Green University of Bangladesh
Department of Computer Science and Engineering (CSE)
Faculty of Sciences and Engineering
Semester: (Fall, Year:2022), B.Sc. in CSE (Day)

Course Title: Data communication Lab
Course Code: CSE 308 Section:203D1

Lab Project Name: University Networking Design Using Cisco Packet Tracer

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[For Teachers use only: Don't Write Anything inside this box]

Lab Project Status

Marks: …… **Signature: .....**

Comments: ..... **Date: .....**

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Chapter 1

Introduction

1.1 Introduction

Computer networks have a significant impact on the working of an organization. Universities depend on the proper functioning and analysis of their networks for education, administration, communication, e-library, automation, etc. An efficient network is essential to facilitate the systematic and cost-efficient transfer of information in an organization in the form of messages, files, and resources. The project provides insights into various concepts such as topology design, IP address configuration, and how to send information in the form of packets to the wireless networks of different areas of a university.

1.2 Design Goals/Objective

The aim of this project is to design the topology of the university network using the software Cisco Packet Tracer with the implementation of wireless networking systems. This university network consists of the following devices:

1) Router (1941)
2) Switches (2960-24TT)
3) Email server
4) DNS server
5) WEB server (HTTP)
6) Wireless Device (Access Point)
7) PCs
8) Laptops
9) Smartphones

Chapter 2

Implementation of the Project

2.1 Implementation & Flow Diagram :

● To design the wireless network of the university we initially started by placing the core devices into the frame.

● Firstly, we placed the main router at the center of the university outline, which was further connected to the server switch using the gigabit Ethernet port with copper straight-through cable and sub routers (**City** campus router and **Permanent** router) using the serial port with serial DC E cable at the Lab,class room ,faculty area respectively.

● The server switch was further connected to the EMAIL, DNS, and WEB servers respectively.

● Campus router was connected to the campus switch which was further connected with wireless access points of the academic dome building and library.

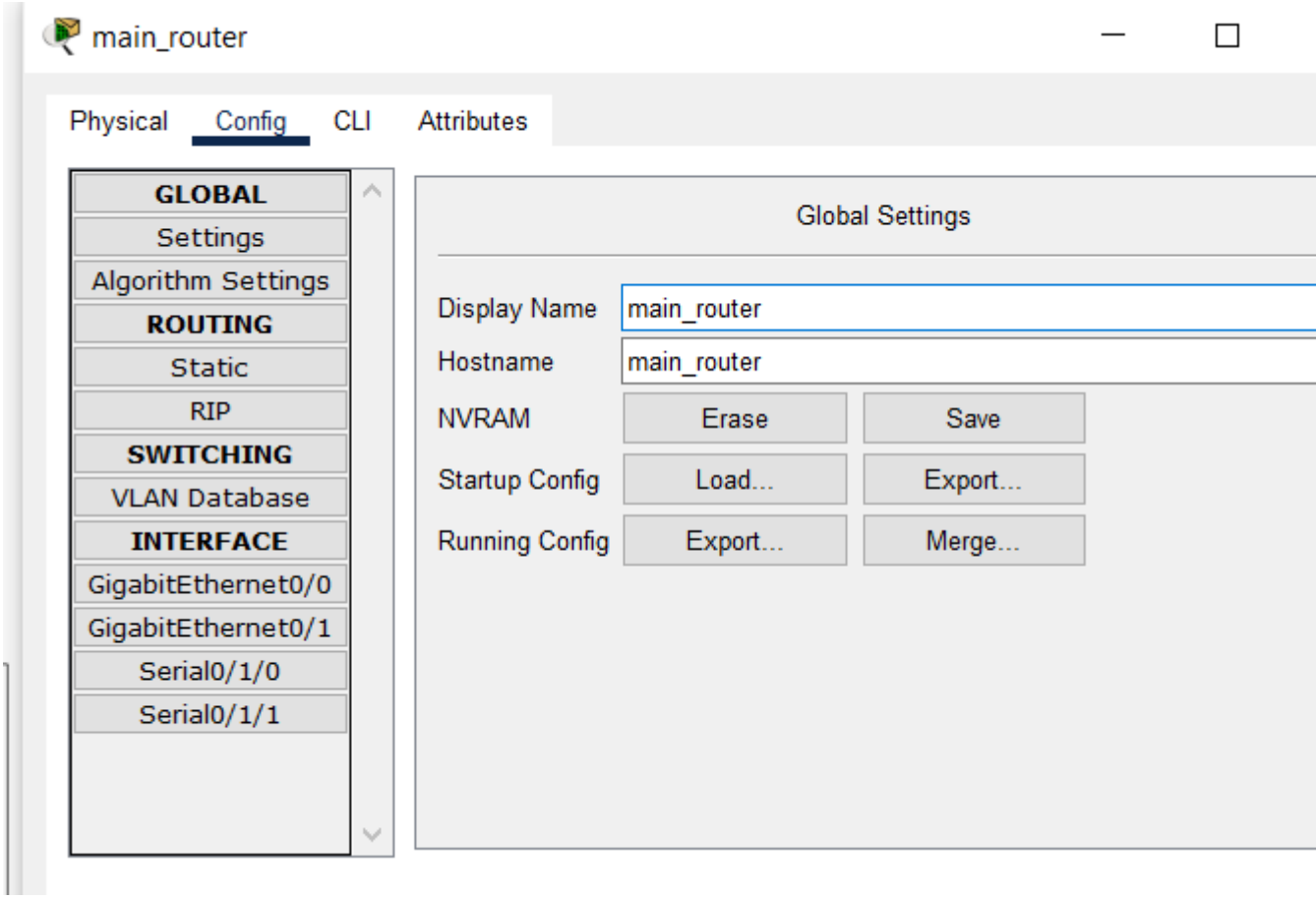
● The wireless access points were then connected to computing devices (PCs, laptops, and smart phones).
● Similarly, the hostel router was connected to the hostel switch which was further connected with the wireless access point of Lab,class room ,faculty block.
● The wireless access points were the n connected to the computing devices (PCs, laptops, and S mart phones), every area has a dedicated access point which can only be connected with the help of a password.
● All these connections are made through Ethernet ports (gigabit Ethernet and fast Ethernet) using copper straight-through cables.

