LAB 9 REPORT

NAME: FONG WEI TZE

STUDENT ID: 22030274

**PART A: Packet Tracer – Subnet an IPv4 Network**

**Step 1: Create a subnetting scheme that meets the required number of subnets and required number of host addresses.**

How many host addresses are needed in the largest required subnet?

50

What is the minimum number of subnets required?

4

The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?

11111111.11111111.11111111.00000000

**In the network mask, what do the ones represent?**

The network portion.

**In the network mask, what do the zeros represent?**

The host portion

**Given each of the possible subnet masks depicted in the following binary format, how many subnets and how many hosts are created in each example?**

(/25) 11111111.11111111.11111111.10000000

Dotted decimal subnet mask equivalent: 255.255.255.128

Number of subnets = 2

Number of hosts: 126 hosts in each subnet.

(/26) 11111111.11111111.11111111.11000000

Dotted decimal subnet mask equivalent: 255.255.255.192

Number of subnets: 4

Number of hosts: 62 hosts in each subnet

(/27) 11111111.11111111.11111111.11100000

Dotted decimal subnet mask equivalent: 255.255.255.224

Number of subnets: 8

Number of hosts: 30 hosts in each subnet

(/28) 11111111.11111111.11111111.11110000

Dotted decimal subnet mask equivalent: 255.255.255.240

Number of subnets: 16

Number of hosts: 14 hosts in each subnet

(/29) 11111111.11111111.11111111.11111000

Dotted decimal subnet mask equivalent: 255.255.255.248

Number of subnets: 32

Number of hosts: 6 hosts in each subnet

(/30) 11111111.11111111.11111111.11111100

Dotted decimal subnet mask equivalent: 255.255.255.252

Number of subnets: 64

Number of hosts: 2 hosts in each subnet

**Considering your answers above, which subnet masks meet the required number of minimum host addresses?**

(/25) 11111111.11111111.11111111.10000000

(/26) 11111111.11111111.11111111.11000000

**Considering your answers above, which subnet masks meets the minimum number of subnets required?**

(/26) 11111111.11111111.11111111.11000000

(/27) 11111111.11111111.11111111.11100000

(/28) 11111111.11111111.11111111.11110000

(/29) 11111111.11111111.11111111.11111000

(/30) 11111111.11111111.11111111.11111100

**Considering your answers above, which subnet mask meets both the required minimum number of hosts and the minimum number of subnets required?**

(/26) 11111111.11111111.11111111.11000000

**When you have determined which subnet mask meets all of the stated network requirements, derive each of the subnets. List the subnets from first to last in the table. Remember that the first subnet is 192.168.0.0 with the chosen subnet mask.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subnet Address** |  | **Prefix** |  | **Subnet Mask** |
| 192.168.0.0 | /26***blank*** |  | 255.255.255.192***blank*** |  |
| 192.168.0.64 | /26***blank*** |  | 255.255.255.192***nk*** |  |
| 192.168.0.128*blank* | /26***blank*** |  | 255.255.255.192***blank*** |  |
| 192.168.0.192***blank*** | /26***blank*** |  | 255.255.255.192***blank*** |  |

**Step 2: Fill in the missing IP addresses in the Addressing Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| CustomerRouter | G0/0 | 192.168.0.1*blank* | 255.255.255.192 | N/A  *N/A*  *N/A* |
| G0/1 | 192.168.0.65 | 255.255.255.192 |
| S0/1/0 | 209.165.201.2 | 255.255.255.252 |
| LAN-A Switch | VLAN1 | 192.168.0.2 | 255.255.255.192*blank* | 192.168.0.1 |
| LAN-B Switch | VLAN1 | 192.168.0.66 | 255.255.255.192*blank* | 192.168.0.65*nk* |
| PC-A | NIC | *l*192.168.0.63*ank* | 255.255.255.192*nk* | 192.168.0.1*lank* |
| PC-B | NIC | 192.168.0.126 | 255.255.255.192*k* | 192.168.0.65 |
| ISPRouter | G0/0 | 209.165.200.225 | 255.255.255.224 | N/A *N/A* |
| S0/1/0 | 209.165.201.1 | 255.255.255.252 |
| ISPSwitch | VLAN1 | 209.165.200.226 | 255.255.255.224 | 209.165.200.225 |
| ISP Workstation | NIC | 209.165.200.235 | 255.255.255.224 | 209.165.200.225 |
| ISP Server | NIC | 209.165.200.240 | 255.255.255.224 | 209.165.200.225 |

