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# IT1080C Computer Networking

## IPv4 Addressing Lab 1 Classful Addressing

When the Internet Protocol was developed, the Internet contains a few large physical networks and many small networks so designers chose an addressing scheme to accommodate a combination of large and small networks. The original classful IP addressing divided IP address space into three primary classes and each class has a different size prefix and suffix.

The first four bits of an IP address determined class to which the address belonged and specifies how the remainder of the address was divided into prefix and suffix.

| **Class** | **First Four Bits** | **First Octet** | **# of Networks** | **# Hosts per Network** | **Prefix / Suffix** |
| --- | --- | --- | --- | --- | --- |
| A | 0XXX | 1 to 126 | 126 | 16,777,214 | **N. H. H. H** |
| B | 10XX | 128 to 191 | 16,384 | 65,534 | **N. N. H. H** |
| C | 110X | 192 to 223 | 2,097,152 | 254 | **N. N. N. H** |

The table defines the first octet each class of addressing belongs, the number of networks in each of the three classes, the maximum number of hosts per network, and the division between the prefix (octets defining the network address) and the suffix (octets available for host addresses).

Find the network address, the broadcast address, and the range of host addresses for each given IPv4 address. Directions for completing lab:

1. Convert the dotted decimal address to binary
2. Compute the network address by setting host bits to zero
3. Convert the binary network address to dotted decimal
4. Compute the broadcast address by setting host bits to one
5. Convert the binary broadcast address to dotted decimal
6. Determine the range of addresses available to hosts on the network (addresses between the network address and the broadcast address)

1. **160.53.5.0**

Address in Binary:   
10100000.00110101.00000101.00000000

Network Address (set all host bits to zero):   
10100000.00110101.00000000.00000000

Dotted decimal: **160.53.0.0**  
  
Broadcast Address (set all host bits to one):   
10100000.00110101.11111111.11111111

Dotted decimal: 160.53.255.255

#### Range of host addresses (between the network address and the broadcast address):

Dotted decimal range: 160.53.0.1  160.53.255.254

1. **64.128.72.16**

Address in Binary:   
01000000.10000000.01001000.00010000

Network Address (set all host bits to zero):   
01000000.00000000.00000000.00000000

Dotted decimal: 64.0.0.0

Broadcast Address (set all host bits to one):   
01000000.11111111.11111111.11111111

Dotted decimal: 64.255.255.255

#### Range of host addresses (between the network address and the broadcast address):

Dotted decimal range: 64.0.0.1  64.255.255.254

1. **129.47.116.11**

Address in Binary:   
10000001.00101111.01110100.00001011

Network Address (set all host bits to zero):   
10000001.00101111.00000000.00000000  
  
Dotted decimal: **129.47.0.0**  
  
Broadcast Address (set all host bits to one):   
10000001.00101111.11111111.11111111

Dotted decimal: **129.47.255.255**  
  
Range of host address (between the network address and the broadcast address):

Dotted decimal range: **129.47.0.1**  **129.47.255.254**

1. **192.168.32.252**

Address in Binary:   
11000000.10101000.00100000.11111100

Network Address (set all host bits to zero):   
11000000.10101000.00100000.00000000  
  
Dotted decimal: 192.168.32.0

Broadcast Address (set all host bits to one):   
11000000.10101000.00100000.11111111  
  
Dotted decimal: 192.168.32.255

#### Range of host address (between the network address and the broadcast address):

Dotted decimal range: 192.168.32.1  192.168.32.254

1. **217.96.128.116**

Address in Binary:   
11011001.01100000.10000000.01110100

Network Address (set all host bits to zero):   
11011001.01100000.10000000.00000000   
  
Dotted decimal: **217.96.128.0**

Broadcast Address (set all host bits to one):   
11011001.01100000.10000000.11111111   
  
Dotted decimal: **217.96.128.255**

#### Range of host address (between the network address and the broadcast address):

Dotted decimal range: **217.96.128.1**  **217.96.128.254**