



MAJOR PROJECT

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Abstract

Purpose: This project aims to create a working 3-tier network topology. The requirements for the design and infrastructure of are stated in the introduction, which you will read in the following pages. These requirements are given to find out whether we can create a 3-tier topology for an enterprise or not.

The goal of this project is also to find out if we can implement this topology using concepts like ip routing or vlan and to learn more about the general aspects of computer networks. For example, nodes, ports, the physical or logical aspects of a computer network, and network topologies.

Method: We were given a set of requirements in the correct order for us to implement and execute our project:

- Naming our switches, routers and devices.
- Implementation of the console
- Implementation of Telnet
- Creating vlans over our routers
- Running dhcp, intervlan, ip routing and NAT.
- And finally, debugging to see if our topology is actually working or not

Although debugging was the final step in creating the topology, it was not the final step. The final step in completing this project was to document everything, i.e. all the above stages and screenshots of our progress to prove that our model works.

Findings: The results show that it is indeed possible to build a topology for a small domain by implementing the requirements set up for this project. And whether the model should be used or implemented in real cases.

Implication for research: through this project, we can better understand how the Cisco Packet Tracer works, how it is easy to use, and how the technology can help students learn faster. We also have a better understanding of the concepts used to create a working network topology. Perhaps this project will facilitate the learning of such concepts.

Conclusion: if you consider the points mentioned in the requirements and follow all the steps in this project, you can create a working network model.

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Introduction

This project is to design and implement a 3-tier networking infrastructure for an organization with the following requirements:

- Subnet an IP address from Class C in a way to have exactly 4 networks and at least 60 usable host IP addresses per network.
- In Cisco packet tracer, use 6 Switches and 3 routers, rename switches to your first name followed by a number (e.g. 1, 2, 3, or 4). Rename routers with your last name followed with some numbers. Now, configure console line, and telnet on each of them
- Create 4 VLANs on each switch, and to each VLAN connect at least 5 host devices.
- The Host devices should receive IP addresses via DHCP.
- configure inter VLAN routing, also make sure that on a same switch a host on one VLAN is able to interact to the host on another VLAN.
- For creating VLANs the use of VTP is preferred.
- A dynamic, static, or a combination of both must be used as a routing mechanism.
- The network design has to be debugged and tested for each service that has been implemented, the screenshot of the test result is required in the report.
- The users must have internet service from a single ISP or multiple ISPs, use NAT services.

IP Subnetting

1. Subnet an IP address from Class C in a way to have exactly 4 networks and at least 60 usable host IP addresses per network.

Answer: 220.100.100.0/26

Step 1 Binary: 11111111.11111111.11111111.11000000

Step 2 Decimal: 255.255.255.192

Step 3 Number of subnets: $2^2 = 4$

Step 4 Number of hosts per subnet: $2^6 - 2 = 62$

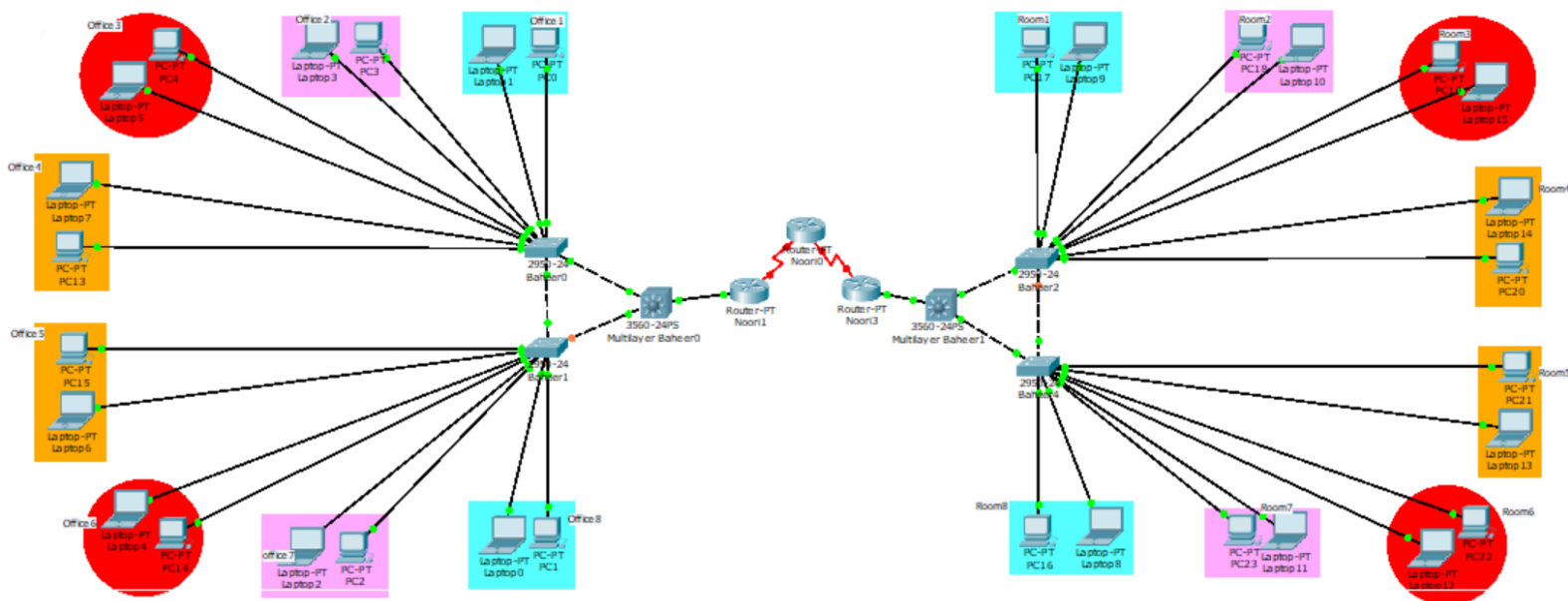
Step 5 Block size: $256 - 192 = 64$

Step 6:

No.	NID	Start IP	End IP	Broadcast IP
1	220.100.100.0	220.100.100.1	220.100.100.62	220.100.100.63
2	220.100.100.64	220.100.100.65	220.100.100.126	220.100.100.127
3	220.100.100.128	220.100.100.129	220.100.100.190	220.100.100.191
Last Subnet	220.100.100.192	220.100.100.193	220.100.100.254	220.100.100.255

Networking topology

2. In Cisco packet tracer, use 6 Switches and 3 routers, rename switches to your first name followed by a number (e.g. 1, 2, 3, or 4). Rename routers with your last name followed with some numbers. Now, configure console line, and telnet on each of them.



Vlans

3. Create 4 VLANs on each switch, and to each VLAN connect at least 5 host devices.

Yes, I have created four vlans on either side.

On the left: Vlans 10 - 40 are assigned to:

- Baheer0 (switch) Office 1 - 4
- Baheer1 (switch) Office 5 - 8

On the left: Vlans 50 - 80 are assigned to:

- Baheer2 (switch) Room 1 - 4
- Baheer4 (switch) Room 5 - 8

The following tables show the VLAN configuration and status for each switch as displayed in the CLI screenshots.

Baheer0

```

Baheer(config)#int range fa0/7-8
Baheer(config-if-range)#switchport mode access
Baheer(config-if-range)#switchport access vlan 40
% Access VLAN does not exist. Creating vlan 40
Baheer(config-if-range)#exit
Baheer(config)#vlan 10
Baheer(config-vlan)#Office1
^
% Invalid input detected at '^' marker.

Baheer(config-vlan)#name Office1
Baheer(config-vlan)#vlan 20
Baheer(config-vlan)#name Office2
Baheer(config-vlan)#vlan 30
Baheer(config-vlan)#name Office3
Baheer(config-vlan)#vlan 40
Baheer(config-vlan)#name Office4
Baheer(config-vlan)#exit
Baheer(config)#do show vlan brief

```

VLAN Name	Status	Ports
1 default	active	Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24
10 Office1	active	Fa0/1, Fa0/2
20 Office2	active	Fa0/3, Fa0/4
30 Office3	active	Fa0/5, Fa0/6
40 Office4	active	Fa0/7, Fa0/8
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Baheer1

```

Baheer(config-if-range)#switchport mode access
Baheer(config-if-range)#switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
Baheer(config-if-range)#exit
Baheer(config)#int range fa0/7-8
Baheer(config-if-range)#switchport mode access
Baheer(config-if-range)#switchport access vlan 40
% Access VLAN does not exist. Creating vlan 40
Baheer(config-if-range)#exit
Baheer(config)#vlan 10
Baheer(config-vlan)#name Office5
Baheer(config-vlan)#vlan 20
Baheer(config-vlan)#name Office6
Baheer(config-vlan)#vlan 30
Baheer(config-vlan)#name Office7
Baheer(config-vlan)#vlan 40
Baheer(config-vlan)#name Office8
Baheer(config-vlan)#exit
Baheer(config)#do show vlan brief

```

VLAN Name	Status	Ports
1 default	active	Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24
10 Office5	active	Fa0/1, Fa0/2
20 Office6	active	Fa0/3, Fa0/4
30 Office7	active	Fa0/5, Fa0/6
40 Office8	active	Fa0/7, Fa0/8
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Baheer2

```

Baheer(config)#int range fa0/7-8
Baheer(config-if-range)#no switchport access vlan 40
Baheer(config-if-range)#switchport access vlan 80
Baheer(config-if-range)#exit
Baheer(config)#int range fa0/5-6
Baheer(config-if-range)#switchport access vlan 70
Baheer(config-if-range)#exit
Baheer(config)#do show vlan brief

