



# **SNS COLLEGE OF TECHNOLOGY COIMBATORE**



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## **DEPARTMENT OF MCA**

**Course Name : 23CAT601 - DATA COMMUNICATION AND NETWORK**

**Class : I Year / I Semester**

**Unit III – NETWORK AND SWITCHING, NETWORK DEVICES**

**Topic – Internetworks – IP addressing methods**



# **Data Communication and Computer Networks**



## IP Addressing

# Lecture Roadmap

In the Following Lectures we Learn about the

- Internet Addressing
- Class full IP Addressing
- Classes and Blocks
- Masking

# IP Addressing

IANA (Internet Assigned Numbers Authority) is responsible for global coordination of the Internet Protocol addressing systems.

Currently there are two types of Internet Protocol (IP) addresses in active use: IP version 4 (IPv4) and IP version 6 (IPv6)

IPv4 was initially deployed on 1 January 1983 and is still the most commonly used version

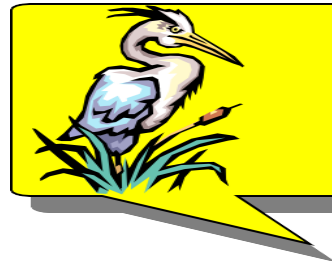
IPv4 addresses are 32-bit numbers often expressed as 4 octets in "dotted decimal" notation (for example, *192.0.2.53*)

# IP Addressing v6

Deployment of the IPv6 protocol began in 1999.

IPv6 addresses are 128-bit numbers and are conventionally expressed using hexadecimal strings (for example, *2001:0db8:582:ae33::29*).

# Internet Address



## **Note:**

An IPv4 address is a 32-bit address.

The IP addresses are unique and universal.

## Two common notations

- Binary Notations

- 10000000 00001100 00001111 00001010

- Dotted Decimal Notation

- 128.12.15.10

## *Example 1*

Change the following IP addresses from binary notation to dotted-decimal notation.

- a.      10000001          00001011                  00001011 11101111  
b.      11111001          10011011                  11111011 00001111

## *Solution*

We replace each group of 8 bits with its equivalent decimal number (see Appendix B) and add dots for separation:

- a.          129.11.11.239  
b.          249.155.251.15



## *Example 2*

Change the following IP addresses from dotted- decimal notation to binary notation.

a. 111.56.45.78

b. 75.45.34.78

### *Solution*

**We replace each decimal number with its binary equivalent (see Appendix B):**

a. 01101111                      00111000                      00101101                      01001110

b. 01001011                      00101101                      00100010                      01001110

# Classful IP Addressing



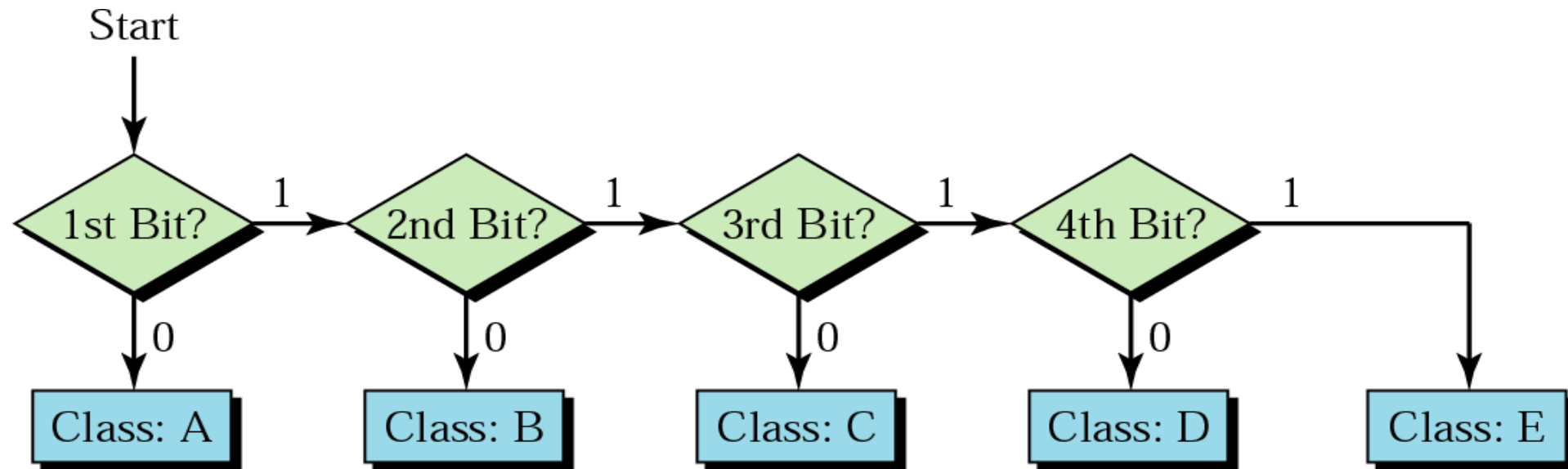
## Note:

In classful addressing, the address space is divided into five classes: A, B, C, D, and E.

# Finding the class in binary notation

	First byte	Second byte	Third byte	Fourth byte
Class A	<b>0</b>			
Class B	<b>10</b>			
Class C	<b>110</b>			
Class D	<b>1110</b>			
Class E	<b>1111</b>			

# Finding the address class



### *Example 3*

Find the class of each address:

- a.      00000001              00001011                      00001011 11101111
- b.      11110011              10011011                      11111011 00001111

### *Solution*

See the procedure in Figure 19.11.

- a.              The first bit is 0; this is a class A address.
- b.              The first 4 bits are 1s; this is a class E address.

# Finding the Class in decimal Notation

	First byte	Second byte	Third byte	Fourth byte
Class A	<b>0 to 127</b>			
Class B	<b>128 to 191</b>			
Class C	<b>192 to 223</b>			
Class D	<b>224 to 239</b>			
Class E	<b>240 to 255</b>			

## *Example 4*

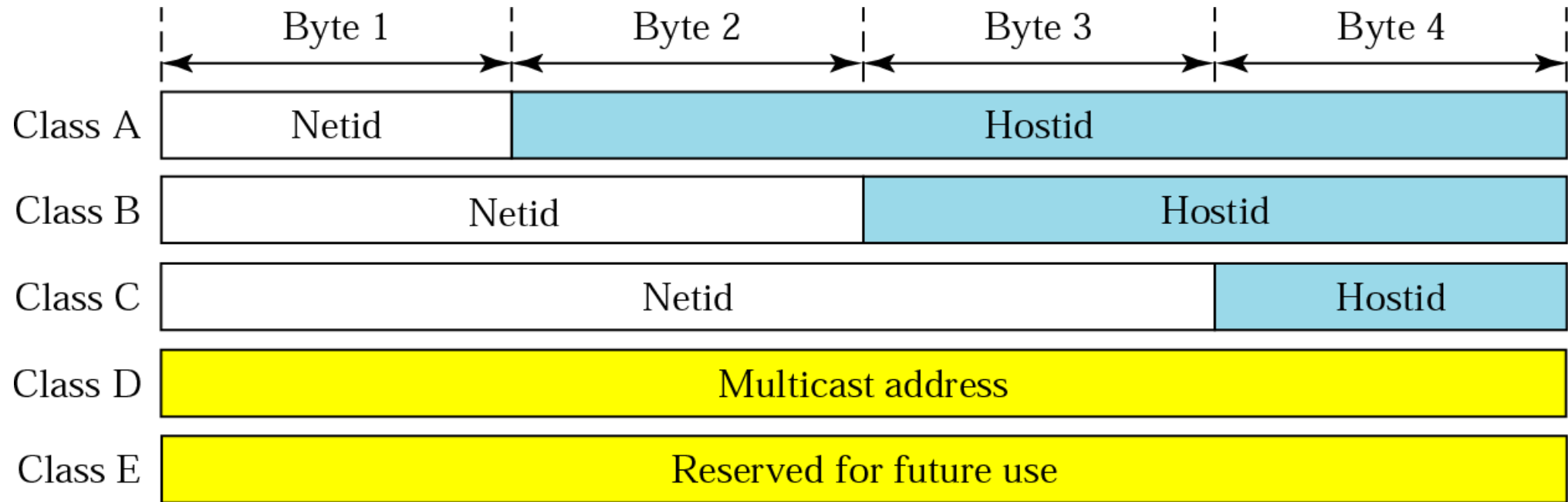
Find the class of each address:

- a. 227.12.14.87
- b. 252.5.15.111
- c. 134.11.78.56

### *Solution*

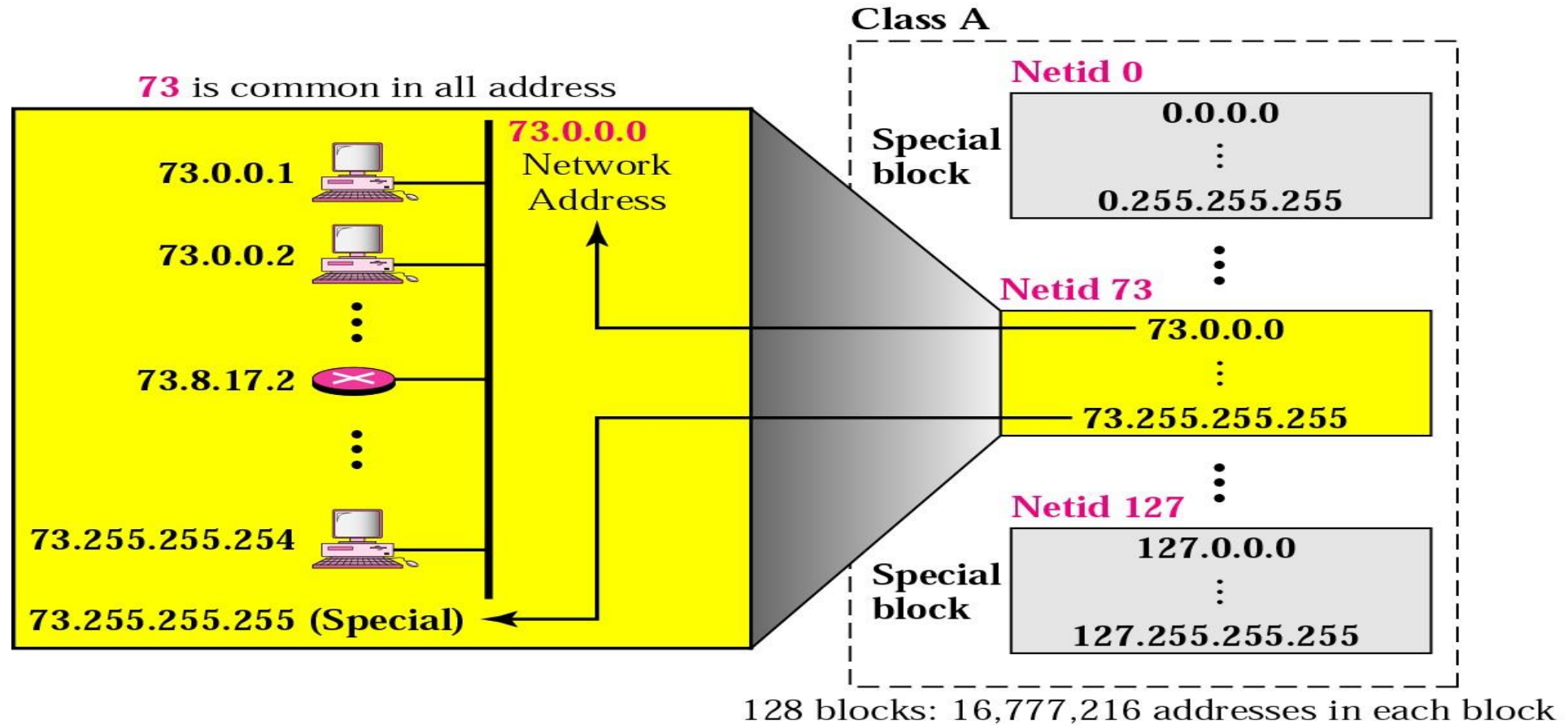
- a. The first byte is 227 (between 224 and 239). The class is D.
- b. The first byte is 252 (between 240 and 255). The class is E.
- c. The first byte is 134 (between 128 and 191). The class is B.

