INTERNETWORKING ESSENTIALS CA2

CSE 307

BACHELOR OF TECHNOLOGY

IN

Computer Science & Engineering

By

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Section-K23UP

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TO

Mr. Simarjit Singh Malhi (Sir)

LOVELY PROFESSIONAL UNIVERSITY

PUNJAB, INDIA

Problem Statement

Project40: You are hired as a network engineer for Cyber Solutions, a mid sized enterprise with a 5-floor office building. Each floor is equipped with a different number of computers, like floor 1 has 11045, floor 2 has 54321, floor 3 has 234, floor 4 has 568, and floor 5 has 10. Configure the DHCP server on floor 1, the Email server should be connected on floor 3, the HTTP server should be connected on floor 2, and the DNS and FTP servers of the company are on floor 5. The organization requires a well-structured network to ensure efficient communication and scalability.

Network Design Requirements:-

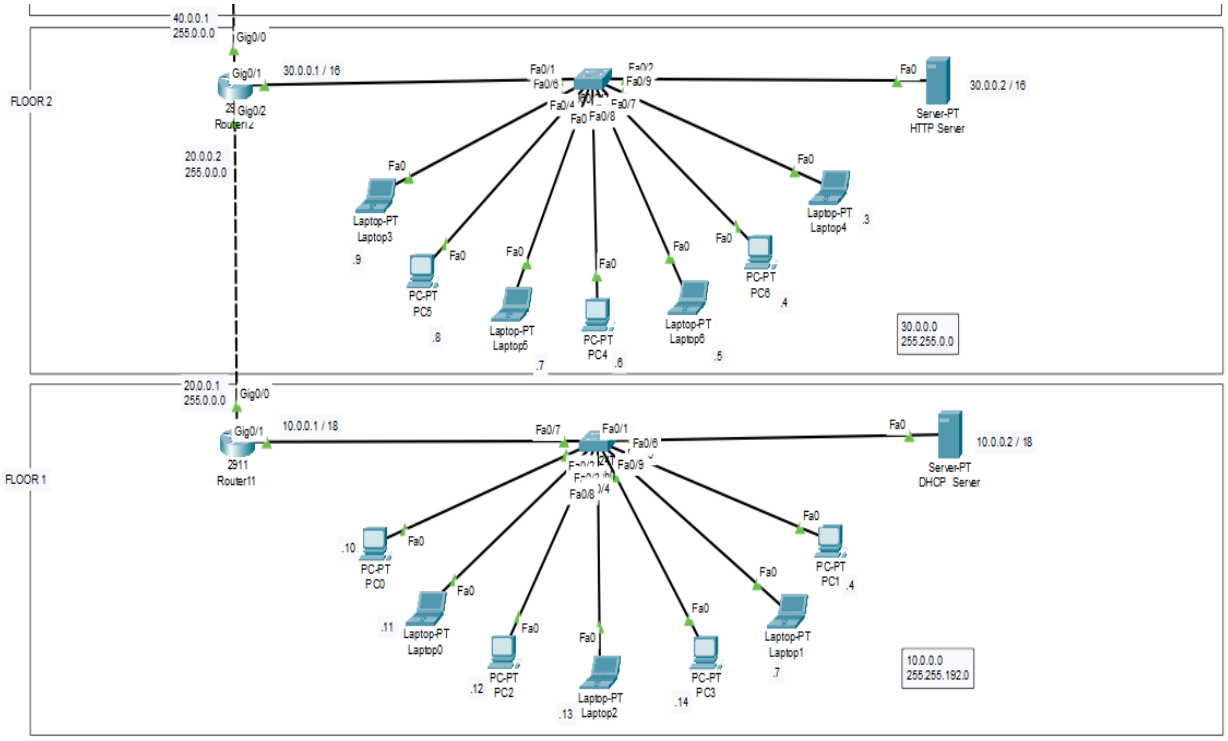
1. Topology Selection: Design a Star topology for the first 2 floors and a Bus topology for the remaining floors, considering performance and fault tolerance. (Just connect 7 computers on each floor instead of the given requirement, as we are not able to do this in Cisco Packet Tracer.)

2. IP Addressing Scheme: The company has decided to use Class A private IPv4 addresses for the first 2 floors and Class B private for the remaining floors, following a classless addressing scheme that is VLSM. Allocate IP addresses properly for each floor, ensuring uniqueness.

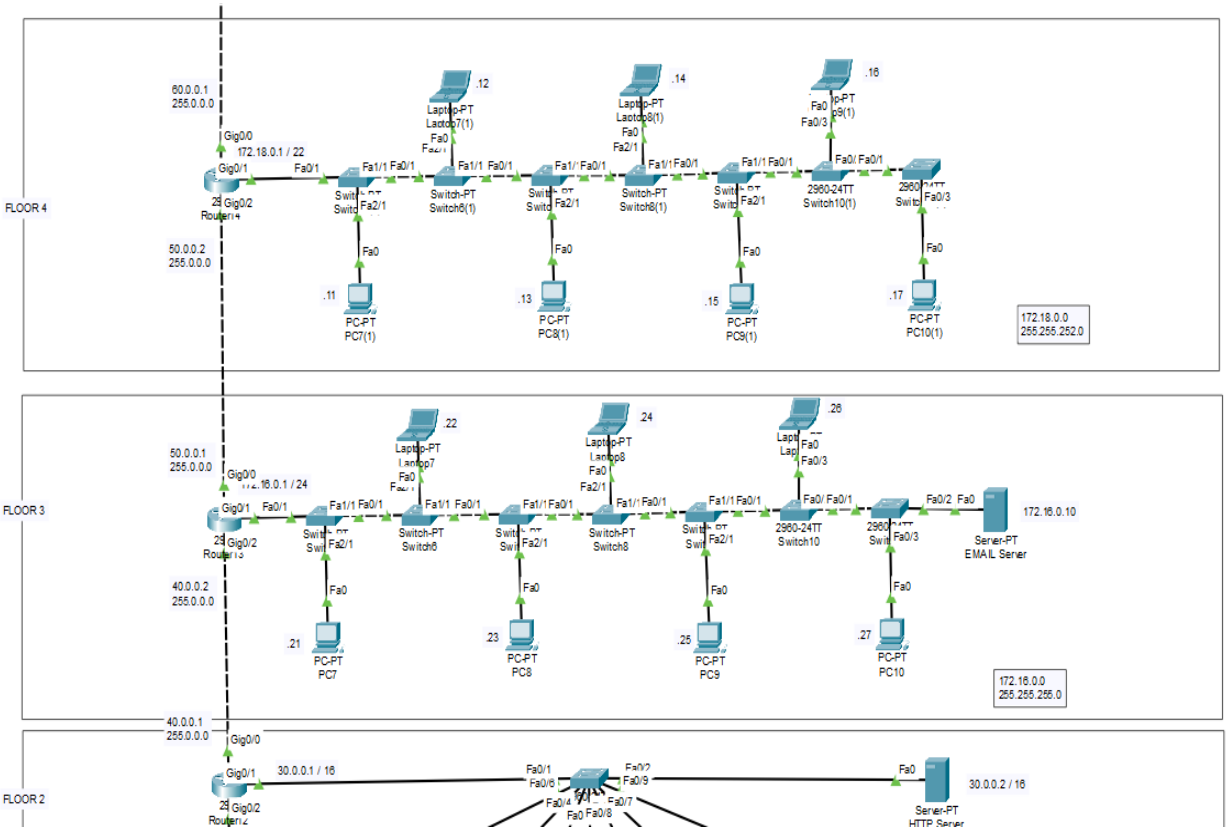
3. Routing Strategy for Inter-Floor Communication & Connectivity: Recommend a routing approach that is Static for inter-floor communication.

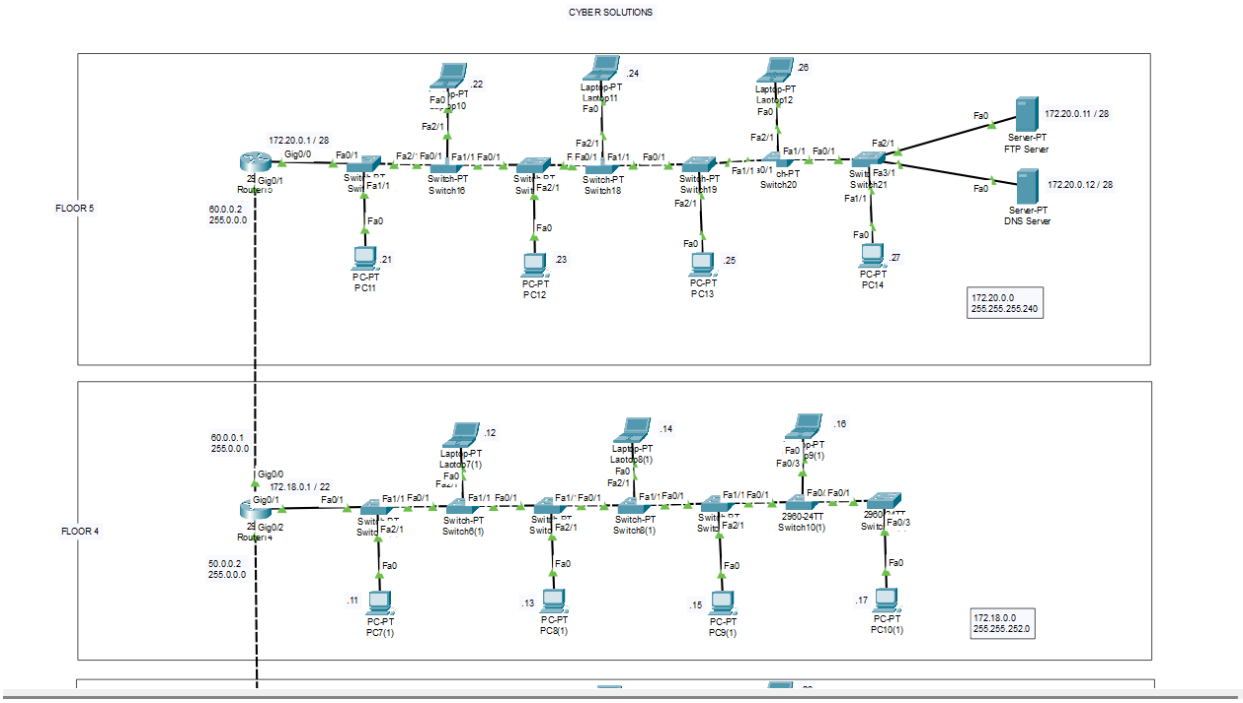
- **Design how the floors will be connected for seamless interdepartment communication.**
- **Suggest the appropriate network devices (e.g., switches, routers, access points) and their placement.**
- **If using dynamic routing, use RIP routing protocol.**
- **If using static routing, define the static routes for efficient data flow.**
- **The minimum number of routers to be used should be 4 and the maximum 5.**
- **Specify the number of default gateways along with IP addresses.**
- **Specify each SUBENTWORK with proper Subnetwork address, host IP range, and broadcast address.**