Chapter 3

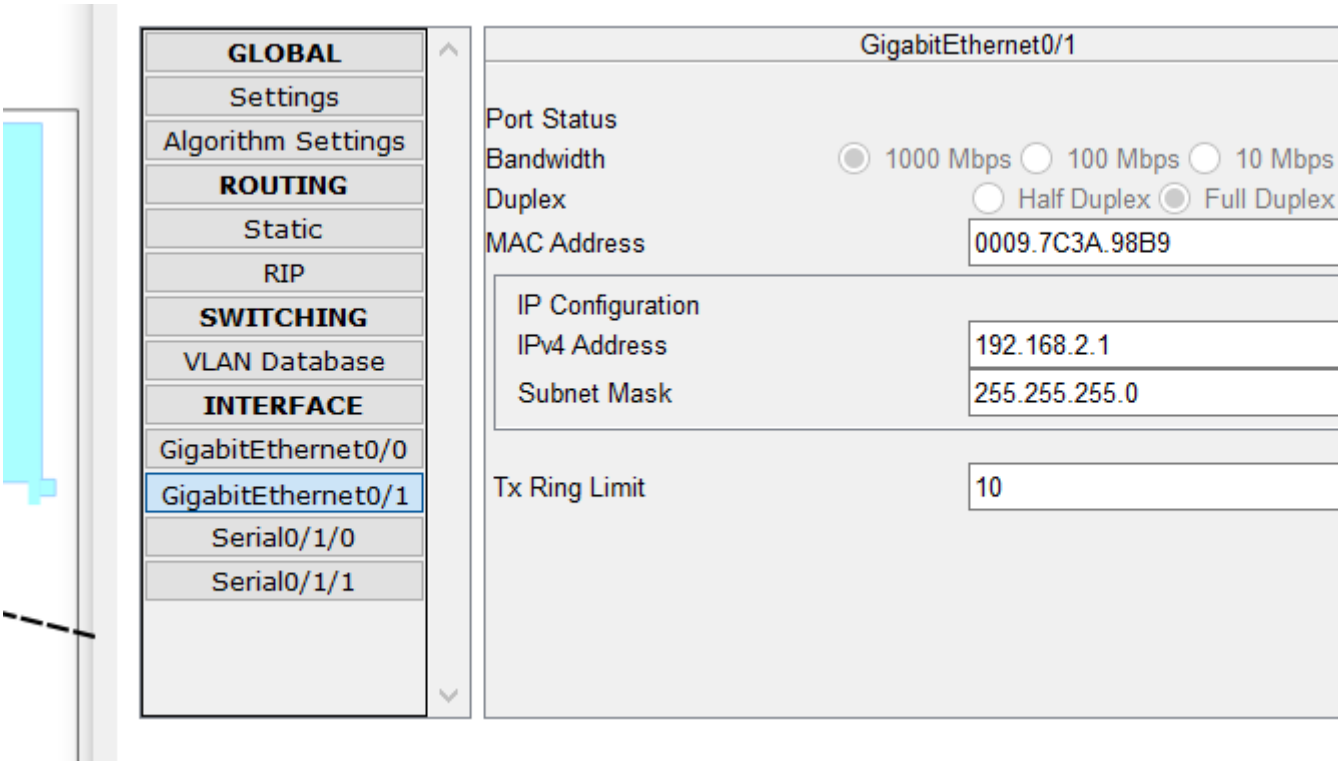
Performance Evaluation

3.1 Configuring IP Addresses

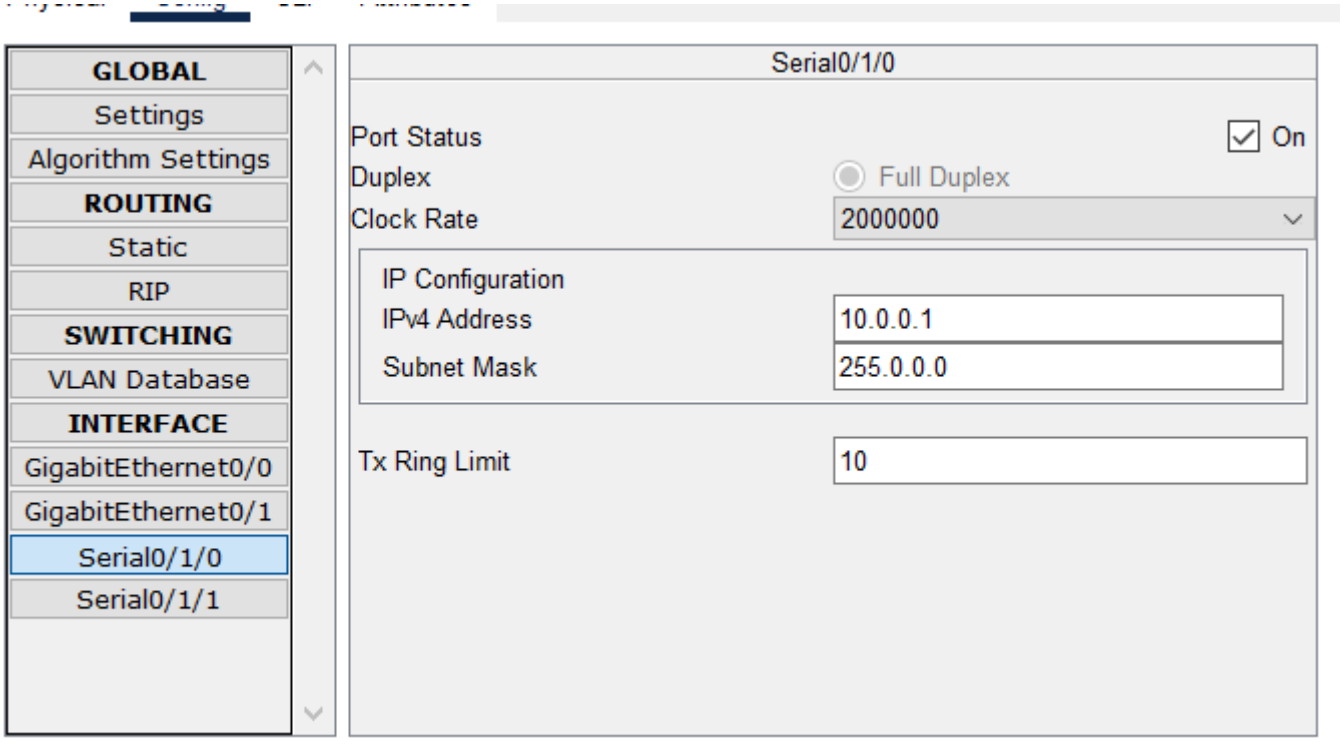
Main Router configuration



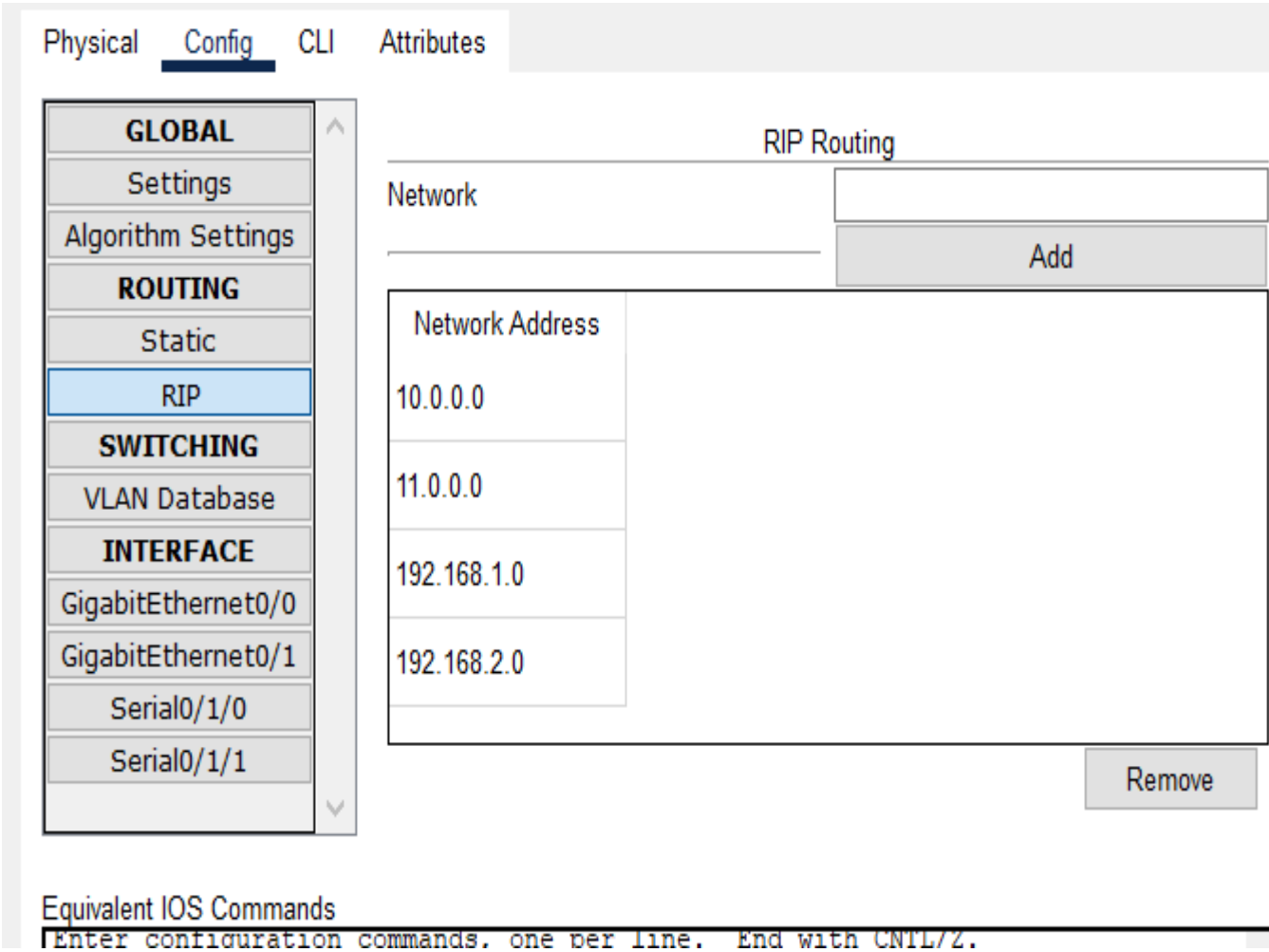
GigabitEthernet0/1


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/1/0
Serial0/1/1
GigabitEthernet0/1
Port Status
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Duplex
Half Duplex
Full Duplex
MAC Address
0009.7C3A.98B9
IP Configuration
IPv4 Address
192.168.2.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10

