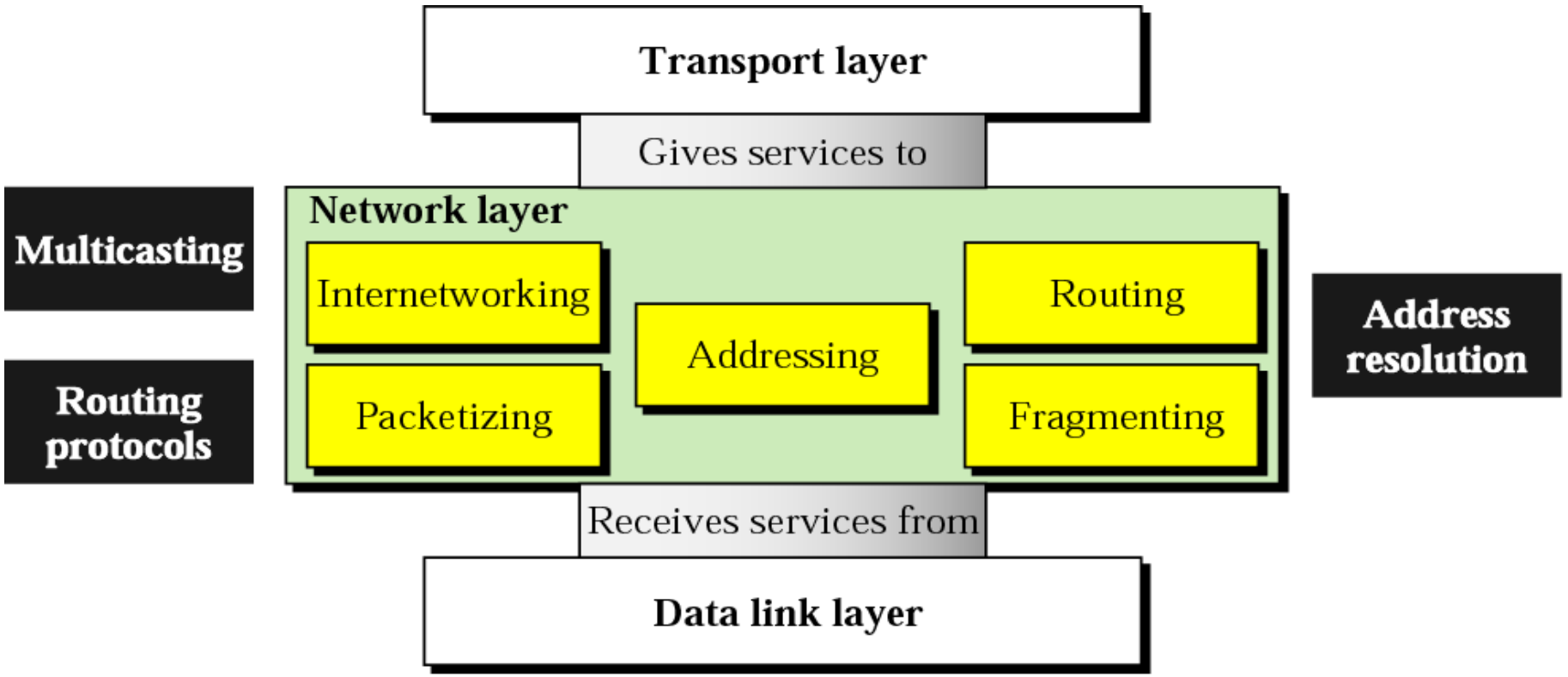
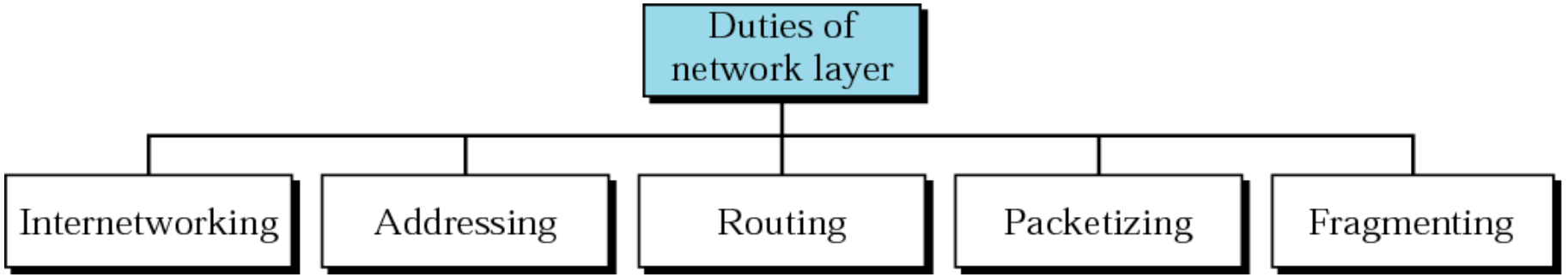
Computer Network