```

VLAN Name	Status	Ports
1 default	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24
50 Room1	active	Fa0/1, Fa0/2
60 Room2	active	Fa0/3, Fa0/4
70 Room3	active	Fa0/5, Fa0/6
80 Room4	active	Fa0/7, Fa0/8
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Baheer4

```

% Access VLAN does not exist. Creating vlan 10
Baheer(config-if-range)#exit
Baheer(config)#int range fa0/3-4
Baheer(config-if-range)#switchport access vlan 20
% Access VLAN does not exist. Creating vlan 20
Baheer(config-if-range)#exit
Baheer(config)#int range fa0/5-6
Baheer(config-if-range)#switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
Baheer(config-if-range)#exit
Baheer(config)#int range fa0/7-8
Baheer(config-if-range)#switchport access vlan 40
% Access VLAN does not exist. Creating vlan 40
Baheer(config-if-range)#exit
Baheer(config)#vlan 10
Baheer(config-vlan)#name Room5
Baheer(config-vlan)#vlan 20
Baheer(config-vlan)#name Room6
Baheer(config-vlan)#vlan 30
Baheer(config-vlan)#name Room7
Baheer(config-vlan)#vlan 40
Baheer(config-vlan)#name Room8
Baheer(config-vlan)#exit
Baheer(config)#do show vlan brief

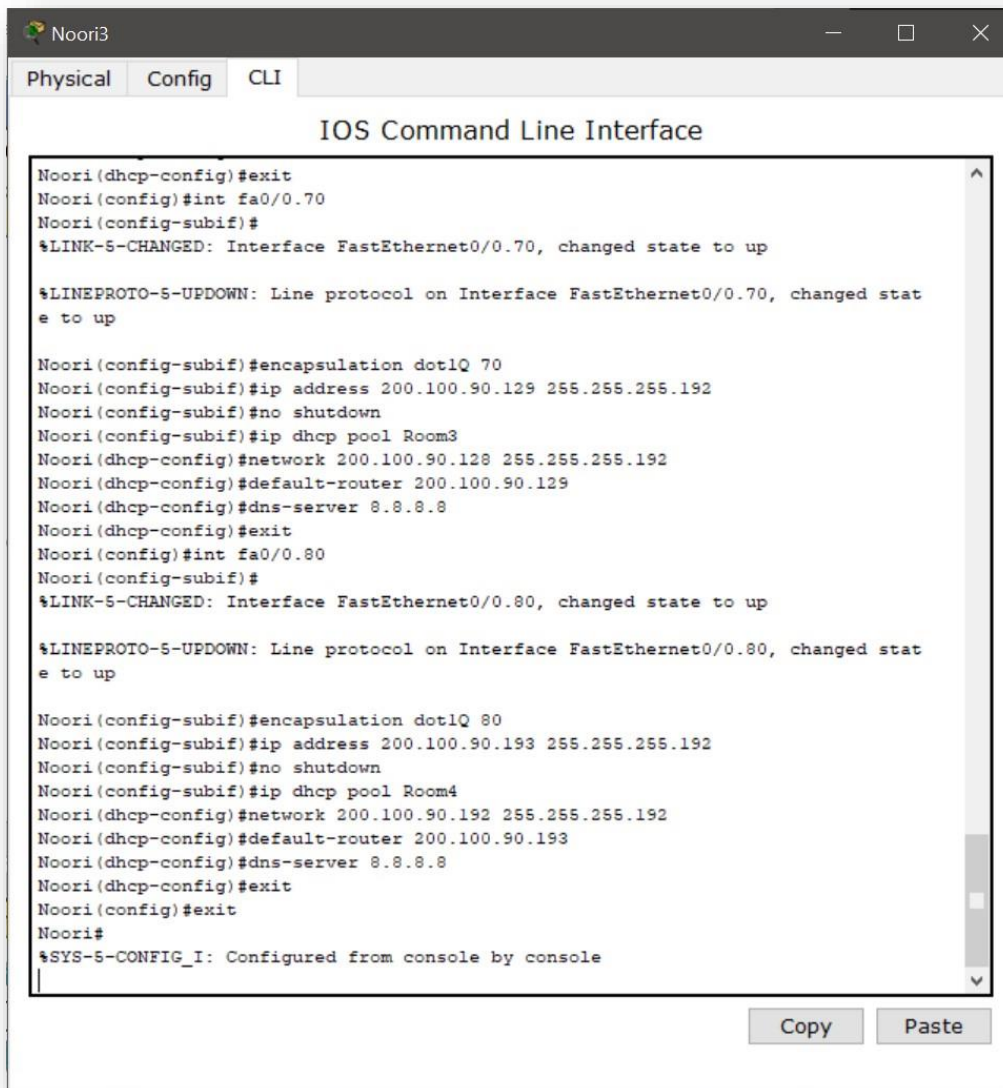
```

VLAN Name	Status	Ports
1 default	active	Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24
10 Room5	active	Fa0/1, Fa0/2
20 Room6	active	Fa0/3, Fa0/4

Assigned IPs to vlans:**Vlan 10:** 220.100.100.0**Vlan 20:** 220.100.100.64**Vlan 30:** 220.100.100.128**Vlan 40:** 220.100.100.192**Vlan 50:** 200.100.90.0**Vlan 60:** 200.100.90.64**Vlan 70:** 200.100.90.128**Vlan 80:** 200.100.90.192**DHCP (dynamic host configuration protocol)**