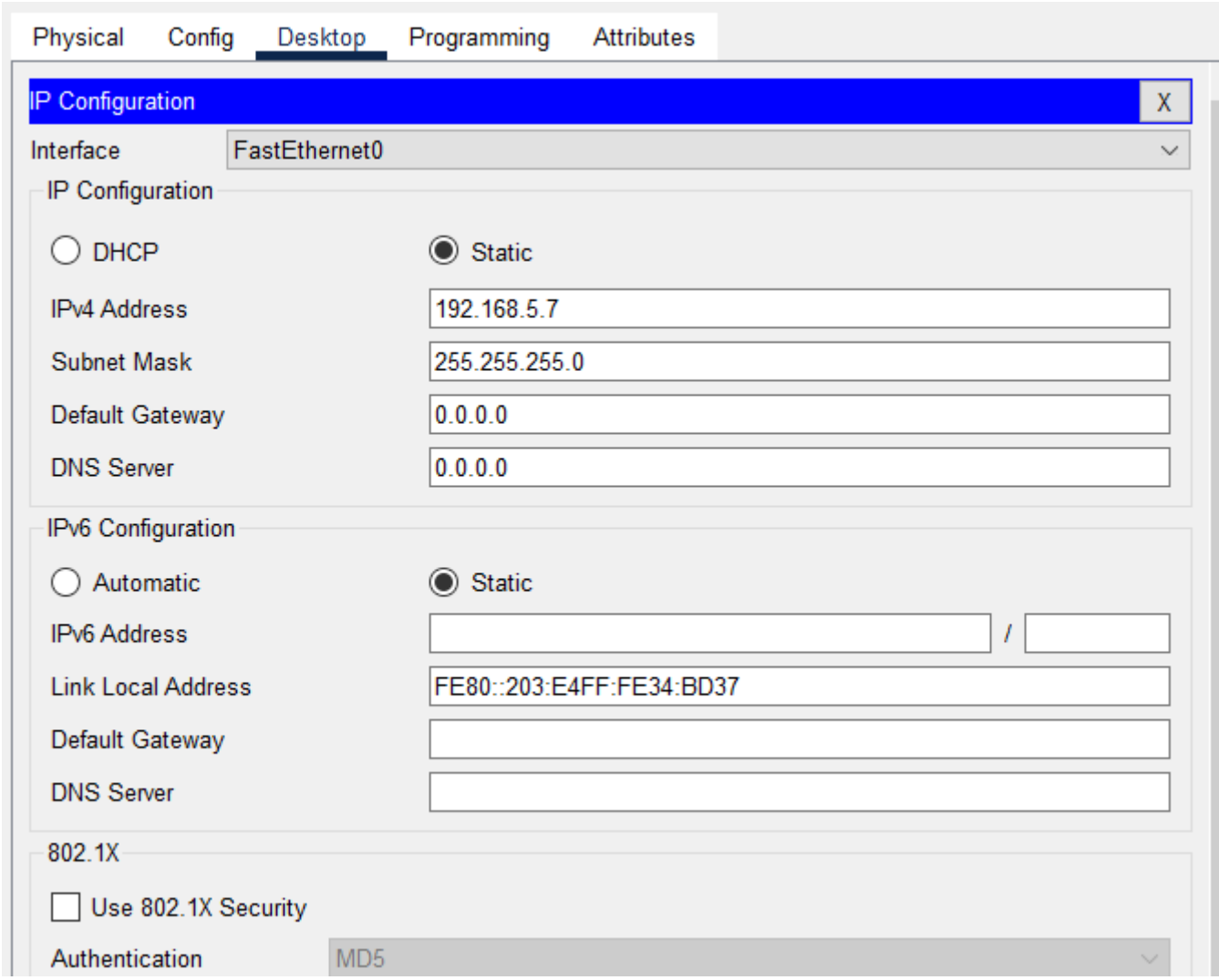
Serial0/1/0


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
10.0.0.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10

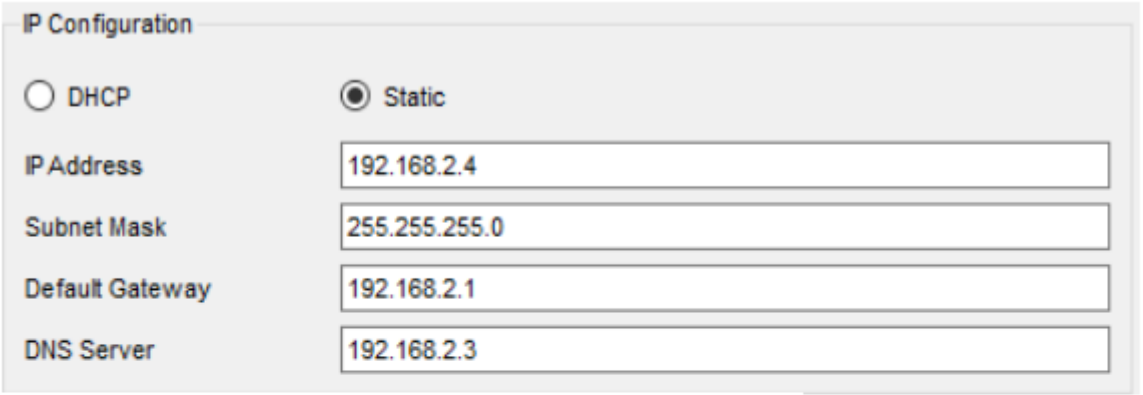
RIP

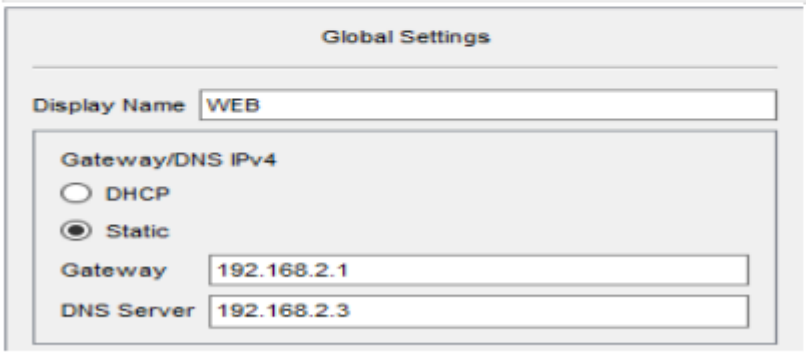

Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/1/0
Serial0/1/1
RIP Routing
Network
Add
Network Address
10.0.0.0
11.0.0.0
192.168.1.0
192.168.2.0
Remove
Equivalent IOS Commands
Enter configuration commands, one per line. End with CNTL/Z.

DNS SERVER

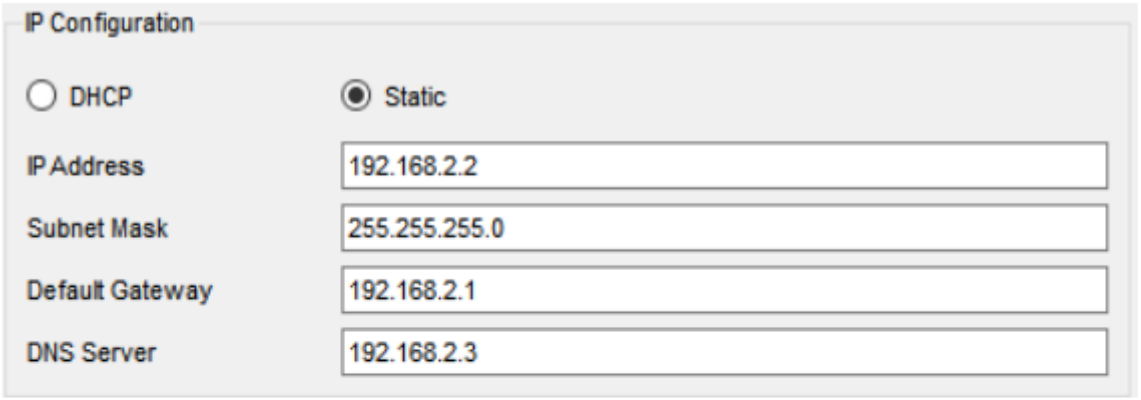

Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.5.7
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::203:E4FF:FE34:BD37
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5