Star Topology for 2 floors:-

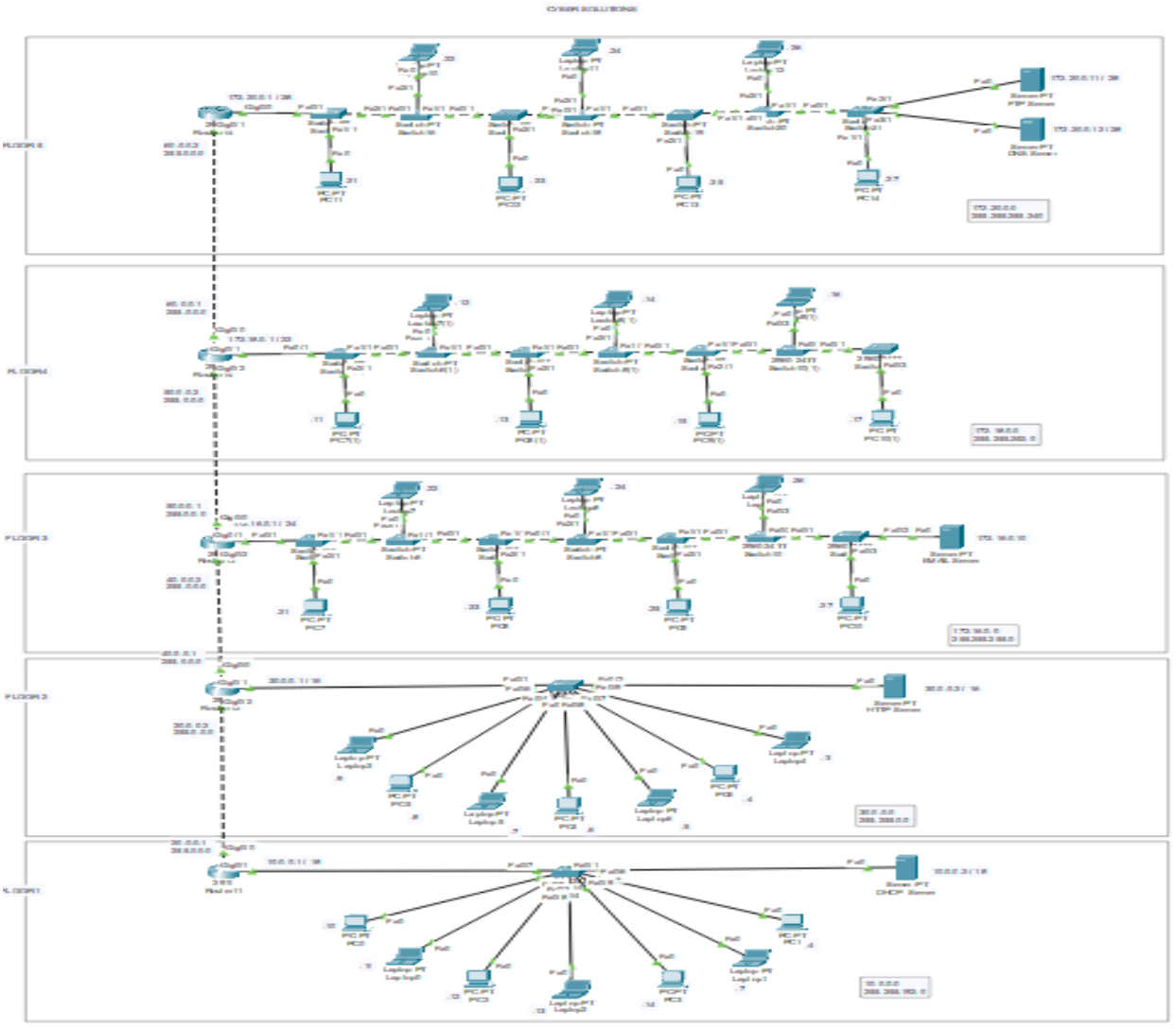


Bus Topology for next 3 floors:-

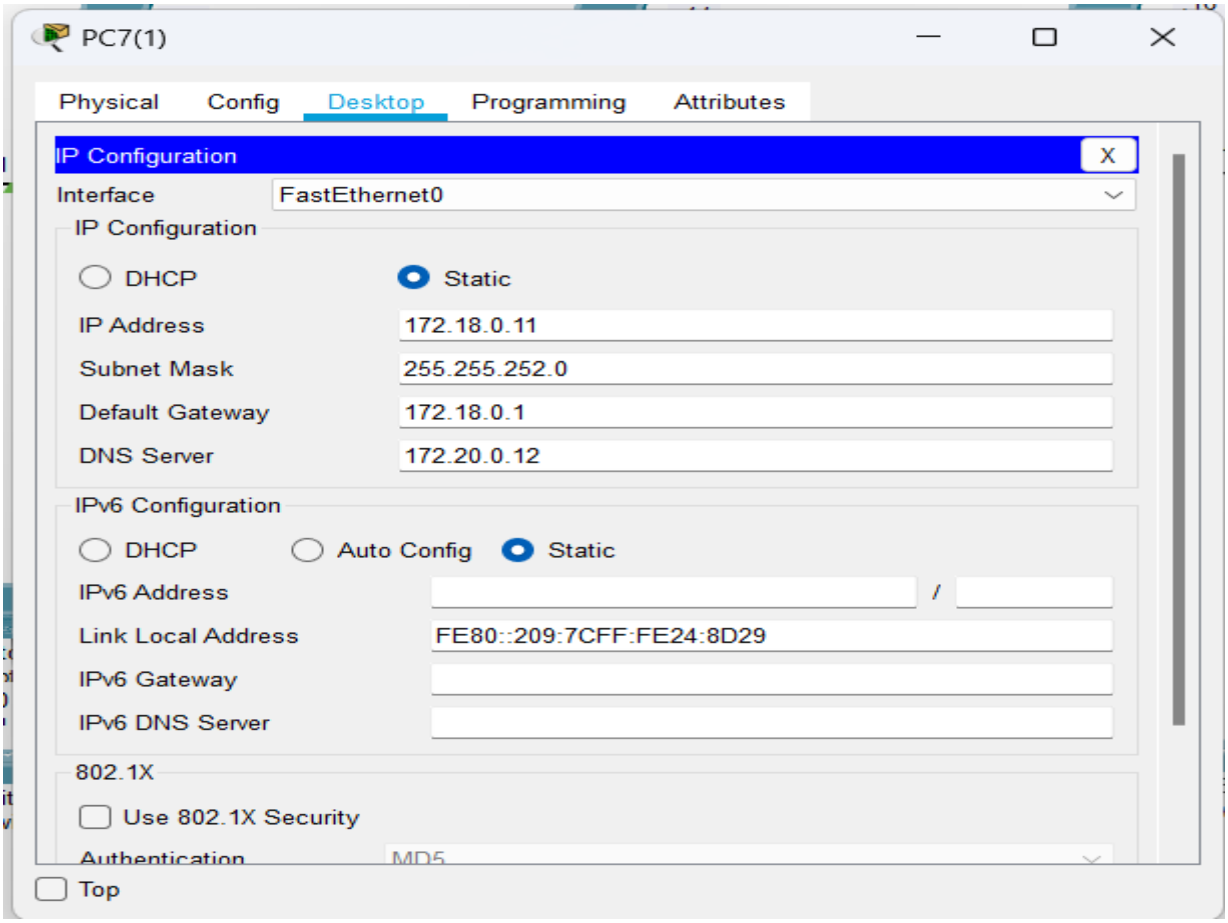


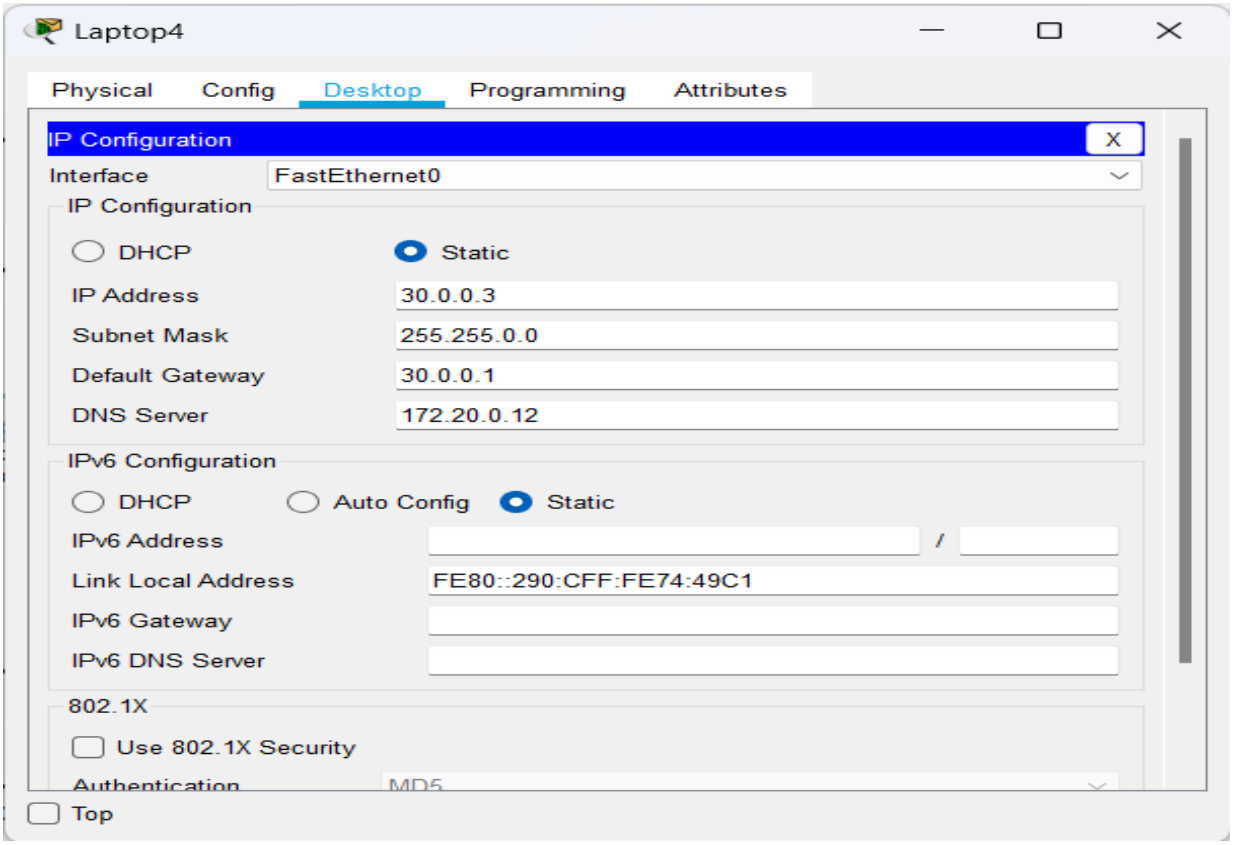


Total Structure:-



1. Allocation of IP Address:





Router2

Physical Config CLI Attributes

IOS Command Line Interface

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.255.192.0 20.0.0.1
Router(config)#ip route 30.0.0.0 255.255.0.0 40.0.0.1
Router(config)#ip route 30.0.0.0 255.255.0.0 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#show ip route
Codes: L - local, C - connected, S - static, 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

