SE TE 1

2nd Semester 2023 – 2024

LABORATORY NO. 7

Designing an IP Subnetting Scheme for Growth

Submitted by:

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Submitted to:

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Instructor

March 13, 2024

I. Objectives

a. To be able to design an IP subnetting scheme that meets a specified network requirement.
b. To efficiently allocate IP addresses to network segments.
c. To design an IP subnetting scheme that can handle future possibility of growth.

II. Design

Step 1: Determining the number of subnets needed.

- Since there are **4 subnets** initially required in the problem and the 20% growth requirement, multiply 4 by 1.2.
- This will yield **4.8 subnets or ~5 subnets** in order to handle the possibility of future growth.

Step 2: Identify the number of hosts needed for each subnet.

- From the given network requirement based on the problem, the number of hosts for each subnet are as follows:
    - Subnet 1: 20 hosts
    - Subnet 2: 10 hosts
    - Subnet 3: 25 hosts
    - Subnet 4: 15 hosts

Step 3: Subnetting Proper

- **Subnet mask: 2^3 = 8**
- The subnet mask will be 255.255.255.248, enough to cater the maximum of 25 hosts per subnet

Step 4: Allocation of IP Addresses for the Router

- Router 1: 172.20.99.1/29
- Router 2: 172.20.99.9/29
- Router 3: 172.20.99.17/29
- Router 4: 172.20.99.25/29
- Router 5: 172.20.99.33/29

Step 5: Allocation of IP Addresses for the Hosts

- Subnet 1: 172.20.99.2 to 172.20.99.6 (5 hosts)
- Subnet 2: 172.20.99.10 to 172.20.99.14 (5 hosts)
- Subnet 3: 172.20.99.18 to 172.20.99.22 (5 hosts)
- Subnet 4: 172.20.99.26 to 172.20.99.30 (5 hosts)
- Subnet 5: 172.20.99.34 to 172.20.99.38 (5 hosts)

