



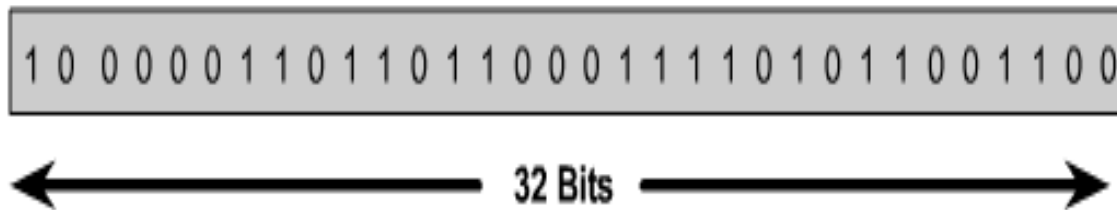
IP Addressing

What is an IP Address?

- An IP address is a unique global address for a network interface
- An **Internet Protocol address** (IP address) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication

IPv4 Address

- An IPv4 address is a 32-bit sequence of 1s and 0s.
- To make the IP address easier to use, the address is usually written as four decimal numbers separated by periods.
- This way of writing the address is called the dotted decimal format.



Binary : 11000000.10101000.00000001.00001000 and 11000000.10101000.00000001.00001001

Decimal : 192.168.1.8 and 192.168.1.9

IP structure

- IP addresses consist of four sections
- Each section is 8 bits long
- Each section can range from 0 to 255
- Written, for example, 128.35.0.72

Address

Space

```
add .....  
r1 add addr  
.....15 .....  
..r2.....  
addr addr2  
41 26  
.....31 .....
```

RULE:

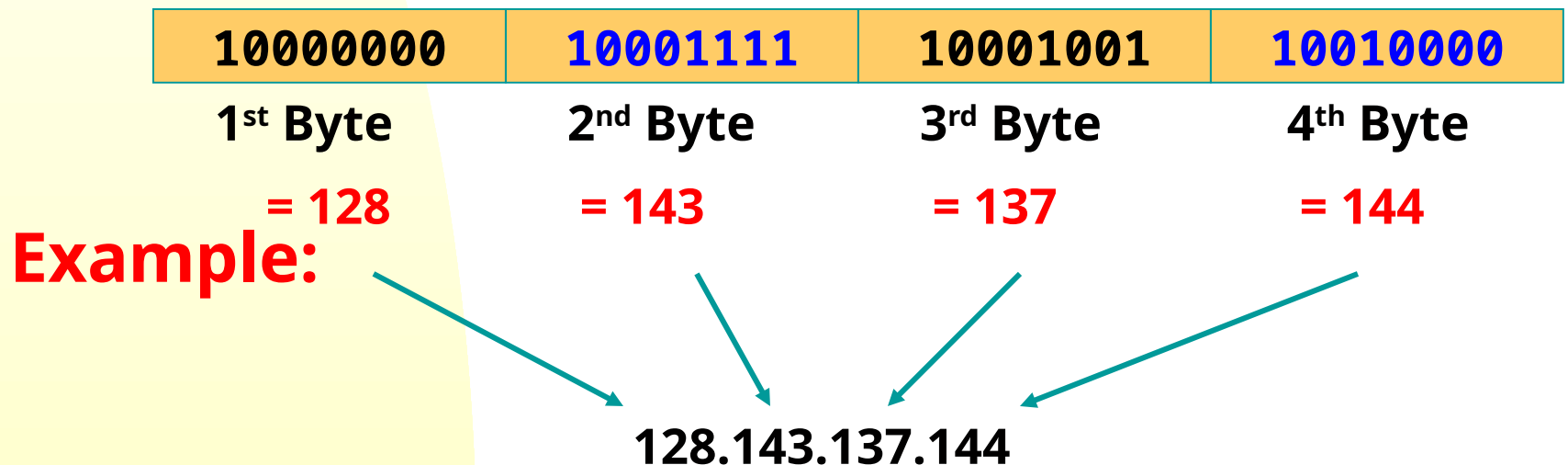
If a protocol uses N bits
to address a memory location,
define an address,
the address space is 2^N
because each bit can have
two

different values (0 and 1)
and N bits can have 2^N
values

*The address space of IPv4 is
 2^{32} or 4,294,967,296.*

Dotted Decimal Notation

- IP addresses are written in a so-called ***dotted decimal notation***
- Each byte is identified by a decimal number in the range [0..255]:



Hexadecimal Notation

0111 0101 1001 0101 0001 1101 1110
1010

75

EA

95

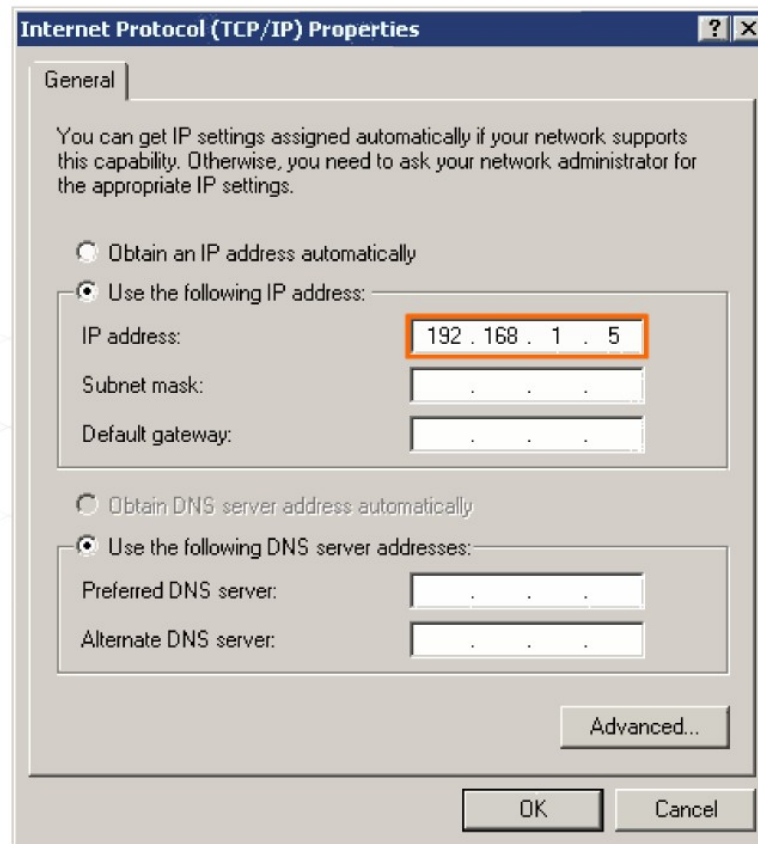
1D

0x75951DE

A

IP Addressing Structure

- Describe the dotted decimal structure of a binary IP address and label its



I see you have
assigned me
an IP address
11000000.1010
1000.00000001.
00000101
Now other
hosts can find
me!



IP version 4 (IPv4) is the current form of addressing used on the Internet.

Example

1

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

**10000001 00001011 00001011
11101111**

Solution

129.11.11.239

Example

2

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

111.56.45.78

Solution

***01101111 00111000 00101101
01001110***

Example

3

Find the error, if any, in the following IP address:

111.56.045.78

Solution

There are no leading zeroes in dotted-decimal notation (045)

Example 3

(continued)

Find the error, if any, in the following IP address:

75.45.301.14

Solution

In dotted-decimal notation, each number is less than or equal to 255; 301 is outside this range.