     30.0.0.0/16 is subnetted, 1 subnets
S       30.0.0.0/16 [1/0] via 40.0.0.1
     40.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       40.0.0.0/8 is directly connected, GigabitEthernet0/0
L       40.0.0.2/32 is directly connected, GigabitEthernet0/0
     50.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       50.0.0.0/8 is directly connected, GigabitEthernet0/2
L       50.0.0.1/32 is directly connected, GigabitEthernet0/2
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.0.0/24 is directly connected, GigabitEthernet0/1
L       172.16.0.1/32 is directly connected, GigabitEthernet0/1

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 30.0.0.0 255.255.0.0 40.0.0.1
Router(config)#ip route 30.0.0.0 255.255.0.0 30.0.0.1
Router(config)#ip route 30.0.0.0 255.255.0.0 20.0.0.2
Router(config)#ip route 30.0.0.0 255.255.0.0 20.0.0.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

PC7(1)(1)

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP Static

IP Address 172.20.0.21

Subnet Mask 255.255.255.240

Default Gateway 172.20.0.1

DNS Server 172.20.0.12

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address /

Link Local Address FE80::200:CFF:FE34:222B

IPv6 Gateway

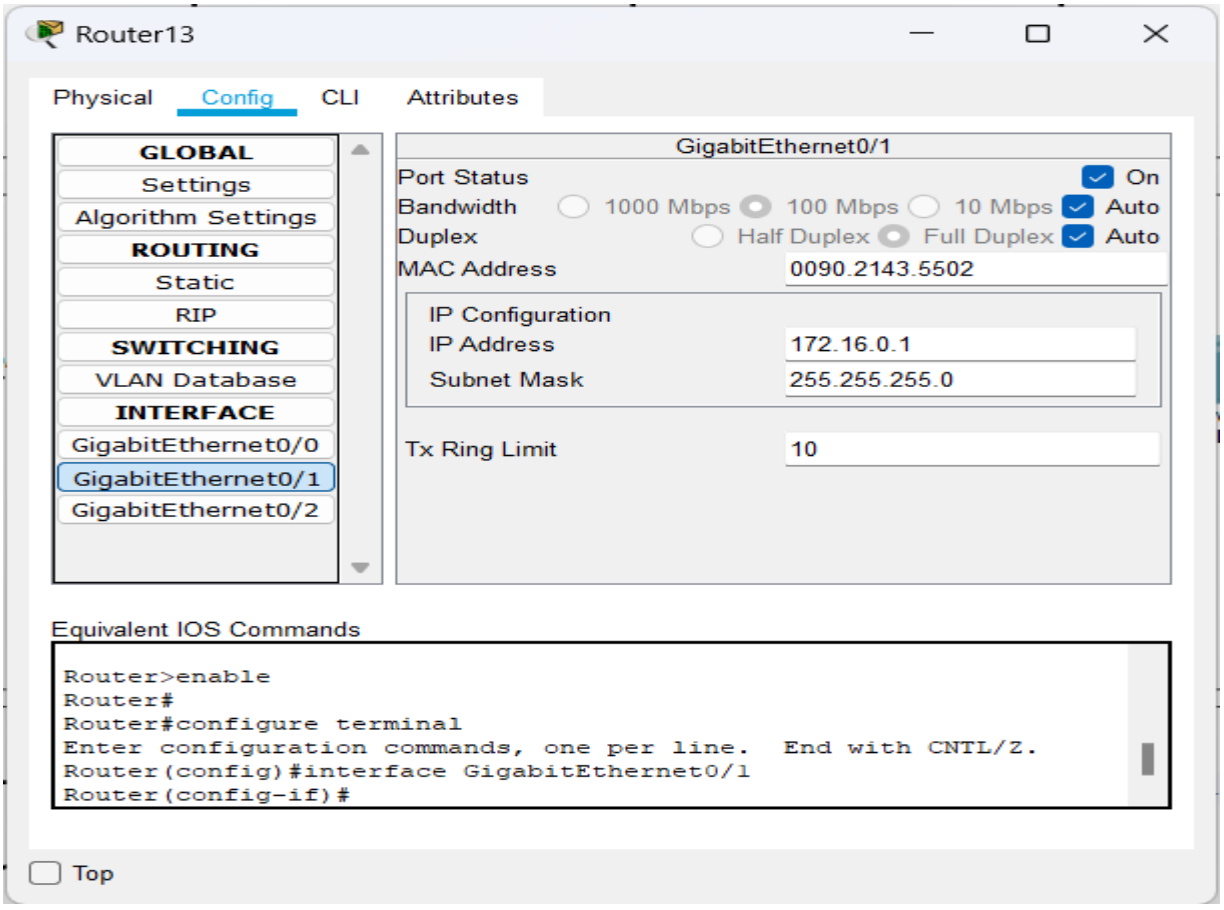
IPv6 DNS Server

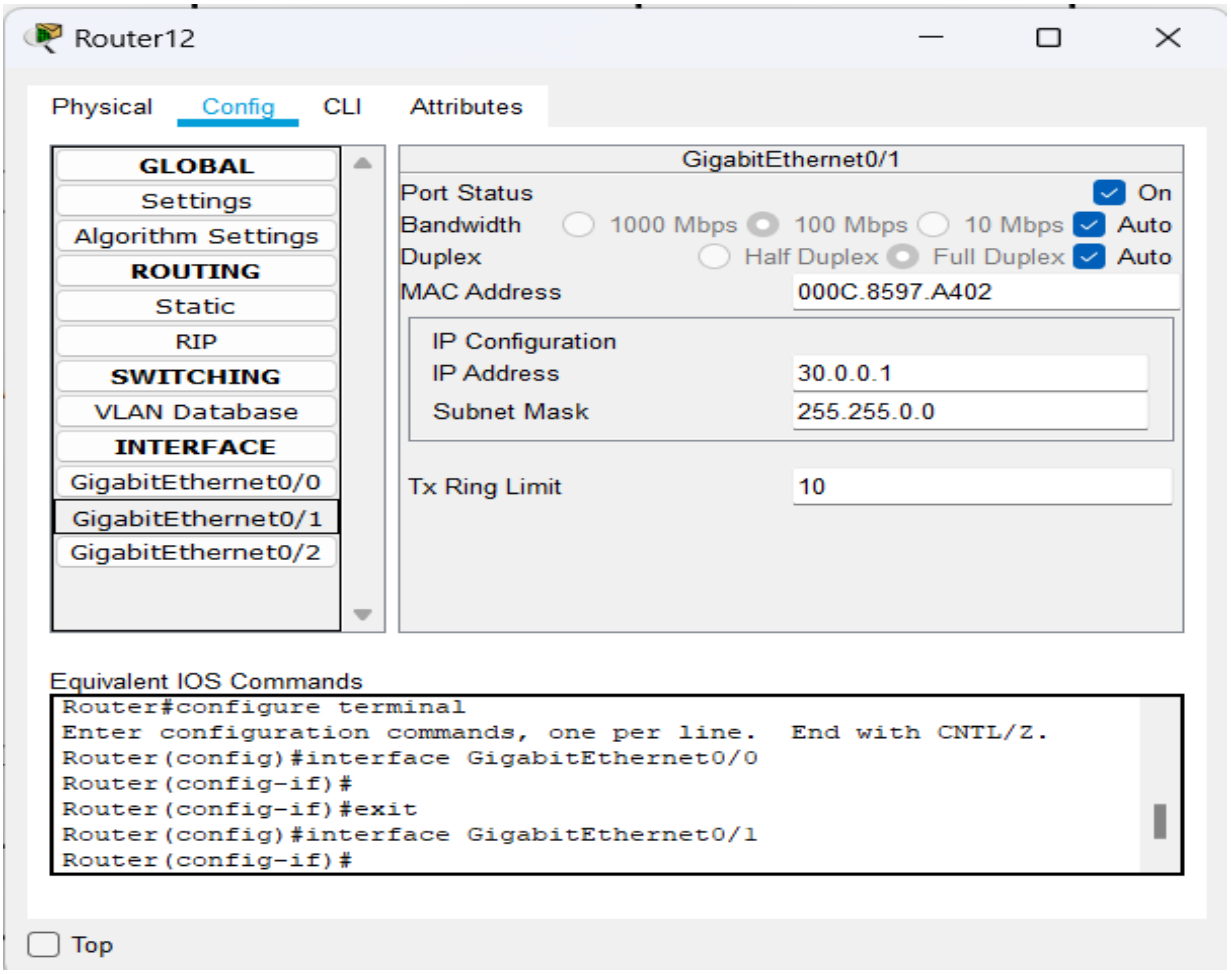
802.1X

Use 802.1X Security

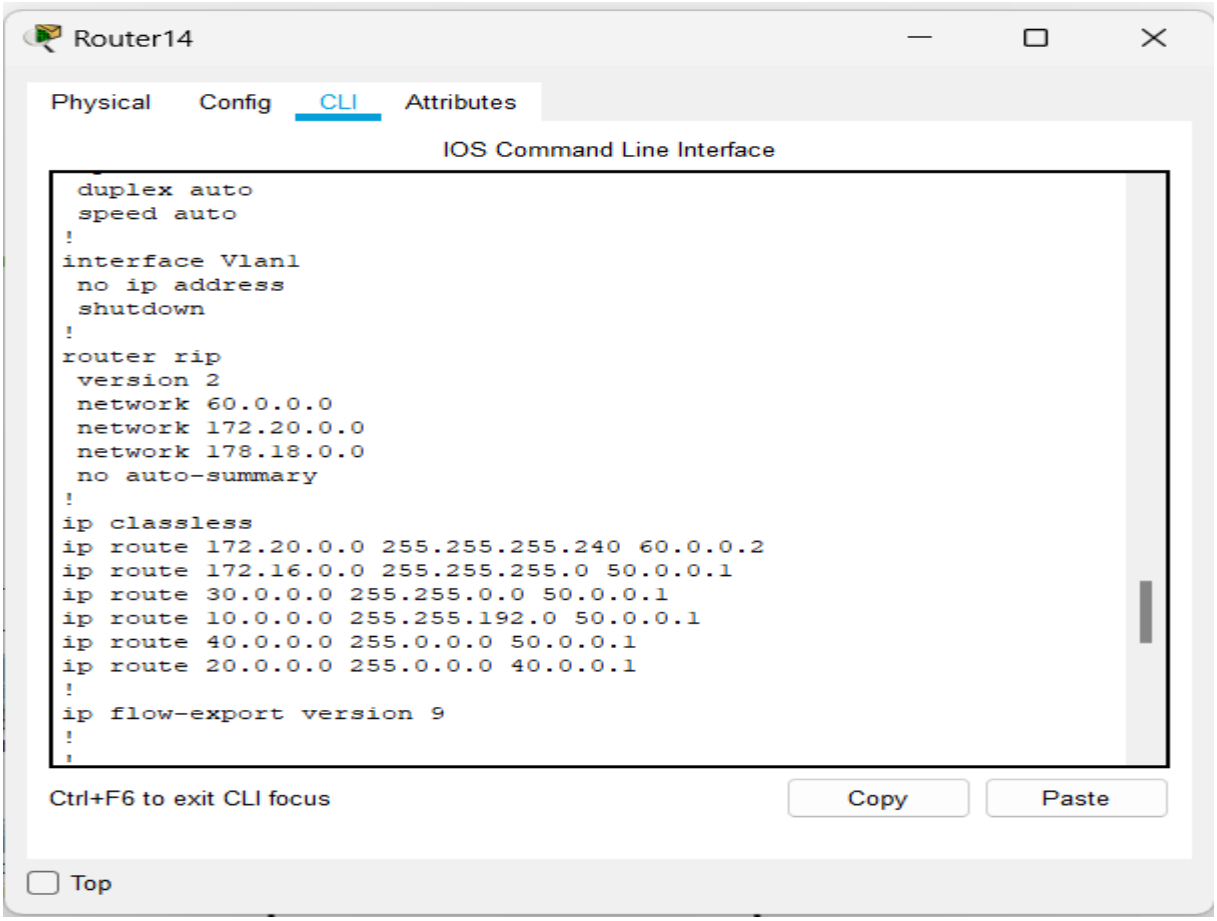
Authentication MD5

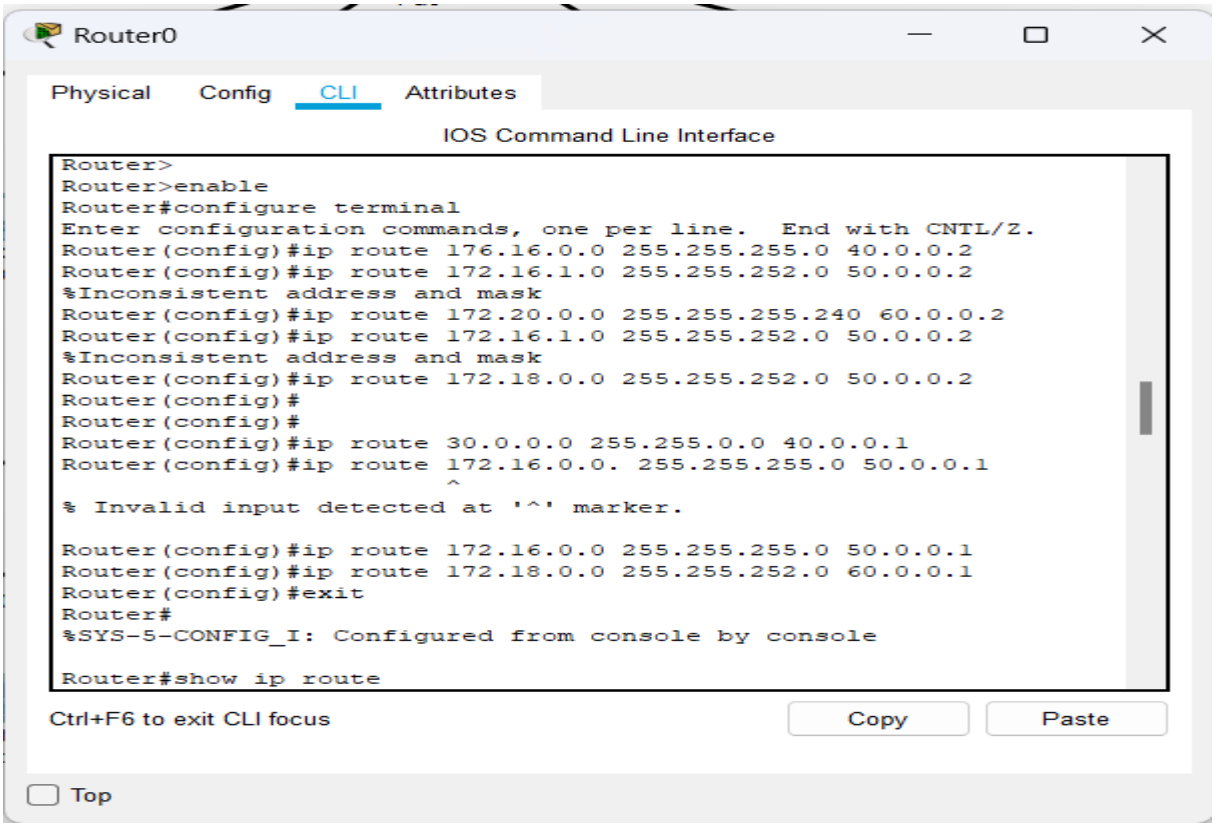
Top


Router13
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0090.2143.5502
IP Configuration
IP Address
172.16.0.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
Equivalent IOS Commands
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Top

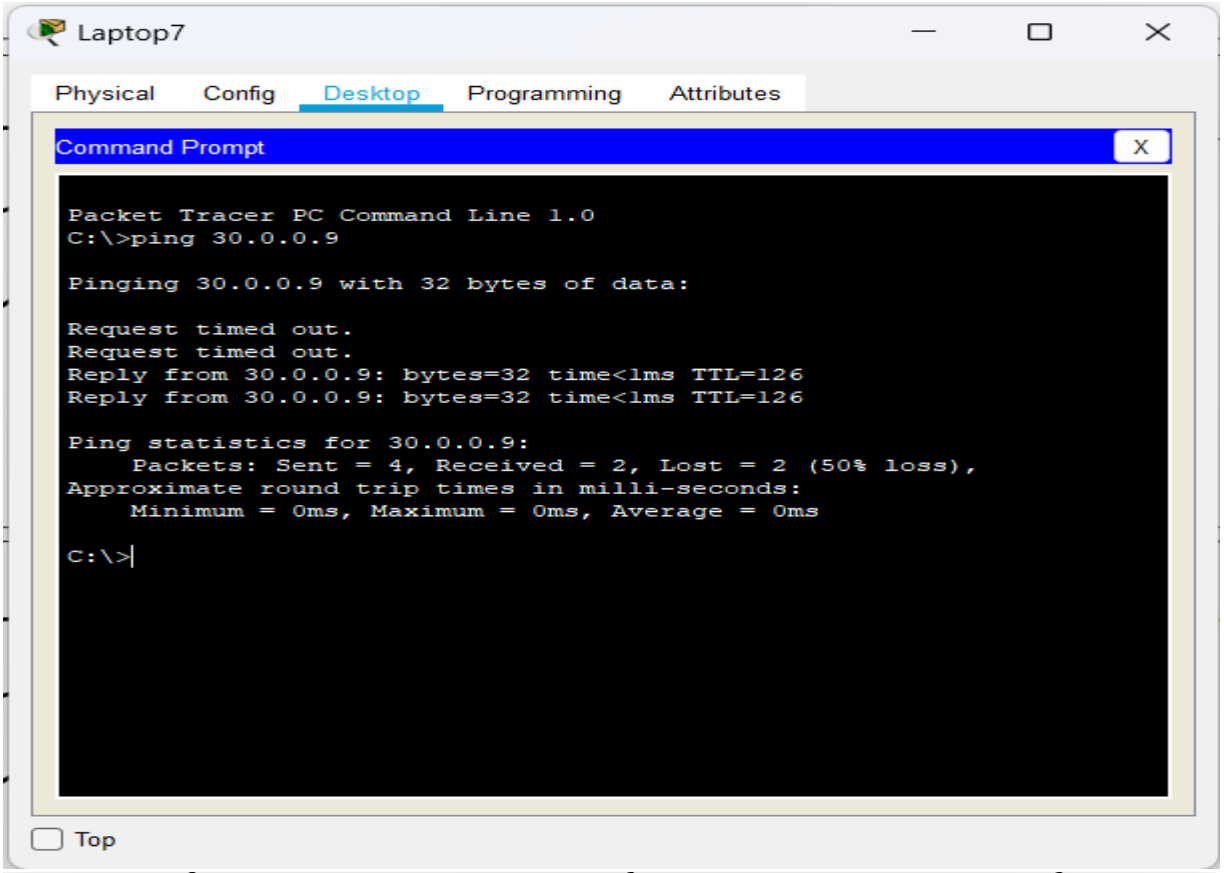

Router12
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000C.8597.A402
IP Configuration
IP Address
30.0.0.1
Subnet Mask
255.255.0.0
Tx Ring Limit
10
Equivalent IOS Commands
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Top

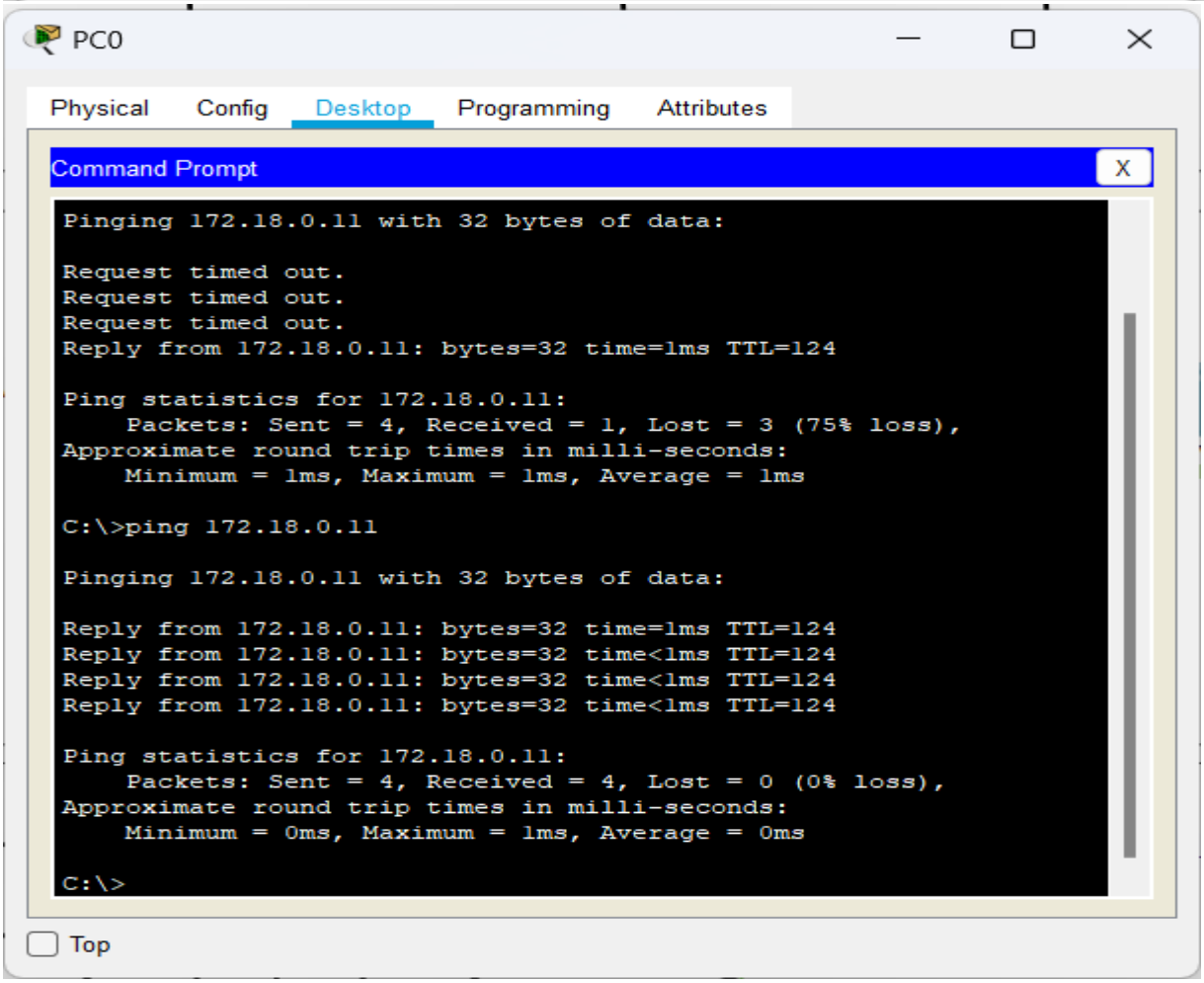
Static Routing:



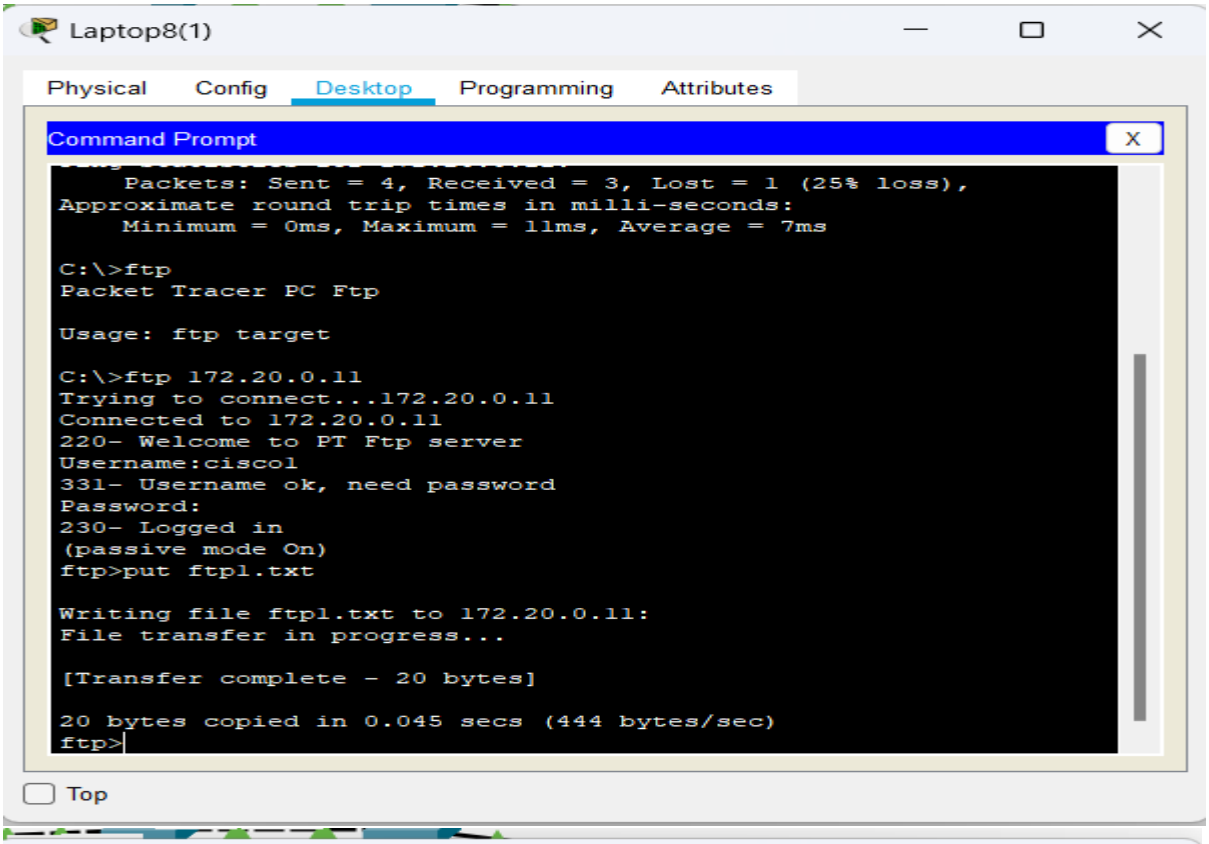


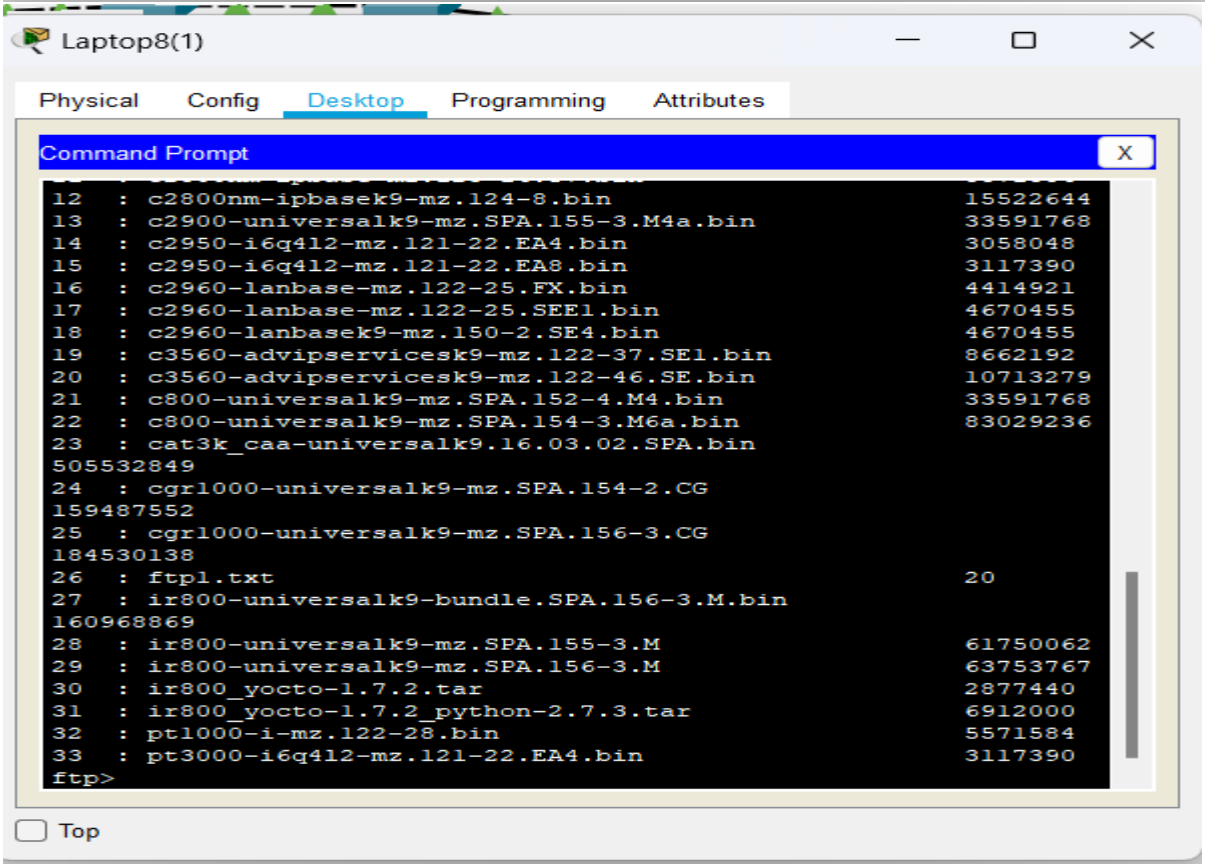
Communication between computers:

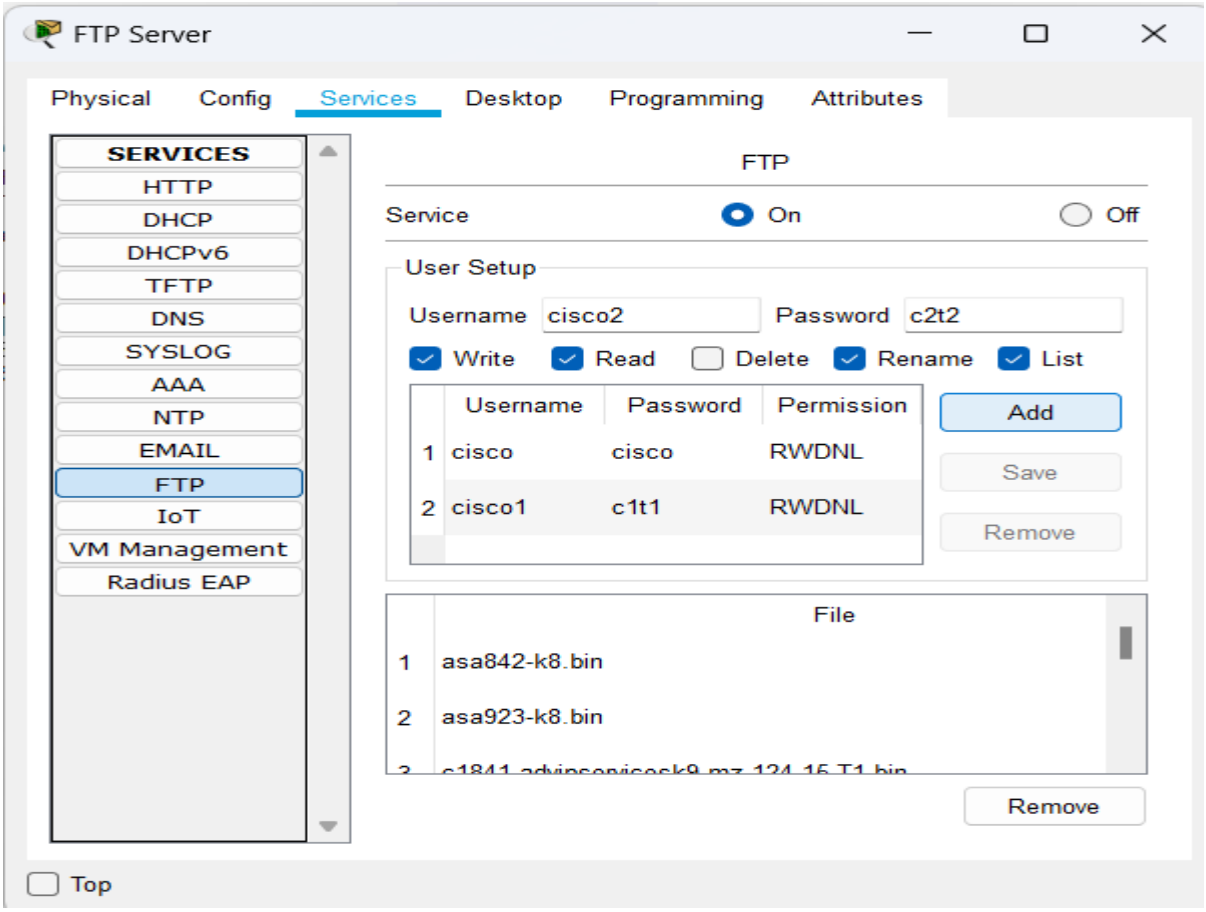




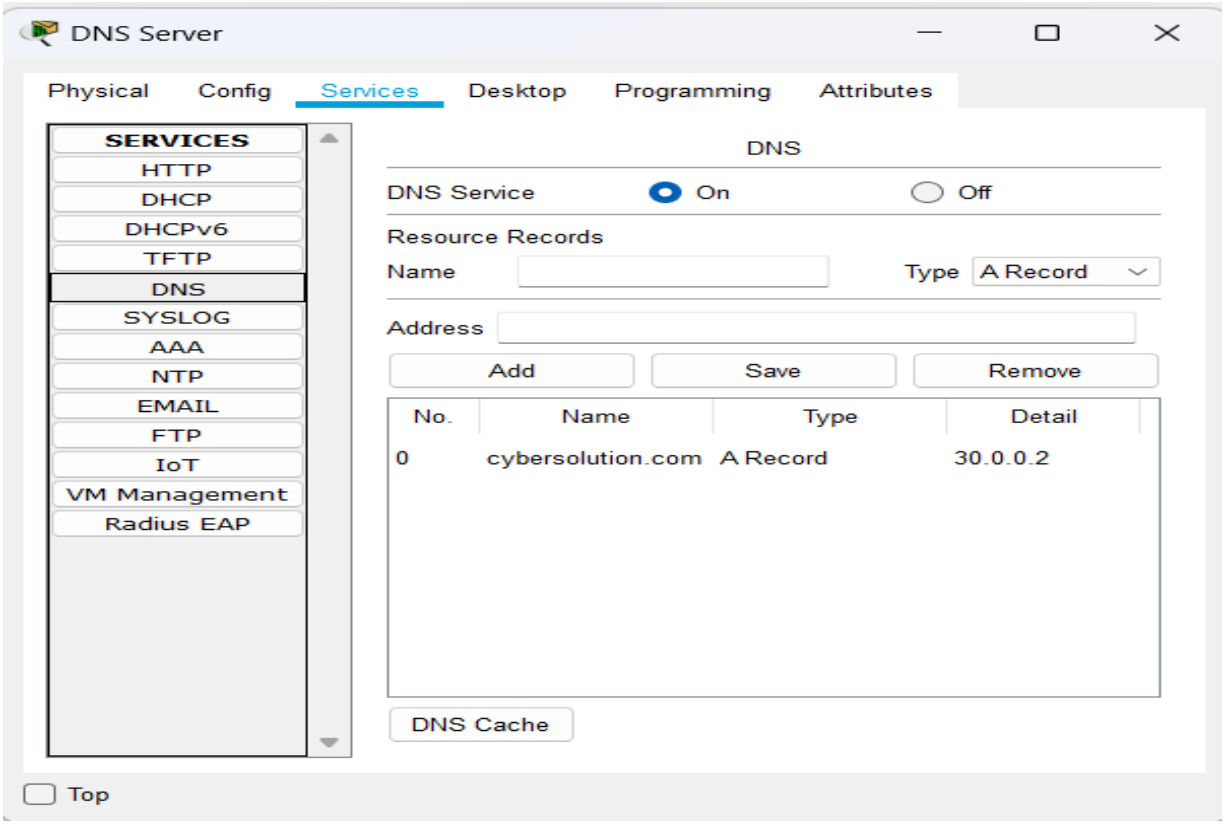
FTP Server:-

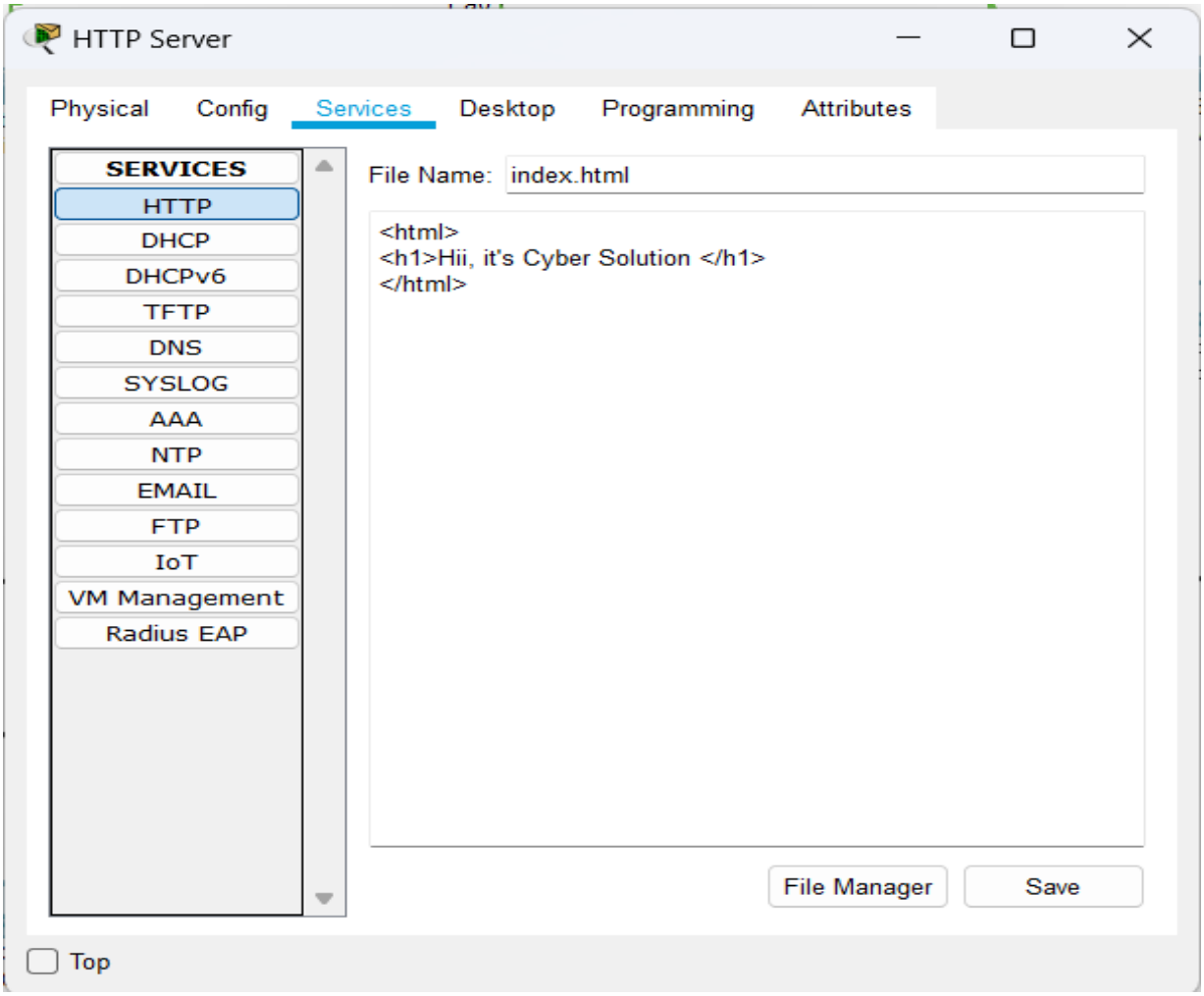

Laptop8(1)
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 7ms
C:\>ftp
Packet Tracer PC Ftp
Usage: ftp target
C:\>ftp 172.20.0.11
Trying to connect...172.20.0.11
Connected to 172.20.0.11
220- Welcome to PT Ftp server
Username:cisco1
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>put ftp1.txt
Writing file ftp1.txt to 172.20.0.11:
File transfer in progress...
[Transfer complete - 20 bytes]
20 bytes copied in 0.045 secs (444 bytes/sec)
ftp>
Top

