CCIT FLOOR 2 NETWORK INFRASTRUCTURE

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Class:

2CS1

CEP CCIT FACULTY OF ENGINEERING

UNIVERSITY OF INDONESIA

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PROJECT INFORMATION

Project Title	: CCIT Floor 2 Network Infrastructure
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Name of Faculty	: Mr. Tri Agus Riyadi, S.Kom, MT

Names of Network Administrator :

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CERTIFICATE OF ORIGINALITY

This is to certify that the project report titled "CCIT Floor 2 Network Infrastructure" is an original work completed by Kheyral Sutan Dumas, Naufal Fauzan Wildani, and Wygho Sandova Putra Maulana. This project has been submitted in partial fulfillment of their course requirement at the National Institute of Information Technology (NIIT).

The project report has been prepared under our guidance and supervision, and it is ensured that the work presented in this report is the result of the individual efforts of the aforementioned students. The contents of this report have not been submitted to any other institution or organization for the award of any degree, diploma, or other similar recognition.

Author acknowledge that the ideas, designs, and implementations presented in this project report are the intellectual properties of the students mentioned above. Any use or reproduction of this work must give proper credit to the original authors.

Author hereby endorse the authenticity and originality of the work presented in this project report and confirm that it meets the academic standards and requirements set forth by the National Institute of Information Technology (NIIT).

ACKNOWLEDGEMENT

Author would like to acknowledge the completion of the insightful paper entitled "CCIT Floor 2 Network Infrastructure." This paper comprehensively discusses the integration of Networking Technology in the functioning of analyzing efficiency, security, and convenience inside the infrastructure.

The contents of this paper provide a detailed overview of potential benefits of Networking Technology. The authors have meticulously examined the various aspects of Network Technology, such as Routing, IP Services, Webserver, and other Network services. Furthermore, the paper explores the challenges associated with the implementation of Networking in CCIT, offering valuable insights for future research and development in this area.

Overall, the paper serves as a significant contribution to the growing body of knowledge on Networking applications in the context of implementing network infrastructure.

Depok, 4 April 2024

Authors

SYSTEM ANALYSIS

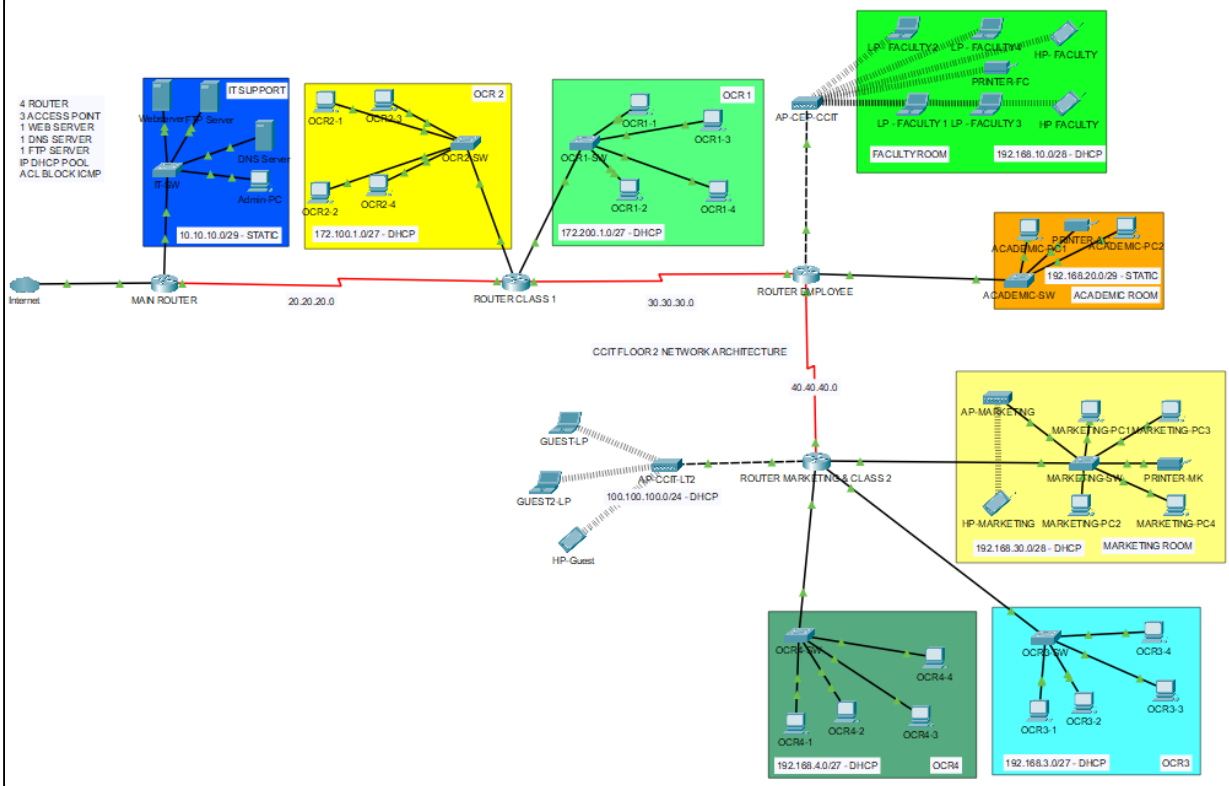
This paper "CCIT Floor2 Network Infrastructure" delves into the integration of Network Infrastructure. The study aims to research The paper specifically focusing on the infrastructure of CCIT floor 2.