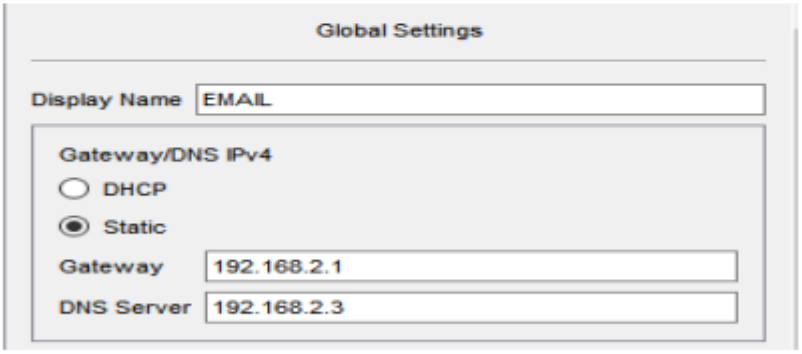
WEB SERVER

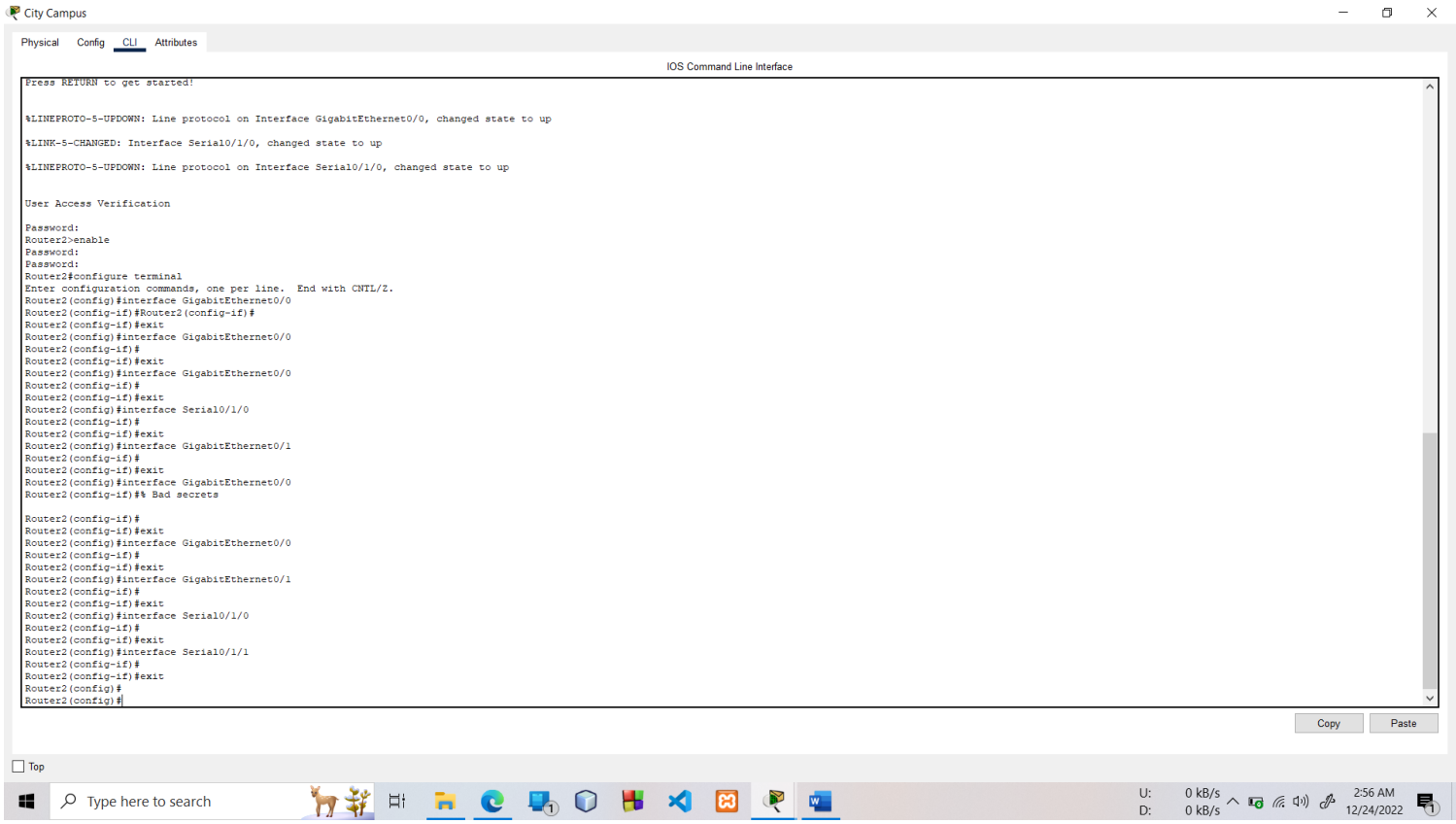

IP Configuration
DHCP
Static
IP Address
192.168.2.4
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.1
DNS Server
192.168.2.3

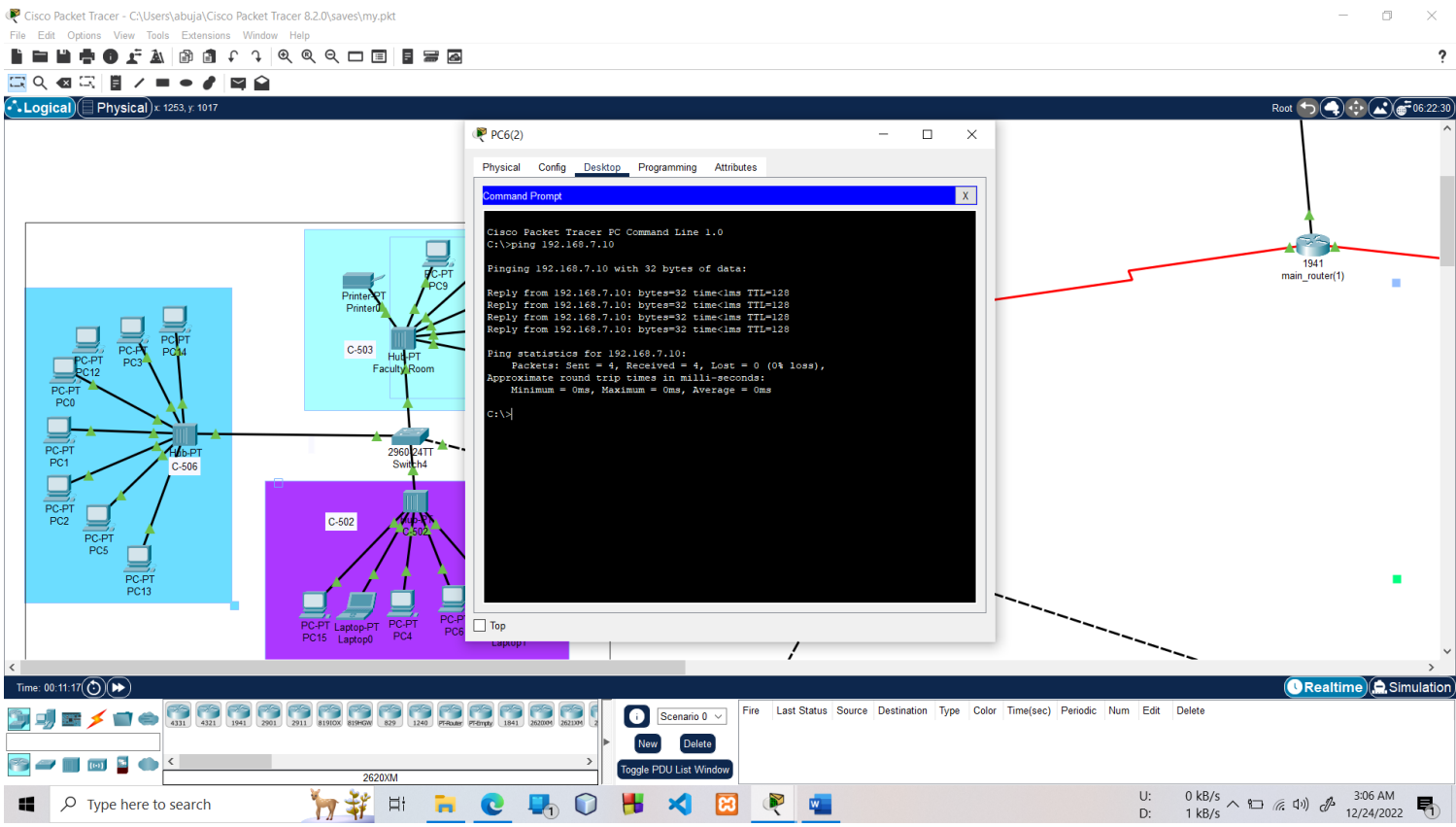

Global Settings
Display Name
WEB
Gateway/DNS IPv4
DHCP
Static
Gateway
192.168.2.1
DNS Server
192.168.2.3