Chapter 5: Network/Internet Layer Protocols and Addressing

Position of Network Layer



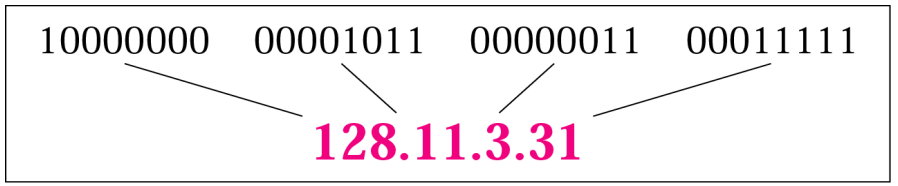
Function of Network Layer



Logical Address

- Logical Address:
  - IP address at the Network Layer
  - Used to Communicate with the different subnets
- IP address types
  - IPV4: 32 bit address
  - IPV6: 128 bit address

Ipv4 address

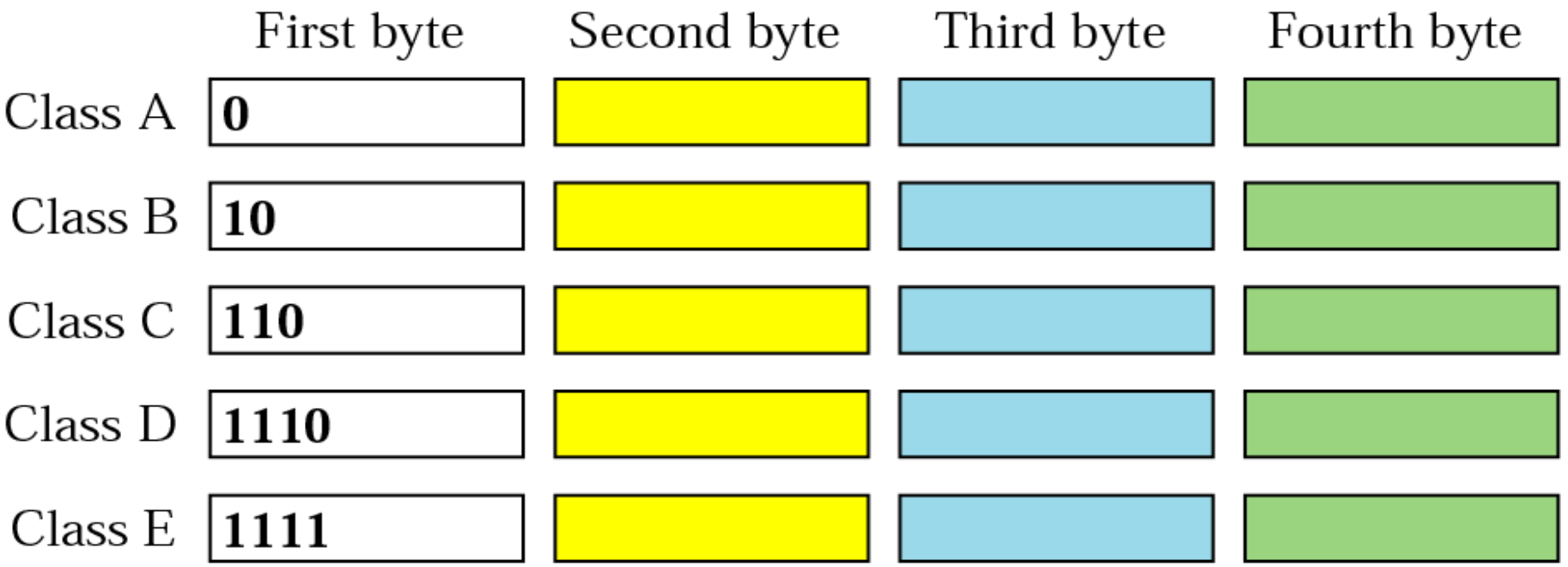


- 32 bit address
- Total unique address equals to 2^32
  - Around 4.2 billion address
- Represented in dotted Decimal Format