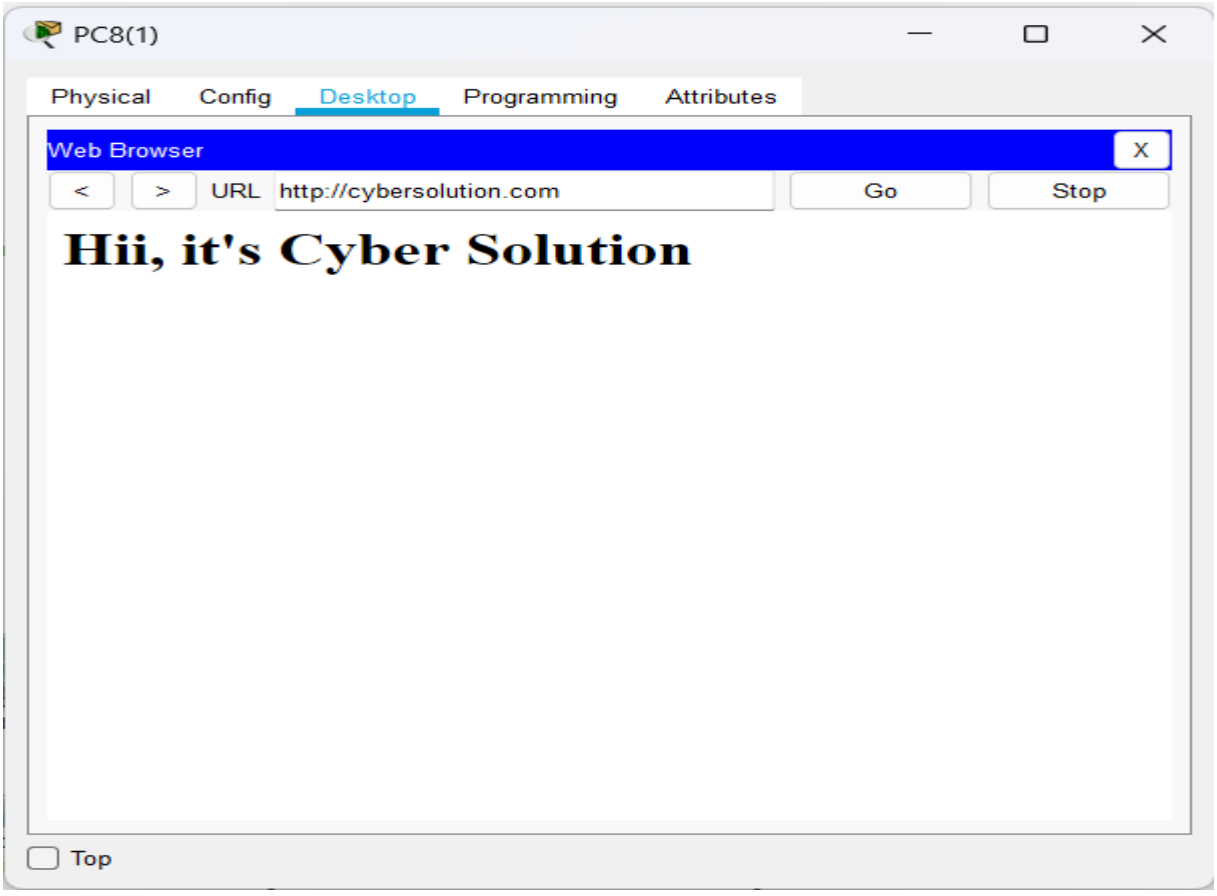

Laptop8(1)
Physical
Config
Desktop
Programming
Attributes
Command Prompt
12 : c2800nm-ipbasek9-mz.124-8.bin 15522644
13 : c2900-universalk9-mz.SPA.155-3.M4a.bin 33591768
14 : c2950-i6q4l2-mz.121-22.EA4.bin 3058048
15 : c2950-i6q4l2-mz.121-22.EA8.bin 3117390
16 : c2960-lanbase-mz.122-25.FX.bin 4414921
17 : c2960-lanbase-mz.122-25.SEE1.bin 4670455
18 : c2960-lanbasek9-mz.150-2.SE4.bin 4670455
19 : c3560-advipservicesk9-mz.122-37.SE1.bin 8662192
20 : c3560-advipservicesk9-mz.122-46.SE.bin 10713279
21 : c800-universalk9-mz.SPA.152-4.M4.bin 33591768
22 : c800-universalk9-mz.SPA.154-3.M6a.bin 83029236
23 : cat3k_caa-universalk9.16.03.02.SPA.bin
505532849
24 : cgr1000-universalk9-mz.SPA.154-2.CG
159487552
25 : cgr1000-universalk9-mz.SPA.156-3.CG
184530138
26 : ftp1.txt 20
27 : ir800-universalk9-bundle.SPA.156-3.M.bin
160968869
28 : ir800-universalk9-mz.SPA.155-3.M 61750062
29 : ir800-universalk9-mz.SPA.156-3.M 63753767
30 : ir800_yocto-1.7.2.tar 2877440
31 : ir800_yocto-1.7.2_python-2.7.3.tar 6912000
32 : pt1000-i-mz.122-28.bin 5571584
33 : pt3000-i6q4l2-mz.121-22.EA4.bin 3117390
ftp>
Top



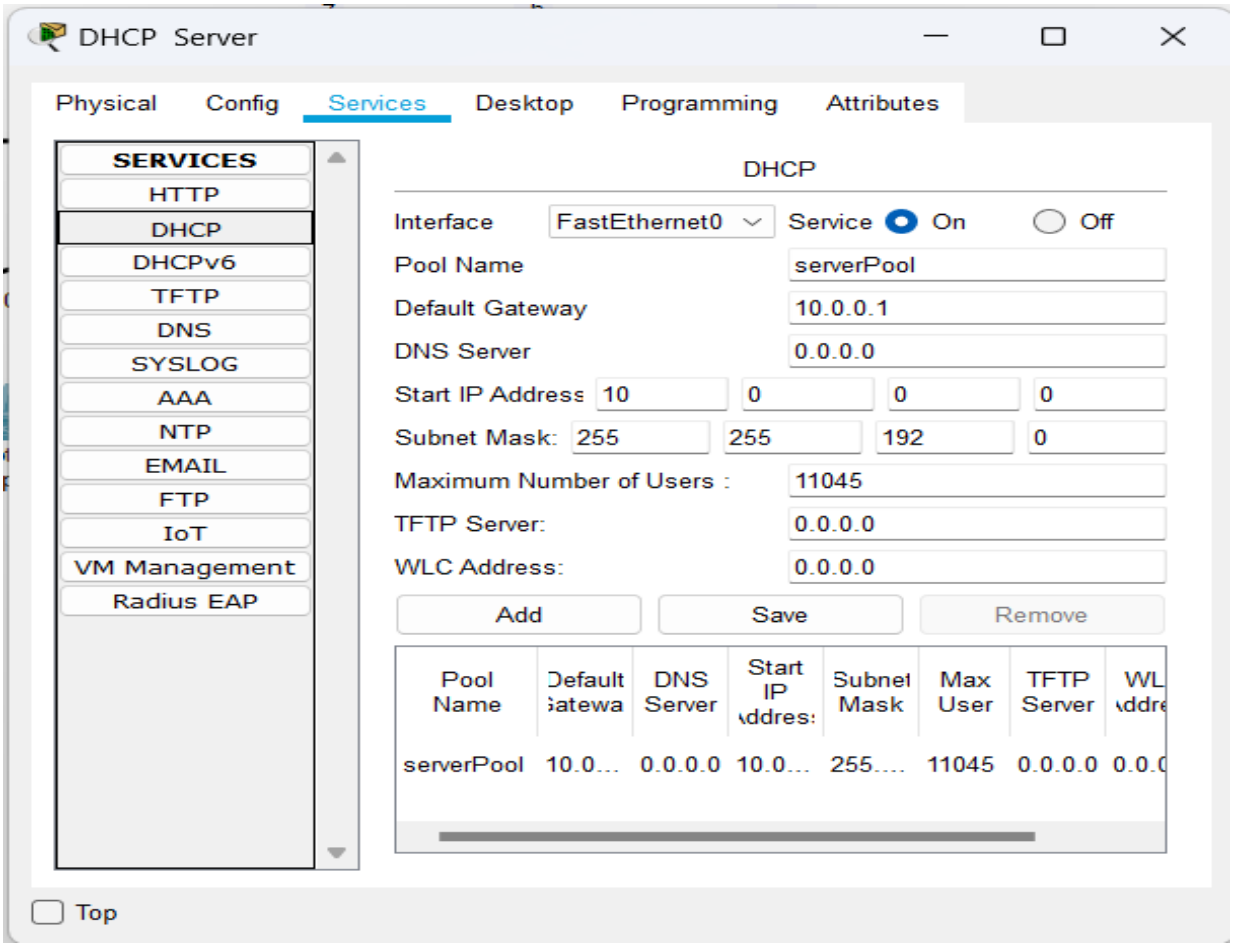
DNS and HTTP Server:-

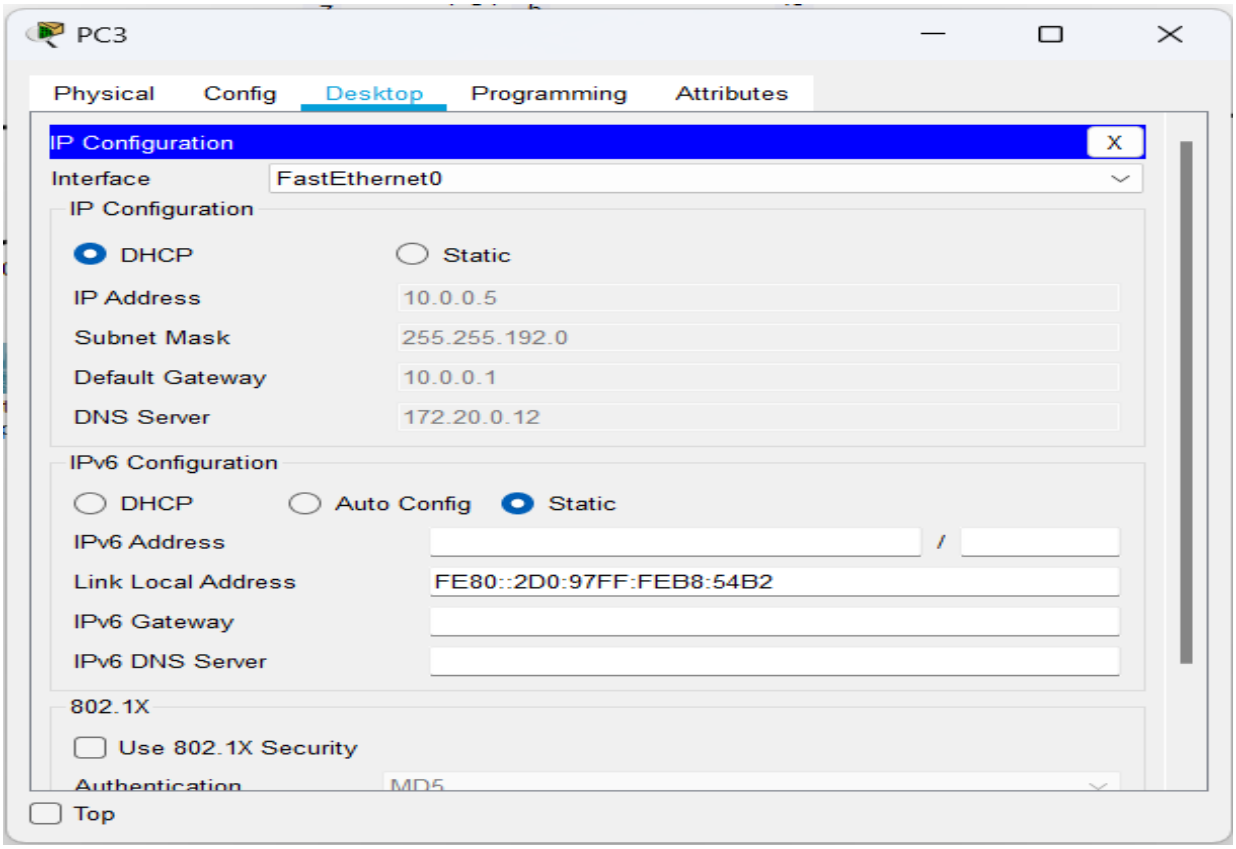



HTTP Server
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
File Name: index.html
<html>
<h1>Hii, it's Cyber Solution </h1>
</html>
File Manager
Save
Top