The study aims to research, analyze the network architecture and resources within this particular environment, aiming to understanding its efficiency, reliability, and scalability. By examining the current infrastructure, including routers, switches, cables, and other networking components, the research endeavors to identify potential bottlenecks, vulnerabilities, and areas for improvement. Furthermore, the paper explores emerging technologies and best practices in network design and management, considering factors such as bandwidth requirements, security protocols, and future scalability.

Through rigorous empirical analysis and simulation, the study seeks to propose recommendations and strategies for optimizing the CCIT floor 2 network infrastructure, ensuring seamless connectivity, robust security, and efficient resource utilization.

Ultimately, the paper aspires to suggest a comprehensive framework for designing, implementing, and maintaining network infrastructures tailored to the specific needs and requirements of CCIT floor 2, thereby facilitating enhanced communication, collaboration, and productivity within the academic and professional community.

NETWORK TOPOLOGY



SECTION	NETWORK ADDRESS	SUBNETMASK	AVAILABLE HOST
IT SUPPORT	10.10.10.0	255.255.255.248	6
OCR 2	172.100.1.0	255.255.255.224	30
OCR 1	172.200.1.0	255.255.255.224	30
FACULTY	192.168.10.0	255.255.255.240	14
ACADEMIC	192.168.20.0	255.255.255.248	4
MARKETING	192.168.30.0	255.255.255.240	14
WIFI MKTING	192.168.30.0	255.255.255.240	14
WIFI CCIT LT2	100.100.100.0	255.255.255.0	254
OCR 4	192.168.4.0	255.255.255.224	30
OCR 3	192.168.3.0	255.255.255.224	30

NETWORK DEVICES

IT Support

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Main-Router	FA 0/0 10.10.10.1/29 SE 0/1 20.20.20.1	ISP IP	Routing Information Protocol (RIP)
Server	Web DNS FTP	10.10.10.2 10.10.10.5 10.10.10.3	10.10.10.1	- Webserver - DNS - FTP
Switch PT-Empty	IT-SW	-	-	-
PC	Admin-PC	10.10.10.4	10.10.10.1	- Browser - CMD

OCR 2

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Class1	FA 2/0 172.100.1.1/27 SE 1/0 30.30.30.1	SE 0/0 20.20.20.2	- DHCP Pool - Access Control List - RIP
Switch PT-Empty	OCR2-SW	-	-	-
PC	OCR2-1 s/d 4	172.100.1.0/27 (DHCP)	172.100.1.1	- Browser - CMD

NETWORK DEVICES

OCR 1

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Class1	FA 3/0 172.200.1.1/27 SE 1/0 30.30.30.1	SE 0/0 20.20.20.2	- RIP - DHCP Pool - ACL
Switch PT-Empty	OCR1-SW	-	-	-
PC	OCR1-1 s/d 4	172.200.1.0/27 (DHCP)	172.200.1.1	- Browser - CMD

Faculty

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Employee	FA 2/0 192.168.10.1/28 SE 1/0 40.40.40.1	SE 0/0 30.30.30.2	- RIP - DHCP Pool - ACL
Access Point-PT	CCIT-Faculty	-	192.168.10.1	-
Laptop	LP-1 s/d 4	192.168.10.0/28 (DHCP)	192.168.10.1	- Browser - CMD - Wireless

