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.

* 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.

***Number of Subnet Bits: 3***

***Number of Subnets Created: 8***

***Number of Host Bits per Subnet: 5***

***Number of Hosts per Subnet; 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:** | 192.168.200.139 |
| **Original Subnet Mask** | 255.255.255.0 |
| **New Subnet Mask:** | 255.255.255.224 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** |  |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

***Number of Subnet Bits: 9***

***Number of Subnets Created: 512***

***Number of Host Bits per Subnet: 23***

***Number of Hosts per Subnet: 8,388,606***

***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:** | 10.101.99.228 |
| **Original Subnet Mask** | 255.0.0.0 |
| **New Subnet Mask:** | 255.255.128.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | blank |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

***Number of Subnet Bits: 3***

***Number of Subnets Created: 8***

***Number of Host Bits per Subnet: 13***

***Number of Hosts per Subnet: 8190***

***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:** | 172.22.32.12 |
| **Original Subnet Mask** | 255.255.0.0 |
| **New Subnet Mask:** | 255.255.224.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | blank |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

***Number of Subnet Bits: 6***

***Number of Subnets Created: 64***

***Number of Host Bits per Subnet: 2***

***Number of Hosts per Subnet: 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:** | 192.168.1.245 |
| **Original Subnet Mask** | 255.255.255.0 |
| **New Subnet Mask:** | 255.255.255.252 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | blank |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

Number of Subnet Bits: 8

Number of Subnets Created: 256

Number of Host Bits per Subnet: 8

Number of Hosts per Subnet: 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:** | 128.107.0.55 |
| **Original Subnet Mask** | 255.255.0.0 |
| **New Subnet Mask:** | 255.255.255.0 |

| Find: | |
| --- | --- |
| **Number of Subnet Bits** | blank |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

Number of Subnet Bits: 5

Number of Subnets Created: 32

Number of Host Bits per Subnet: 3

Number of Hosts per Subnet: 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

|  |  |
| --- | --- |
| 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** | blank |
| **Number of Subnets Created** | blank |
| **Number of Host Bits per Subnet** | blank |
| **Number of Hosts per Subnet** | blank |
| **Network Address of this Subnet** | blank |
| **IPv4 Address of First Host on this Subnet** | blank |
| **IPv4 Address of Last Host on this Subnet** | blank |
| **IPv4 Broadcast Address on this Subnet** | blank |

# Reflection Question

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

The subnet mask is crucial when analyzing an IPv4 address because it determines how the IP address is divided into network and host parts. Specifically, the subnet mask:

Identifies the network: The subnet mask helps identify which part of the IP address refers to the network and which part refers to the host. This is important for routing packets correctly within and between networks.

Allows for subnetting: By changing the subnet mask, a network can be broken down into smaller subnets. This is useful for managing traffic within a large network and can improve network performance.

Controls the number of hosts: The subnet mask also determines how many hosts can exist within a particular network or subnet. The more bits allocated for the host in the subnet mask, the more hosts can be accommodated.

In essence, the subnet mask is a key component in understanding and managing IP addressing in a network. It’s like a blueprint that guides the distribution and routing of IP addresses within a network. Without it, devices would have a hard time communicating efficiently.

Type your answers here.

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