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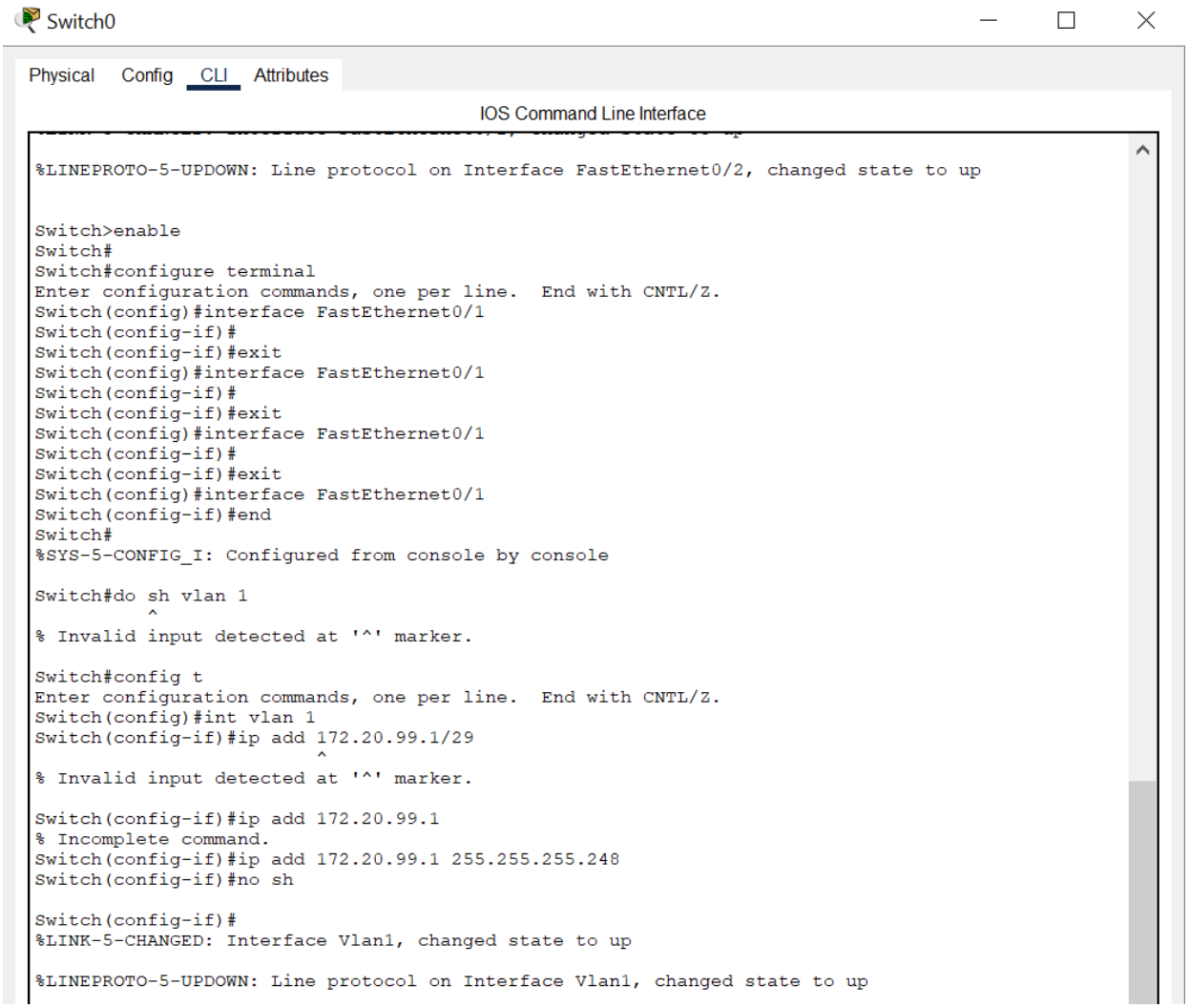
