



COE 371L

Computer Networks I

Fall 2019

Lab #1

Section #1

Title: Identifying and Configuring IPv4 and IPv6 Addresses

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Lab – Identifying and Configuring IPv4 and IPv6 Addresses

1. Identify IPv4 Addresses

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

* 1. [Report] 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 |

* 1. [Report] 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 |

1. Classify IPv4 Addresses

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

* 1. [Report] 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 |

* 1. [Report] 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 |

* 1. [Report] 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 Address |
| 172.16.255.0/16 | yes | Lies in Class B |
| 241.19.10.100/24 | no | Reserved |
| 192.168.0.254/24 | yes | Lies in Class C |
| 192.31.7.255/24 | no | Broadcast |
| 64.102.255.255/14 | yes | Lies in Class A |
| 224.0.0.5/16 | no | Multicast |
| 10.0.255.255/8 | yes | Lies in Class A |
| 198.133.219.8/24 | yes | Lies in Class C |

1. [Report] Reflection

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

-It’s because there are many internet-enabled devices and corporate institutions that still use IPv4 addressing, and therefore important to study how they operate and work with them.

1. Identify the Different Types of IPv6 Addresses

In Part 3, you will review the characteristics of IPv6 addresses to identify the different types of IPv6 addresses.

* 1. Review the different types of IPv6 addresses.
  2. [Report] Match the IPv6 address to its type.

Match the IPv6 addresses to their corresponding address type. Notice that the addresses have been compressed to their abbreviated notation and that the slash network prefix number is not shown. Some answer choices must be used more than once.

|  |  |  |  |
| --- | --- | --- | --- |
| IPv6 Address | Answer |  | Answer Choices |
| 2001:0DB8:1:ACAD::FE55:6789:B210 | 1.b |  | a. Loopback address |
| ::1 | 2.a |  | b. Global unicast address |
| FC00:22:A:2::CD4:23E4:76FA | 3.d |  | c. Link-local address |
| 2033:DB8:1:1:22:A33D:259A:21FE | 4.b |  | d. Unique-local address |
| FE80::3201:CC01:65B1 | 5.c |  | e. Multicast address |
| FF00:: | 6.e |  |  |
| FF00::DB7:4322:A231:67C | 7.e |  |  |
| FF02::2 | 8.e |  |  |

1. Examine a Host IPv6 Network Interface and Address

In Part 4, you will check the IPv6 network settings of your PC to identify your network interface IPv6 address.

* 1. Check your PC IPv6 network address settings.

1. Practice IPv6 Address Abbreviation

In Part 3, you will study and review rules for IPv6 address abbreviation to correctly compress and decompress IPv6 addresses.

* 1. Study and review the rules for IPv6 address abbreviation.
  2. [Report] Practice compressing and decompressing IPv6 addresses.

Using the rules of IPv6 address abbreviation, either compress or decompress the following addresses:

* + - 1. 2002:0EC0:0200:0001:0000:04EB:44CE:08A2

2002:EC0:200:1::4EB:44CE:8A2

* + - 1. FE80:0000:0000:0001:0000:60BB:008E:7402

FE80::1:0:60BB:8E:7402

* + - 1. FE80::7042:B3D7:3DEC:84B8

FE80:0000:0000:0000:7042:B3D7:3DEC:84B8

* + - 1. FF00::

FF00:0000:0000:0000:0000:0000:0000:0000

* + - 1. 2001:0030:0001:ACAD:0000:330E:10C2:32BF

2001:30:1:ACAD::330E:10C2:32BF

1. Set Up Topology and Configure Basic Router and Switch Settings
   1. Cable the network as shown in the topology.
   2. Initialize and reload the router and switch.
   3. Verify that the PC interfaces are configured to use the IPv6 protocol.
   4. Configure the router.
   5. Configure the switch.
2. Configure IPv6 Addresses Manually
   1. Assign the IPv6 addresses to Ethernet interfaces on R1.
   2. Enable IPv6 routing on R1.
   3. Assign IPv6 addresses to the management interface (SVI) on S1.
   4. Assign static IPv6 addresses to the PCs.
3. Verify End-to-End Connectivity

[Report] Reflection

* 1. Why can the same link-local address, FE80::1, be assigned to both Ethernet interfaces on R1?

-They can be assigned to both interfaces and can be used interchangeably because the packets are local.

* 1. What is the Subnet ID of the IPv6 unicast address 2001:db8:acad::aaaa:1234/64?

-0000