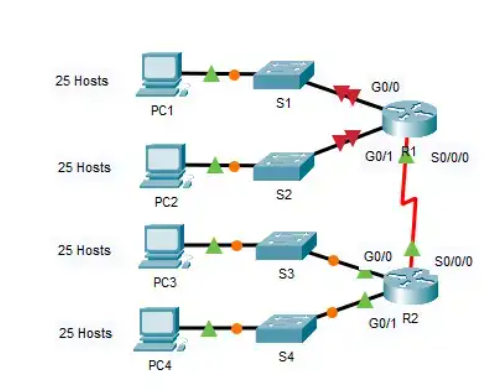
**Lab 13: Packet Tracer - Subnetting**

**Addressing Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| R1 | G0/0 |  |  |  |
| G0/1 |  |  |  |
| S0/0/0 |  |  |  |
| R2 | G0/0 |  |  |  |
| G0/1 |  |  |  |
| S0/0/0 |  |  |  |
| S1 | VLAN 1 |  |  |  |
| S2 | VLAN 1 |  |  |  |
| S3 | VLAN 1 |  |  |  |
| S4 | VLAN 1 |  |  |  |
| PC1 | NIC |  |  |  |
| PC2 | NIC |  |  |  |
| PC3 | NIC |  |  |  |
| PC4 | NIC |  |  |  |



**Objectives**

**Part 1: Design an IP Addressing Scheme**

**Part 2: Assign IP Addresses to Network Devices and Verify Connectivity**

**Scenario**

In this activity, you are given the network address of 192.168.100.0/24 to subnet and provide the IP addressing for the network shown in the topology. Each LAN in the network requires enough space for, at least, 25 addresses for end devices, the switch and the router. The connection between R1 to R2 will require an IP address for each end of the link.

**Part 1:**     **Design an IP Addressing Scheme**

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

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

Based on the topology, we need a total of 5 subnets (4 LANs + 1 WAN link).

1. **How many bits must be borrowed to support the number of subnets in the topology table** **Based on the topology, we need a total of 5 subnets (4 LANs + 1 WAN link).**

To support 5 subnets, we need to borrow 3 bits since 2^3 = 8 (which is more than the required 5 subnets).

1. **How many subnets does this create?**

Borrowing 3 bits creates 8 subnets.

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

**Note: If your answer is less than the 25 hosts required, then you borrowed too many bits.**

With 3 borrowed bits, we have 5 host bits remaining. Thus, we can have 2^5 - 2 = 30 usable hosts per subnet (subtracting 2 for network address and broadcast address).

**e.     Calculate the binary value for the first five subnets. The first subnet is already shown.**

**Net 0: 192 . 168 . 100 . 0 0 0 0 0 0 0 0**

**Net 1: 192 . 168 . 100 .** 0 1 0 0 0 0 0 0

**Net 2: 192 . 168 . 100 .** 1 0 0 0 0 0 0 0

**Net 3: 192 . 168 . 100 .** 1 1 0 0 0 0 0 0

**Net 4: 192 . 168 . 100 .** 1 1 1 0 0 0 0 0

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

**11111111.11111111.11111111.** 1 1 1 0 0 0 0 0

**255 . 255 . 255 .** 224

1. **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 Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subnet Number** | **Subnet Address** | **First Usable Host Address** | **Last Usable Host Address** | **Broadcast Address** |
| 0 | 192.168.100.0 | 192.168.100.1 | 192.168.100.30 | 192.168.100.31 |
| **1** | 192.168.100.32 | 192.168.100.33 | 192.168.100.62 | 192.168.100.63 |
| **2** | 192.168.100.64 | 192.168.100.65 | 192.168.100.94 | 192.168.100.95 |
| **3** | 192.168.100.96 | 192.168.100.97 | 192.168.100.126 | 192.168.100.127 |
| **4** | 192.168.100.126 | 192.168.100.129 | 192.168.100.158 | 192.168.100.159 |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

**Step 2:**     **Assign the subnets to the network shown in the topology.**

1. **Assign Subnet 0 to the LAN connected to the GigabitEthernet 0/0 interface of R1:**

Assign Subnet 0 to the LAN connected to the GigabitEthernet 0/0 interface of R1: 192.168.100.0/27

1. **Assign Subnet 1 to the LAN connected to the GigabitEthernet 0/1 interface of R1:**

Assign Subnet 1 to the LAN connected to the GigabitEthernet 0/1 interface of R1: 192.168.100.32/27

