

EE981 Network Switching & Routing

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Topics in Addressing

- Address Space and IPv4
- Classfull Architecture
 - Hierarchical Addressing
- Subnetting & Supernetting
- Classless Architecture
- Specialized Blocks & Addresses

IP Address

Identifier used in the IP layer of the TCP/IP protocol suite to identify each device connected to the Internet is called the Internet address or IP address.

IPv4 Address is 32 bit long

The IPv4 addresses are unique and universal.

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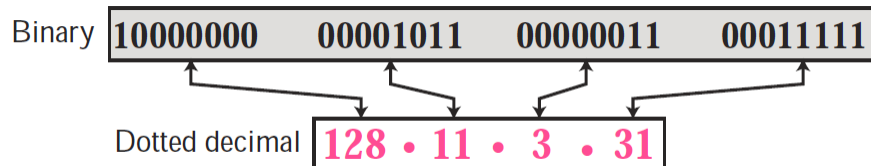
Address Space

The address space of IPv4 is
 2^{32}

4,294,967,296

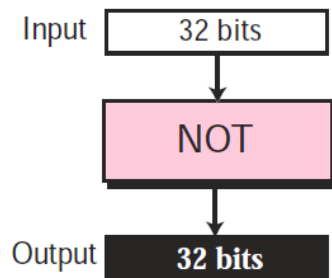
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Notation Binary / Dotted Decimal



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Binary Operations



NOT operation

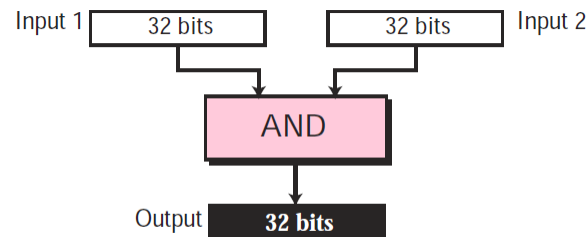
Input	Output
0	1
1	0

Operation for each bit

Original number:	00010001	01111001	00001110	00100011
Complement:	11101110	10000110	11110001	11011100

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Binary Operations



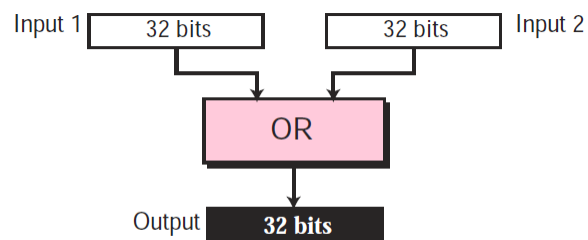
AND		
Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

Operation for each bit

First number:	00010001	01111001	00001110	00100011
Second number:	11111111	11111111	10001100	00000000
Result	00010001	01111001	00001100	00000000

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Binary Operations



OR		
Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

Operation for each bit

First number:	00010001	01111001	00001110	00100011
Second number:	11111111	11111111	10001100	00000000
Result	11111111	11111111	10001110	00100011

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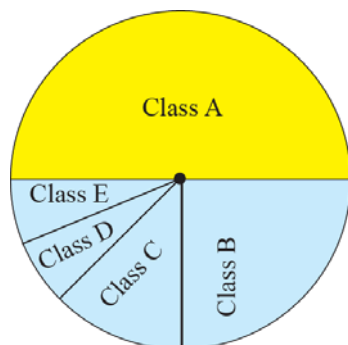
Classfull Addressing

