Networking Academy

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LAB 2:
11.7.5: Packet Tracer - Subnetting Scenario

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.100.1	255.255.255.224	-
	G0/1	192.168.100.33	255.255.255.224	-
	S0/0/0	192.168.100.129	255.255.255.224	-
R2	G0/0	192.168.100.65	255.255.255.224	-
	G0/1	192.168.100.97	255.255.255.224	-
	S0/0/0	192.168.100.158	255.255.255.224	-
S1	VLAN 1	192.168.100.2	255.255.255.224	192.168.100.1
S2	VLAN 1	192.168.100.34	255.255.255.224	192.168.100.33
S3	VLAN 1	192.168.100.66	255.255.255.224	192.168.100.65
S4	VLAN 1	192.168.100.98	255.255.255.224	192.168.100.97
PC1	NIC	192.168.100.30	255.255.255.224	192.168.100.1
PC2	NIC	192.168.100.62	255.255.255.224	192.168.100.33
PC3	NIC	192.168.100.94	255.255.255.224	192.168.100.65
PC4	NIC	192.168.100.126	255.255.255.224	192.168.100.97

Objectives

Part 1: Design an IP Addressing Scheme

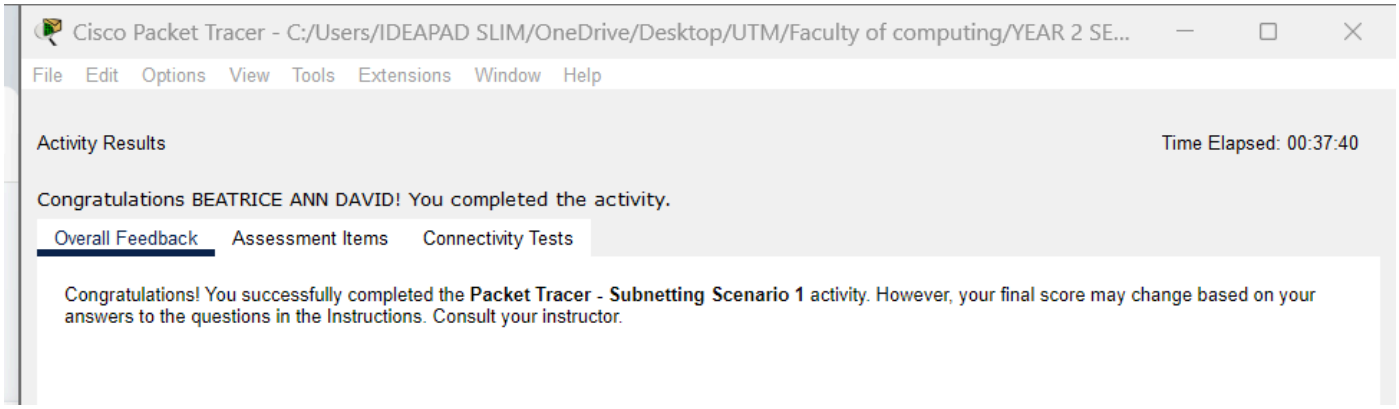
Part 2: Assign IP Addresses to Network Devices and Verify Connectivity

