



Binary Lesson 5
Usable Addresses
Class A, B, and C

Slash Notation

- Consider a class A address of 1.2.3.4
- The network portion is the first octet
 - 1
- This situation can be written
 - 1.2.3.4/8
 - The number after the / is the number of bits in the network portion

Subnet Mask

- Consider a class A address of 1.2.3.4 /8 in binary
- The *subnet mask* is 255.0.0.0
- The network address is 1.0.0.0
- In Binary:

| | | | | |
|------------|----------|----------|----------|----------|
| IP: | 00000001 | 00000010 | 00000011 | 00000100 |
| Subnt Msk: | 11111111 | 00000000 | 00000000 | 00000000 |
| Net Addr: | 00000001 | 00000000 | 00000000 | 00000000 |

Network Address

- To find the network address, take a node's IP address and set all the host bits to 0

| | | | | |
|------------|----------|----------|----------|----------|
| IP: | 00000001 | 00000010 | 00000011 | 00000100 |
| Subnt Msk: | 11111111 | 00000000 | 00000000 | 00000000 |
| | NNNNNNNN | HHHHHHHH | HHHHHHHH | HHHHHHHH |
| Net Addr: | 00000001 | 00000000 | 00000000 | 00000000 |

- In decimal:

| | | | | |
|------------|-----|---|---|---|
| IP: | 1 | 2 | 3 | 4 |
| Subnt Msk: | 255 | 0 | 0 | 0 |
| Net Addr: | 1 | 0 | 0 | 0 |

Broadcast Address

- To find the broadcast address, take a node's IP address and set all the host bits to 1

| | | | | |
|------------|----------|----------|----------|----------|
| IP: | 00000001 | 00000010 | 00000011 | 00000100 |
| Subnt Msk: | 11111111 | 00000000 | 00000000 | 00000000 |
| | NNNNNNNN | HHHHHHHH | HHHHHHHH | HHHHHHHH |
| Brdc Addr: | 00000001 | 11111111 | 11111111 | 11111111 |

- In decimal:

| | | | | |
|------------|-----|-----|-----|-----|
| IP: | 1 | 2 | 3 | 4 |
| Subnt Msk: | 255 | 0 | 0 | 0 |
| Brdc Addr: | 1 | 255 | 255 | 255 |

Usable Addresses

- All the other addresses are usable--starting at network address + 1 and ending at broadcast address -1

| | | | | |
|--------------------|--------|------|------|-----|
| Network Addr: | 1. | 0. | 0. | 0 |
| Subnet Mask: | 255. | 0. | 0. | 0 |
| Broadcast Addr: | 1.255. | 255. | 255. | 255 |
| First Usable Addr: | 1. | 0. | 0. | 1 |
| Last Usable Addr: | 1.255. | 255. | 254. | |

Class B

- Class B address: 147.144.1.212 /16
- The *subnet mask* is 255.255.0.0
- The network address is 147.144.0.0
- The broadcast address is 147.144.255.255
- In Binary:

| | | | | |
|------------|----------|----------|----------|----------|
| IP: | 10010011 | 10010000 | 00000001 | 11010100 |
| Subnt Msk: | 11111111 | 11111111 | 00000000 | 00000000 |
| Net Addr: | 10010011 | 10010000 | 00000000 | 00000000 |
| Brdc Addr: | 10010011 | 10010000 | 11111111 | 11111111 |

Class B Usable Addresses

- Class B address: 147.144.1.212 /16
- The *subnet mask* is 255.255.0.0
- The network address is 147.144.0.0
- The broadcast address is 147.144.255.255
- First usable address: 147.144.0.1
- Last usable address: 147.144.255.254

Class C

- Class C address: 192.168.1.10 /24
- The *subnet mask* is 255.255.255.0
- The network address is 192.168.1.0
- The broadcast address is 192.168.1.255
- In Binary:

| | | | | |
|------------|----------|----------|----------|----------|
| IP: | 11000000 | 10101000 | 00000001 | 00001010 |
| Subnt Msk: | 11111111 | 11111111 | 11111111 | 00000000 |
| Net Addr: | 11000000 | 10101000 | 00000001 | 00000000 |
| Brdc Addr: | 11000000 | 10101000 | 00000001 | 11111111 |