EMAIL SERVER





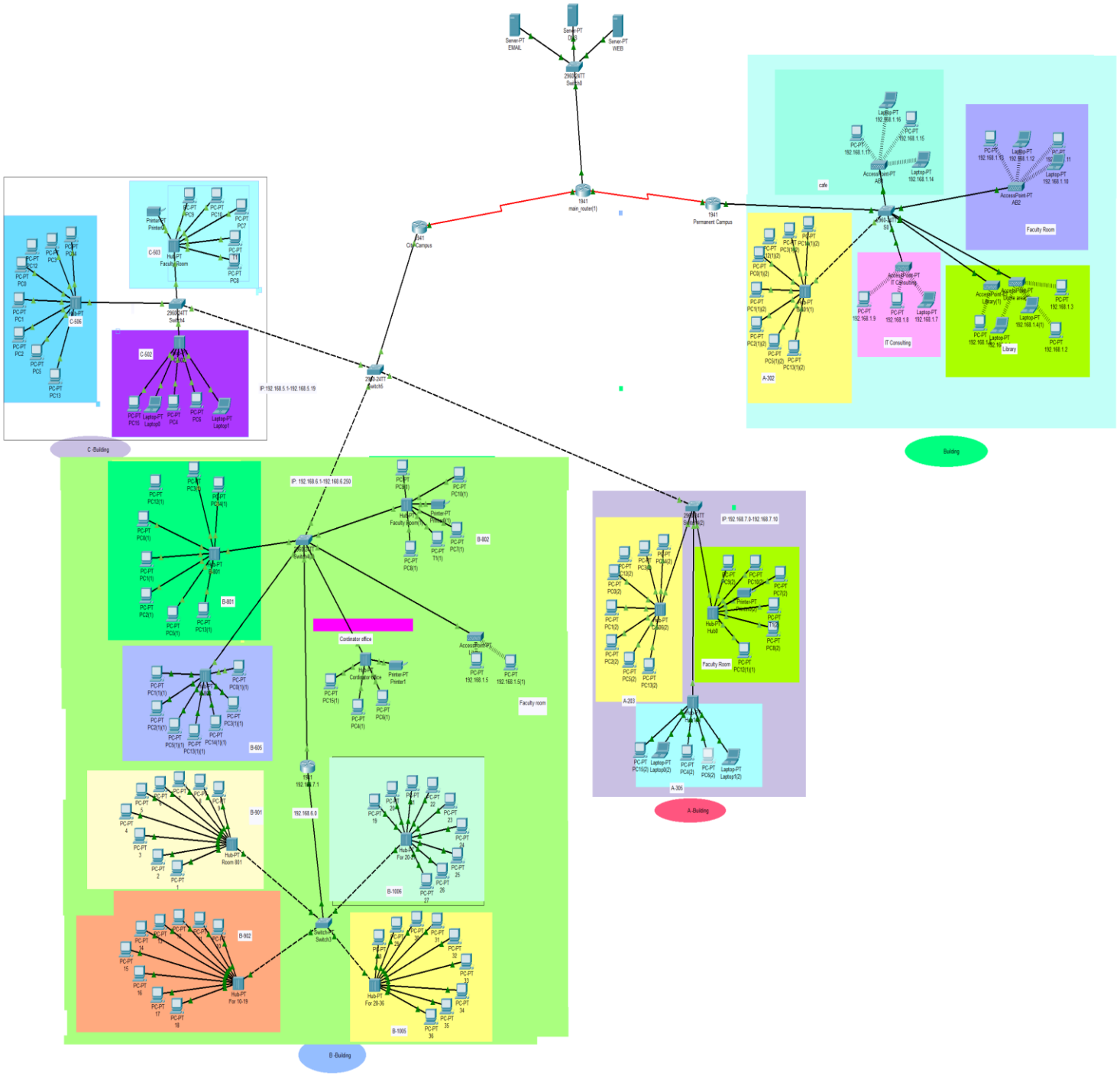

City Campus
Physical
Config
CLI
Attributes
IOS Command Line Interface
Press RETURN to get started!
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
User Access Verification
Password:
Router2>enable
Password:
Password:
Router2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router2(config)#interface GigabitEthernet0/0
Router2(config-if)#Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/0
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/0
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface Serial0/1/0
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/1
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/0
Router2(config-if)#% Bad secrets
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/0
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface GigabitEthernet0/1
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface Serial0/1/0
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#interface Serial0/1/1
Router2(config-if)#
Router2(config-if)#exit
Router2(config)#
Router2(config)#
Copy
Paste
Top
Type here to search
U: 0 kB/s
D: 0 kB/s
2:56 AM
12/24/2022


Cisco Packet Tracer - C:\Users\abuja\Cisco Packet Tracer 8.2.0\saves\my.pkt
File Edit Options View Tools Extensions Window Help
Logical
Physical
Root
06:22:30
PC6(2)
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.7.10
Pinging 192.168.7.10 with 32 bytes of data:
Reply from 192.168.7.10: bytes=32 time<1ms TTL=128
Reply from 192.168.7.10: bytes=32 time<1ms TTL=128
Reply from 192.168.7.10: bytes=32 time<1ms TTL=128
Reply from 192.168.7.10: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.7.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Top
1941
main_router(1)
C-503
Hub-PT
Faculty Room
Printer0
PC9
C-506
C-502
PC0
PC1
PC2
PC3
PC4
PC5
PC12
PC13
PC15
Laptop0
Time: 00:11:17
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
2620XM
Type here to search
U: 0 kB/s
D: 1 kB/s
3:06 AM
12/24/2022

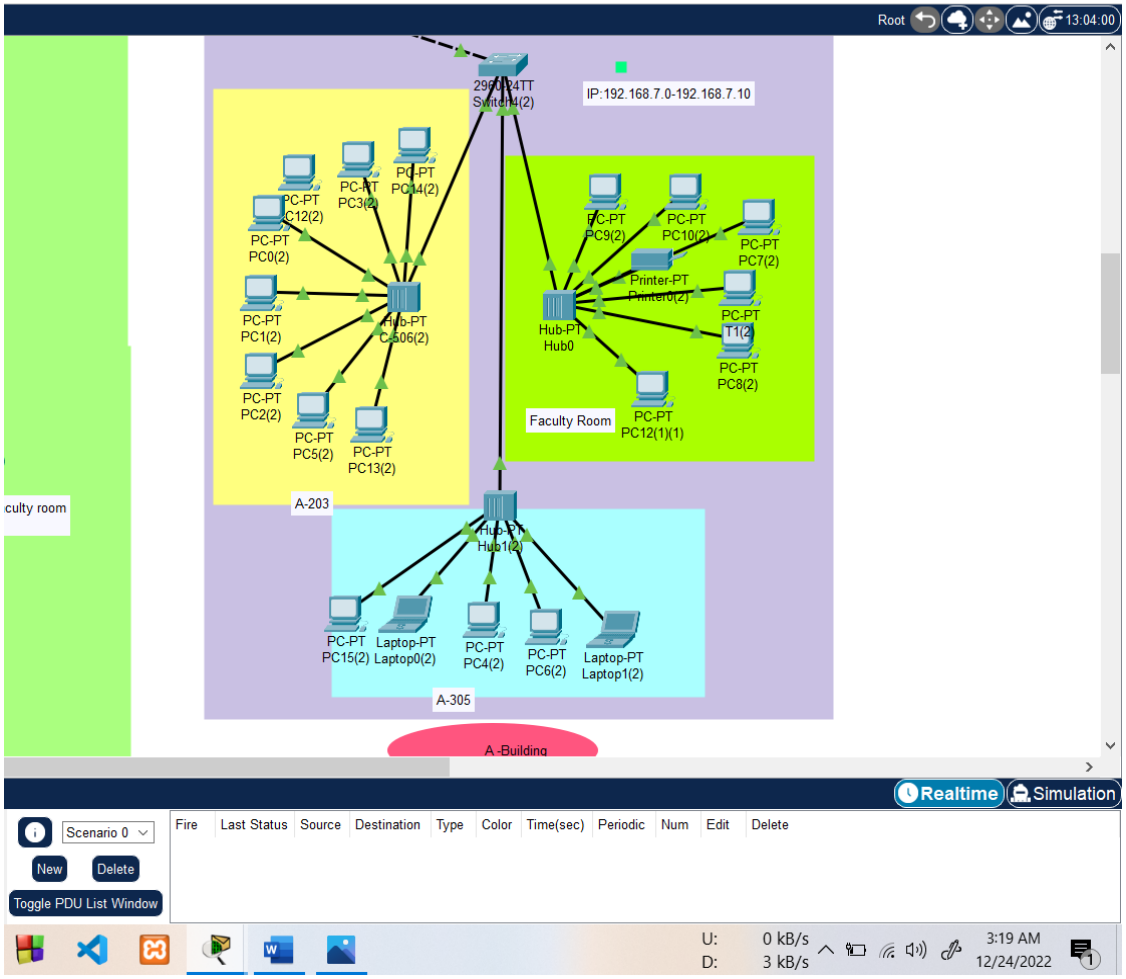
3.2 Results and Discussions

Finally, I have combined all the steps as mentioned in chapter 3(3.2) and implemented the desired wireless network for university. We have the complete network providing various facilities to the teaching staff, non-teaching staff, and students.