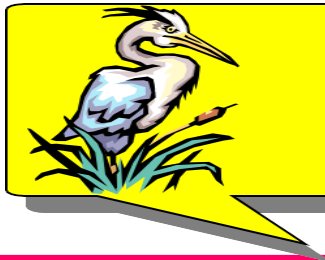
# Netid and Hostid





# Blocks in class A

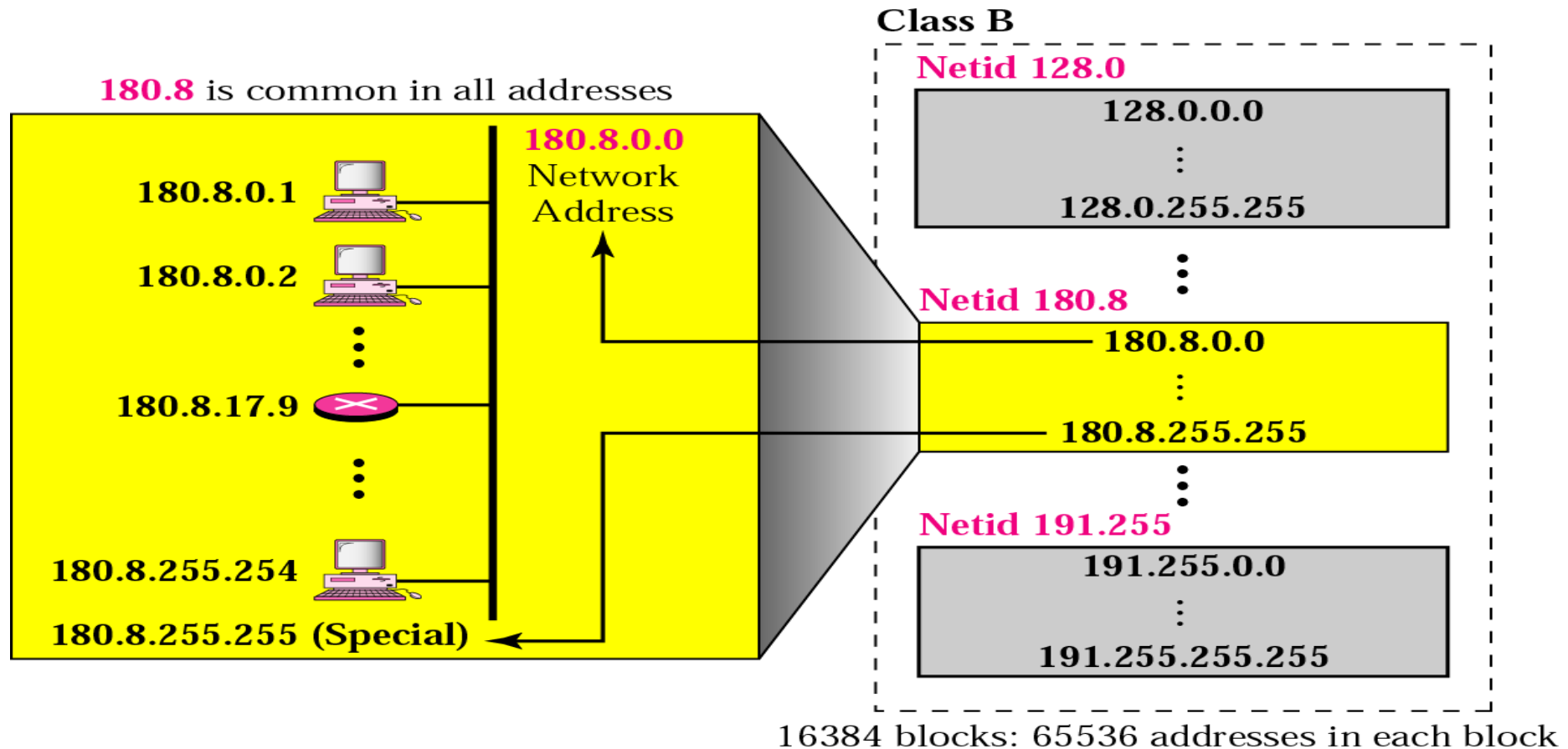




**Note:**

Millions of class A addresses are wasted.