**Part 3: Test and Troubleshoot the Network**

**Determine if PC-A can communicate with its default gateway. Do you get a reply?**

**Yes**

**Determine if PC-B can communicate with its default gateway. Do you get a reply?**

**Yes**

**Determine if PC-A can communicate with PC-B. Do you get a reply?**

**Yes**

**PART B: Lab - Calculate IPv4 Subnets**

**Problem 1:**

|  |  |  |
| --- | --- | --- |
|  | **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** |  | 5 |
| **Number of Hosts per Subnet** |  | 30*blank* |
| **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 |

**Problem 2:**

|  |  |  |
| --- | --- | --- |
|  | **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** |  | 9 |
| **Number of Subnets Created** |  | 512 |
| **Number of Host Bits per Subnet** |  | 15 |
| **Number of Hosts per Subnet** |  | 32766 |
| **Network Address of this Subnet** |  | 10.0.128.0 |
| **IPv4 Address of First Host on this Subnet** |  | 10.0.128.1 |
| **IPv4 Address of Last Host on this Subnet** |  | 10.0.128.254 |
| **IPv4 Broadcast Address on this Subnet** |  | 10.0.128.255 |

**Problem 3:**

|  |  |  |
| --- | --- | --- |
|  | **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** |  | 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** |  | 172.22.32.254 |
| **IPv4 Broadcast Address on this Subnet** |  | 172.22.32.255 |

**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:** | |
| **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** |  | 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 |

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

It allows us to identify the network portion and the host portion of the address as well as identifying the number of subnet bits. The number of subnet bits can then be used to find the number of subnets which can be created.

**PART C: Packet Tracer - Subnetting Scenario**

**Step 1: Subnet the 192.168.100.0/24 network into the appropriate number of subnets.**

**Based on the topology, how many subnets are needed?**

5

**How many bits must be borrowed to support the number of subnets in the topology table?**

3

**How many subnets does this create?**

8

**How many usable hosts does this create per subnet?**

30

**Calculate the binary value for the first five subnets. The first two subnets have been done for you.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subnet** | **Network Address** | **Bit 7** | **Bit 6** | **Bit 5** | **Bit 4** | **Bit 3** | **Bit 2** | **Bit 1** | **Bit 0** |
| 0 | 192.168.100.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 192.168.100.32 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 192.168.100.64 | 0 | 1*ank* | 0*Blank* | 0*blank* | 0 | 0 | *n*0*k* | 0 |
| 3 | 192.168.100.96 | *Bl*0*ank* | 1*lank* | *l*1*ank* | 0 | 0 | *n*0*k* | *k* 0 | 0 |
| 4 | 192.168.100.128 | 1*lank nk* | 0*ank* | *Bl*0*ank lank* | 0*ank blank* | *l*0*ank Blank* | *l*0*ank lank* | *Bl*0*ank* | *Bl*0*ank* |

**Calculate the binary and decimal value of the new subnet mask.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First**  **Octet** | **Second Octet** | **Third**  **Octet** | **Mask**  **Bit 7** | **Mask**  **Bit 6** | **Mask**  **Bit 5** | **Mask**  **Bit 4** | **Mask**  **Bit 3** | **Mask**  **Bit 2** | **Mask**  **Bit 1** | **Mask**  **Bit 0** |
| 11111111 | 11111111 | 11111111 | *Blank* 1*lan* | *Blan*1*lan k* | *Blank* 1*lan* | *bla*0*ank nk* | *Blank* 0*ank* | *Blan*0*ank k* | *Blank* 0*ank* | *blank* 0*ank* |
| **First**  **Decimal Octet** | **Second**  **Decimal Octet** | **Third**  **Decimal Octet** |  |  | **Fourth Decimal Octet** | | | |  |  |
|  |  |  | *blank* |  |  | | | |  |  |
| 255. | 255. | 255. | 224 |  |  | | | |  |  |