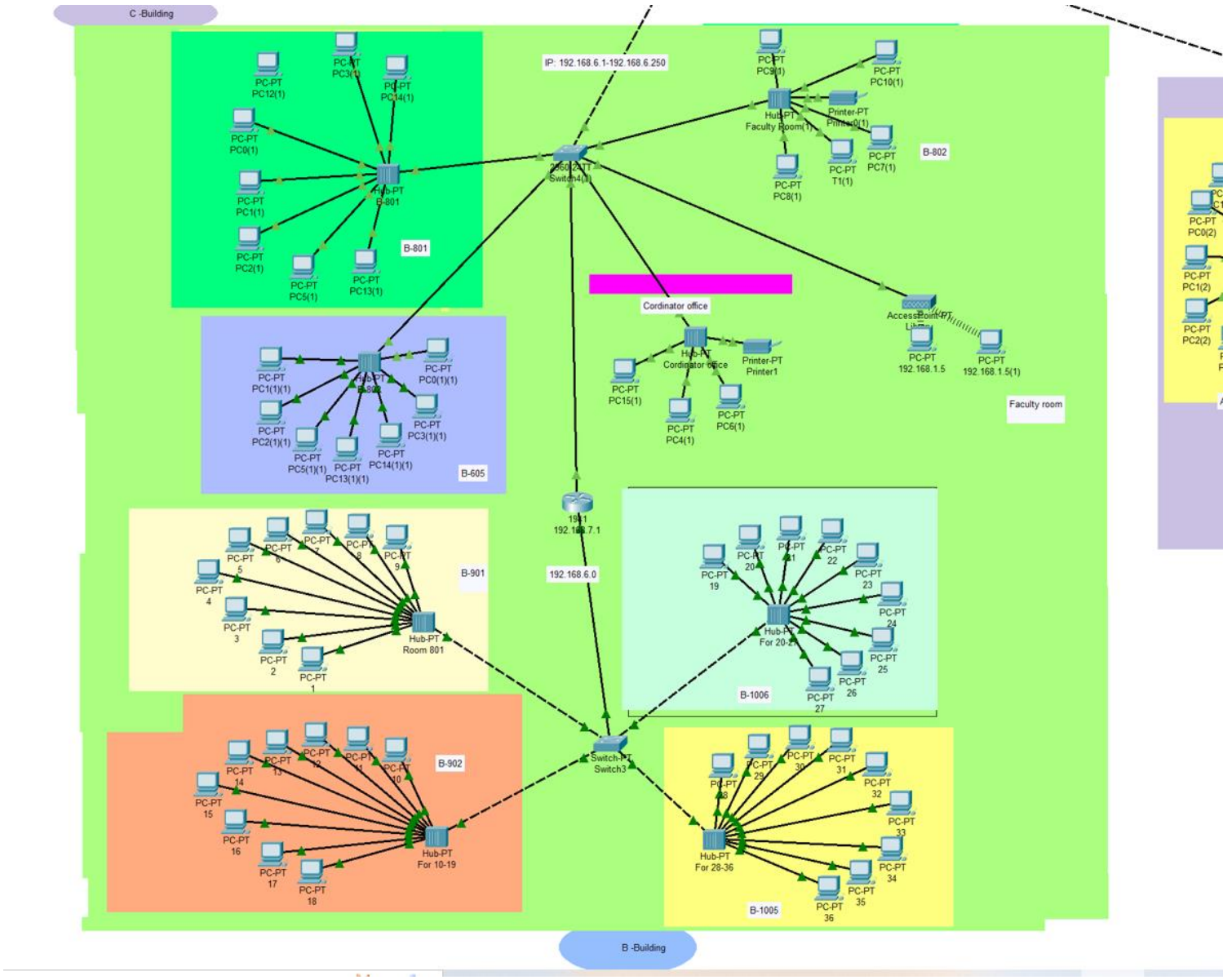
3.2.1 Results



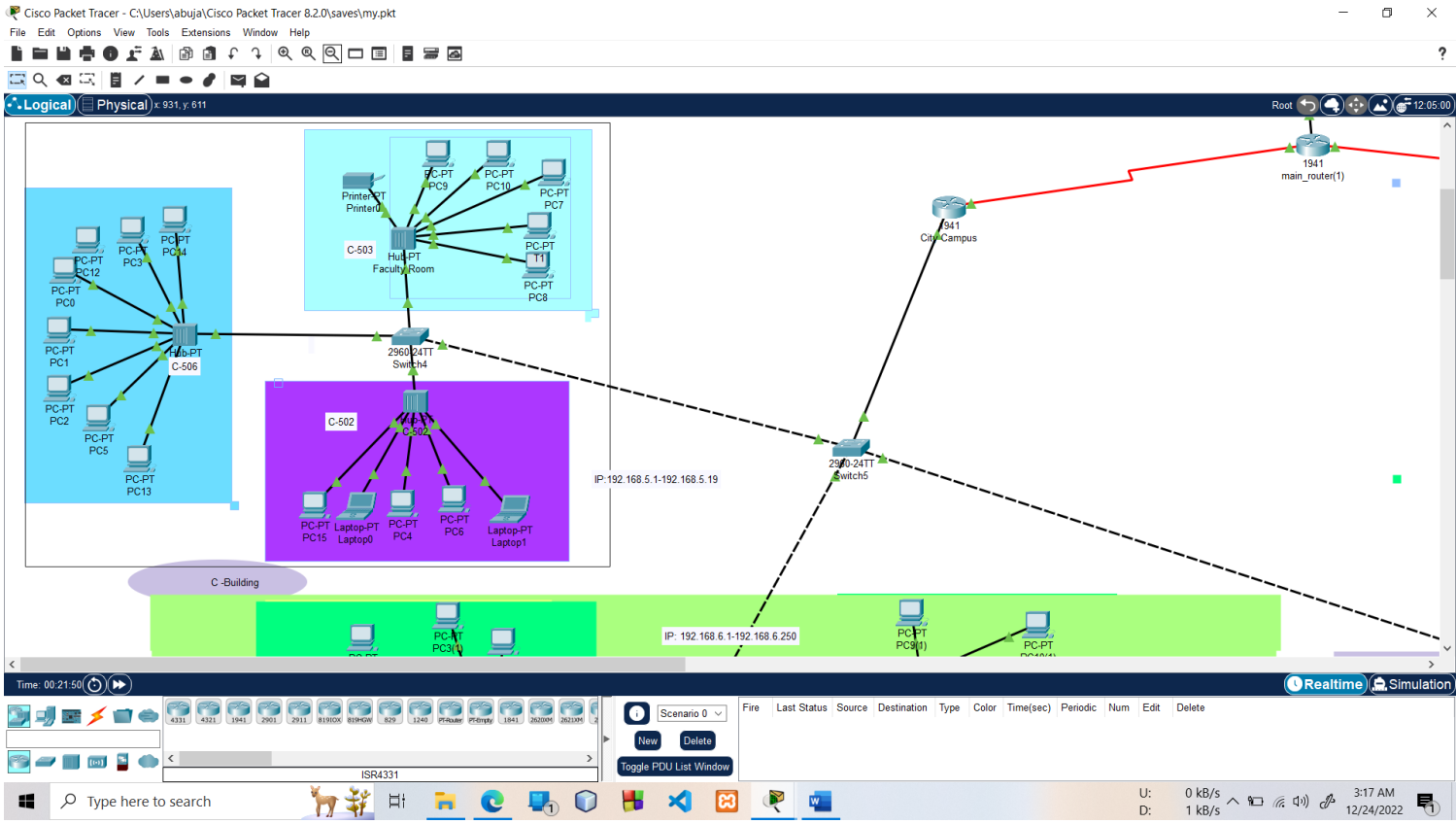
Full view


Root
13:04:00
IP:192.168.7.0-192.168.7.10
PC-PT PC12(2)
PC-PT PC3(2)
PC-PT PC14(2)
PC-PT PC0(2)
PC-PT PC1(2)
Hub-PT C-506(2)
PC-PT PC2(2)
PC-PT PC5(2)
PC-PT PC13(2)
A-203
PC-PT PC9(2)
PC-PT PC10(2)
PC-PT PC7(2)
Printer-PT Printer0(2)
Hub-PT Hub0
PC-PT T1(2)
PC-PT PC8(2)
PC-PT PC12(1)(1)
Faculty Room
culty room
Hub-PT Hub1(2)
PC-PT PC15(2)
Laptop-PT Laptop0(2)
PC-PT PC4(2)
PC-PT PC6(2)
Laptop-PT Laptop1(2)
A-305
A-Building
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
U:
D:
0 kB/s
3 kB/s
3:19 AM
12/24/2022

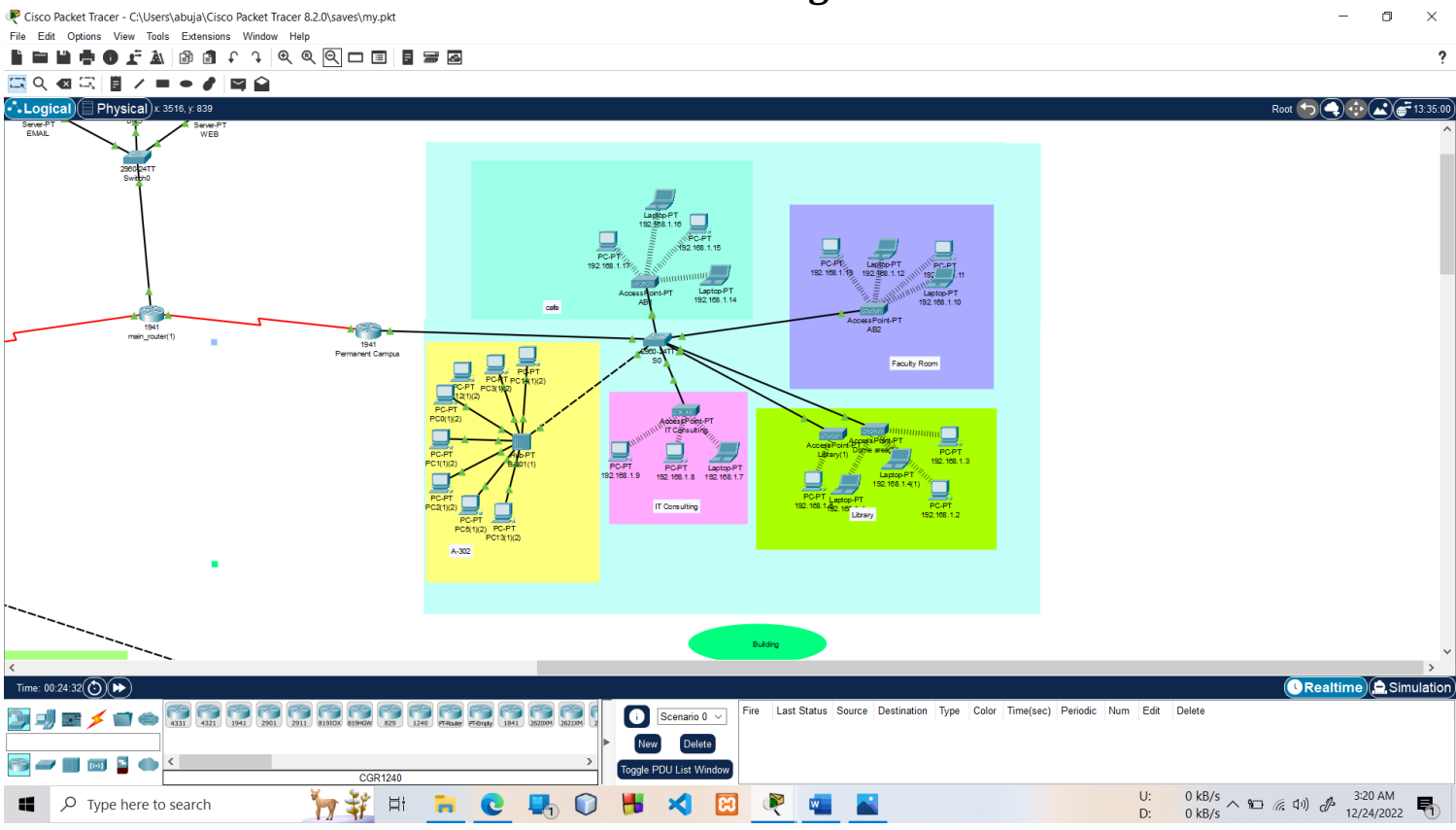
A- building


C -Building
IP: 192.168.6.1-192.168.6.250
B-801
B-802
B-605
B-901
B-902
B-1006
B-1005
Cordinator office
Faculty room
192.168.6.0
Switch3
Hub-PT Room 801
Hub-PT For 10-19
Hub-PT For 28-36
B -Building