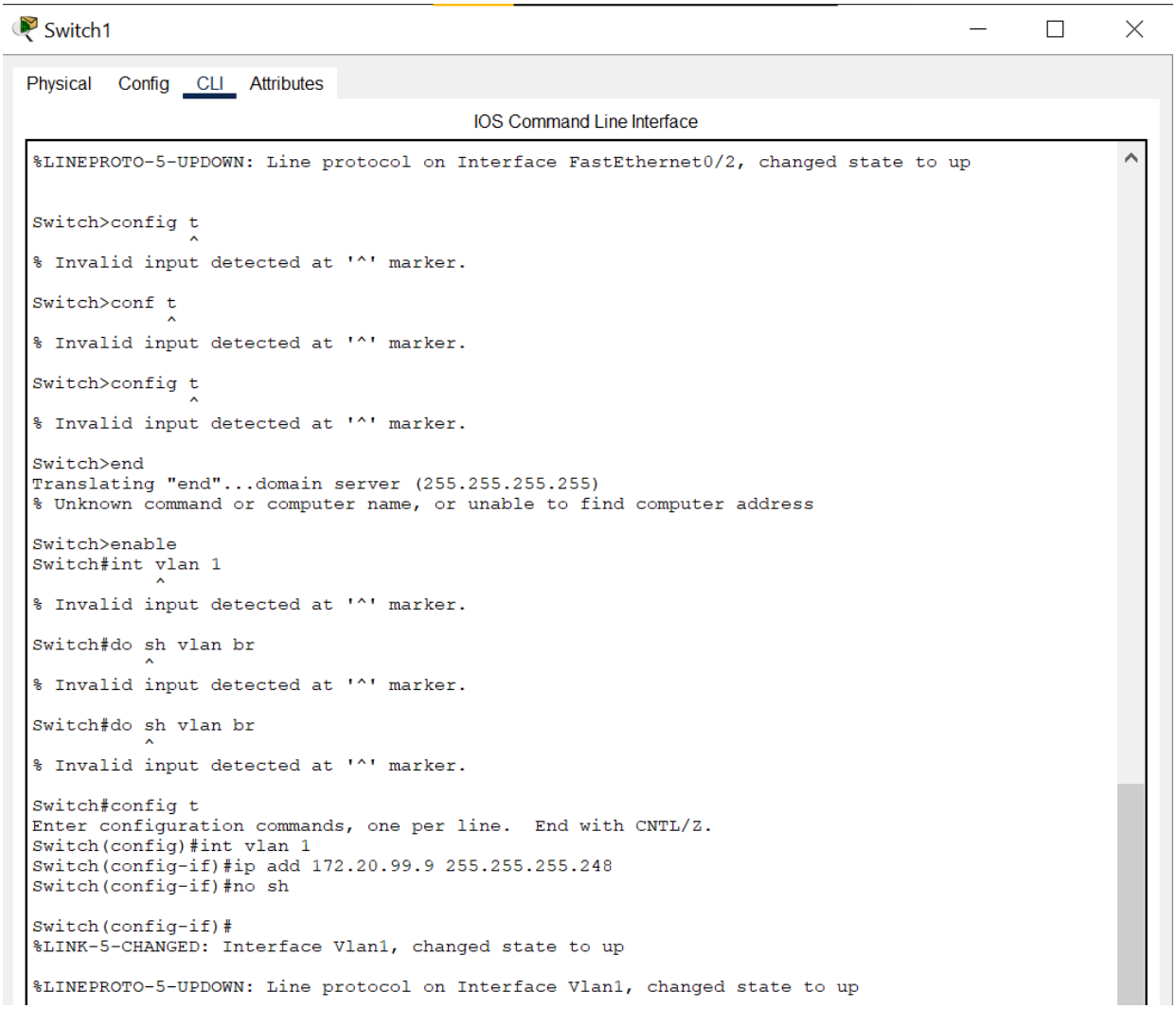
III. Schematics