# Blocks in class B

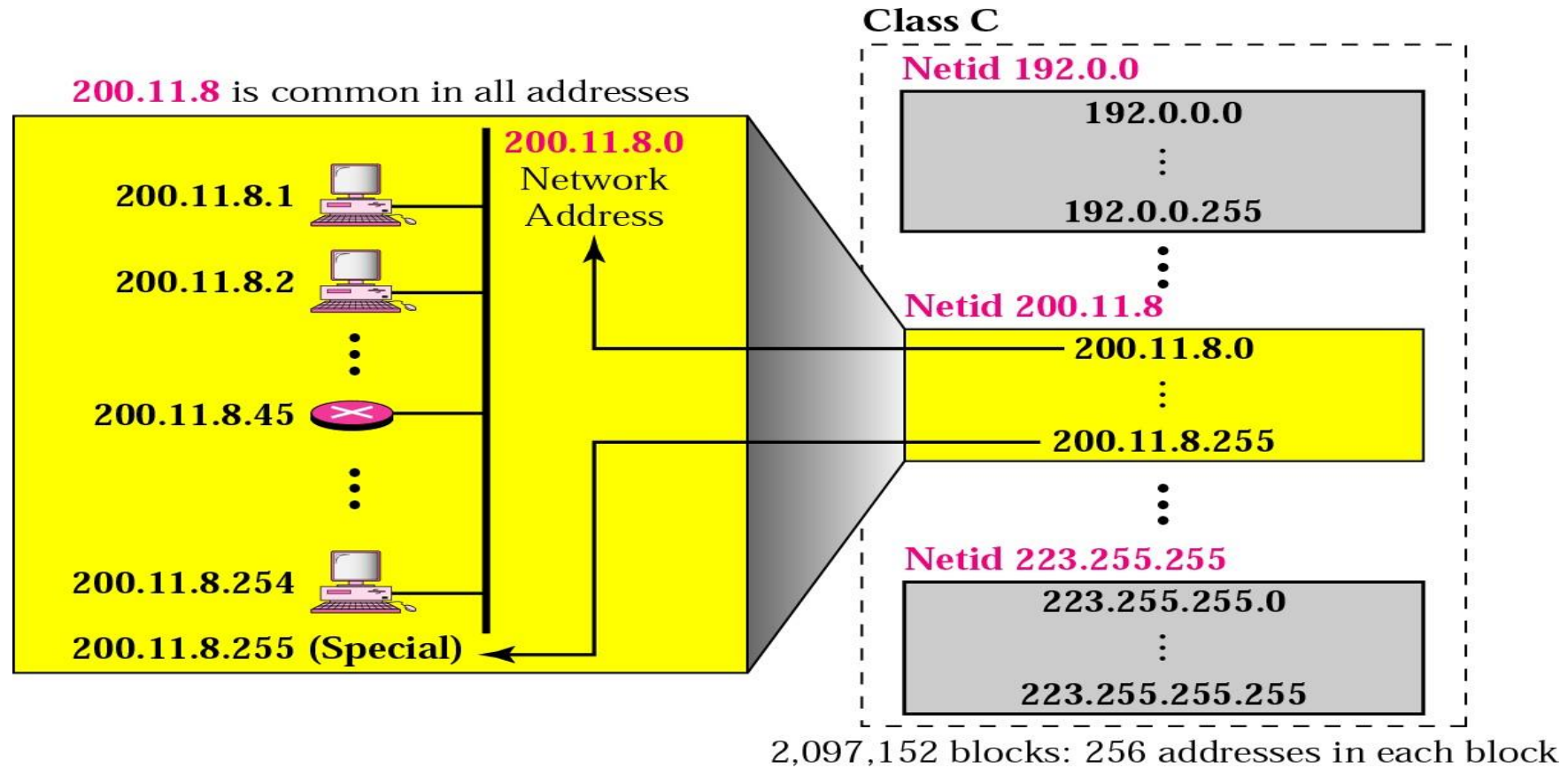




**Note:**

Many class B addresses are wasted.

# Blocks in class C

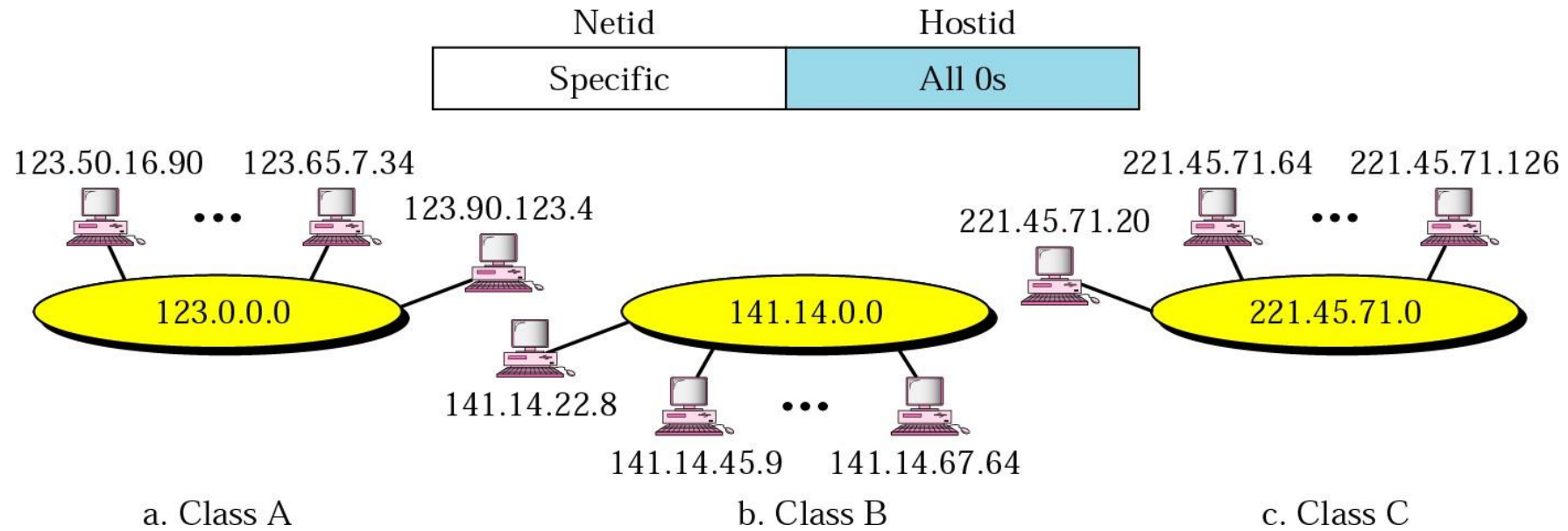


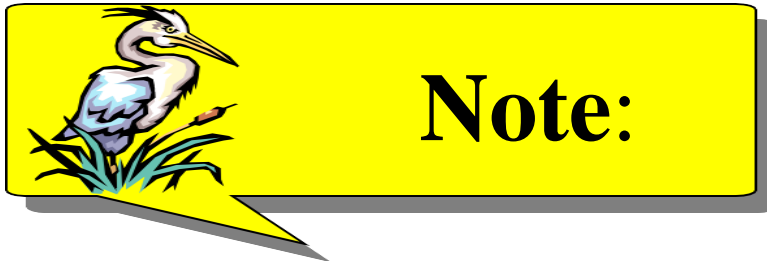


## **Note:**

The number of addresses in class C is smaller than the needs of most organizations.