B- building



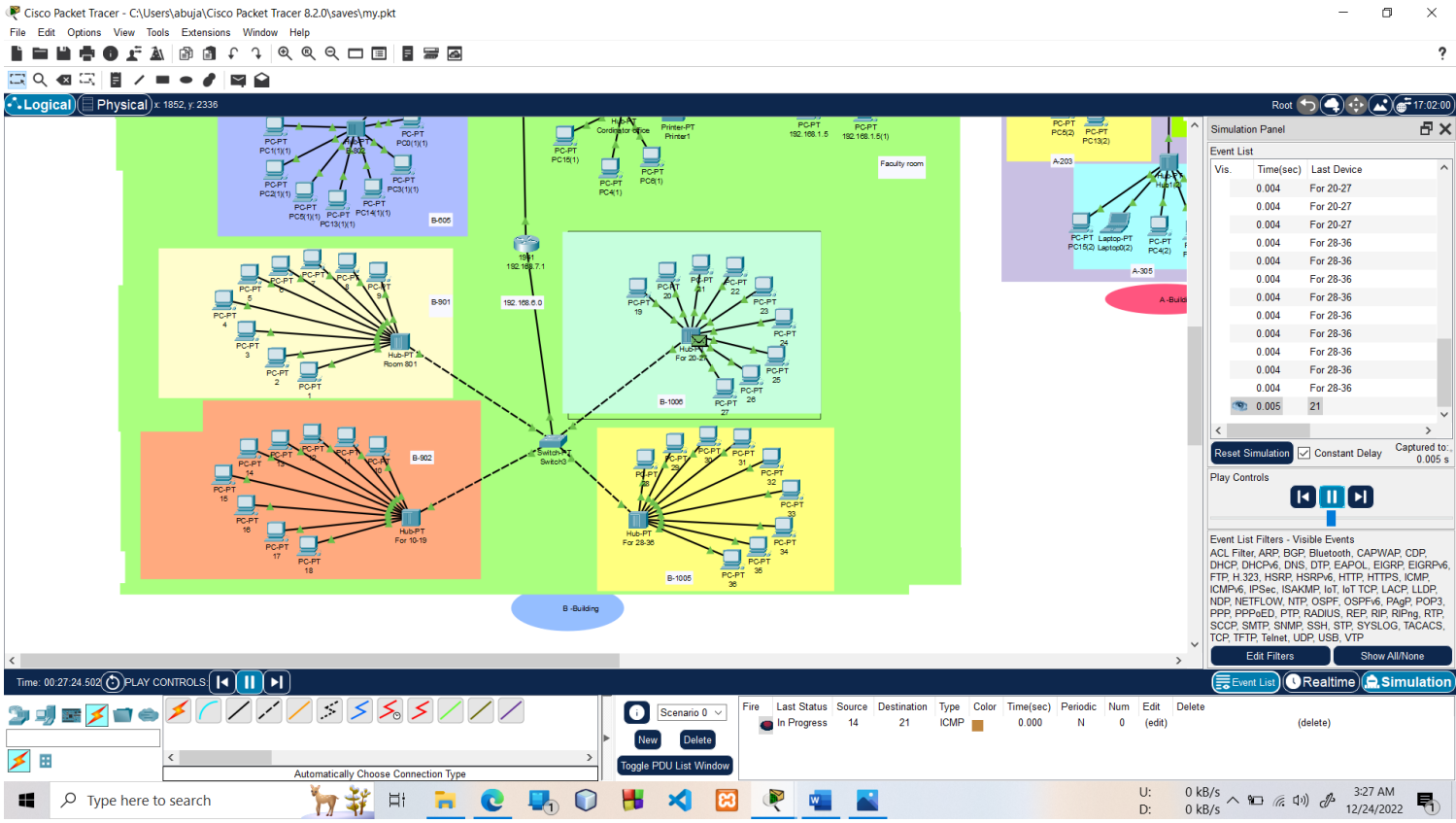
C- building



Permanent - building

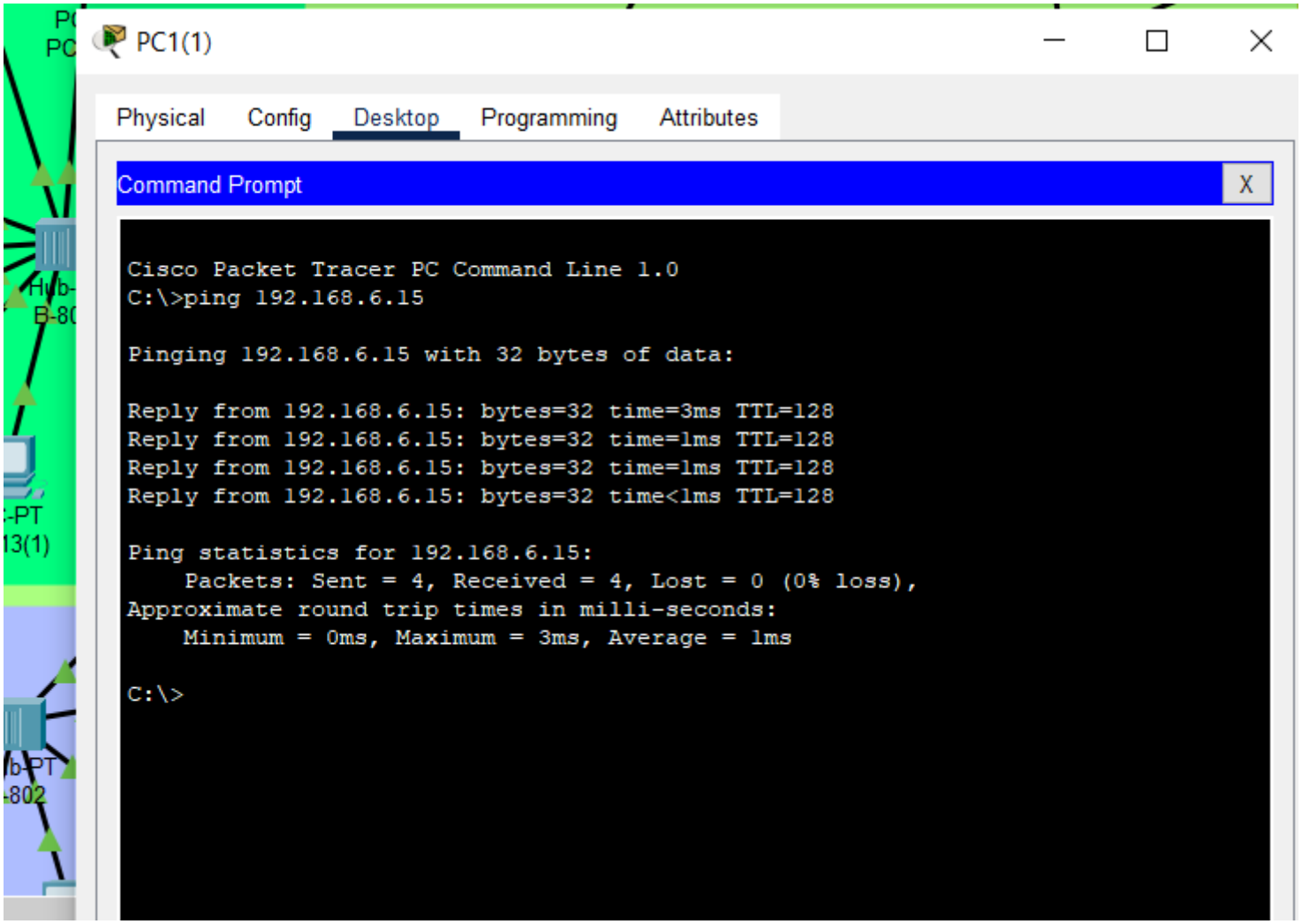
3.2.2 Final Simulation

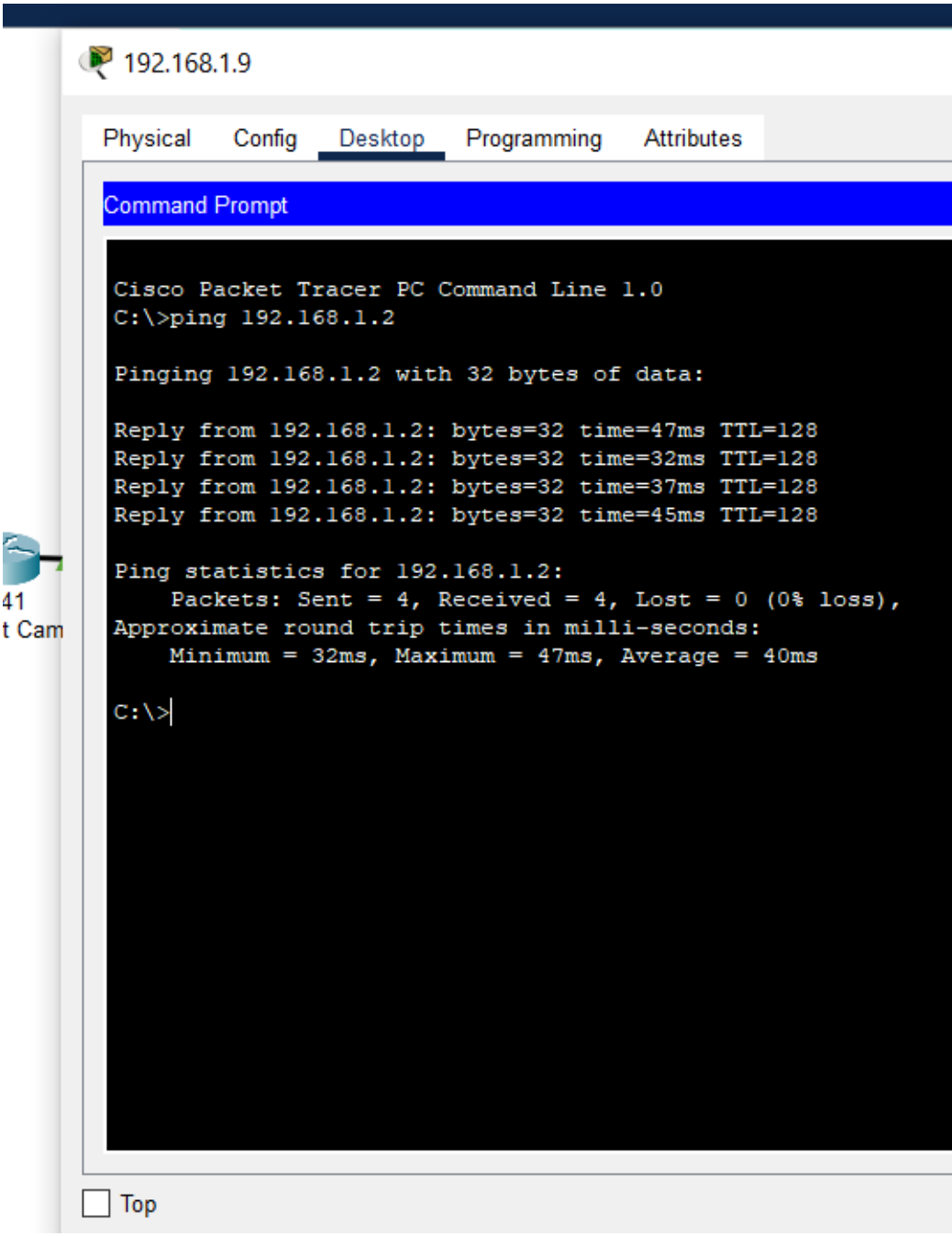
In Simulation Mode, you can watch your network run at a slower pace, observing the paths that packets take and inspecting them in detail. The proposed architecture, when simulated on Cisco Packet Tracer, produced results which are demonstrated as follows:

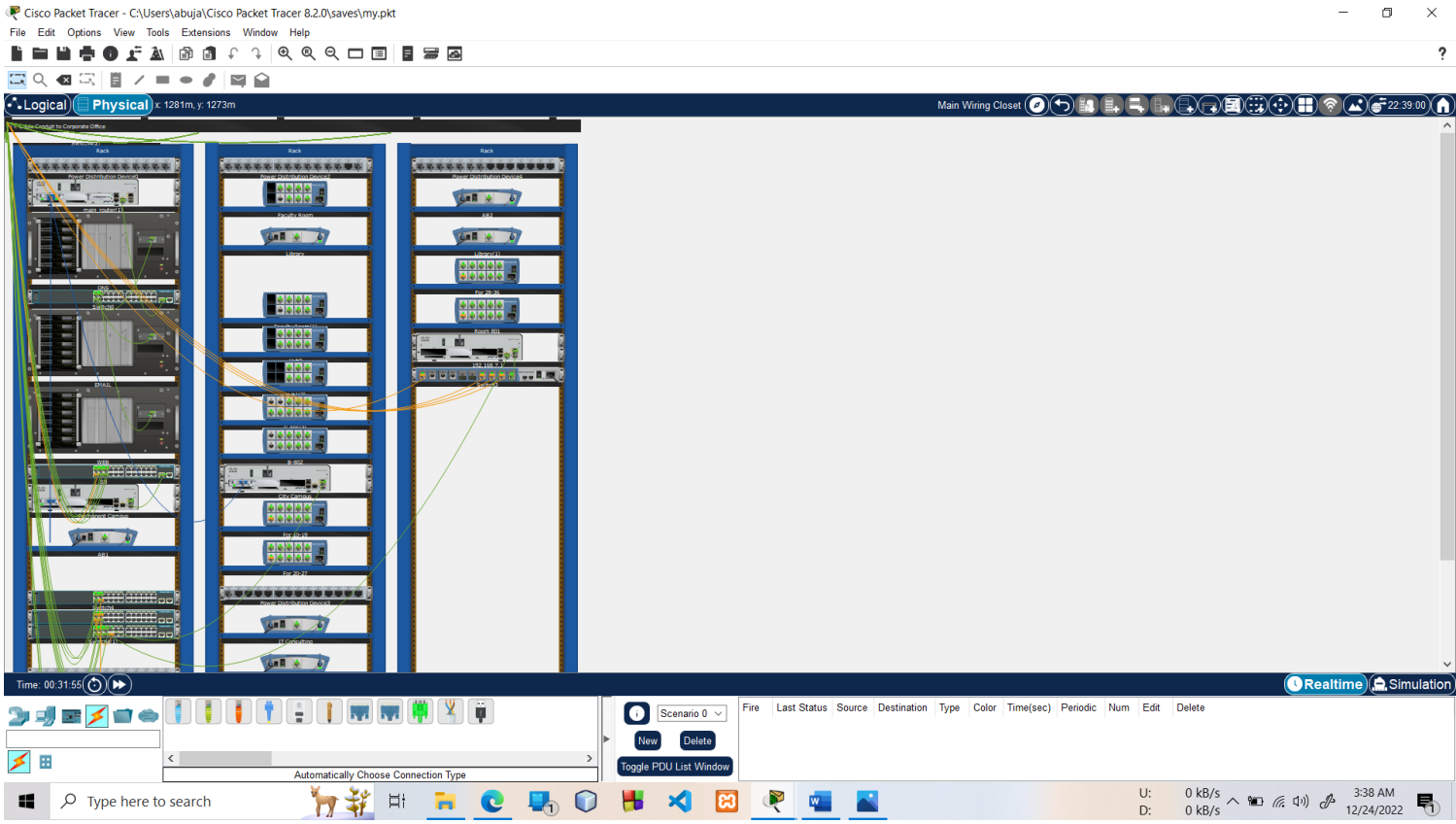


Final simulation for the network system to check all the connections

Ping Test: Network connectivity and communication can be tested sing the ping command, followed by the domain name or the IP address of the device (equipment) whose connectivity one wishes to verify.


PC1(1)
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.6.15
Pinging 192.168.6.15 with 32 bytes of data:
Reply from 192.168.6.15: bytes=32 time=3ms TTL=128
Reply from 192.168.6.15: bytes=32 time=1ms TTL=128
Reply from 192.168.6.15: bytes=32 time=1ms TTL=128
Reply from 192.168.6.15: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.6.15:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 3ms, Average = 1ms
C:\>


192.168.1.9
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time=47ms TTL=128
Reply from 192.168.1.2: bytes=32 time=32ms TTL=128
Reply from 192.168.1.2: bytes=32 time=37ms TTL=128
Reply from 192.168.1.2: bytes=32 time=45ms TTL=128
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 32ms, Maximum = 47ms, Average = 40ms
C:\>
Top