A B C D E

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Classes

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



Class A: $2^{31} = 2,147,483,648$ addresses, 50%

Class B: $2^{30} = 1,073,741,824$ addresses, 25%

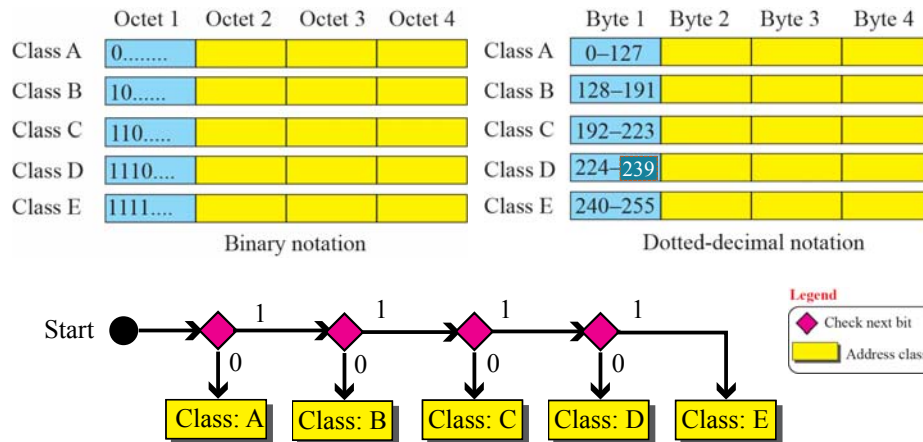
Class C: $2^{29} = 536,870,912$ addresses, 12.5%

Class D: $2^{28} = 268,435,456$ addresses, 6.25%

Class E: $2^{28} = 268,435,456$ addresses, 6.25%

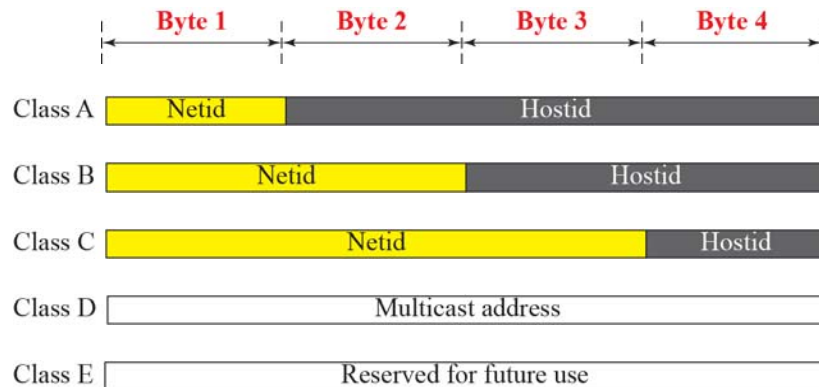
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Identifying Classes



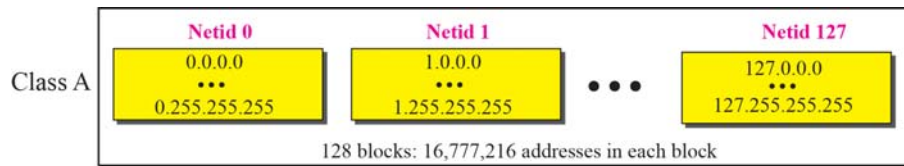
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Net ID & Host ID



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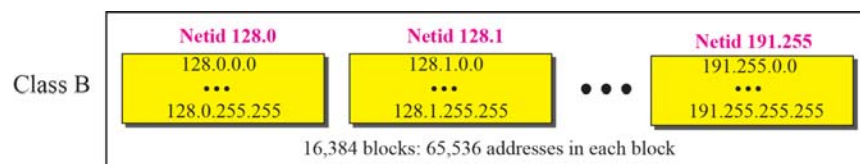
Class A



Millions of class A addresses
are wasted.

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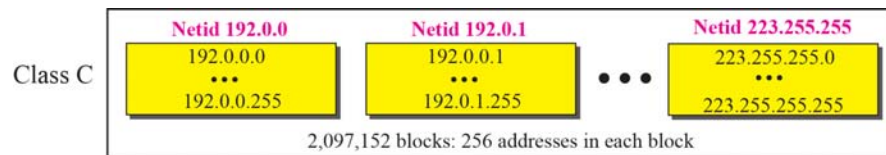
Class B



Many class B addresses are wasted.

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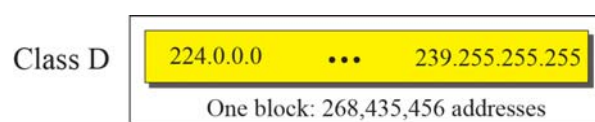
Class C



Not so many organizations are so small to have a class C block.

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Class D



Class D addresses are made of one block, used for multicasting.

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Class E

Class E

240.0.0.0 ... 255.255.255.255

One block: 268,435,456 addresses

The only block of class E addresses was reserved for future purposes.

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Address Allocation

The range of addresses allocated to an organization in classful addressing was a block of addresses in Class A, B, or C.

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