Lab 3 – IP Addressing and Subnetting

Analyze the table below and list the range of host and broadcast addresses given a network/prefix mask pair. (1 Point per row)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IP Address/Prefix | Network Address | First Host Address | Last Host Address | Broadcast Address |
| 192.160.255.160/24 | 192.160.255.0 | 192.160.255.1 | 192.160.255.254 | 192.160.255.255 |
| 165.43.200.220/22 | 165.43.200.0 | 165.43.196.1 | 165.43.203.254 | 165.43.203.255 |
| 1.2.22.150/29 | 1.2.22.144 | 1.2.22.145 | 1.2.22.150 | 1.2.22.151 |
| 172.233.100.106/26 | 172.233.100.64 | 172.233.100.65 | 172.233.100.126 | 172.233.100.127 |
| 1.1.101.54/27 | 1.1.101.32 | 1.1.101.33 | 1.1.101.62 | 1.1.101.63 |

1. Given the subnet mask of 255.252.0.0. How many host addresses are on this network ? (2 points)

Ans: 262142 host addresses

1. What is the classful subnet mask for the IP Address of 130.56.100.254 ? (2 points)

Ans: /16

1. Given the IP Address of 116.2.139.223 with a subnet mask of 255.255.0.0. Use the process shown in class and determine the dotted decimal value of the broadcast address. Show your work (2 points)

In this case, the binary representation of the IP address and subnet mask are:

IP Address: 01110100.00000010.10001011.11011111

Subnet Mask: 11111111.11111111.00000000.00000000

Performing the bitwise OR between the IP address and the complement of the subnet mask (i.e., the mask with all 1s flipped to 0s and vice versa) gives:

Broadcast Address: 01110100.00000010.11111111.11111111 = 116.2.255.255

Therefore, the dotted decimal value of the broadcast address is 116.2.255.255.

1. Given the IP Address of 21.87.55.245 with a subnet mask of 255.255.0.0. Use the process shown in class and determine the dotted decimal value of the network address. Show your work (2 points)

In this case, the binary representation of the IP address and subnet mask are:

IP Address: 00010101.01010111.00110111.11110101

Subnet Mask: 11111111.11111111.00000000.00000000

Performing the bitwise AND between the IP address and the subnet mask gives:

Network Address: 00010101.01010111.00000000.00000000 = 21.87.0.0

Therefore, the dotted decimal value of the network address is 21.87.0.0.

1. Given the IP Address of 20.1.22.7 with a subnet mask of 255.255.255.0. Use the process shown in class and determine the dotted decimal value of the range of the host IP Addresses. Show your work (2 points)

First, we identify the network address:

IP address: 00010100.00000001.00010110.00000111

Subnet mask: 11111111.11111111.11111111.00000000

Network address: 00010100.00000001.00010110.00000000

Therefore, the network address is 20.1.22.0.

If convert all the host bits of the network address to 0 and add 1, we get the first host address:

First usable IP: 20.1.122.1 Last Usable IP: 20.1.122.254

1. Given the IP Address of 115.19.20.8. Convert the address to binary. Show your work. (2 points).

Convert each octet to binary:

115 = 01110011

19 = 00010011

20 = 00010100

8 = 00001000

Then combine them.

Ans: 01110011.00010011.00010100.00001000

1. Given the IP Address of 01011101 . 11000011 . 11100000 . 00010011. Convert the address to dotted decimal notation. Show your work (2 points)

Convert each binary octet to decimal:

01011101 = 93

11000011 = 195

11100000 = 224

00010011 = 19

Write the decimal octets in dotted decimal notation:

Ans: 93.195.224.19

1. What are the ranges of Class C IP Addresses ? (Full IP Addresses of 4 octets, not just one octet) (2 Points)

The range of Class C IP addresses is from 192.0.0.0 to 223.255.255.255, where the first 3 octets represent the network address and the last octet represents the host address.

1. What is the IP Address 127.0.0.1 used for? (2 points)

Ans: Loopback address. It is used to send packets to the local machine itself for testing purposes.

1. Is 190.34.1.45 255.255.0.0 a valid address that can be assigned to a printer? Yes or No. Show your work. (2 Points)

No, 190.34.1.45 with subnet mask 255.255.0.0 is not a valid address that can be assigned to a printer.

This is because the given IP address belongs to Class B network, but the subnet mask indicates that it has a network prefix length of 16 bits, which is greater than the network prefix length for a Class B network (i.e., 8 bits). A valid IP address for a printer with Class B network would have subnet mask 255.255.255.0 or smaller.