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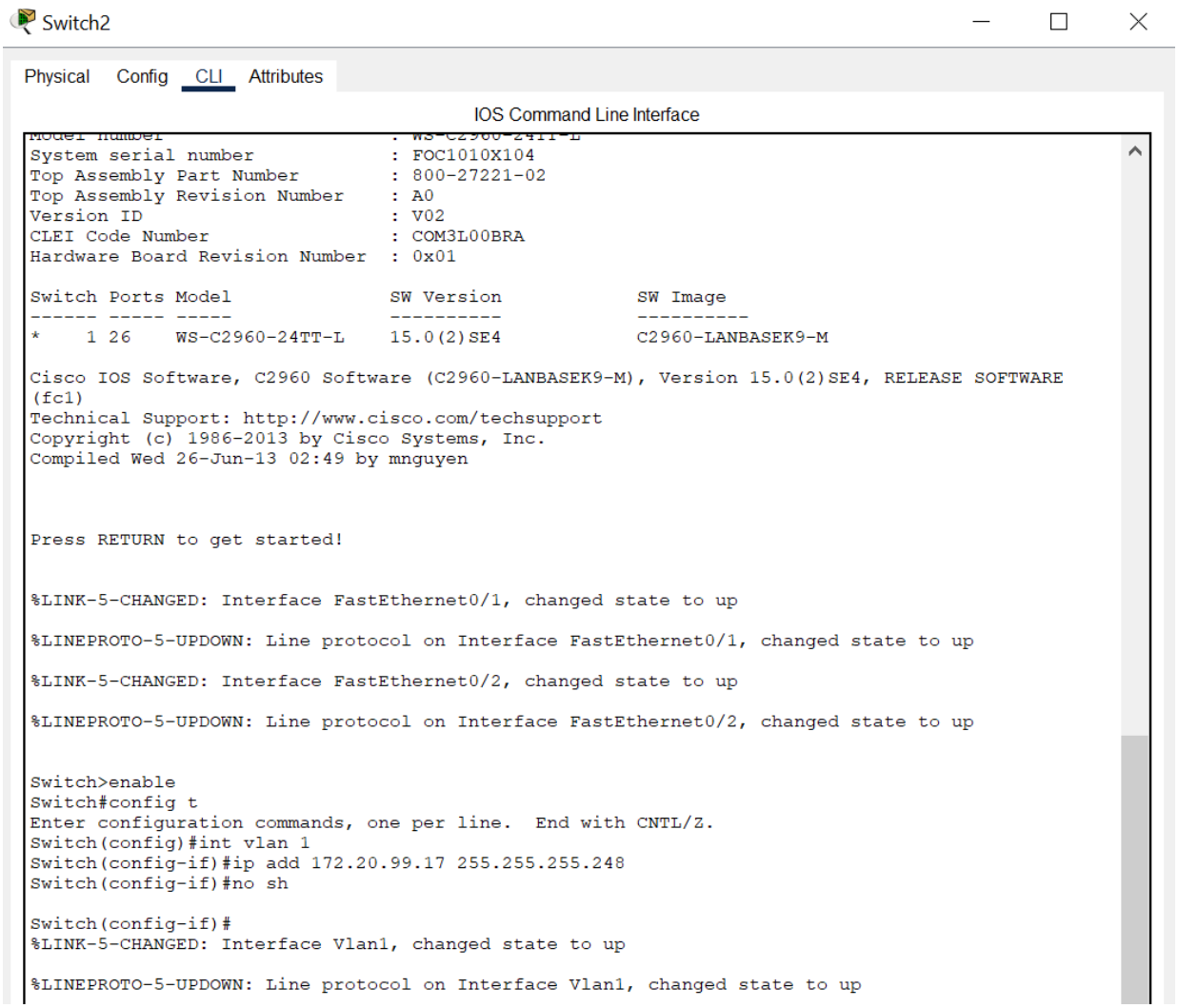
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Physical
Config
CLI
Attributes
IOS Command Line Interface
Model number : WS-C2960-24TT-L
System serial number : FOC1010X104
Top Assembly Part Number : 800-27221-02
Top Assembly Revision Number : A0
Version ID : V02
CLEI Code Number : COM3L00BRA
Hardware Board Revision Number : 0x01
Switch Ports Model SW Version SW Image