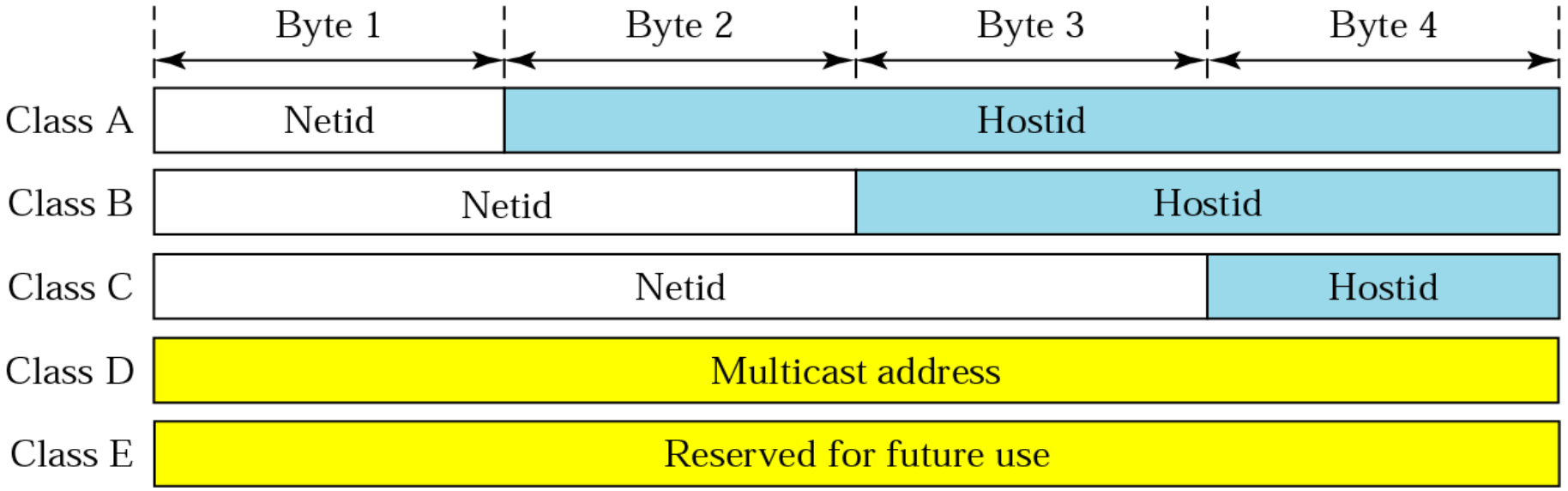
Ipv4 Classful Addressing

- Classful Addressing
  - Address are Divided into Class
  - Five Classes
    - Classes are A, B, C, D, E

Classful addressing



Netid and hostid in Classful Addressing



Default masks for Classful Addressing

Class	*In Binary*	*In Dotted-Decimal*	*Using Slash*
A	11111111 00000000 00000000 00000000	255.0.0.0	/8
B	11111111 11111111 00000000 00000000	255.255.0.0	/16
C	11111111 11111111 11111111 00000000	255.255.255.0	/24

Netid , Hostid, Mask, CIDR

- Netid: Identify network
- Hostid: Identify End devices
- Mask: Used to find netid and hostid
- CIDR: Classless interdomain routing
  - Used in classless addressing
  - Defined by slash notation /n
  - Example: /8, /16, /24

Subnetting, Supernetting

- Subnetting:
  - Method used to divide the addresses into several contiguous groups (network)
- Supernetting:
  - Method used to combine several class C blocks to create a large range of address
  - Several Network are combined to create a SuperNetwork
  - Supernetting decrease the number of 1s in the mask

Classless Addressing

- To Overcome address depeltion classeless concept is used
- For classless addressing
  - The address in a block must be contiguous
  - The number of address in a block must be power of 2
  - The first address must be evenly divisible by the number of given address

Classless Addressing

- Classwork
  - A block of addresses is granted to small organization. We know that one of the addresses is 205.16.37.39/28. what is the first address in the block ?
  - Find the last address from that block
  - Find the fifth address from that block

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
- Normally Network address is the address whose host bits are all zero
- 192.168.1.0/24 is network address
- 192.168.1.4/30 is network address

Private Ip Address

- Range of Ip address, which are not routable to internet
- commonly used for home, office, and enterprise local area networks (LANs)
- If such a private network needs to connect to the Internet, it must use either a network address translator (NAT) gateway, or a proxy server.

IP Address : Private IP Address Space

Range	Total Hosts
10.0.0.0 - 10.255.255.255	2^{24}
172.16.0.0 - 172.31.255.255	2^{20}
192.168.0.0 - 192.168.255.255	2^{16}