Take-Away Assignment Description

Tasks being Assessed: Subnetting, Addressing Design, and Network Simulation Using Packet Tracer
Mode: Group work (Groups of 3 students)

Submission Deadline: January 29th, 2026

In this experiment, students are required to design, implement, and simulate a subnetted network using **Cisco Packet Tracer**, based on a given network address and specific host requirements. The activity focuses on practical subnetting, IP address planning, and network verification skills aligned with CCNA-level routing and addressing concepts.

You have been provided with a **base network address (192.168.1.0/24)** and a **network topology** consisting of a Headquarters (HQ) router, multiple branch routers, LANs, and point-to-point WAN links. The task is to subnet the network correctly, assign IP addresses, configure devices, and verify full connectivity. Please see the attached file, which follows the description of the tasks.

Required:

1. Analyze Network Requirements

Students must first study the given topology and scenario requirements and determine:

- The **total number of subnets** required (LANs and WAN links)

- The **maximum number of hosts** required in any single subnet

- The number of host IP addresses needed for:

    o   HQ LAN

    o   BRANCH1 LAN 1

    o   BRANCH1 LAN 2

    o   BRANCH2 LAN 1

    o   BRANCH2 LAN 2

- The **total number of IP addresses** required for the entire network

Answers to these questions must be written clearly in the provided worksheet or report generated by each group.

2. Design an IP Addressing Scheme

Using the **192.168.1.0/24** network:

- Subnet the address space to meet all LAN and WAN requirements

- Decide on appropriate **subnet masks** for each subnet

- Justify whether the given /24 network can satisfy the requirements

- Determine:

  - Maximum number of hosts per subnet

  - Number of usable subnets created

Hint: Students should recognize that the default addressing may be insufficient and that a more efficient subnetting technique (e.g., VLSM) is required. Although not a must to follow the hint.

3. Complete the Addressing Table

Fill in the Addressing Table provided in the document, assigning:

- IP address

- Subnet mask

- Default gateway (where applicable)

For all of the following:

- Router interfaces (FastEthernet and Serial)

- PCs (PC1 to PC5 NICs)

The addressing table must be fully completed, accurate, and consistent with the designed subnetting scheme.

4. Packet Tracer Network Implementation

Using **Cisco Packet Tracer**:

- Recreate the given topology

- Configure all routers and PCs using the designed IP addressing scheme

- Assign IP addresses to:

  - LAN interfaces

  - Serial WAN links

  - End devices (PCs)

- Configure basic routing as needed to ensure connectivity

5. Simulation and Verification

Verify that the network is functioning correctly by:

- Successfully pinging:

  - Between PCs on different LANs

- o Between routers
- o Across WAN links
- Ensure all devices can reach each other

Only the **192.168.1.0/24** address space must be used.

6. Screenshots and Evidence

Students are required to take **clear screenshots** of:

- The completed Packet Tracer topology
- IP configuration of routers and PCs
- Successful ping tests demonstrating full connectivity

These screenshots must be attached to the filled addressing table and answers as part of the final submission.

7. Reflection Question

Research and answer the reflection task:

- Explain why the original address space is insufficient
- Propose a valid solution **without increasing the original address space**
- Briefly describe how the proposed solution was implemented in Packet Tracer