4. The Host devices should receive IP addresses via DHCP.

Assigning the default gateway address, domain name server address, subnet mask and other configuration parameters dynamically. The following code and DHCP was configured on Noori1 router too.



```

Noori3
Physical Config CLI
IOS Command Line Interface

Noori(dhcp-config)#exit
Noori(config)#int fa0/0.70
Noori(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.70, changed state to up

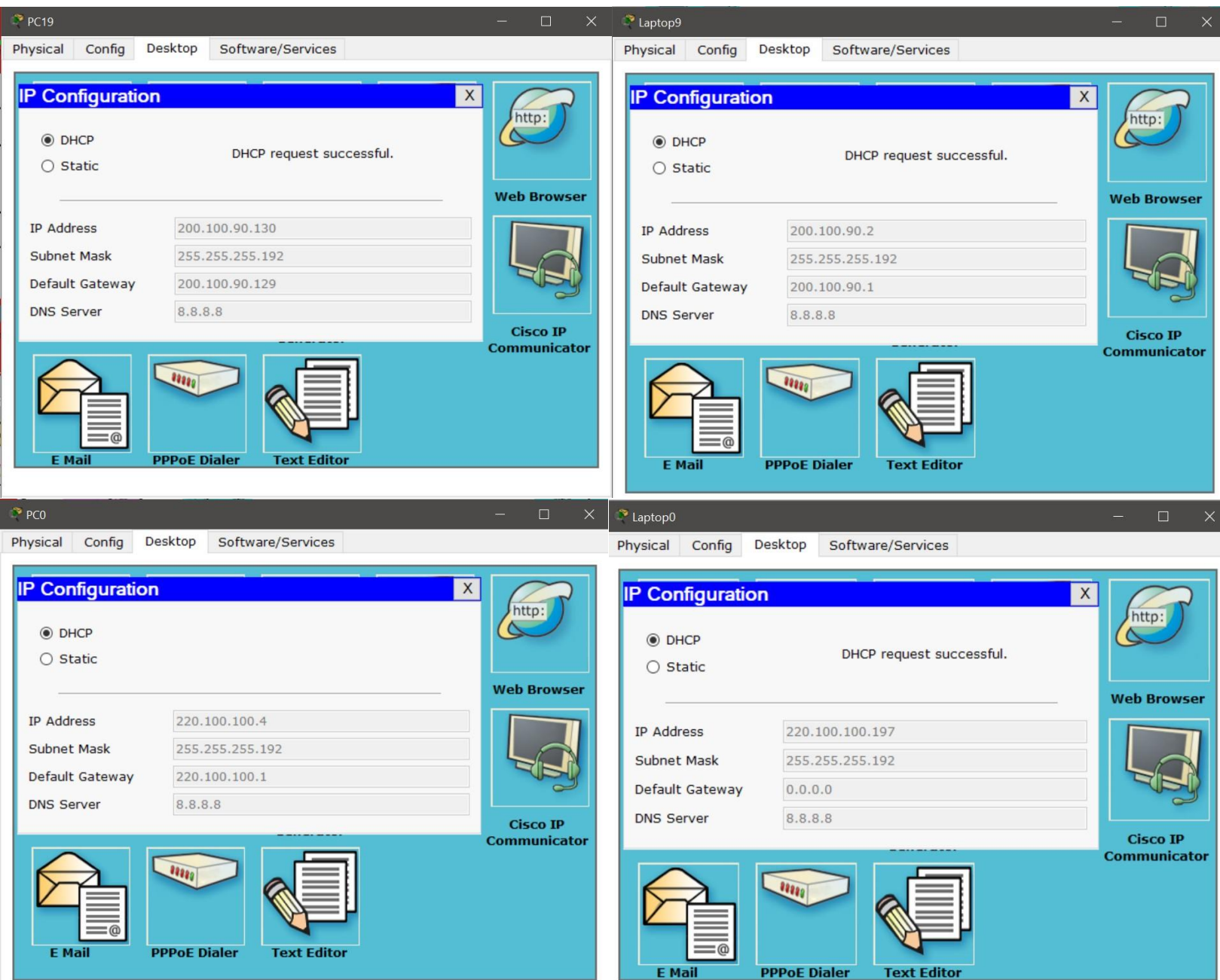
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.70, changed state to up

Noori(config-subif)#encapsulation dot1Q 70
Noori(config-subif)#ip address 200.100.90.129 255.255.255.192
Noori(config-subif)#no shutdown
Noori(config-subif)#ip dhcp pool Room3
Noori(dhcp-config)#network 200.100.90.128 255.255.255.192
Noori(dhcp-config)#default-router 200.100.90.129
Noori(dhcp-config)#dns-server 8.8.8.8
Noori(dhcp-config)#exit
Noori(config)#int fa0/0.80
Noori(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.80, changed state to up

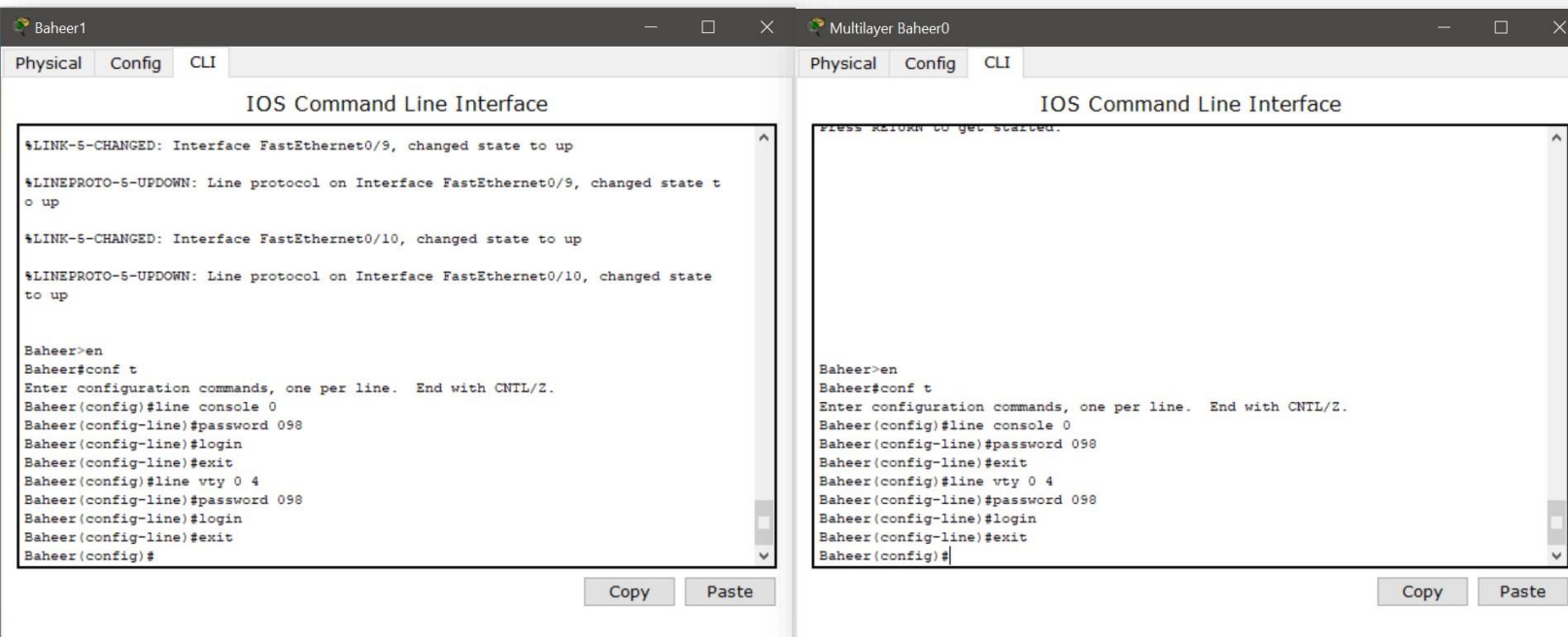
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.80, changed state to up

Noori(config-subif)#encapsulation dot1Q 80
Noori(config-subif)#ip address 200.100.90.193 255.255.255.192
Noori(config-subif)#no shutdown
Noori(config-subif)#ip dhcp pool Room4
Noori(dhcp-config)#network 200.100.90.192 255.255.255.192
Noori(dhcp-config)#default-router 200.100.90.193
Noori(dhcp-config)#dns-server 8.8.8.8
Noori(dhcp-config)#exit
Noori(config)#exit
Noori#
%SYS-5-CONFIG_I: Configured from console by console
  
