Lab - Calculate IPv4 Subnets

Objectives

Part 1: Determine IPv4 Address Subnetting

Part 2: Calculate IPv4 Address Subnetting

# Background / Scenario

The ability to work with IPv4 subnets and determine network and host information based on a given IP address and subnet mask is critical to understanding how IPv4 networks operate. The first part is designed to reinforce how to compute network IP address information from a given IP address and subnet mask. When given an IP address and subnet mask, you will be able to determine other information about the subnet.

# Required Resources

* 1 PC (Windows with Internet access)
* Optional: IPv4 address calculator

# Instructions

Fill out the tables below with appropriate answers given the IPv4 address, original subnet mask, and new subnet mask.

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 192.168.200.139 |
| **Original Subnet Mask** | 255.255.255.0 |
| **New Subnet Mask:** | 255.255.255.224 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 3 |
| **Number of Subnets Created** | 8 |
| **Number of Host Bits per Subnet** | 32 – 27 = 5 |
| **Number of Hosts per Subnet** | 2^5 – 2 = 30 |
| **Network Address of this Subnet** | 192.168.200.128 |
| **IPv4 Address of First Host on this Subnet** | 192.168.200.129 |
| **IPv4 Address of Last Host on this Subnet** | 192.168.200.158 |
| **IPv4 Broadcast Address on this Subnet** | 192.168.200.159 |

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 10.101.99.228 |
| **Original Subnet Mask** | 255.0.0.0 |
| **New Subnet Mask:** | 255.255.128.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 17 – 8 = 9 |
| **Number of Subnets Created** | 2^9 = 512 |
| **Number of Host Bits per Subnet** | 32 – 17 = 15 |
| **Number of Hosts per Subnet** | 2^15 – 2 = 32,766 |
| **Network Address of this Subnet** | 10.101.0.0 |
| **IPv4 Address of First Host on this Subnet** | 10.101.0.1 |
| **IPv4 Address of Last Host on this Subnet** | 10.101.127.254 |
| **IPv4 Broadcast Address on this Subnet** | 10.101.127.255 |

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 172.22.32.12 |
| **Original Subnet Mask** | 255.255.0.0 |
| **New Subnet Mask:** | 255.255.224.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 19 – 16 = 3 |
| **Number of Subnets Created** | 2^3 = 8 |
| **Number of Host Bits per Subnet** | 32 – 19 = 13 |
| **Number of Hosts per Subnet** | 2^13 – 2 = 8,190 |
| **Network Address of this Subnet** | 172.22.32.0 |
| **IPv4 Address of First Host on this Subnet** | 172.22.32.1 |
| **IPv4 Address of Last Host on this Subnet** | 172.22.63.254 |
| **IPv4 Broadcast Address on this Subnet** | 172.22.63.255 |

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 192.168.1.245 |
| **Original Subnet Mask** | 255.255.255.0 |
| **New Subnet Mask:** | 255.255.255.252 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 30 – 24 = 6 |
| **Number of Subnets Created** | 2^6 = 64 |
| **Number of Host Bits per Subnet** | 32 – 30 = 2 |
| **Number of Hosts per Subnet** | 2^2 – 2 = 2 |
| **Network Address of this Subnet** | 192.168.1.244 |
| **IPv4 Address of First Host on this Subnet** | 192.168.1.245 |
| **IPv4 Address of Last Host on this Subnet** | 192.168.1.246 |
| **IPv4 Broadcast Address on this Subnet** | 192.168.1.247 |

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 128.107.0.55 |
| **Original Subnet Mask** | 255.255.0.0 |
| **New Subnet Mask:** | 255.255.255.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 24 – 16 = 8 |
| **Number of Subnets Created** | 2^8 = 256 |
| **Number of Host Bits per Subnet** | 32 – 24 = 8 |
| **Number of Hosts per Subnet** | 2^8 – 2 = 254 |
| **Network Address of this Subnet** | 128.107.0.0 |
| **IPv4 Address of First Host on this Subnet** | 128.107.0.1 |
| **IPv4 Address of Last Host on this Subnet** | 128.107.0.254 |
| **IPv4 Broadcast Address on this Subnet** | 128.107.0.255 |

|  |  |
| --- | --- |
| Given: | |
| **Host IP Address:** | 192.135.250.180 |
| **Original Subnet Mask** | 255.255.255.0 |
| **New Subnet Mask:** | 255.255.255.248 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | 29 – 24 = 5 |
| **Number of Subnets Created** | 2^5 = 32 |
| **Number of Host Bits per Subnet** | 32 – 29 = 3 |
| **Number of Hosts per Subnet** | 2^3 – 2 = 6 |
| **Network Address of this Subnet** | 192.135.250.176 |
| **IPv4 Address of First Host on this Subnet** | 192.135.250.177 |
| **IPv4 Address of Last Host on this Subnet** | 192.135.250.182 |
| **IPv4 Broadcast Address on this Subnet** | 192.135.250.183 |

# Reflection Question

Why is the subnet mask so important when analyzing an IPv4 address?