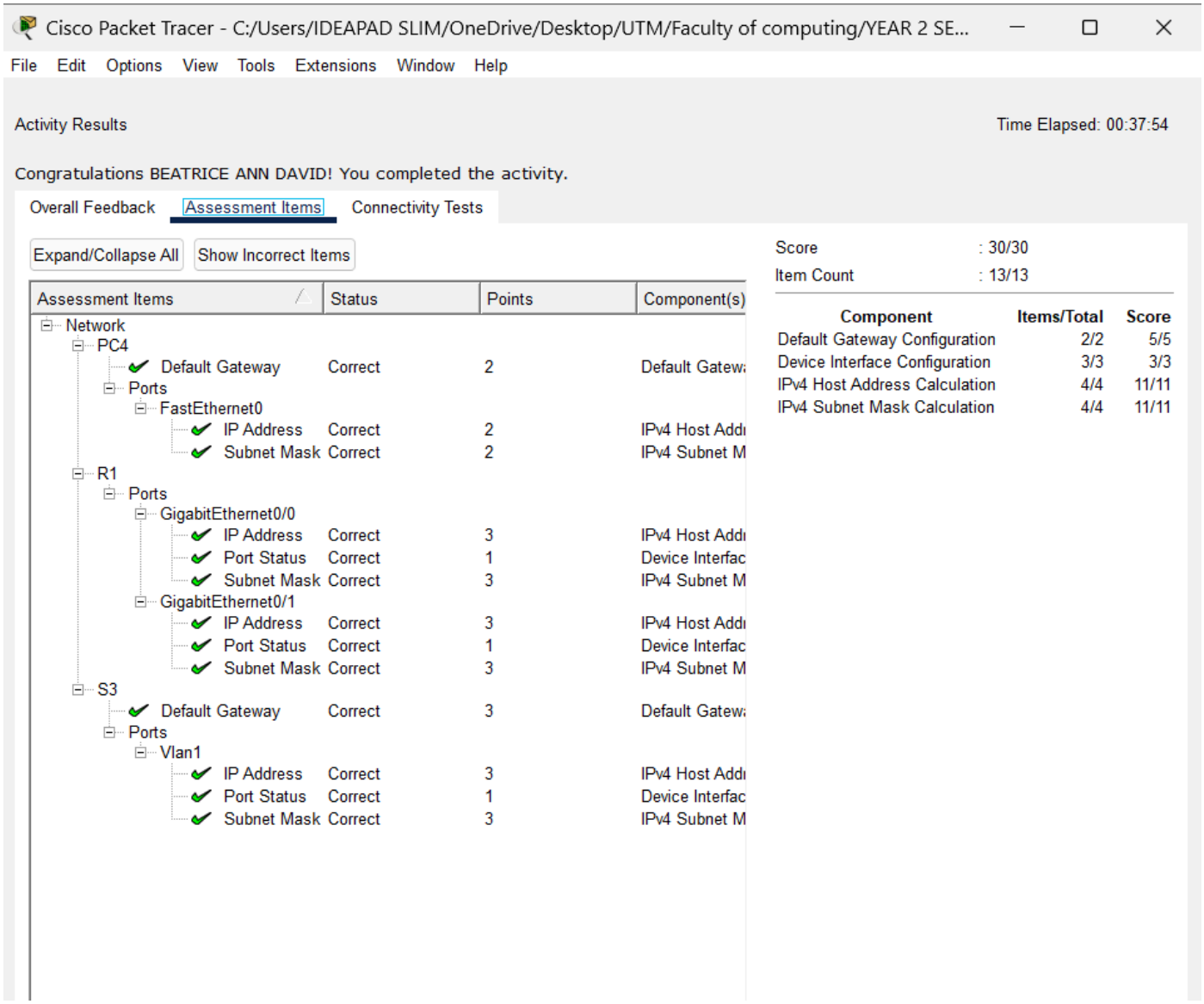
Scenario

In this activity, you are given the network address of 192.168.100.0/24 to subnet and provide the IP addressing for the Packet Tracer network. Each LAN in the network requires 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.

Screenshots:

A. Result





B. Working:

Part 1: Design an IP Addressing Scheme

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

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

5

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

Borrow 3 bits

c. How many subnets does this create?

8 subnets

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

30 usable IP address

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

e. 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
1	192.168.100.	0	0	1	0	0	0	0	0
2	192.168.100.	0	1	0	0	0	0	0	0
3	192.168.100.	0	1	1	0	0	0	0	0
4	192.168.100.	1	0	0	0	0	0	0	0

f. 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	1	1	1	0	0	0	0	0
First Decimal Octet	**Second Decimal Octet**	**Third Decimal Octet**	**Fourth Decimal Octet**							
255.	255.	255.	224							

g. 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	192.168.100.128	192.168.100.129	192.168.100.158	192.168.100.159
5	192.168.100.160	192.168.100.161	192.168.100.190	192.168.100.191

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
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	192.168.100.255	192.168.100.255
8	192.168.101.0	192.168.101.1	192.168.101.30	192.168.101.31
9	192.168.101.32	192.168.101.33	192.168.101.62	192.168.101.63
10	192.168.101.64	192.168.101.65	192.168.101.94	192.168.101.95

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

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

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

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

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

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

Step 3: Document the addressing scheme.

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

a. Assign the first usable IP addresses in each subnet to R1 for the two LAN links and the WAN link.

b. Assign the first usable IP addresses in each subnet to R2 for the LAN links. Assign the last usable IP address for the WAN link.

c. Assign the second usable IP address in the attached subnets to the switches.

d. Assign the last usable IP addresses to the PCs in each subnet.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.100.1	255.255.255.224	-
	G0/1	192.168.100.33	255.255.255.224	-
	S0/0/0	192.168.100.129	255.255.255.224	-
R2	G0/0	192.168.100.65	255.255.255.224	-
	G0/1	192.168.100.97	255.255.255.224	-
	S0/0/0	192.168.100.158	255.255.255.224	-
S1	VLAN 1	192.168.100.2	255.255.255.224	192.168.100.1
S2	VLAN 1	192.168.100.34	255.255.255.224	192.168.100.33
S3	VLAN 1	192.168.100.66	255.255.255.224	192.168.100.65
S4	VLAN 1	192.168.100.98	255.255.255.224	192.168.100.97
PC1	NIC	192.168.100.30	255.255.255.224	192.168.100.1
PC2	NIC	192.168.100.62	255.255.255.224	192.168.100.33
PC3	NIC	192.168.100.94	255.255.255.224	192.168.100.65
PC4	NIC	192.168.100.126	255.255.255.224	192.168.100.97

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. EIGRP dynamic routing is already configured between R1 and R2.