```

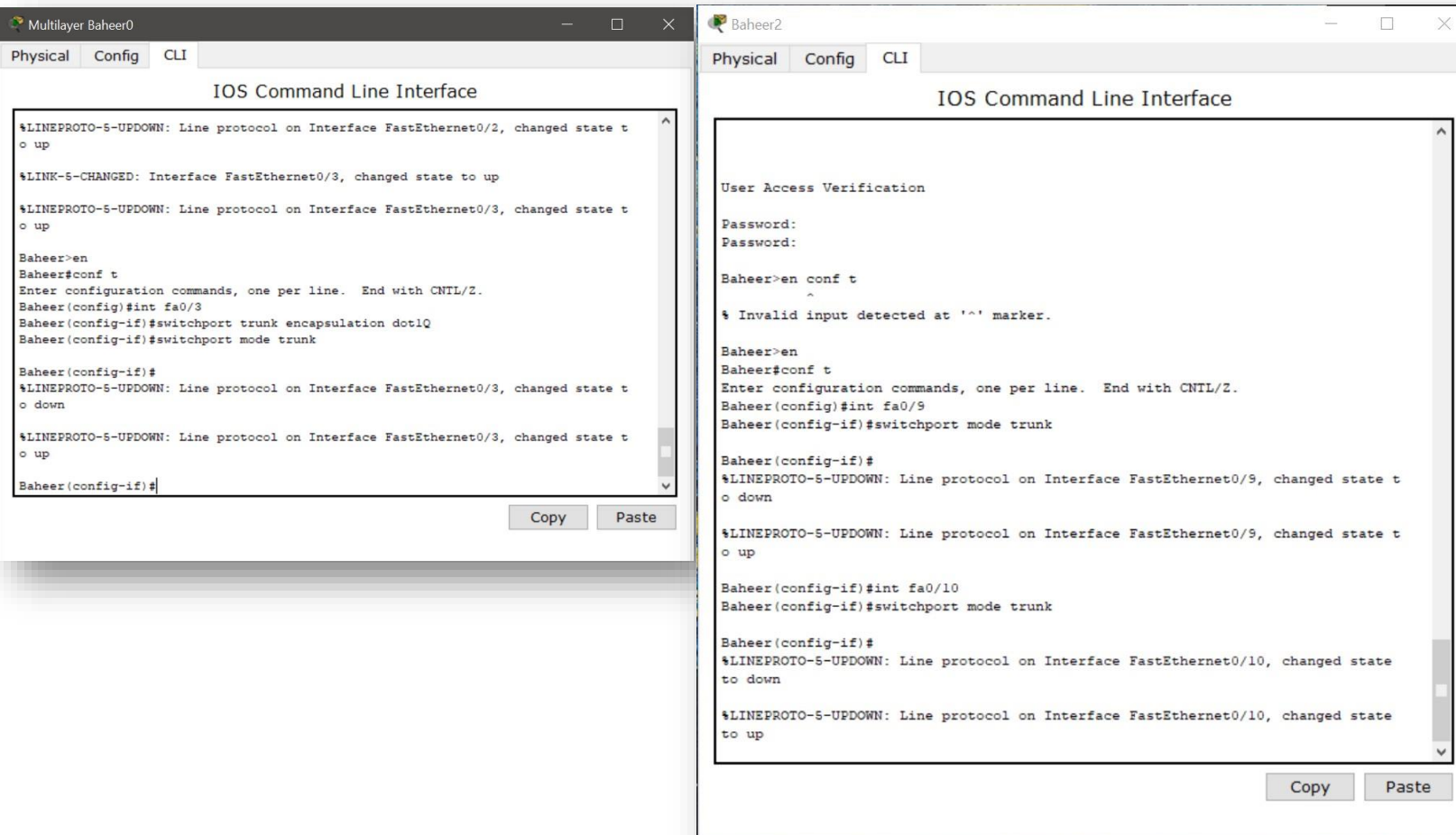

Here are some of the dhcp configuration done on the devices as prove:



Telnet and console configurations

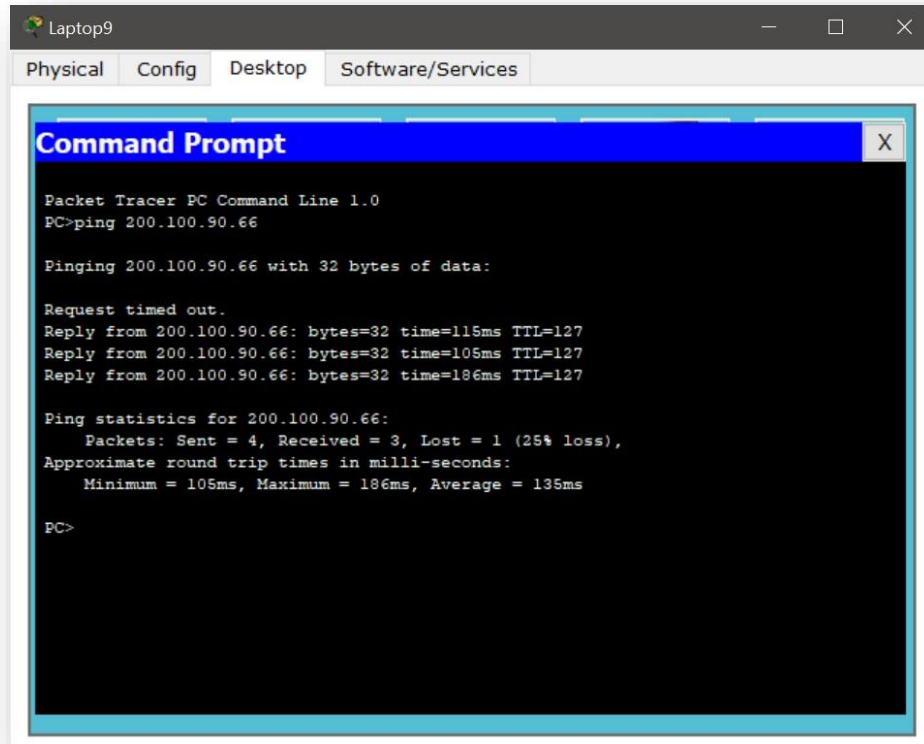


Multilayer trunk configuration



Inter Vlan routing

5. configure inter VLAN routing, also make sure that on a same switch a host on one VLAN is able to interact to the host on another VLAN.



```

Laptop9
Physical Config Desktop Software/Services

Command Prompt

Packet Tracer PC Command Line 1.0
PC>ping 200.100.90.66

Pinging 200.100.90.66 with 32 bytes of data:

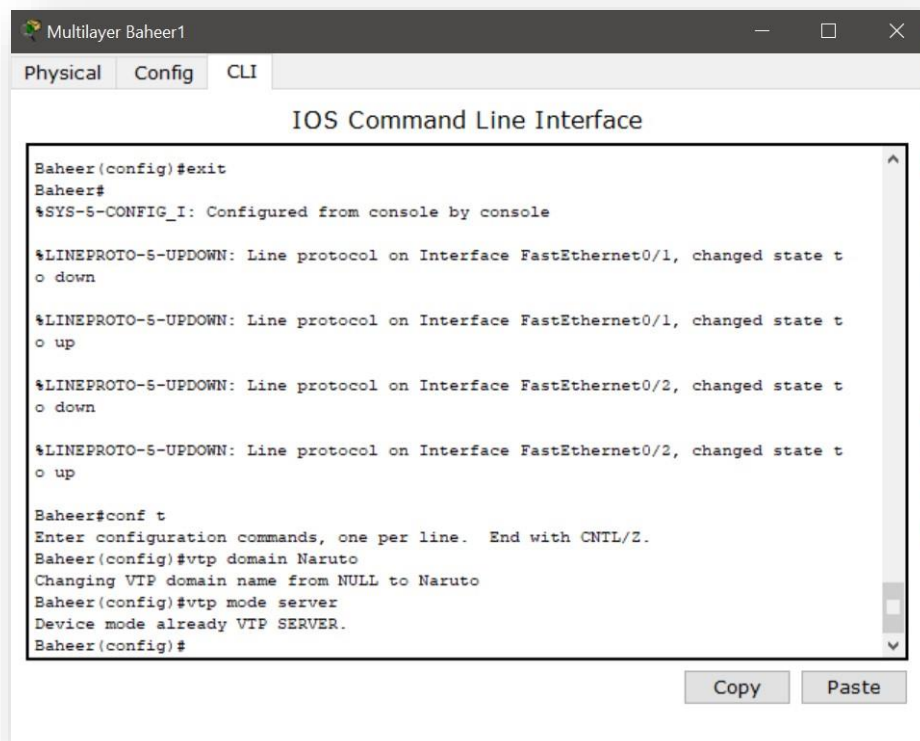
Request timed out.
Reply from 200.100.90.66: bytes=32 time=115ms TTL=127
Reply from 200.100.90.66: bytes=32 time=105ms TTL=127
Reply from 200.100.90.66: bytes=32 time=186ms TTL=127

Ping statistics for 200.100.90.66:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 105ms, Maximum = 186ms, Average = 135ms

PC>
  
```

VTP

6. For creating VLANs the use of VTP is preferred.



```

Multilayer Baheer1
Physical Config CLI

IOS Command Line Interface

Baheer(config)#exit
Baheer#
%SYS-5-CONFIG_I: Configured from console by console

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state t
o down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state t
o up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state t
o down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state t
o up

Baheer#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Baheer(config)#vtp domain Naruto
Changing VTP domain name from NULL to Naruto
Baheer(config)#vtp mode server
Device mode already VTP SERVER.
Baheer(config)#
  
```

IP routing

7. A dynamic, static, or a combination of both must be used as a routing mechanism.

RIP routing

The image shows two side-by-side screenshots of Cisco IOS Command Line Interface (CLI) windows for routers Noori1 and Noori3.

