

CHAPTER 7, IPV4

Binary to Decimal Conversion

Binary	1	0	1	1	0	0	1	1
Position Value	128	64	32	16	8	4	2	1

Sum Position Values:	128
	32
	16
	2
	1
	<hr/>
Decimal	179

Q1. Convert to Binary: 10101010

A) 170

B) 160

C) 101

D) 202

ANSWER ON LAST SLIDE

Decimal to Binary Conversion

Decimal	212							
Position Value	128	64	32	16	8	4	2	1
Binary	1	1	0	1	0	1	0	0

	Value	Remainder
		212
Remainder Calculation:	128	84
	64	20
	16	4
	4	0

Q2. Convert to Decimal: 135

A) 10001010

B) 10101010

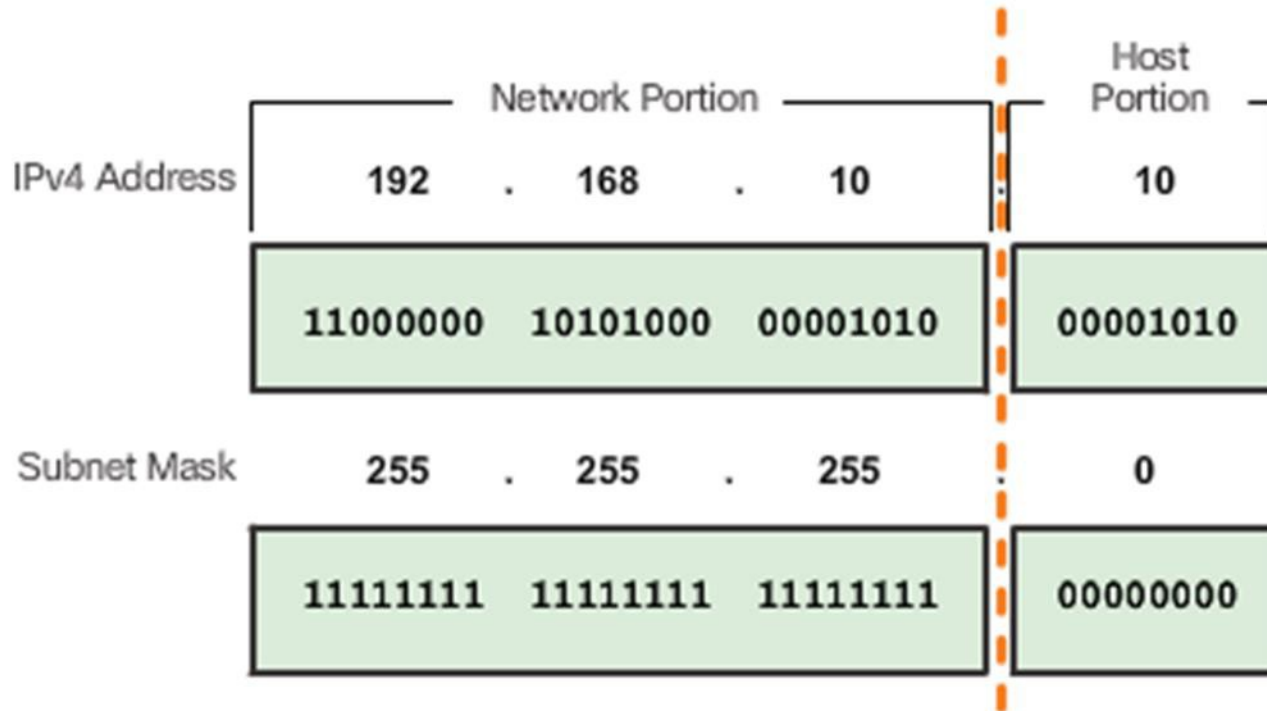
C) 11001101

D) 10000111

ANSWER ON LAST SLIDE

The Subnet Mask

- Comparing the IP Address and the Subnet Mask
- The 1s in the subnet mask identify the network portion while the 0s identify the host portion.