NETWORK DEVICES

Academic

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Employee	FA 3/0 192.168.20.1/29 SE 0/1 40.40.40.1/8	SE 0/0 30.30.30.2/8	- DHCP Pool - ACL - RIP
Switch PT-Empty	Academic-SW	-	-	-
PC	Academic PC 1 s/d 2	192.168.20.2/29 192.168.20.3/29	FA 3/0 192.168.20.1	- Browser - CMD
Printer	Printer-AC	192.168.20.4/29	192.168.20.1	- Wireless

Guest

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Marketing &Class 2	FA 1/0 100.100.100.1/24	SE 0/0 40.40.40.2/8	- DHCP Pool - ACL - RIP
Access Point-PT	CCIT-LT2	-	100.100.100.1	- Wireless
Laptop	LP-Guest 1 s/d 2	100.100.100.0/24	100.100.100.1	- Browser - CMD -Wireless
Handphone	HP-Guest	100.100.100.0/24	100.100.100.1	- Wireless

NETWORK DEVICES

Marketing

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Marketing &Class 2	FA 2/0 192.168.30.1/28	SE 0/0 40.40.40.2/8	- DHCP Pool - ACL - RIP
Switch PT-Empty	Marketing-SW	-	-	-
Access Point-PT	CCIT-Marketing	-	192.168.30.1	- Wireless
PC	Marketing-PC 1 s/d 4	192.168.30.0/28	192.168.30.1	- Browser - CMD -Wireless
Printer	Printer-MK	192.168.30.0/28	192.168.30.1	- Wireless
Handphone	HP-Guest	192.168.30.0/28	192.168.30.1	- Wireless

NETWORK DEVICES

OCR 4

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Marketing &Class 2	FA 3/0 192.168.4.1/27	SE 0/0 40.40.40.2/8	- DHCP Pool - ACL - RIP
Switch PT-Empty	OCR1-SW	-	-	-
PC	OCR1-1 s/d 4	192.168.4.0/27 (DHCP)	192.168.4.1	- Browser - CMD

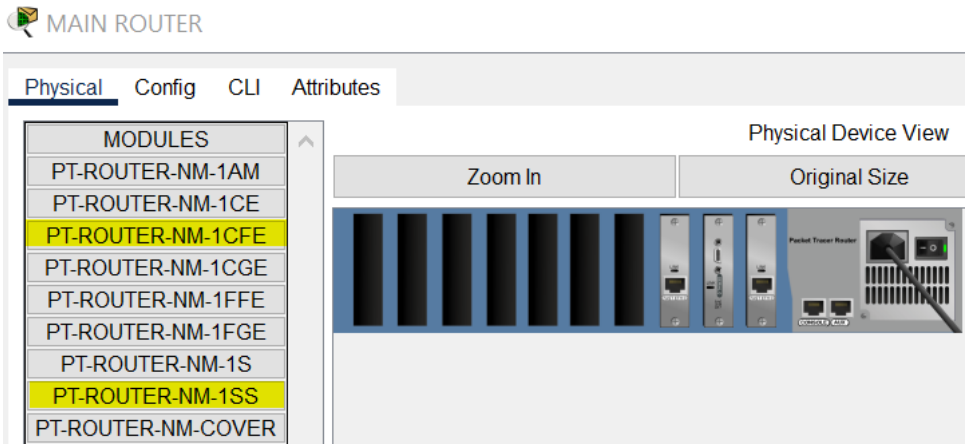
OCR 3

Devices	Device Name	IP Address	Gateway	Features
Routers PT-Empty	Router-Marketing &Class 2	FA 4/0 192.168.3.1/27	SE 0/0 40.40.40.2/8	- DHCP Pool - ACL - RIP
Switch PT-Empty	OCR1-SW	-	-	-
PC	OCR1-1 s/d 4	192.168.3.0/27 (DHCP)	192.168.3.1	- Browser - CMD

CONFIGURATION

1. Setting up interfaces on PT-Empty Devices

Interfaces should be installed on each PT-Empty device to establish connectivity within the network topology.