1. **Assign Subnet 2 to the LAN connected to the GigabitEthernet 0/0 interface of R2:**

Assign Subnet 2 to the LAN connected to the GigabitEthernet 0/0 interface of R2: 192.168.100.64/27

1. **Assign Subnet 3 to the LAN connected to the GigabitEthernet 0/1 interface of R2:**

Assign Subnet 3 to the LAN connected to the GigabitEthernet 0/1 interface of R2: 192.168.100.96/27

1. **Assign Subnet 4 to the WAN link between R1 to R2:**

Assign Subnet 4 to the WAN link between R1 and R2: 192.168.100.128/27

**Step 3:**     **Document the addressing scheme.**

**Fill in the Subnet Table using the following guidelines:**

Here is the updated subnet table with the assigned IP addresses based on the given guidelines:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subnet Number** | **Subnet Address** | **First Usable Host Address** | **Last Usable Host Address** | **Broadcast Address** |
| 0 | 192.168.100.0 | 192.168.100.1 | 192.168.100.30 | 192.168.100.31 |
| **1** | 192.168.100.32 | 192.168.100.33 | 192.168.100.62 | 192.168.100.63 |
| **2** | 192.168.100.64 | 192.168.100.65 | 192.168.100.94 | 192.168.100.95 |
| **3** | 192.168.100.96 | 192.168.100.97 | 192.168.100.126 | 192.168.100.127 |
| **4** | 192.168.100.126 | 192.168.100.129 | 192.168.100.158 | 192.168.100.159 |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

1. **Assign the first usable IP addresses to R1 for the two LAN links and the WAN link.**

1. R1 G0/0 interface: 192.168.100.2/27

2. R1 G0/1 interface: 192.168.100.34/27

3. R1 S0/0/0 interface: 192.168.100.130/27

**b.    Assign the first usable IP addresses to R2 for the LANs links. Assign the last usable IP address for the WAN link.**

• R2 G0/0 interface: 192.168.100.66/27

• R2 G0/1 interface: 192.168.100.98/27

• R2 S0/0/0 interface: 192.168.100.162/27

**c.     Assign the second usable IP addresses to the switches.**

• S1 VLAN 1 interface: 192.168.100.3/27

• S2 VLAN 1 interface: 192.168.100.35/27

• S3 VLAN 1 interface: 192.168.100.67/27

• S4 VLAN 1 interface: 192.168.100.99/27

**d.    Assign the last usable IP addresses to the hosts.**

• PC1 NIC: 192.168.100.30/27

• PC2 NIC: 192.168.100.62/27

• PC3 NIC: 192.168.100.94/27

• PC4 NIC: 192.168.100.126/27

**Part 2:**     **Assign IP Addresses to Network Devices and Verify Connectivity**

Most of the IP addressing is already configured on this network. Implement the following steps to complete the addressing configuration.

**Step 1:**     **Configure IP addressing on R1 LAN interfaces.**

• R1 G0/0 interface: Configure IP address 192.168.100.2 with subnet mask 255.255.255.224 (or /27).

• R1 G0/1 interface: Configure IP address 192.168.100.34 with subnet mask 255.255.255.224 (or /27).

**Step 2:**     **Configure IP addressing on S3, including the default gateway.**

• S3 VLAN 1 interface: Configure IP address 192.168.100.67 with subnet mask 255.255.255.224 (or /27).

• Set the default gateway on S3 to 192.168.100.66 (IP address of R2 G0/0 interface).

**Step 3:**     **Configure IP addressing on PC4, including the default gateway.**

• PC4 NIC: Configure IP address 192.168.100.126 with subnet mask 255.255.255.224 (or /27).

• Set the default gateway on PC4 to 192.168.100.97 (IP address of R2 G0/1 interface).

**Step 4:**     **Verify connectivity.**

**You can only verify connectivity from R1, S3, and PC4. However, you should be able to ping every IP address listed in the Addressing Table.**

• From R1, try to ping all IP addresses listed in the Addressing Table, including the IP addresses of R2, S3, PC4, and other devices.

• From S3, try to ping all IP addresses listed in the Addressing Table, including the IP addresses of R1, R2, PC4, and other devices.

• From PC4, try to ping all IP addresses listed in the Addressing Table, including the IP addresses of R1, R2, S3, and other devices.

By performing these steps and verifying connectivity, you can ensure that the IP addressing is properly configured on the network devices and that they can communicate with each other.Top of Form