

FLSM Subnetting

- Let's say we've been allocated Class C *200.15.10.0/24*
 - To subnet the network into smaller subnets, we need to 'borrow' host bits and add them to the network portion of the address.
 - The network address line always moves to the right when we subnet.
 - ! The further to the right we go, the more subnets we'll have of that size but less hosts.
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Formulas

calculate the number of subnets

- ! $2^{(\text{subnet_bits})}$

e.g: source : [08-03+Subnetting+Overview, page 3](#)

- If a **Class C network uses a /28 subnet mask** then we've *borrowed 4 bit* from the default of /24
 - \$ $2^4 = 16$ available subnets
 - If a **Class B network uses a /28 subnet mask** then we've *borrowed 12 bits* from the default of / 16
 - \$ $2^{12} = 4096$ available subnets
 - Hosts on different subnets need to go via a router if they want to communicate with each other
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Calculate the number of hosts

- ! $(2^{\text{host_bits}}) - 2$
 - We subtract 2 because the network address and broadcast address cannot be assigned to hosts
 - If a **Class C network uses a /28 subnet mask** then we *have 4 bits* left for hosts
 - \$ $2^4 - 2 = 14$
 - If a **Class B network uses a /28 subnet mask** then we *have 4 bits* left for hosts
 - \$ $2^4 - 2 = 14$
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Class C /31 Subnet

- ! subnet mask for /31 = 255.255.255.254
- ! Binary Subnet Mask = 11111111.11111111.11111111.11111110
- 7 bits of network bits.

- 1 host bit.

Number of subnets

$$2^7 = 128.$$

Number of Hosts

$$2^1 = 2$$

Number of usable hosts

$$2^1 - 2 = 0$$

Class C /30 Subnet

- ! subnet mask for /30 = 255.255.255.252
- ! Binary Subnet Mask = 11111111.11111111.11111111.11111100
- 6 bits of network bits.
- 2 host bit.

Number of subnets

$$2^6 = 64.$$

Number of Hosts

$$2^2 = 4$$

Number of usable hosts

$$2^2 - 2 = 2$$

Class C /29 Subnet

- ! subnet mask for /29 = 255.255.255.248
- ! Binary Subnet Mask = 11111111.11111111.11111111.11111000
- 5 bits of network bits.
- 3 host bit.

Number of subnets

$$2^5 = 32$$

Number of Hosts

$$2^3 = 8$$

Number of usable hosts

$$2^1 - 2 = 6$$

Class C /28 Subnet

- ! subnet mask for /28 = 255.255.255.240
- ! Binary Subnet Mask = 11111111.11111111.11111111.11110000
 - 4 bits of network bits.
 - 4 host bit.

Number of subnets

$$2^4 = 16.$$

Number of Hosts

$$2^4 = 16$$

Number of usable hosts

$$2^1 - 2 = 14$$

Class C /27 Subnet

- ! subnet mask for /31 = 255.255.224.
- ! Binary Subnet Mask = 11111111.11111111.11111111.11100000
 -
 - 3 bits of network bits.
 - 5 host bit.

Number of subnets

$$2^3 = 8.$$

Number of Hosts

$$2^5 = 32.$$

Number of usable hosts

$$2^1 - 2 = 30$$

Class C /26 Subnet

- ! subnet mask for /31 = 255.255.255.192
- ! Binary Subnet Mask = 11111111.11111111.11111111.11000000
 - 2 bits of network bits.
 - 6 host bit.

Number of subnets

$$2^2 = 4.$$

Number of Hosts

$$2^6 = 64$$

Number of usable hosts

$$2^6 - 2 = 62$$

Class C /25 Subnet

- ! subnet mask for /31 = 255.255.255.128
- ! Binary Subnet Mask = 11111111.11111111.11111111.10000000
 - 1 bits of network bits.
 - 7 host bit.

Number of subnets

$$2^1 = 2.$$

Number of Hosts

$$2^7 = 128$$

Number of usable hosts

$$2^7 - 2 = 126$$

Class C /24 Subnet

- ! subnet mask for /31 = 255.255.255.0
- ! Binary Subnet Mask = 11111111.11111111.11111111.00000000
 - 0 bits of network bits.
 - 8 host bit.

Number of subnets

$$2^0 = 1.$$

Number of Hosts

$$2^8 = 256$$

Number of usable hosts

$$2^1 - 2 = 0$$

Practice Question-1.pdf

/26

2² network addresses = 4 networks

2⁶ host addresses - 2 = 62 usable hosts

255.255.255.192/26

198.22.45.173 / 26

198.22.45.0 - 198.22.45.63

198.22.45.64 - 198.22.45.127

198.22.45.128 - 198.22.45.191

198.22.45.192 - 198.22.45.255

Practice Questions

1. IP Address: 192.168.10.75/28

- Find the subnet mask, network address, broadcast address, and valid host addresses.

2. IP Address: 172.16.45.92/27

- Determine the subnet mask in dotted decimal notation and find the network, broadcast, and valid host addresses.

3. IP Address: 10.0.5.200/29

- Calculate the subnet mask, network address, broadcast address, and valid host addresses.

4. IP Address: 192.168.2.45/30

- Find the subnet mask, network address, broadcast address, and the two valid host addresses.

5. IP Address: 172.31.88.15/26

- Determine the subnet mask, network address, broadcast address, and valid host addresses.

Solutions

1. 192.168.10.75/28

Subnet mask - 255.255.255.240

11111111.11111111.11111111.11110000

11000000.10101000.00001010.01001011

Number of subnets - 16

Number of usable Hosts - 14

Network address - 192.168.10.64

Broadcast address - 192.168.10.79

2. 172.16.45.92/27

Subnet mask - 255.255.255.224

11111111.11111111.11111111.11100000

10101100.00010000.00101101.01011100

Number of subnets - 8

Number of hosts - 32

Number of usable hosts - 30

Network address - 172.16.45.64

Broadcast address - 172.16.45.94

3. 10.0.5.200/29

Subnet mask - 255.255.255.224

11111111.11111111.11111111.11111000

00001010.00000000.00000101.11001000

Number of subnets - 32

Number of hosts - 8

Number of usable hosts - 6

Network address - 10.0.5.200

Broadcast address - 10.0.5.207

4. 192.168.2.45/30

Subnet mask - 255.255.255.252

11111111.11111111.11111111.11111100

11000000.10101000.00000010.00101110

Number of subnets - 64

Number of hosts - 4

Number of usable hosts - 2

Network address - 192.168.2.44

Broadcast address - 192.168.2.47

5. 172.31.88.15/26

Subnet mask - 255.255.255.252

11111111.11111111.11111111.11000000

10101100.00011111.01011000.00001111

Number of subnets - 4

Number of hosts - 64

Number of usable hosts - 62

Network address - 172.31.88.0

Broadcast address - 172.31.88.63
