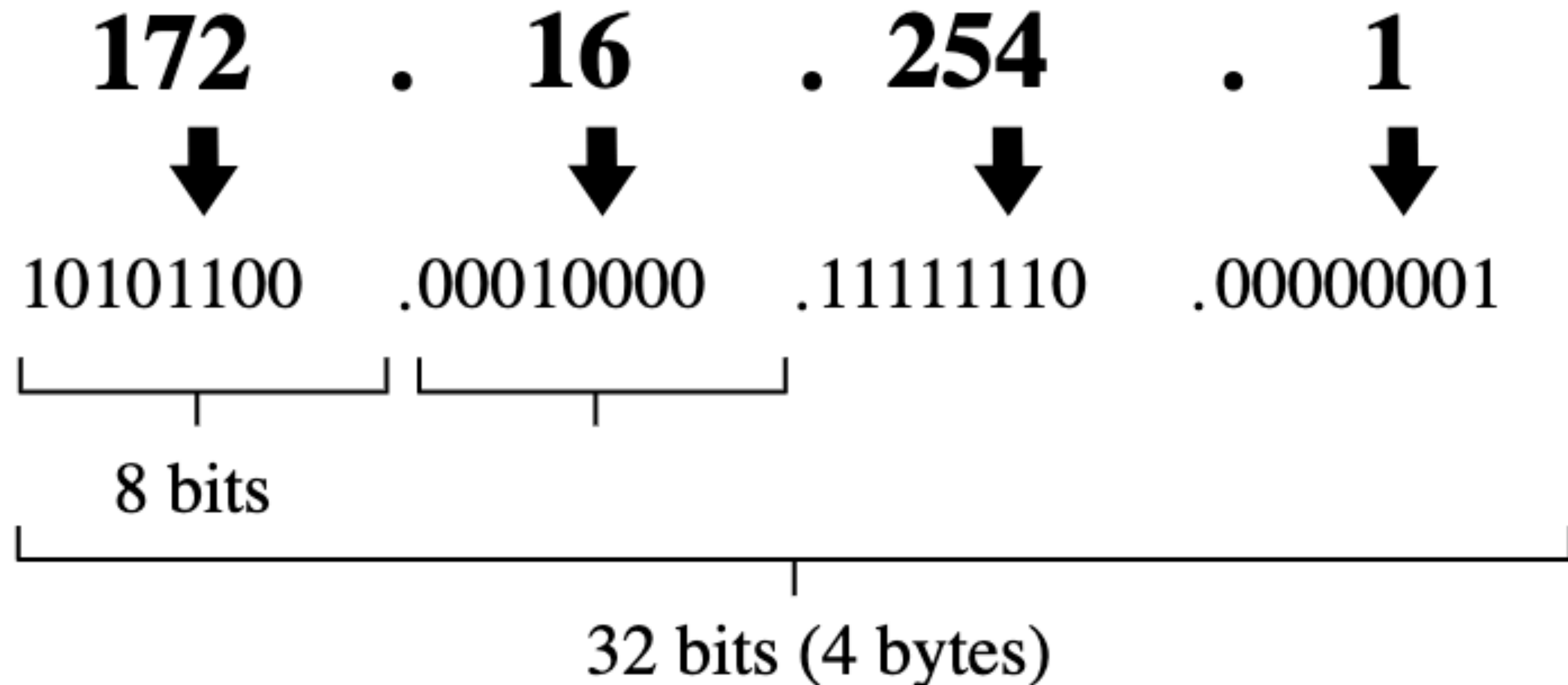# Computer Networks
week 10. IP address

IP address - The unique number ID assigned to one host or interface in a network.

IPv4 address in dotted-decimal notation

172 . **16** . **254** . **1**

10101100 .00010000 .11111110 .00000001

8 bits

32 bits (4 bytes)

Subnet mask - A 32-bit combination used to describe which portion of an address refers to the subnet and which part refers to the host.

192.168.10.15 / 24

ip   = 192.168.10.15   =   11000000 . 10101000 . 00001010 . 00001111
mask   = 255.255.255.0   =   11111111 . 11111111 . 11111111 . 00000000

network   = 192.168.10.0   =   11000000 . 10101000 . 00001010 . 00000000
hostmin   = 192.168.10.1   =   11000000 . 10101000 . 00001010 . 00000001
hostmax   = 192.168.10.254   =   11000000 . 10101000 . 00001010 . 11111110
broadcast = 192.168.10.255   =   11000000 . 10101000 . 00001010 . 11111111
hosts = 256 - 2 = 254.

network   hosts

Network classes

Class A networks use a default subnet mask of 255.0.0.0 and have 0-127 as their first octet. The address 10.52.36.11 is a class A address. Its first octet is 10, which is between 1 and 126, inclusive.

Class B networks use a default subnet mask of 255.255.0.0 and have 128-191 as their first octet. The address 172.16.52.63 is a class B address. Its first octet is 172, which is between 128 and 191, inclusive.