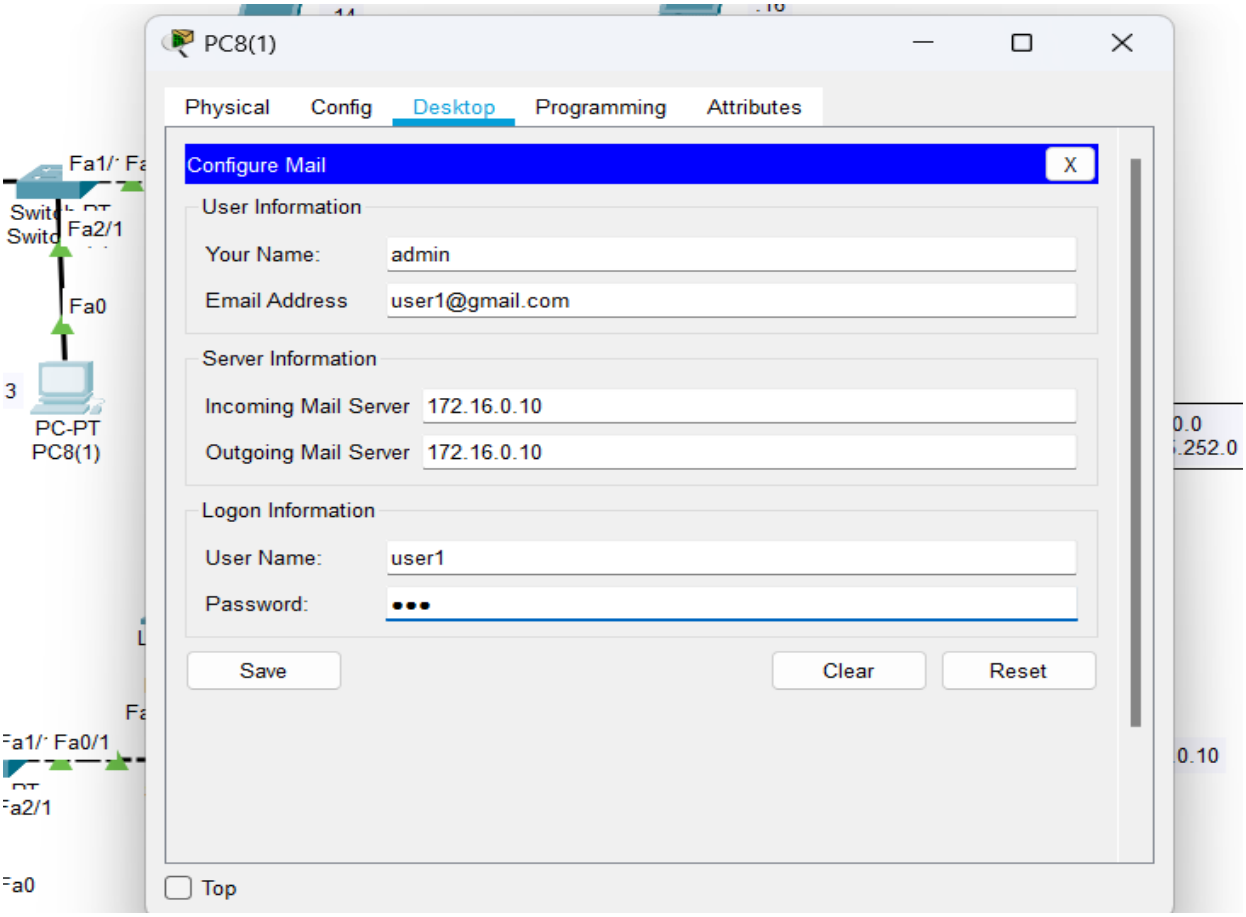

PC8(1)
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://cybersolution.com
Go
Stop
Hii, it's Cyber Solution
Top

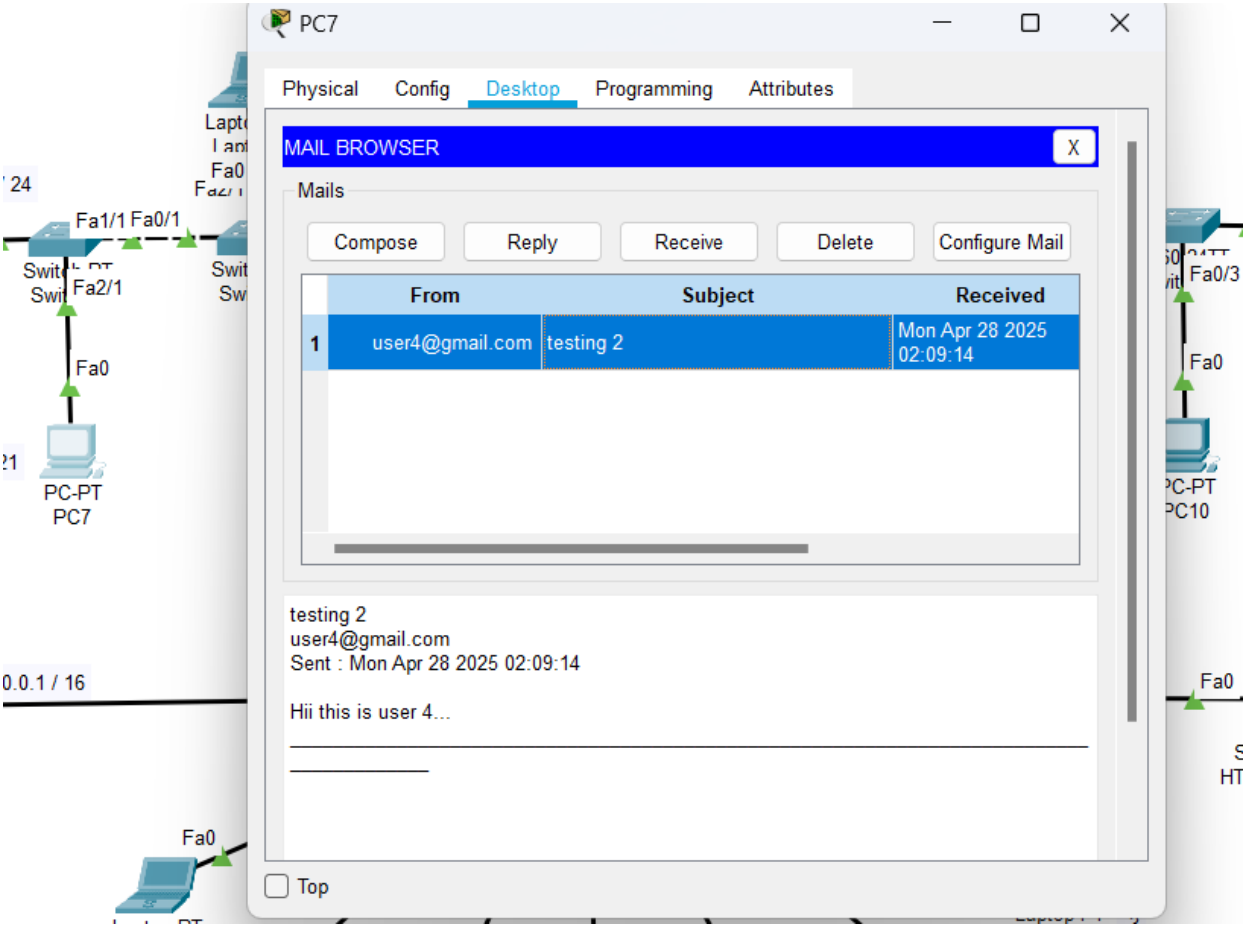
DHCP Server:-

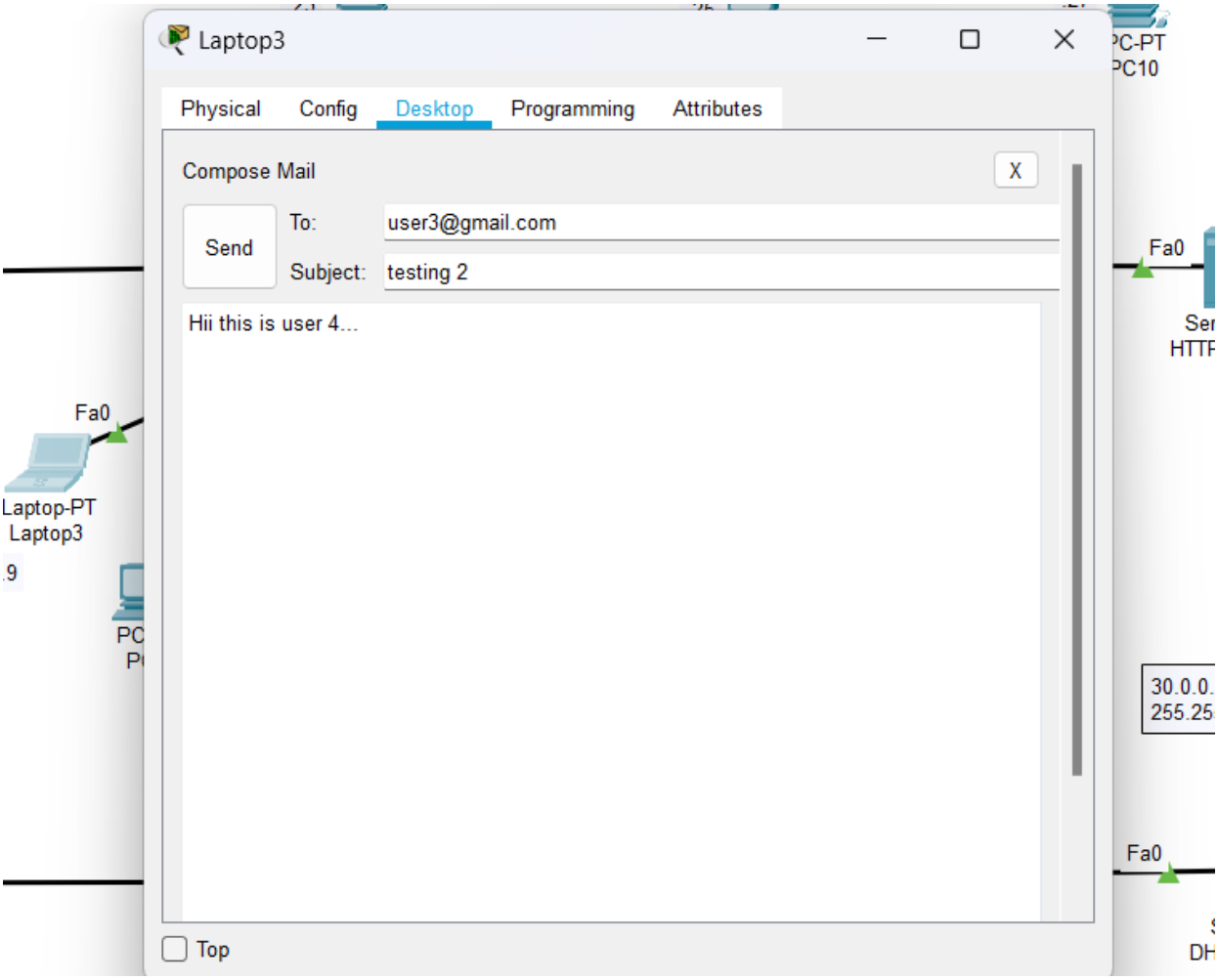

DHCP Server
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DHCP
Interface
FastEthernet0
Service
On
Off
Pool Name
serverPool
Default Gateway
10.0.0.1
DNS Server
0.0.0.0
Start IP Address
10
0
0
0
Subnet Mask:
255
255
192
0
Maximum Number of Users :
11045
TFTP Server:
0.0.0.0
WLC Address:
0.0.0.0
Add
Save
Remove
Pool Name
Default Gatewa
DNS Server
Start IP Addres
Subnet Mask
Max User
TFTP Server
WL Addre
serverPool
10.0...
0.0.0.0
10.0...
255....
11045
0.0.0.0
0.0.0
Top


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IP Address
10.0.0.5
Subnet Mask
255.255.192.0
Default Gateway
10.0.0.1
DNS Server
172.20.0.12
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::2D0:97FF:FEB8:54B2
IPv6 Gateway
IPv6 DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Top

Email Server:-







GITHUB UPLOAD

https://github.com/SubhamMahanty05/internetworking-ca2