Final Submission
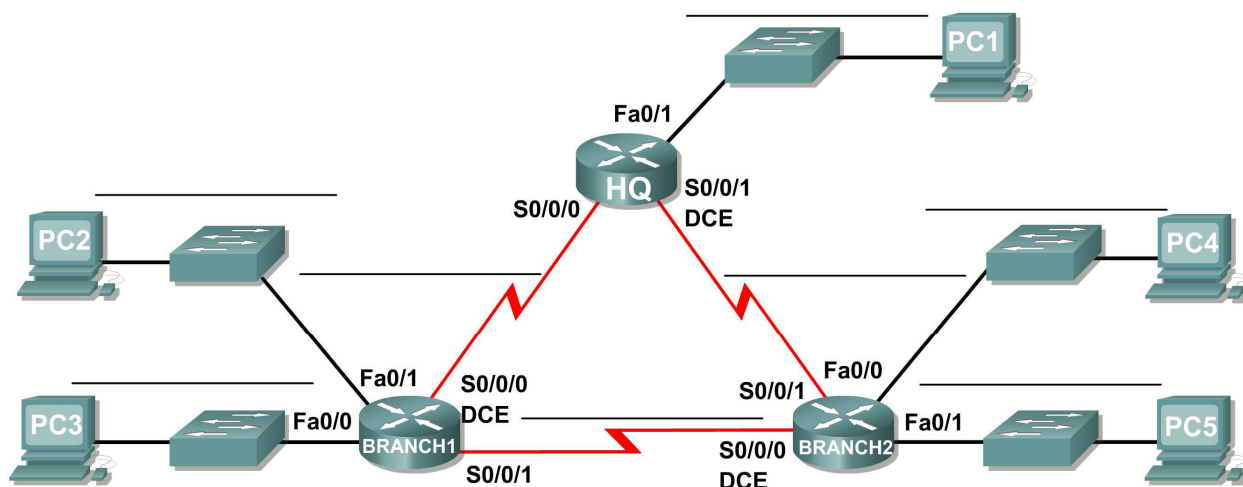
Each group must submit:

1. Answers to **Task 1 (Network Requirements)**
2. A completed **Addressing Table**
3. Answers to **Task 2 (Subnet Design Questions)**
4. A written response to **Task 3 (Reflection)**
5. **Packet Tracer screenshots** showing configuration and successful pings

Review the file attached for more insight.

NOTE: Final work to be printed with a cover page bearing the necessary details about the group members

Activity 3.5.4: Subnetting Scenario 3

Topology Diagram

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
HQ	Fa0/0			N/A
	S0/0/0			N/A
	S0/0/1			N/A
BRANCH1	Fa0/0			N/A
	Fa0/1			N/A
	S0/0/0			N/A
	S0/0/1			N/A
BRANCH2	Fa0/0			N/A
	Fa0/1			N/A
	S0/0/0			N/A
	S0/0/1			N/A
PC1	NIC			
PC2	NIC			
PC3	NIC			
PC4	NIC			
PC5	NIC			

Learning Objectives

Upon completion of this lab, you will be able to:

- Determine the number of subnets needed.
- Determine the number of hosts needed.
- Design an appropriate addressing scheme.
- Conduct research to find a possible solution.

Scenario

In this lab, you have been given the network address 192.168.1.0/24 to subnet and provide the IP addressing for the network shown in the Topology Diagram. The network has the following addressing requirements:

- The BRANCH1 LAN 1 will require 15 host IP addresses.
- The BRANCH1 LAN 2 will require 15 host IP addresses.
- The BRANCH2 LAN 1 will require 15 host IP addresses.
- The BRANCH2 LAN 2 will require 15 host IP addresses.
- The HQ LAN will require 30 host IP addresses.
- The link from HQ to BRANCH1 will require an IP address for each end of the link.
- The link from HQ to BRANCH2 will require an IP address for each end of the link.
- The link from HQ to Branch 3 will require an IP address for each end of the link.

Task 1: Examine the Network Requirements.

Examine the network requirements and answer the questions below. Keep in mind that IP addresses will be needed for each of the LAN interfaces.

How many subnets are needed? _____

What is the maximum number of IP addresses that are needed for a single subnet? _____

How many IP addresses are needed for each of the branch LANs? _____

What is the total number of IP addresses that are needed? _____

Task 2: Design an IP Addressing Scheme

Subnet the 192.168.1.0/24 network into the appropriate number of subnets.

Can the 192.168.1.0/24 network be subnetted to fit the network requirements? _____

If the "number of subnets" requirement is met, what is the maximum number of hosts per subnet? _____

If the "maximum number of hosts" requirement is met, what is the number of subnets that will be available to use? _____

Task 3: Reflection

You do not have enough address space to implement an addressing scheme. Research this problem and propose a possible solution. Increasing the size of your original address space is not an acceptable solution. (**Hint:** We will discuss solutions to this problem in Chapter 6.)

_____

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_____

Attempt to implement your solution using Packet Tracer. Successful implementation of a solution requires that:

- Only the 192.168.1.0/24 address space is used.
- PCs and routers can ping all IP addresses.