# Network address





In classful addressing, the network address is the one that is assigned to the organization.



## *Example 5*

Given the address 23.56.7.91, find the network address.

### *Solution*

The class is A. Only the first byte defines the netid. We can find the network address by replacing the hostid bytes (56.7.91) with 0s. Therefore, the network address is 23.0.0.0.

## *Example 6*

Given the address 132.6.17.85, find the network address.

### *Solution*

The class is B. The first 2 bytes defines the netid. We can find the network address by replacing the hostid bytes (17.85) with 0s. Therefore, the network address is 132.6.0.0.

## *Example 7*

Given the network address 17.0.0.0, find the class.

### *Solution*

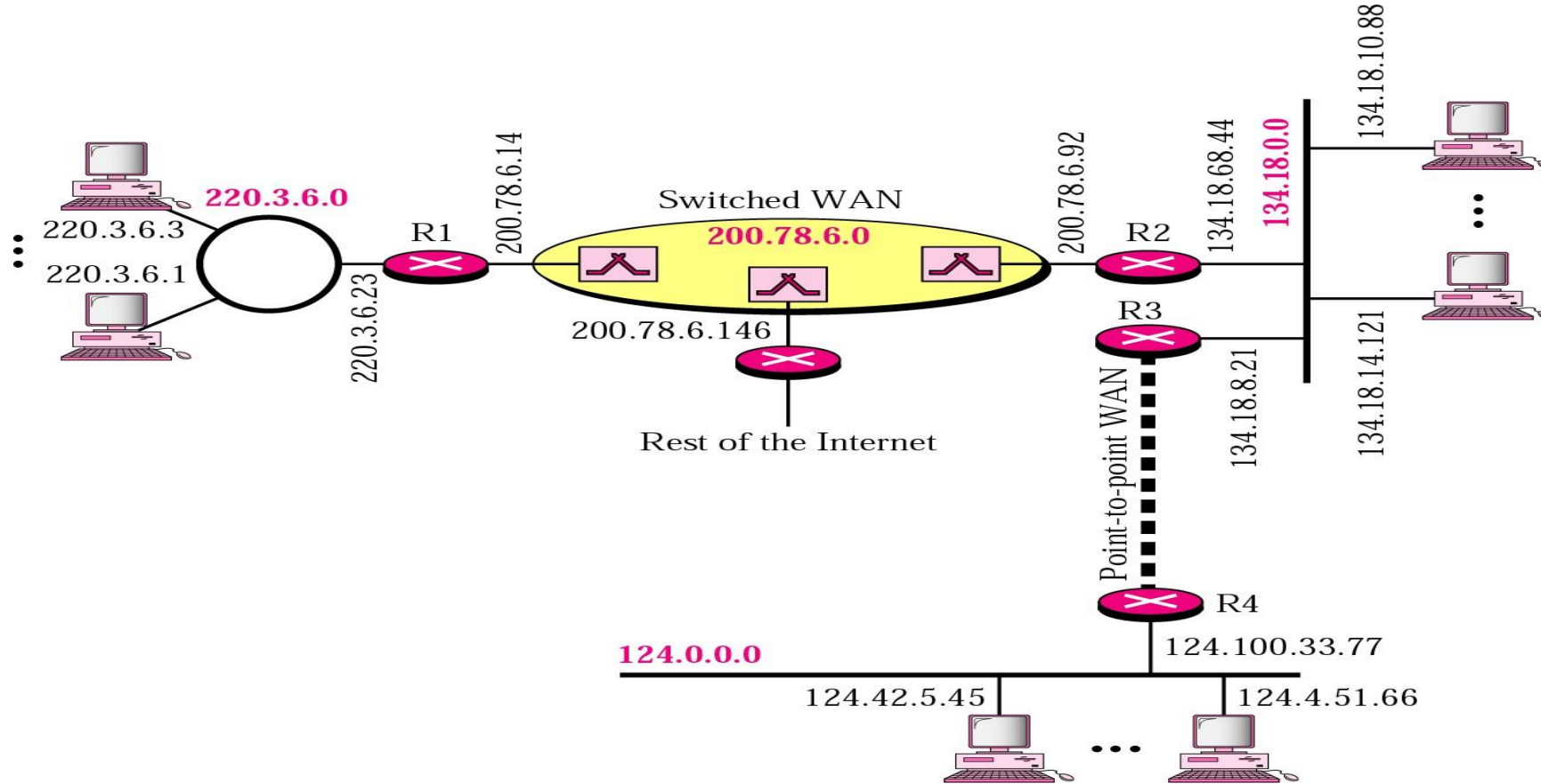
The class is A because the netid is only 1 byte.