Cisco Packet Tracer - C:\Users\abuja\Cisco Packet Tracer 8.2.0\saves\my.pkt
File Edit Options View Tools Extensions Window Help
Logical
Physical
x: 1281m, y: 1273m
Main Wiring Closet
Time: 00:31:55
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Type here to search
U: 0 kB/s
D: 0 kB/s
3:38 AM
12/24/2022

Chapter 4

Conclusion

4.1 Introduction

In this project, we will design a University Network using Cisco Pac ket Tracer that uses a networking topology implemented using servers, routers, s witches, and end devices in a multiple area networks. We will include a DNS server and a web server for establishing a smooth communication system between different areas of our network and specifically for the communication between students and teachers. We will also include an email server to facilitate intra university communication through emails within the domain. We will also use console pass words and SSH protocol to ensure a safe and secure transfer of data.

4.1 Scope of Future Work

The configuration and specifications are for the initial prototype and can further be developed

and additional functionality can be added to increase support and coverage of our existing

network.

References

[1] https://en.wikipedia.org/wiki/Packet_Tracer
[2] https://www.paessler.com/it-explained/server
[3]https://computernetworking747640215.wordpress.com/2018/07/05/secure-shell ssh-configuration-on-a-switch-and-router- in-packet-tracer/
[4]http://router.over-blog.com/article- how-to-configure-cisco-router password-106850439.html
[5] https://www.cognoscape.com/benefits- going-wireless/