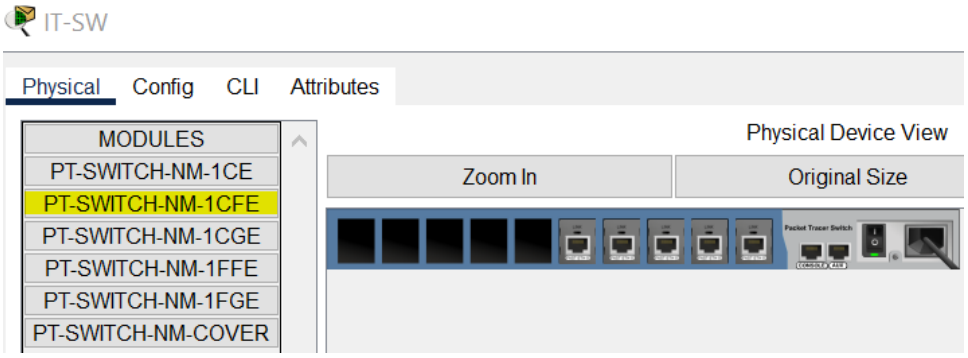


The Fast Ethernet interface should be equipped with module 1CFE, while the serial interface should utilize module 1SS for optimal performance and compatibility.

This procedure should be replicated across all routers, with necessary adjustments made to accommodate the specific port and interface requirements dictated by the network topology.

CONFIGURATION

Similar configuration steps should be undertaken for switches, but switches will only employ module 1CFE for interface configuration.



Next, establish connections using cables based on the following criteria:

DEVICES	CABLES
Router to Router	Serial Interfaces
Router to Switch	Straight Trough – Fast Ethernet
Router to Access Point	Cross Over – Fast Ethernet
Switch to End-Devices	Straight Trough – Fast Ethernet
Switch to Server	Straight Trough – Fast Ethernet
Switch to Access Point	Straight Trough – Fast Ethernet

CONFIGURATION

2. Configuration within Routers

Configuration with the routers will be initiated first. The Command Line Interface (CLI) can be accessed by opening the router interface. All settings within this router should be noted and retained. Adjust interface configurations according to the cable topology specific to your devices. IP Address configuration should be prioritized initially.

Follow the command bellow in Command Line Interface. After this step is to repeat the main router's configurations for routers with DHCP clients, as well as to set up extra DHCP settings.

MAIN ROUTER (STATIC)

// **Enabling router privileges mode**
Router> enable
Router# configure terminal

// Setup router password
Router(config)# enable password routerpassword1

// Setup IP Network IT Support
Router(config)# interface fastethernet 0/0
Router(config-if)# ip address 10.10.10.1 255.255.255.248
Router(config-if)# no shutdown

// Setup IP Network Serial Interfaces
Router(config)# interface serial 1/0
Router(config-if)# ip address 20.20.20.1 255.0.0.0
Router(config-if)# no shutdown

CONFIGURATION

ROUTER CLASS 1 (DHCP)

// Enabling router privileges mode
Router> enable
Router# configure terminal

// Setup router password
Router(config)# enable password routerpassword2

// Setup IP Network OCR2 and OCR3
Router(config)# interface fastethernet 2/0
Router(config-if)# ip address 172.100.1.1 255.255.255.224
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 3/0
Router(config-if)# ip address 172.200.1.1 255.255.255.224
Router(config-if)# no shutdown

// Setup IP Network Serial Interfaces
Router(config)# interface serial 0/0
Router(config-if)# ip address 20.20.20.2 255.0.0.0
Router(config-if)# no shutdown
Router(config)# exit
Router(config)# interface serial 1/0
Router(config-if)# ip address 30.30.30.1 255.0.0.0
Router(config-if)# no shutdown

//Setup DHCP Pool OCR2 and OCR1
Router(config)# ip dhcp pool OCR2
Router(dhcp-config)# network 172.100.1.0 255.255.255.224
Router(dhcp-config)# default-router 172.100.1.1
Router(dhcp-config)# dns-server 10.10.10.5
Router(dhcp-config)# exit
Router(config)# ip dhcp pool OCR1
Router(dhcp-config)# network 172.200.1.0 255.255.255.224
Router(dhcp-config)# default-router 172.200.1.1
Router(dhcp-config)# dns-server 10.10.10.5

CONFIGURATION

ROUTER EMPLOYEE (DHCP & STATIC)