Step 1: Configure R1 LAN interfaces.

a. Configure both LAN interfaces with the addresses from the Addressing Table.

b. Configure the interfaces so that the hosts on the LANs have connectivity to the default gateway.

```
R1>enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface gigabitEthernet 0/0
R1(config-if)#ip address 192.168.100.1 255.255.255.224
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

R1(config-if)#exit
R1(config)#interface gigabitEthernet 0/1
R1(config-if)#ip address 192.168.100.33 255.255.255.224
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

R1(config-if)#
```

Step 2: Configure IP addressing on S3.

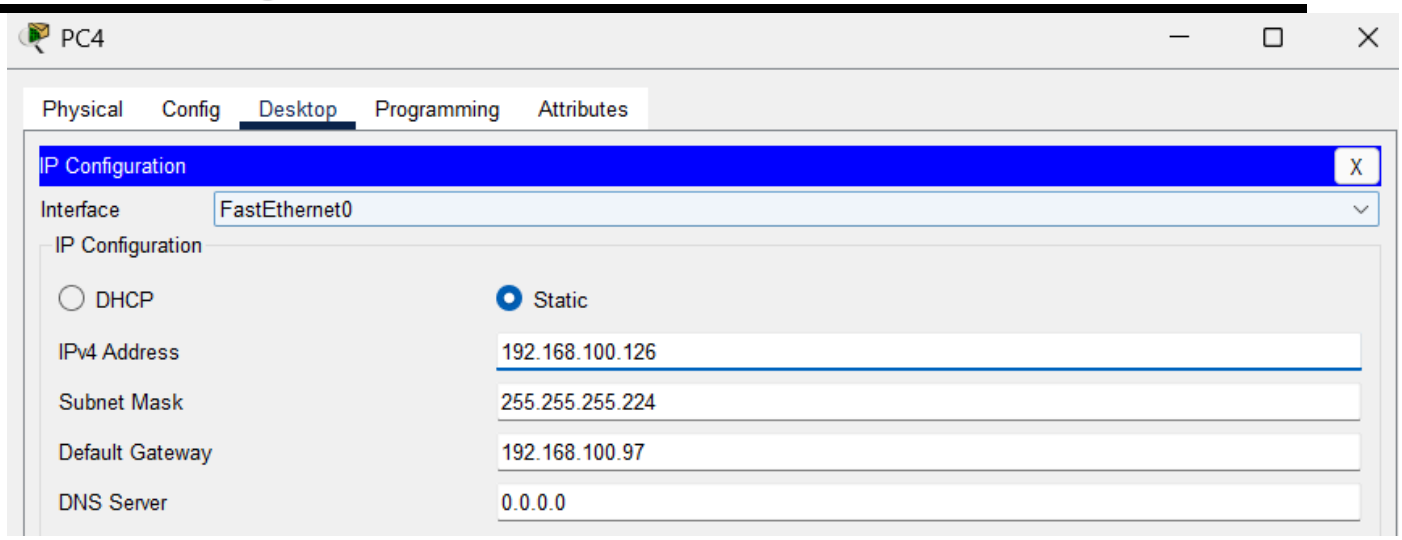
a. Configure the switch VLAN1 interface with addressing.

b. Configure the switch with the default gateway address.

```
S3>enable
S3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)#interface vlan 1
S3(config-if)#ip address 192.168.100.66 255.255.255.224
S3(config-if)#no shutdown

S3(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

S3(config-if)#exit
S3(config)#ip default-gateway 192.168.100.65
S3(config)#
```

Step 3: Configure PC4.

Configure PC4 with host and default gateway addresses.



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**.

```
C:\>ping 192.168.100.66

Pinging 192.168.100.66 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.100.66: bytes=32 time<1ms TTL=254
Reply from 192.168.100.66: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.100.66:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.100.66

Pinging 192.168.100.66 with 32 bytes of data:

Reply from 192.168.100.66: bytes=32 time<1ms TTL=254
Reply from 192.168.100.66: bytes=32 time<1ms TTL=254
Reply from 192.168.100.66: bytes=32 time<1ms TTL=254
Reply from 192.168.100.66: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.100.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.100.1

Pinging 192.168.100.1 with 32 bytes of data:

Reply from 192.168.100.1: bytes=32 time=19ms TTL=254
Reply from 192.168.100.1: bytes=32 time=1ms TTL=254
Reply from 192.168.100.1: bytes=32 time=1ms TTL=254
Reply from 192.168.100.1: bytes=32 time=2ms TTL=254

Ping statistics for 192.168.100.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 19ms, Average = 5ms

C:\>
```