Packet Tracer - Subnet Scenario 2

Topology
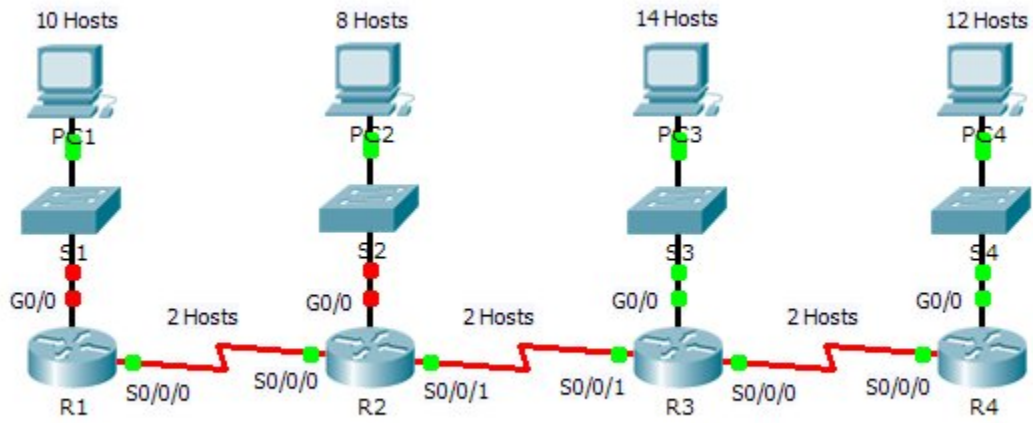
Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	172.31.1.1	255.255.255.240	N/A
R1	S0/0/0	172.31.1.65	255.255.255.240	N/A
R2	G0/0	172.31.1.17	255.255.255.240	N/A
R2	S0/0/0	172.31.1.78	255.255.255.240	N/A
R2	S0/0/1	172.31.1.81	255.255.255.240	N/A
R3	G0/0	172.31.1.33	255.255.255.240	N/A
R3	S0/0/0	172.31.1.97	255.255.255.240	N/A
R3	S0/0/1	172.31.1.94	255.255.255.240	N/A
R4	G0/0	172.31.1.49	255.255.255.240	N/A
R4	S0/0/0	172.31.1.110	255.255.255.240	N/A
S1	VLAN 1	172.31.1.2	255.255.255.240	172.31.1.1
S2	VLAN 1	172.31.1.18	255.255.255.240	172.31.1.17
S3	VLAN 1	172.31.1.34	255.255.255.240	172.31.1.33
S4	VLAN 1	172.31.1.50	255.255.255.240	172.31.1.49
PC1	NIC	172.31.1.14	255.255.255.240	172.31.1.1
PC2	NIC	172.31.1.30	255.255.255.240	172.31.1.17
PC3	NIC	172.31.1.46	255.255.255.240	172.31.1.33
PC4	NIC	172.31.1.62	255.255.255.240	172.31.1.49

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 172.31.1.0 /24 to subnet and provide the IP addressing for the network shown in the Topology. The required host addresses for each WAN and LAN link are labeled in the topology.

Part 1: Design an IP Addressing Scheme

Step 1:   Subnet the 172.31.1.0/24 network based on the maximum number of hosts required by the largest subnet.

a.   Based on the topology, how many subnets are needed? ___7____

b.   How many bits must be borrowed to support the number of subnets in the topology table? ___4____

c. How many subnets does this create? ____16___

d. How many usable host addresses does this create per subnet? ____14___

    Note: If your answer is less than the 14 maximum hosts required for the R3 LAN, then you borrowed too many bits.

e. Calculate the binary value for the first five subnets. Subnet zero is already shown.