Subnet Mask Notations

Dotted Decimal

255.255.255.252

Dotted Binary 11111111.11111111.11111111.11111100

Slash

/30

Q3. Convert this Subnet Mask to Dotted Binary Notation: /25

A) 11111111.11110111.11111111.10000000

B) 11111111.11111111.11111111.10000000

C) 11111111.11111111.11111110.00000000

D) 11111111.11111111.11111111.11000000

ANSWER ON LAST SLIDE

Q4. Convert this Subnet Mask to Dotted Decimal Notation: /25

A) 255.255.255.128

B) 255.255.255.192

C) 255.255.255.0

D) 255.255.254.0

ANSWER ON LAST SLIDE

Calculate the Network Address

- Logical AND is the comparison of two bits.
- ANDing between the IP address and the subnet mask yields the network address.

1 AND 1 = 1
0 AND 1 = 0
0 AND 0 = 0
1 AND 0 = 0

IP address	192	.	168	.	10	.	10
Binary	11000000			10101000		00001010	
Subnet mask	255	.	255	.	255	.	0
	11111111			11111111		00000000	
AND Results	11000000			10101000		00000000	
Network Address	192	.	168	.	10	.	0

Q5. Find the Network Address for the following scenario.

Host Address: 192.168.125.1

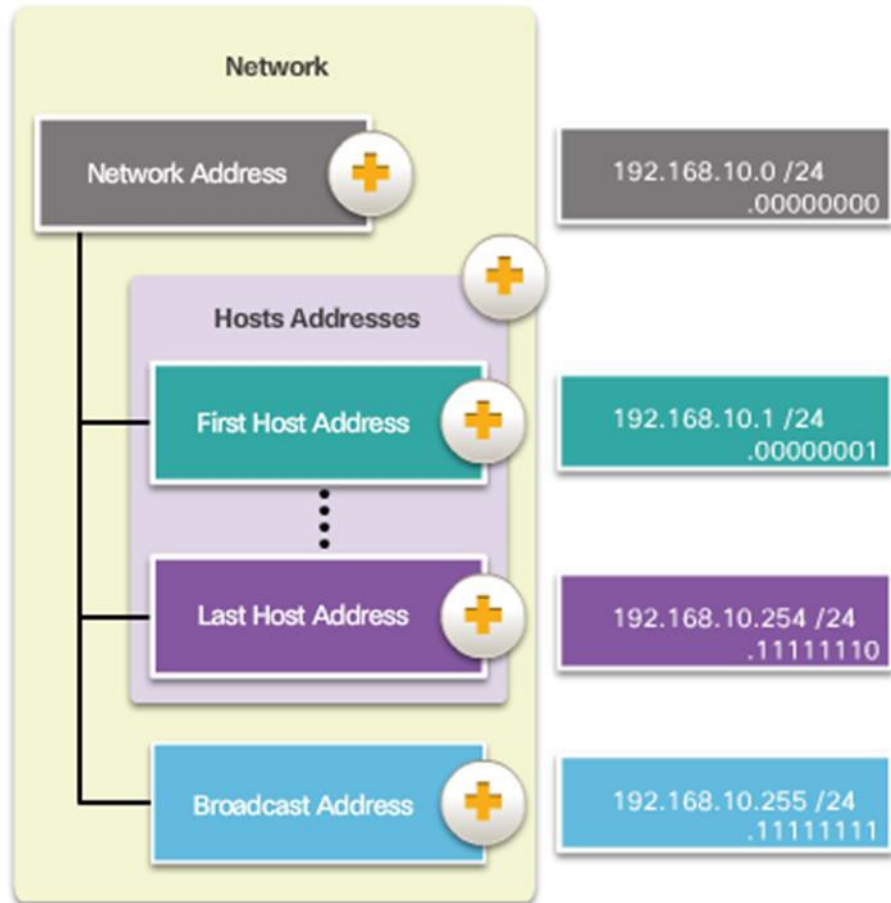
Subnet Mask: 255.255.255.128

- A) 192.168.125.1
- B) 192.168.125.128
- C) 192.168.125.0
- D) 192.168.125.192

ANSWER ON LAST SLIDE

Network, Host, and Broadcast Addresses

Types of Addresses in Network 192.168.10.0 /24



Example

Network Address: 192.168.125.128/25

Network Address in Dotted Binary Notation:

11000000.10101000.01111101.10000000
192.168.125.128/25

Network Address: Host portion are all 0s

First Host Address:

11000000.10101000.01111101.10000001
192.168.125.129

First Host Address: Host portion is 1 binary

Example

Network Address: 192.168.125.128/25

Last Host Address:

11000000.10101000.01111101.1 1111110
192.168.125.254

Last Host Address: one less than broadcast in host portion

Broadcast Address:

11000000.10101000.01111101.1 1111111
192.168.125.255

Broadcast Address: host portion are all 1s

Q6. What is the first host address for the following network address: 10.23.100.64/26

A) 10.23.100.193

B) 10.23.100.63

C) 10.23.100.64

D) 10.23.100.65

ANSWER ON LAST SLIDE

Q7. What is the last host address for the following network address: 10.23.100.64/26

A) 10.23.100.127

B) 10.23.100.254

C) 10.23.100.126

D) I don't know

ANSWER ON LAST SLIDE

Q7. What is the last host address for the following network address: 10.23.100.64/26

Answer:

Last Host Address:

00001010.00010111.01100100.01**111110**

10.23.100.**126**

Legacy Address Classes

Classful Address have a fixed size host portion

Class A has /8

Class B has /16

Class C has /24

Class A Specifics	
Address block	0.0.0.0 - 127.0.0.0*
Default Subnet Mask	/8 (255.0.0.0)
Maximum Number of Networks	128
Number of Host per Network	16,777,214
High order bit	0xxxxxxx.____.____.____

* 0.0.0.0 and 127.0.0.0 are reserved and cannot be assigned

Class B Specifics	
Address block	128.0.0.0 - 191.255.0.0
Default Subnet Mask	/16 (255.255.0.0)
Maximum Number of Networks	16,384
Number of Host per Network	65,534
High order bit	10xxxxxx.____.____.____

Class C Specifics	
Address block	192.0.0.0 - 223.255.255.0
Default Subnet Mask	/24 (255.255.255.0)
Maximum Number of Networks	2,097,152
Number of Host per Network	254
High order bit	110xxxxx.____.____.____

Q8. Which Class is the following IP Address:
130.125.100.20/16

A) Class A

B) Class B

C) Class C

D) Class D

ANSWER ON LAST SLIDE

Public and Private IPv4 Addresses

Private Addresses:

- Class A Private Addresses
10.0.0.0/8 or 10.0.0.0 to 10.255.255.255
- Class B Private Addresses
172.16.0.0 /12 or 172.16.0.0 to 172.31.255.255
- Class C Private Addresses
192.168.0.0 /16 or 192.168.0.0 to 192.168.255.255

IP Addresses must be unique (non overlapping) in the public Internet
Private Addresses can be used in a private location
Private Addresses cannot be routed onto the public Internet
Private Addresses must be Translated into Public Address before routing on the public Internet. This is called NAT – Network Address Translation

Special Use IPv4 Addresses

- Loopback addresses
127.0.0.0 /8 or 127.0.0.1 to 127.255.255.254
- Link-Local addresses or Automatic Private IP Addressing (APIPA) addresses
169.254.0.0 /16 or
169.254.0.1 to 169.254.255.254
- TEST-NET addresses
192.0.2.0/24 or 192.0.2.0
to 192.0.2.255

Classless Addressing

- Formal name is Classless Inter-Domain Routing (CIDR, pronounced “cider”).
- Created a new set of standards that allowed service providers to allocate IPv4 addresses on any address bit boundary (prefix length) instead of only by a class A, B, or C address.

Answers

Q1: A

Q2: D

Q3: B

Q4: A

Q5: C

Q6: D

Q7: C

Q8: B