Noori1 CLI:

```

220.100.100.0/26 is subnetted, 4 subnets
C    220.100.100.0 is directly connected, FastEthernet0/0.10
C    220.100.100.64 is directly connected, FastEthernet0/0.20
C    220.100.100.128 is directly connected, FastEthernet0/0.30
C    220.100.100.192 is directly connected, FastEthernet0/0.40
C    221.100.100.0/24 is directly connected, Serial2/0
Noori(config)#router rip
Noori(config-router)#version 2
Noori(config-router)#no auto-summary
Noori(config-router)#network 220.100.100.0
^
% Invalid input detected at '^' marker.

Noori(config-router)#network 220.100.100.0
Noori(config-router)#network 220.100.100.64
Noori(config-router)#network 220.100.100.128
Noori(config-router)#network 220.100.100.192
Noori(config-router)#network 221.100.100.0
Noori(config-router)#exit
Noori(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
  
```

Noori3 CLI:

```

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

200.100.90.0/26 is subnetted, 4 subnets
C    200.100.90.0 is directly connected, FastEthernet0/0.50
C    200.100.90.64 is directly connected, FastEthernet0/0.60
C    200.100.90.128 is directly connected, FastEthernet0/0.70
C    200.100.90.192 is directly connected, FastEthernet0/0.80
C    222.100.100.0/24 is directly connected, Serial2/0
Noori(config)#router rip
Noori(config-router)#version 2
Noori(config-router)#no auto-summary
Noori(config-router)#network 200.100.90.0
Noori(config-router)#network 200.100.90.64
Noori(config-router)#network 200.100.90.128
Noori(config-router)#network 200.100.90.192
Noori(config-router)#network 222.100.90.0
Noori(config-router)#
  
```

Routing table

The image shows a screenshot of the Cisco IOS Command Line Interface (CLI) for router Noori0, displaying the routing table.

```

R    220.100.100.128 [120/1] via 221.100.100.1, 00:00:04, Serial2/0
R    220.100.100.192 [120/1] via 221.100.100.1, 00:00:04, Serial2/0
C    221.100.100.0/24 is directly connected, Serial2/0
C    222.100.100.0/24 is directly connected, Serial3/0
Noori(config-router)#exit
Noori(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

200.100.90.0/26 is subnetted, 4 subnets
R    200.100.90.0 [120/1] via 222.100.100.1, 00:00:26, Serial3/0
R    200.100.90.64 [120/1] via 222.100.100.1, 00:00:26, Serial3/0
R    200.100.90.128 [120/1] via 222.100.100.1, 00:00:26, Serial3/0
R    200.100.90.192 [120/1] via 222.100.100.1, 00:00:26, Serial3/0
220.100.100.0/26 is subnetted, 4 subnets
R    220.100.100.0 [120/1] via 221.100.100.1, 00:00:05, Serial2/0
R    220.100.100.64 [120/1] via 221.100.100.1, 00:00:05, Serial2/0
R    220.100.100.128 [120/1] via 221.100.100.1, 00:00:05, Serial2/0
R    220.100.100.192 [120/1] via 221.100.100.1, 00:00:05, Serial2/0
C    221.100.100.0/24 is directly connected, Serial2/0
C    222.100.100.0/24 is directly connected, Serial3/0
Noori(config)#
  
```


Noori1

Physical Config CLI

IOS Command Line Interface

```

Noori>en
Noori#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Noori(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    200.100.90.0/26 is subnetted, 4 subnets
R       200.100.90.0 [120/2] via 221.100.100.2, 00:00:16, Serial2/0
R       200.100.90.64 [120/2] via 221.100.100.2, 00:00:16, Serial2/0
R       200.100.90.128 [120/2] via 221.100.100.2, 00:00:16, Serial2/0
R       200.100.90.192 [120/2] via 221.100.100.2, 00:00:16, Serial2/0
    220.100.100.0/26 is subnetted, 4 subnets
C       220.100.100.0 is directly connected, FastEthernet0/0.10
C       220.100.100.64 is directly connected, FastEthernet0/0.20
C       220.100.100.128 is directly connected, FastEthernet0/0.30
C       220.100.100.192 is directly connected, FastEthernet0/0.40
C       221.100.100.0/24 is directly connected, Serial2/0
R       222.100.100.0/24 [120/1] via 221.100.100.2, 00:00:16, Serial2/0
Noori(config)#

```

Copy Paste

Noori3

Physical Config CLI

IOS Command Line Interface

```

% Invalid input detected at '^' marker.

Noori(config-router)#network 222.100.100.0
Noori(config-router)#exit
Noori(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    200.100.90.0/26 is subnetted, 4 subnets
C       200.100.90.0 is directly connected, FastEthernet0/0.50
C       200.100.90.64 is directly connected, FastEthernet0/0.60
C       200.100.90.128 is directly connected, FastEthernet0/0.70
C       200.100.90.192 is directly connected, FastEthernet0/0.80
    220.100.100.0/26 is subnetted, 4 subnets
R       220.100.100.0 [120/2] via 222.100.100.2, 00:00:02, Serial2/0
R       220.100.100.64 [120/2] via 222.100.100.2, 00:00:02, Serial2/0
R       220.100.100.128 [120/2] via 222.100.100.2, 00:00:02, Serial2/0
R       220.100.100.192 [120/2] via 222.100.100.2, 00:00:02, Serial2/0
R       221.100.100.0/24 [120/1] via 222.100.100.2, 00:00:02, Serial2/0
C       222.100.100.0/24 is directly connected, Serial2/0
Noori(config)#

