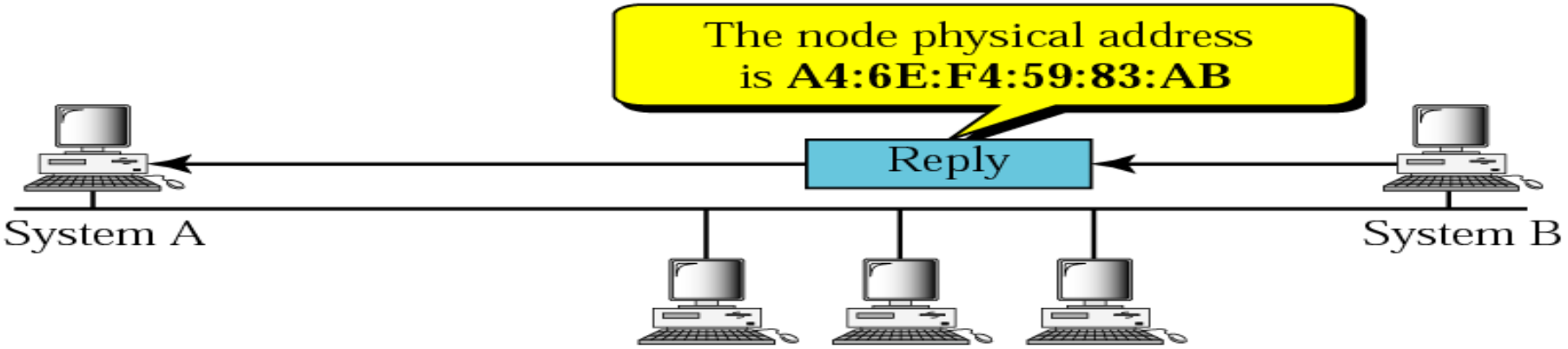
Address Resolution Protocol

- IP addresses are chosen by the local system administrator to suit the local network
- Ethernet addresses are built into the interface hardware by the manufacturer
- The two addresses bear absolutely no relationship to one another (as we would expect from the layering principles)
- ARP is used to find the hardware address corresponding to an IP address

Address Resolution Protocol



a. ARP request is broadcast



b. ARP reply is unicast

Thank You

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