Class C networks use a default subnet mask of 255.255.255.0 and have 192-223 as their first octet. The address 192.168.123.132 is a class C address. Its first octet is 192, which is between 192 and 223, inclusive.
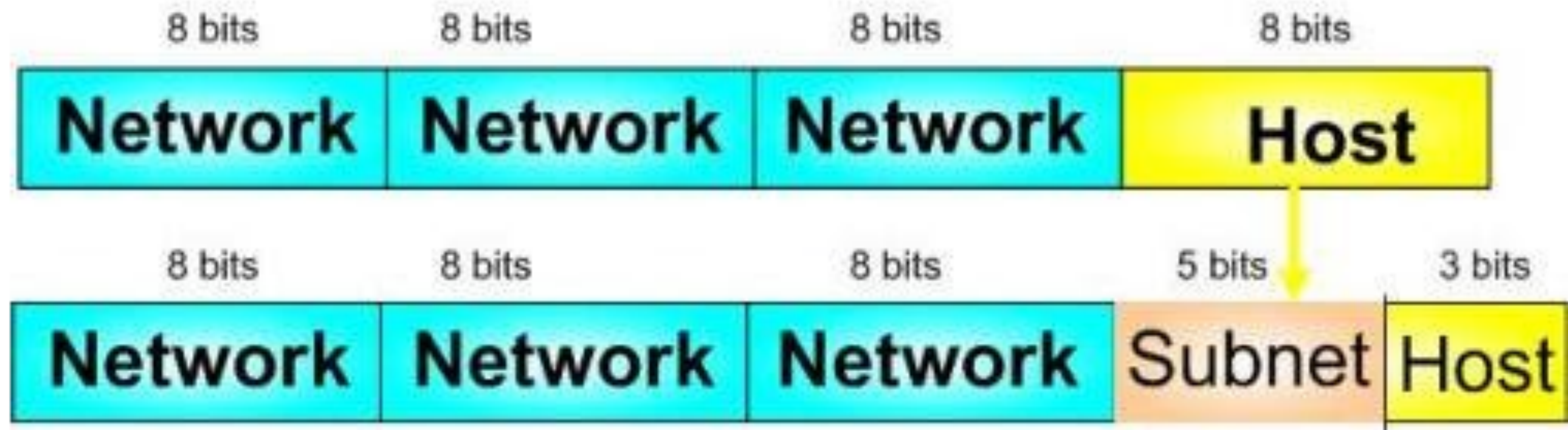
Class D is for multicasting and **Class E** is experimental

Subnets

In some scenarios, the default subnet mask values don't fit the organization needs for one of the following reasons:

   1 - The physical topology of the network.

   2 - The numbers of networks (or hosts) don't fit within the default subnet mask restrictions.

So, the networks can be divided using subnet masks.

Subnet mask - A 32-bit combination used to describe which portion of an address refers to the subnet and which part refers to the host.

192.168.10.15 / 29

ip	= 192.168.10.15	=	11000000 . 10101000 . 00001010 . 00001111
mask	= 255.255.255.248	=	11111111 . 11111111 . 11111111 . 11111000

network	= 192.168.10.8	=	11000000 . 10101000 . 00001010 . 00001000
hostmin	= 192.168.10.9	=	11000000 . 10101000 . 00001010 . 00001001
hostmax	= 192.168.10.14	=	11000000 . 10101000 . 00001010 . 00001110
broadcast	= 192.168.10.15	=	11000000 . 10101000 . 00001010 . 00001111

hosts = 8 - 2 = 6.

Task 1. Calculate:

1 - Mask
2 - Network address

3 - First host ip
4 - Last host ip

5 - Broadcast ip
6 - Number of hosts

1) 10.0.0.0 /24;

2) 192.168.0.45 /24;

3) 192.168.23.45 /25;

4) 192.168.23.51 /26;

5) 192.150.23.51 /23;

6) 82.15.0.0 /17;

7) 83.15.0.22 /22;

8) 10.0.0.0 /8;

9) 192.168.0.45 /30;

10) 192.168.23.45 /29;

11) 192.168.23.51 /17;

12) 192.150.23.51 /10;

13) 82.15.0.0 /11;

14) 83.15.0.22 /18;

15) 10.0.0.0 /2;

16) 192.0.0.20 /15;

17) 10.111.2.15 /18;

18) 74.23.12.15 /12;

19) 192.150.23.51 /9;

20) 82.15.0.0 /7;

21) 83.15.0.22 /6;

22) 10.0.0.0 /16;

23) 127.0.0.1 /31;

24) 10.244.0.245 /30;

25) 10.244.0.87 /29;

26) 200.20.20.20 /28;

27) 10.244.76.76 /30;

28) 83.15.0.22 /30;

Task 2.
Download and install Packet Tracer
https://www.netacad.com/courses/packet-tracer