    ```
    Net 0: 172 . 31 . 1 . 0   0   0   0   0   0   0   0
    ```

    ```
    Net 1: 172 . 31 . 1 . 0___ 0___ 0___ 1___ 0___ 0___ 0___ 0___
    ```
    _____

    ```
    Net 2: 172 . 31 . 1 . 0___ 0___ 1___ 0___ 0___ 0___ 0___ 0___
    ```
    _____

    ```
    Net 3: 172 . 31 . 1 . 0___ 0___ 1___ 1___ 0___ 0___ 0___ 0___
    ```
    _____

    ```
    Net 4: 172 . 31 . 1 . 0___ 1___ 1___ 0___ 0___ 0___ 0___ 0___
    ```
    _____

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

    ```
    11111111.11111111.11111111. 1___ 1___ 1___ 1___ 0___ 0___ 0___ 0___
    ```
    _____

    ```
       255  .   255  .   255  . 240
    ```
    _____

g. Complete the **Subnet Table**, listing all available subnets, the first and last usable host address, and the broadcast address. The first subnet is done for you. Repeat until all addresses are listed.

    Note: You may not need to use all rows.

Subnet Table

Subnet Number	Subnet IP	First Usable Host IP	Last Usable Host IP	Broadcast Address
0	172.31.1.0	172.31.1.1	172.31.1.14	172.31.1.15
1	172.31.1.16	172.31.1.17	172.31.1.30	172.31.1.31
2	172.31.1.32	172.31.1.33	172.31.1.46	172.31.1.47
3	172.31.1.48	172.31.1.49	172.31.1.62	172.31.1.63
4	172.31.1.64	172.31.1.65	172.31.1.78	172.31.1.79
5	172.31.1.80	172.31.1.81	172.31.1.94	172.31.1.95
6	172.31.1.96	172.31.1.97	172.31.1.110	172.31.1.111
7	172.31.1.112	172.31.1.113	172.31.1.126	172.31.1.127
8	172.31.1.128	172.31.1.129	172.31.1.142	172.31.1.143
9	172.31.1.144	172.31.1.145	172.31.1.158	172.31.1.159
10	172.31.1.160	172.31.1.161	172.31.1.174	172.31.1.175
11	172.31.1.176	172.31.1.177	172.31.1.190	172.31.1.191
12	172.31.1.192	172.31.1.193	172.31.1.206	172.31.1.207
13	172.31.1.208	172.31.1.209	172.31.1.222	172.31.1.223
14	172.31.1.224	172.31.1.225	172.31.1.238	172.31.1.239
15	172.31.1.240	172.31.1.241	172.31.1.254	172.31.1.255

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

When assigning the subnets, keep in mind that routing is necessary to allow information to be sent throughout the network.

a.   Assign Subnet 0 to the R1 LAN: 172.31.1.0 /28

b.   Assign Subnet 1 to the R2 LAN: 172.31.1.16/28

c.   Assign Subnet 2 to the R3 LAN: 172.31.1.32/28

d.   Assign Subnet 3 to the R4 LAN: 172.31.1.48/28

e.   Assign Subnet 4 to the link between R1 and R2: 172.31.1.64/28

f.   Assign Subnet 5 to the link between R2 and R3: 172.31.1.80/28

g.   Assign Subnet 6 to the link between R3 and R4: 172.31.1.96/28

Step 3:   Document the addressing scheme.

Complete the **Addressing Table** using the following guidelines:

a.   Assign the first usable IP addresses to routers for each of the LAN links.

b.   Use the following method to assign WAN link IP addresses:

- For the WAN link between R1 and R2, assign the first usable IP address to R1 and last usable IP address R2.
- For the WAN link between R2 and R3, assign the first usable IP address to R2 and last usable IP address R3.
- For the WAN link between R3 and R4, assign the first usable IP address to R3 and last usable IP address R4.

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

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

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 and R2 LAN interfaces.

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

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

Step 4: Verify connectivity.

You can only verify connectivity from R1, R2, S3, and PC4. However, you should be able to ping every IP address listed in the **Addressing Table**.

Suggested Scoring Rubric

Activity Section	Question Location	Possible Points	Earned Points
Part 1: Design an IP Addressing Scheme	Step 1a	1	
	Step 1b	1	
	Step 1c	1	
	Step 1d	1	
	Step 1e	4	
	Step 1f	2	
Complete Subnet Table	Step 1g	10	
Assign Subnets	Step 2	10	
Document Addressing	Step 3	40	
Part 1 Total		**70**	
Packet Tracer Score		**30**	
Total Score		**100**	