------ ----- ----- ---------- ----------
* 1 26 WS-C2960-24TT-L 15.0(2)SE4 C2960-LANBASEK9-M
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
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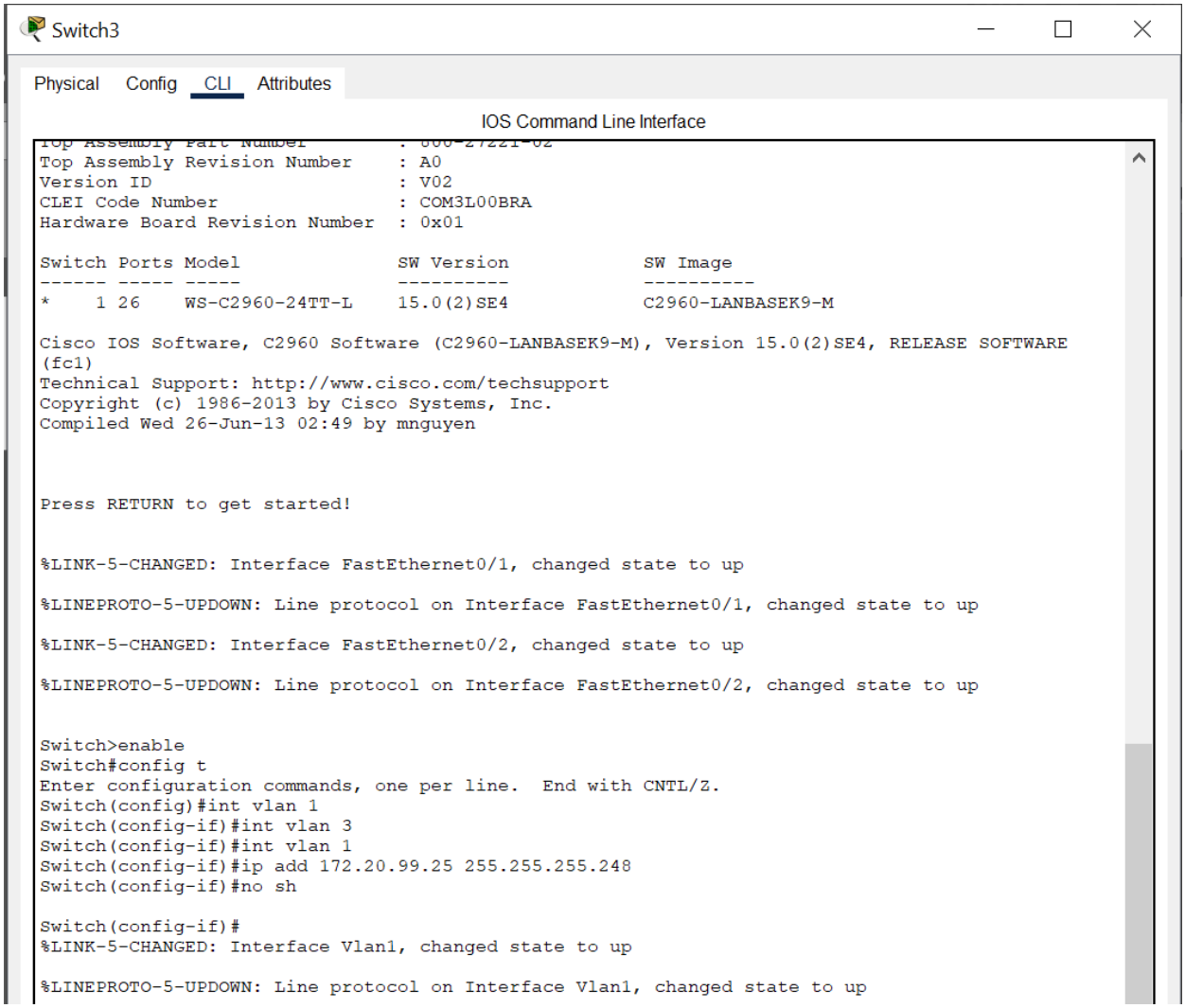
Compiled Wed 26-Jun-13 02:49 by mnguyen
Press RETURN to get started!
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int vlan 1
Switch(config-if)#ip add 172.20.99.17 255.255.255.248
Switch(config-if)#no sh
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up