**Fill in the Subnet Table, listing the decimal value of all available subnets, the first and last usable host address, and the broadcast address. Repeat until all addresses are listed.**

**Note: You may not need to use all rows.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subnet Number** | **Subnet Address** | **First Usable Host Address** | **Last Usable Host Address** |  | **Broadcast Address** |
| **0** | 192.168.100.0 | 192.168.100.1*Blank* | 192.168.100.30*Blank* | 192.168.100.31 |  |
| **1** | 192.168.100.32 | 192.168.100.33*nk* | 192.168.100.62 | 192.168.100.63*blank* |  |
| **2** | 192.168.100.64 | 192.168.100.65*Blank* | 192.168.100.94*Blank* | 192.168.100.95*blank* |  |
| **3** | 192.168.100.96*k* | 192.168.100.97*ank* | 192.168.100.126*Blank* | 192.168.100.127*lank* |  |
| **4** | 192.168.100.128*Blank* | 192.168.100.129*Blank* | 192.168.100.158*Blank* | 192.168.100.159 |  |
| **5** | 192.168.100.160*Blank* | 192.168.100.161*Blank* | 192.168.100.190 | 192.168.100.191*k* |  |
| **6** | 192.168.100.192 | 192.168.100.193 | 192.168.100.222 | 192.168.100.223 |  |
| **7** | 192.168.100.224 | 192.168.100.225 | 192.168.100.254 | 192.168.100.255 |  |

**Addressing Table**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Device** | **Interface** |  | **IP Address** |  | **Subnet Mask** | **Default Gateway** |
| R1  *R1*  *R1* | G0/0 | 192.168.100.1*Blank* Blank |  | 255.255.255.224 |  | N/A  *Blank*  *Blank*  *Blank*  *Blank*  *Blank*  *Blank* |
| G0/1 | 192.168.100.33*nk ank* |  | 255.255.255.224*Blank* |  |
| S0/0/0 | 192.168.100.129*Blank Blank* |  | 255.255.255.224*Blank Blank* |  |
| R2  *R2*  *R2* | G0/0 | 192.168.100.65*Blank Blank* |  | 255.255.255.224*Blank Blank* |  |
| G0/1 | 192.168.100.97*ank Blank* |  | *la*255.255.255.224*Blank nk* |  |
| S0/0/0 | 192.168.100.129*Blank Blank* |  | 255.255.255.224*Blank Blank* |  |
| S1 | VLAN 1 | 192.168.100.2*Blank Blank* |  | *a*255.255.255.224*Blank Blank* |  | 192.168.100.1*Blank Blank* |
| S2 | VLAN 1 | *a*192.168.100.34*k nk* |  | *a*255.255.255.224*Blank* |  | 192.168.100.33*nk ank* |
| S3 | VLAN 1 | 192.168.100.66*Blank Blank* |  | *la*255.255.255.224*Blank k* |  | 192.168.100.65*Blank Blank* |
| S4 | VLAN 1 | 192.168.100.98*ank Blank* |  | *la*255.255.255.224*Blank* |  | 192.168.100.97*ank Blank* |
| PC1 | NIC | 192.168.100.3*Blank lank* |  | 255.255.255.224*Blank nk* |  | 192.168.100.1*Blank ank* |
| PC2 | NIC | *a*192.168.100.35 *k* |  | 255.255.255.224*Blank Blank* |  | *l*192.168.100.33*nk ank* |
| PC3 | NIC | 192.168.100.67*ank ank* |  | *la*255.255.255.224*Blank k* |  | 192.168.100.65*Blank nk* |
| PC4 | NIC | 192.168.100.99*nk nk* |  | *la*255.255.255.224*Blank* |  | 192.168.100.97*ank* |