Lab– Identifying IPv4 Addresses (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Objectives

Part 1: Identify IPv4 Addresses

- Identify the network and host portion of an IP address.
- Identify the range of host addresses given a network/prefix mask pair.

Part 2: Classify IPv4 Addresses

- Identify the type of address (network, host, multicast, or broadcast).
- Identify whether an address is public or private.
- Determine if an address assignment is a valid host address.

Background / Scenario

Addressing is an important function of network layer protocols because it enables data communication between hosts on the same network, or on different networks. In this lab, you will examine the structure of Internet Protocol version 4 (IPv4) addresses. You will identify the various types of IPv4 addresses and the components that help comprise the address, such as network portion, host portion, and subnet mask. Types of addresses covered include public, private, unicast, and multicast.

Instructor Note: This activity can be done individually in class or assigned as homework. The lab can also be done in class with students working in pairs. If the lab is done in class, it should be followed up by discussion with correct answers. All public IP addresses used in this lab are owned by Cisco.

Required Resources

- Device with Internet access
- Optional: IPv4 address calculator

Part 1: Identify IPv4 Addresses

In Part 1, you will be given several examples of IPv4 addresses and will complete tables with appropriate information.

Step 1: Analyze the table shown below and identify the network portion and host portion of the given IPv4 addresses.

The first two rows show examples of how the table should be completed.

Key for table:

N = all 8 bits for an octet are in the network portion of the address

n = a bit in the network portion of the address

H = all 8 bits for an octet are in the host portion of the address

h = a bit in the host portion of the address

IP Address/Prefix	Network/Host N,n = Network H,h = Host	Subnet Mask	Network Address
192.168.10.10/24	N.N.N.H	255.255.255.0	192.168.10.0
10.101.99.17/23	N.N.nnnnnnnh.H	255.255.254.0	10.101.98.0
209.165.200.227/27	N.N.N.nnnhhhhh	255.255.255.224	209.165.200.224
172.31.45.252/24	N.N.N.H	255.255.255.0	172.31.45.0
10.1.8.200/26	N.N.N.nnhhhhhh	255.255.255.192	10.1.8.192
172.16.117.77/20	N.N.nnnnhhhh.H	255.255.240.0	172.16.112.0
10.1.1.101/25	N.N.N.nhhhhhhh	255.255.255.128	10.1.1.0
209.165.202.140/27	N.N.N.nnnhhhhh	255.255.255.224	209.165.202.128
192.168.28.45/28	N.N.N.nnnnhhhh	255.255.255.240	192.168.28.32

Step 2: Analyze the table below and list the range of host and broadcast addresses given a network/prefix mask pair.

The first row shows an example of how the table should be completed.

IP Address/Prefix	First Host Address	Last Host Address	Broadcast Address
192.168.10.10/24	192.168.10.1	192.168.10.254	192.168.10.255
10.101.99.17/23	10.101.98.1	10.101.99.254	10.101.99.255
209.165.200.227/27	209.165.200.225	209.165.200.254	209.165.200.255
172.31.45.252/24	172.31.45.1	172.31.45.254	172.31.45.255
10.1.8.200/26	10.1.8.193	10.1.8.254	10.1.8.255
172.16.117.77/20	172.16.112.1	172.16.127.254	172.16.127.255
10.1.1.101/25	10.1.1.1	10.1.1.126	10.1.1.127
209.165.202.140/27	209.165.202.129	209.165.202.158	209.165.202.159
192.168.28.45/28	192.168.28.33	192.168.28.46	192.168.28.47

Part 2: Classify IPv4 Addresses

In Part 2, you will identify and classify several examples of IPv4 addresses.

Step 1: Analyze the table shown below and identify the type of address (network, host, multicast, or broadcast address).

The first row shows an example of how the table should be completed.

IP Address	Subnet Mask	Address Type
10.1.1.1	255.255.255.252	host
192.168.33.63	255.255.255.192	broadcast
239.192.1.100	255.252.0.0	multicast
172.25.12.52	255.255.255.0	host
10.255.0.0	255.0.0.0	host
172.16.128.48	255.255.255.240	network
209.165.202.159	255.255.255.224	broadcast
172.16.0.255	255.255.0.0	host
224.10.1.11	255.255.255.0	multicast

Step 2: Analyze the table shown below and identify the address as public or private.

IP Address/Prefix	Public or Private
209.165.201.30/27	Public
192.168.255.253/24	Private
10.100.11.103/16	Private
172.30.1.100/28	Private
192.31.7.11/24	Public
172.20.18.150/22	Private
128.107.10.1/16	Public
192.135.250.10/24	Public
64.104.0.11/16	Public

Step 3: Analyze the table shown below and identify whether the address/prefix pair is a valid host address.

IP Address/Prefix	Valid Host Address?	Reason
127.1.0.10/24	No	Loopback
172.16.255.0/16	Yes	Host address
241.19.10.100/24	No	Reserved
192.168.0.254/24	Yes	Host address
192.31.7.255/24	No	Broadcast
64.102.255.255/14	Yes	Host address
224.0.0.5/16	No	Multicast
10.0.255.255/8	Yes	Host address
198.133.219.8/24	Yes	Host address

Reflection

Why should we continue to study and learn about IPv4 addressing if the available IPv4 address space is depleted?

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Many organizations will continue to use the private IPv4 address space for their internal networking needs. The public IPv4 addresses will be used for many years to come.