Switch3
Physical
Config
CLI
Attributes
IOS Command Line Interface
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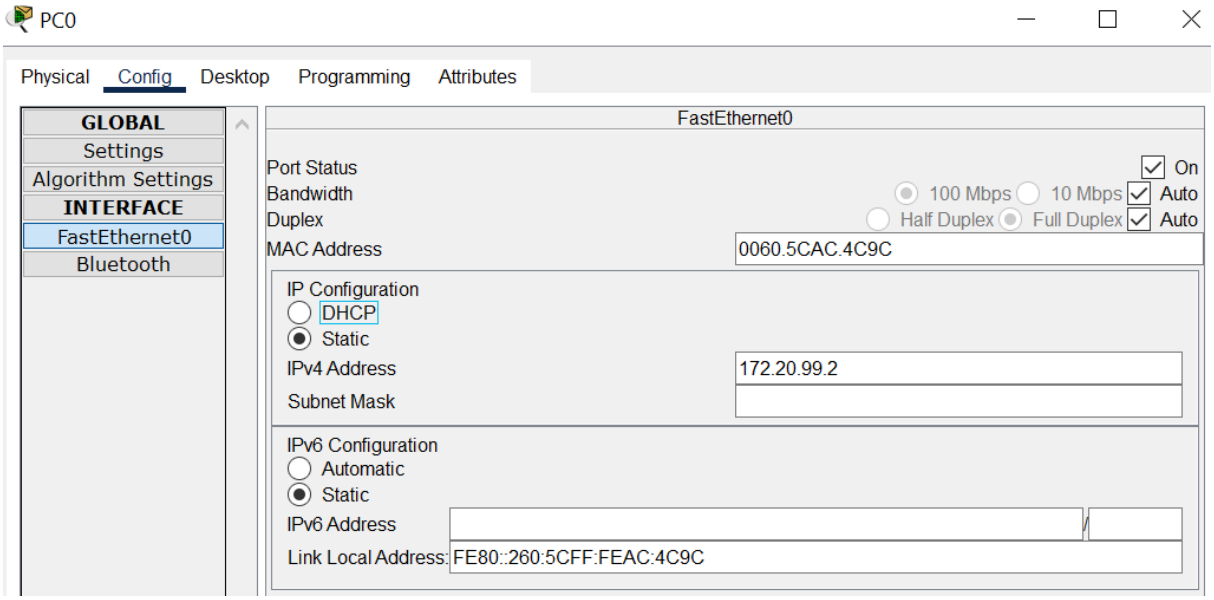
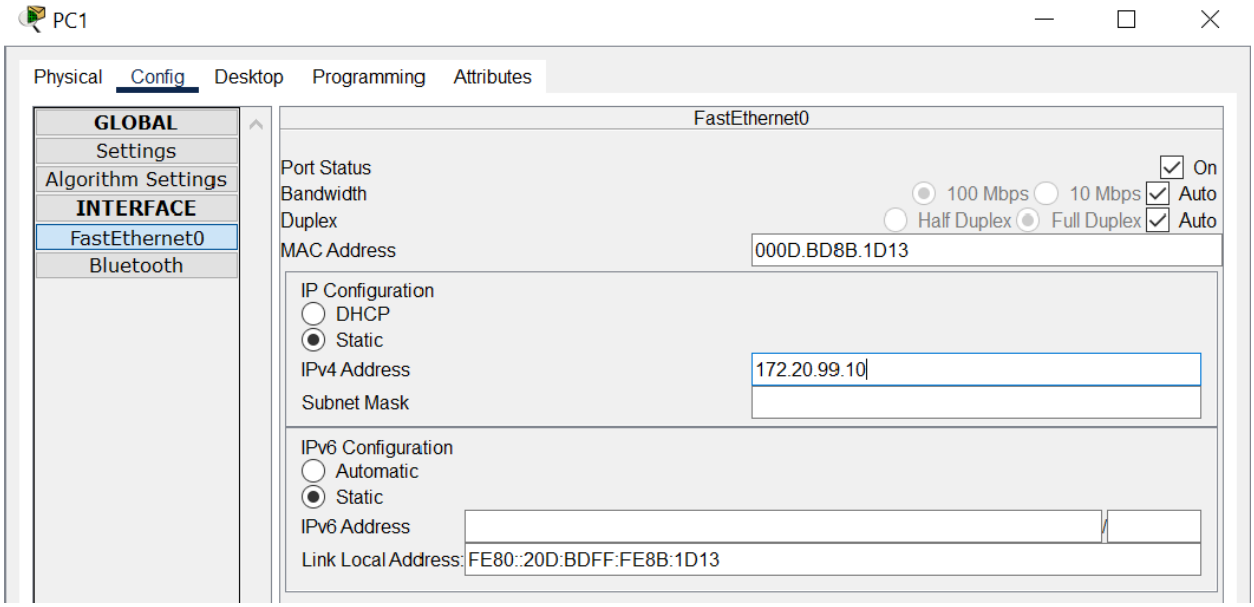
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int vlan 1
Switch(config-if)#int vlan 3
Switch(config-if)#int vlan 1
Switch(config-if)#ip add 172.20.99.25 255.255.255.248
Switch(config-if)#no sh
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up





