

## 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.

#### Problem 1:

| Given:                      |                 |
|-----------------------------|-----------------|
| <b>Host IP Address:</b>     | 192.168.200.139 |
| <b>Original Subnet Mask</b> | 255.255.255.0   |
| <b>New Subnet Mask:</b>     | 255.255.255.224 |

| Find:  |                 |
|--|-----------------|
| <b>Number of Subnet Bits</b>                     | 3               |
| <b>Number of Subnets Created</b>                 | 8               |
| <b>Number of Host Bits per Subnet</b>            | 5               |
| <b>Number of Hosts per Subnet</b>                | 30              |
| <b>Network Address of this Subnet</b>            | 192.168.200.128 |
| <b>IPv4 Address of First Host on this Subnet</b> | 192.168.200.129 |
| <b>IPv4 Address of Last Host on this Subnet</b>  | 192.168.200.158 |
| <b>IPv4 Broadcast Address on this Subnet</b>     | 192.168.200.159 |

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### Problem 2:

| Given:                      |               |
|-----------------------------|---------------|
| <b>Host IP Address:</b>     | 10.101.99.228 |
| <b>Original Subnet Mask</b> | 255.0.0.0     |
| <b>New Subnet Mask:</b>     | 255.255.128.0 |

| Find:  |                |
|--|----------------|
| <b>Number of Subnet Bits</b>                     | 9              |
| <b>Number of Subnets Created</b>                 | 512            |
| <b>Number of Host Bits per Subnet</b>            | 15             |
| <b>Number of Hosts per Subnet</b>                | 32,766         |
| <b>Network Address of this Subnet</b>            | 10.101.0.0     |
| <b>IPv4 Address of First Host on this Subnet</b> | 10.101.0.1     |
| <b>IPv4 Address of Last Host on this Subnet</b>  | 10.101.127.254 |
| <b>IPv4 Broadcast Address on this Subnet</b>     | 10.101.127.255 |

### Problem 3:

| Given:                      |               |
|-----------------------------|---------------|
| <b>Host IP Address:</b>     | 172.22.32.12  |
| <b>Original Subnet Mask</b> | 255.255.0.0   |
| <b>New Subnet Mask:</b>     | 255.255.224.0 |

| Find:  |               |
|--|---------------|
| <b>Number of Subnet Bits</b>                     | 3             |
| <b>Number of Subnets Created</b>                 | 8             |
| <b>Number of Host Bits per Subnet</b>            | 13            |
| <b>Number of Hosts per Subnet</b>                | 8,190         |
| <b>Network Address of this Subnet</b>            | 172.22.32.0   |
| <b>IPv4 Address of First Host on this Subnet</b> | 172.22.32.1   |
| <b>IPv4 Address of Last Host on this Subnet</b>  | 172.22.63.254 |
| <b>IPv4 Broadcast Address on this Subnet</b>     | 172.22.63.255 |

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### Problem 4:

| 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                     | 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 |

### Problem 5:

| 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                     | 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 |

**Problem 6:**

| Given:                      |                 |
|-----------------------------|-----------------|
| <b>Host IP Address:</b>     | 192.135.250.180 |
| <b>Original Subnet Mask</b> | 255.255.255.0   |
| <b>New Subnet Mask:</b>     | 255.255.255.248 |

| Find:  |                 |
|--|-----------------|
| <b>Number of Subnet Bits</b>                     | 5               |
| <b>Number of Subnets Created</b>                 | 32              |
| <b>Number of Host Bits per Subnet</b>            | 3               |
| <b>Number of Hosts per Subnet</b>                | 6               |
| <b>Network Address of this Subnet</b>            | 192.135.250.176 |
| <b>IPv4 Address of First Host on this Subnet</b> | 192.135.250.177 |
| <b>IPv4 Address of Last Host on this Subnet</b>  | 192.135.250.182 |
| <b>IPv4 Broadcast Address on this Subnet</b>     | 192.135.250.183 |

**Reflection Question**

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