```

Copy Paste

IP routing testing

The screenshot shows a Windows Command Prompt window titled "Laptop9" with tabs for "Physical", "Config", "Desktop", and "Software/Services". The command prompt displays the following text:

```

Pinging 220.100.100.197 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 220.100.100.197:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 220.100.100.2

Pinging 220.100.100.2 with 32 bytes of data:

Request timed out.
Reply from 220.100.100.2: bytes=32 time=43ms TTL=125
Reply from 220.100.100.2: bytes=32 time=22ms TTL=125
Reply from 220.100.100.2: bytes=32 time=41ms TTL=125

Ping statistics for 220.100.100.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 43ms, Average = 35ms

PC>

```

Configuring router

The screenshot shows a Cisco IOS Command Line Interface window titled "Noori1" with tabs for "Physical", "Config", and "CLI". The command prompt displays the following text:

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Noori
Noori(config)#no shutdown
^
% Invalid input detected at '^' marker.
Noori(config)#no shutdown
^
% Invalid input detected at '^' marker.
Noori(config)#int fa0/0
Noori(config-if)#no shutdown

Noori(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

```

At the bottom of the window, there are "Copy" and "Paste" buttons.

8. The network design has to be debugged and tested for each service that has been implemented, the screenshot of the test result is required in the report.

Here are samples

PC0

Physical Config Desktop Software/Services

Command Prompt

```





Packet Tracer PC Command Line 1.0
PC>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Request timed out.
Reply from 8.8.8.8: bytes=32 time=25ms TTL=253
Reply from 8.8.8.8: bytes=32 time=126ms TTL=253
Reply from 8.8.8.8: bytes=32 time=142ms TTL=253

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 25ms, Maximum = 142ms, Average = 97ms
PC>

```

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic
	Failed	PC18	PC13	ICMP		0.000	N
	Successful	PC18	PC13	ICMP		0.000	N

Laptop15

Physical Config Desktop Software/Services

Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>ping 220.100.100.192

Pinging 220.100.100.192 with 32 bytes of data:

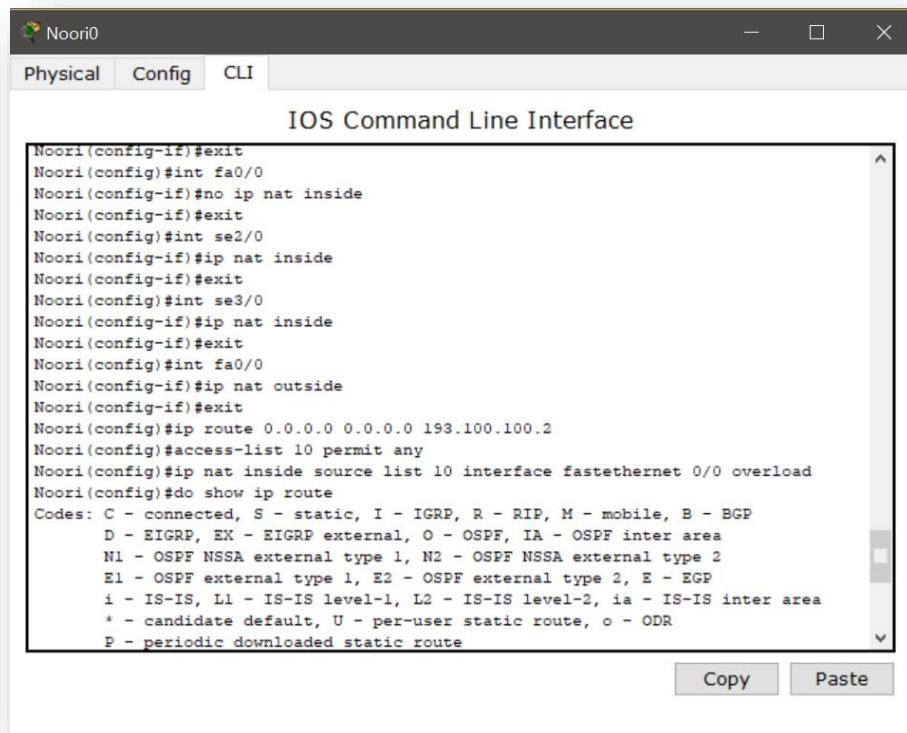
Reply from 221.100.100.1: bytes=32 time=114ms TTL=253
Reply from 221.100.100.1: bytes=32 time=63ms TTL=253
Reply from 221.100.100.1: bytes=32 time=19ms TTL=253
Reply from 221.100.100.1: bytes=32 time=11ms TTL=253

Ping statistics for 220.100.100.192:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 114ms, Average = 51ms
PC>

```

Nat

9. The users must have internet service from a single ISP or multiple ISPs, use NAT services.



```
Noori0
Physical Config CLI
IOS Command Line Interface

Noori(config-if)#exit
Noori(config)#int fa0/0
Noori(config-if)#no ip nat inside
Noori(config-if)#exit
Noori(config)#int se2/0
Noori(config-if)#ip nat inside
Noori(config-if)#exit
Noori(config)#int se3/0
Noori(config-if)#ip nat inside
Noori(config-if)#exit
Noori(config)#int fa0/0
Noori(config-if)#ip nat outside
Noori(config-if)#exit
Noori(config)#ip route 0.0.0.0 0.0.0.0 193.100.100.2
Noori(config)#access-list 10 permit any
Noori(config)#ip nat inside source list 10 interface fastethernet 0/0 overload
Noori(config)#do show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route
```

Copy Paste