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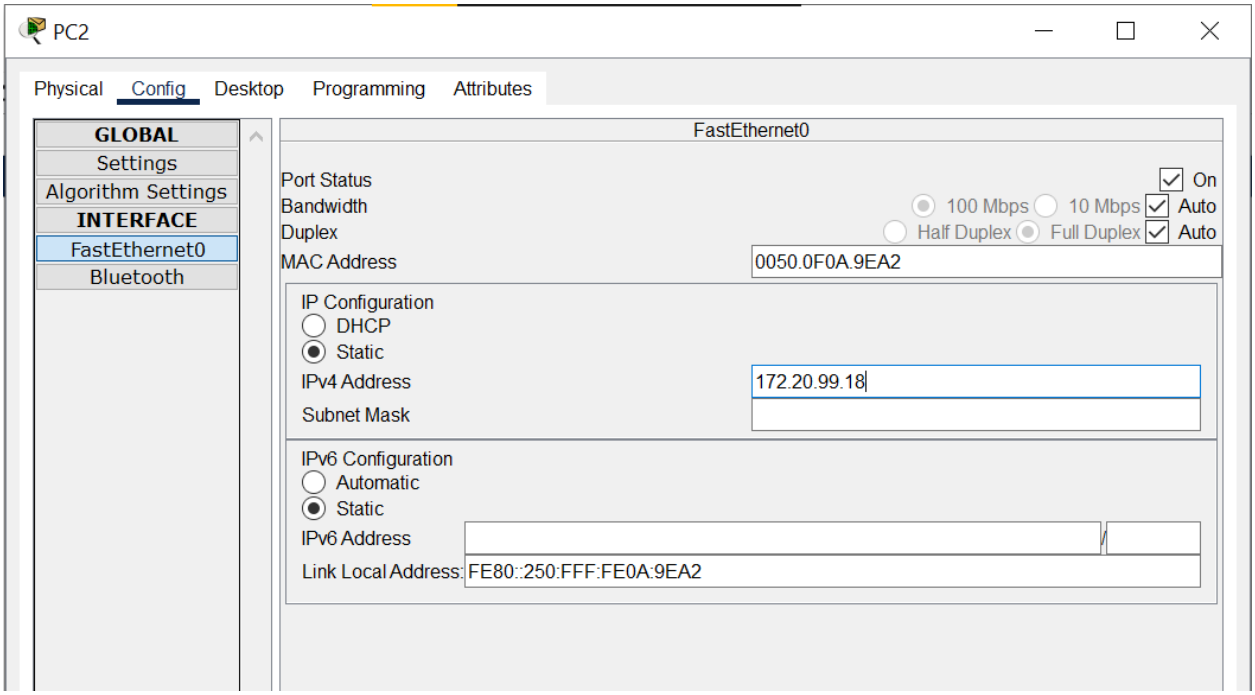