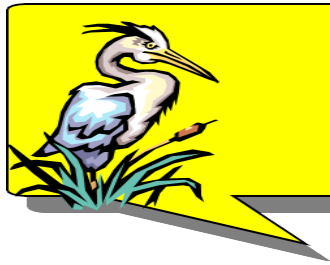


## Note:

A network address is different from a netid. A network address has both netid and hostid, with 0s for the hostid.

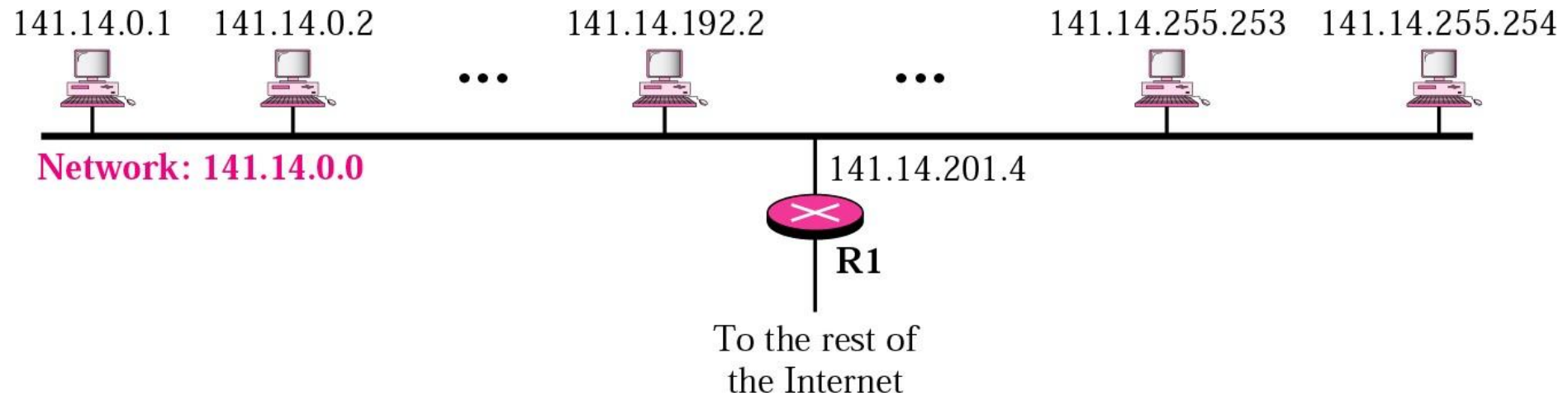
# Sample Internet





**Note:**

IP addresses are designed with two levels of hierarchy.



# Mask

- Default Mask
- Subnet Mask

# Mask

01100110  
11111111

11001100  
00000000

01010101  
00000000

11000011  
00000000

01100110

00000000

00000000

00000000



# Mask

102 204 85 195

255 . 0 . 0 . 0

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102 . 0 . 0 . 0

# Default masks





# Thanks For Your Time

