



Note

An IPv4 address is 32 bits long.



Note

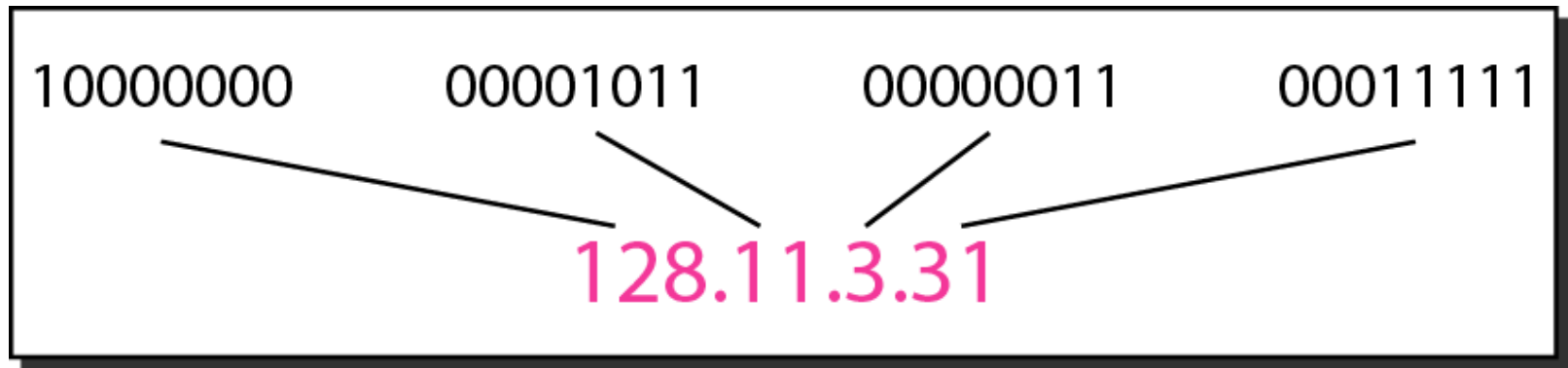
The IPv4 addresses are unique
and universal.



Note

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

Figure 19.1 *Dotted-decimal notation and binary notation for an IPv4 address*



Change the following IPv4 addresses from binary notation to dotted-decimal notation.

a. 10000001 00001011 00001011 11101111

b. 11000001 10000011 00011011 11111111

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. 193.131.27.255

Change the following IPv4 addresses from dotted-decimal notation to binary notation.

a. 111.56.45.78

b. 221.34.7.82

Solution

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

a. 01101111 00111000 00101101 01001110

b. 11011101 00100010 00000111 01010010

Find the error, if any, in the following IPv4 addresses.

- a. 111.56.045.78
- b. 221.34.7.8.20
- c. 75.45.301.14
- d. 11100010.23.14.67



Note

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

Figure 19.2 *Finding the classes in binary and dotted-decimal notation*

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

a. Binary notation

	First byte	Second byte	Third byte	Fourth byte
Class A	0–127			
Class B	128–191			
Class C	192–223			
Class D	224–239			
Class E	240–255			

b. Dotted-decimal notation

Find the class of each address.

- a. 00000001 00001011 00001011 11101111
- b. 11000001 10000011 00011011 11111111
- c. 14.23.120.8
- d. 252.5.15.111

Table 19.1 *Number of blocks and block size in classful IPv4 addressing*

<i>Class</i>	<i>Number of Blocks</i>	<i>Block Size</i>	<i>Application</i>
A	128	16,777,216	Unicast
B	16,384	65,536	Unicast
C	2,097,152	256	Unicast
D	1	268,435,456	Multicast
E	1	268,435,456	Reserved



Note

In classful addressing, a large part of the available addresses were wasted.

Table 19.2 *Default masks for classful addressing*

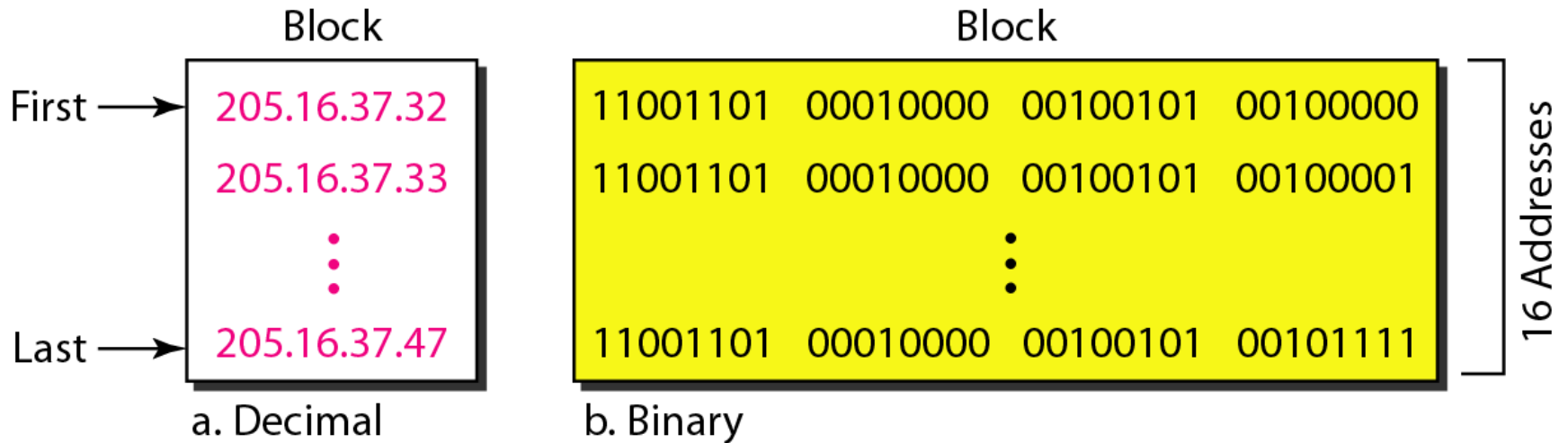
<i>Class</i>	<i>Binary</i>	<i>Dotted-Decimal</i>	<i>CIDR</i>
A	11111111 00000000 00000000 00000000	255 .0.0.0	/8
B	11111111 11111111 00000000 00000000	255.255 .0.0	/16
C	11111111 11111111 11111111 00000000	255.255.255 .0	/24



Note

Classful addressing, which is almost obsolete, is replaced with classless addressing.

Figure 19.3 *A block of 16 addresses granted to a small organization*





Note

In IPv4 addressing, a block of addresses can be defined as

$x.y.z.t /n$

in which $x.y.z.t$ defines one of the addresses and the $/n$ defines the mask.



Note

The first address in the block can be found by setting the rightmost
 $32 - n$ bits to 0s.