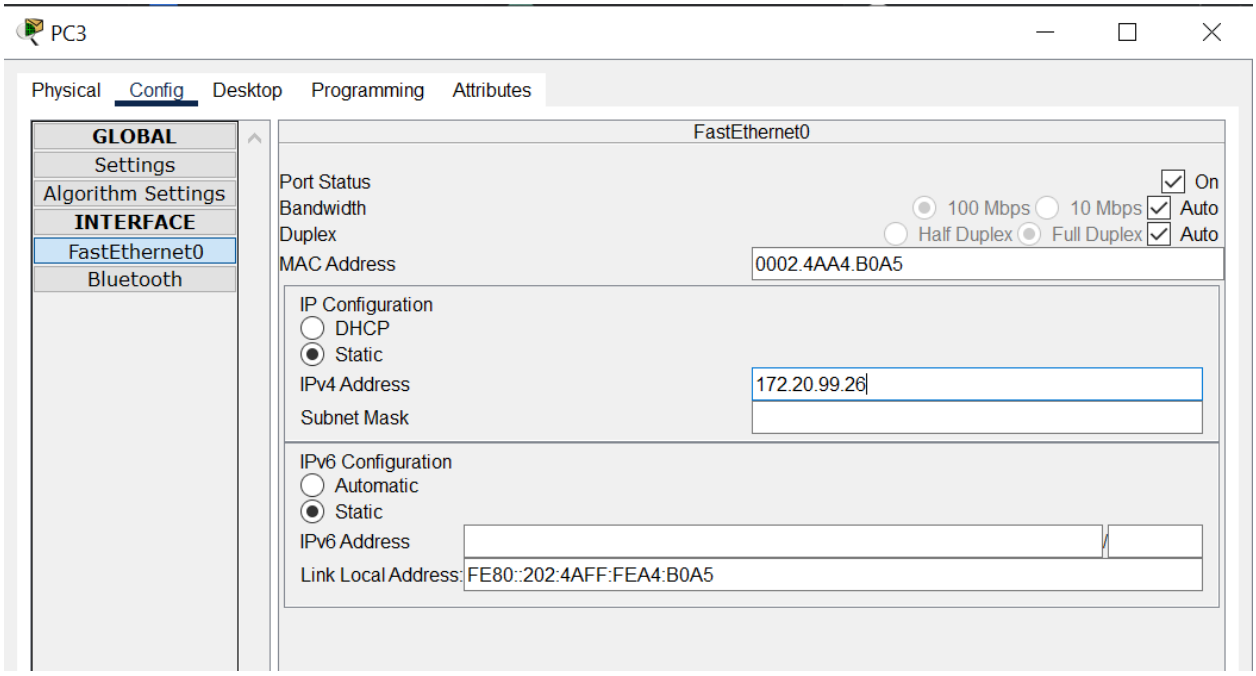

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IV. Questions

a. How many Ethernet networks currently exist? There are **4 Ethernet networks.**
b. How many WAN links currently exist? There is **1 WAN link.**
c. How many total networks? There are **5 networks in total**
d. How many subnets? **There are 4 subnets.**
e. How many subnets with 20% growth? **There are 5 subnets with 20% growth**

Reflection:

1. With the initial block of addresses assigned by the ISP, and the requirements for future growth, is there any other subnetting scheme that could have worked?

Yes, given the initial IP block from the ISP and future growth needs, an alternative subnetting scheme like **Variable Length Subnet Mask (VLSM) could have been more efficient**. VLSM allows for dividing an IP address space into subnets of varying sizes, optimizing the use of IP addresses by allocating smaller subnets to networks with fewer hosts and larger subnets to those with more hosts.

2. If the maximum number of hosts per network segment was only 14, could you have used another scheme? Why?

Yes, if the maximum number of hosts per network segment was 14, **a /28 subnet mask could have been used**. This mask supports up to 14 usable host addresses per subnet, making it suitable for the scenario described. The choice of a /28 subnet mask is practical for networks that require a maximum of 14 hosts, ensuring efficient use of IP addresses without wasting them.

3. Although it works for the scenario in item b above, would it be a good idea to use 4 bits for subnets and 4 bits for hosts?

No, **using 4 bits for subnets and 4 bits for hosts might not be practical**. With 4 bits for subnets, you would have 16 subnets, and with 4 bits for hosts, you would have 16 hosts per subnet. **This setup would not meet the network's requirements for a maximum of 14 hosts per network segment**, as it would allow for **16 hosts**, not 14. Therefore, this approach would not be efficient for the given scenario.

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