// Enabling router privileges mode
Router> enable
Router# configure terminal

// Setup router password
Router(config)# enable password routerpassword3

// Setup IP Network FACULTY and ACADEMIC
Router(config)# interface fastethernet 2/0
Router(config-if)# ip address 192.168.10.1 255.255.255.224
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 3/0
Router(config-if)# ip address 192.168.20.1 255.255.255.224
Router(config-if)# no shutdown

// Setup IP Network Serial Interfaces
Router(config)# interface serial 0/0
Router(config-if)# ip address 30.30.30.2 255.0.0.0
Router(config-if)# no shutdown
Router(config)# interface serial 1/0
Router(config-if)# ip address 40.40.40.1 255.0.0.0
Router(config-if)# no shutdown

//Setup DHCP Pool FACULTY
Router(config)# ip dhcp pool FACULTY
Router(dhcp-config)# network 192.168.10.0 255.255.255.240
Router(dhcp-config)# default-router 192.168.10.1
Router(dhcp-config)# dns-server 10.10.10.5

// ACADEMIC IP is Static

CONFIGURATION

ROUTER MARKETING & CLASS 2 (DHCP)

// Enabling router privileges mode
Router> enable
Router# configure terminal

// Setup router password
Router(config)# enable password routerpassword4

// Setup IP Network MARKETING & WiFi, GUEST, OCR4, and OCR3
Router(config)# interface fastethernet 2/0
Router(config-if)# ip address 192.168.30.1 255.255.255.240
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 1/0
Router(config-if)# ip address 100.100.100.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 3/0
Router(config-if)# ip address 192.168.4.1 255.255.255.224
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 4/0
Router(config-if)# ip address 192.168.3.1 255.255.255.224
Router(config-if)# no shutdown

// Setup IP Network Serial Interfaces
Router(config)# interface serial 0/0
Router(config-if)# ip address 40.40.0.2 255.0.0.0
Router(config-if)# no shutdown

CONFIGURATION

// Setup DHCP Pool for MARKETING & WiFi, GUEST, OCR4, OCR3

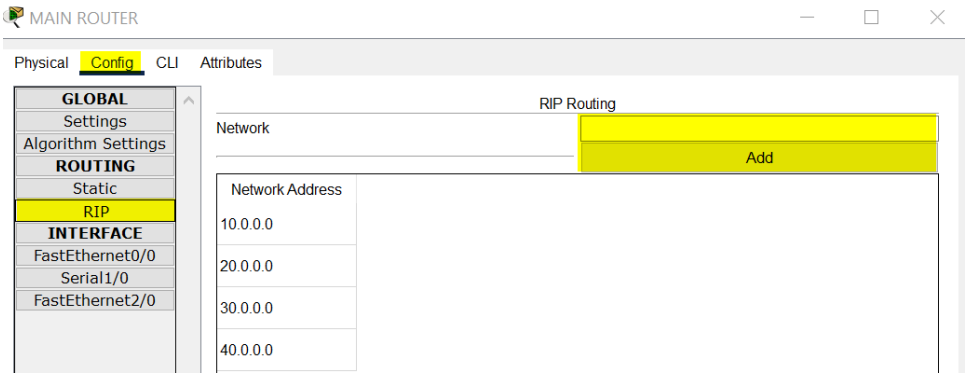
```
Router(config)# ip dhcp pool MARKETING
Router(dhcp-config)# network 192.168.30.0 255.255.255.240
Router(dhcp-config)# default-router 192.168.30.1
Router(dhcp-config)# dns-server 10.10.10.5
Router(dhcp-config)# exit
Router(config)# ip dhcp pool CCIT-LT2
Router(dhcp-config)# network 100.100.100.0 255.255.255.0
Router(dhcp-config)# default-router 100.100.100.1
Router(dhcp-config)# dns-server 10.10.10.5
Router(dhcp-config)# exit
Router(config)# ip dhcp pool OCR4
Router(dhcp-config)# network 192.168.4.0 255.255.255.224
Router(dhcp-config)# default-router 192.168.4.1
Router(dhcp-config)# dns-server 10.10.10.5
Router(dhcp-config)# exit
Router(config)# ip dhcp pool OCR3
Router(dhcp-config)# network 192.168.3.0 255.255.255.224
Router(dhcp-config)# default-router 192.168.3.1
Router(dhcp-config)# dns-server 10.10.10.5
```

CONFIGURATION

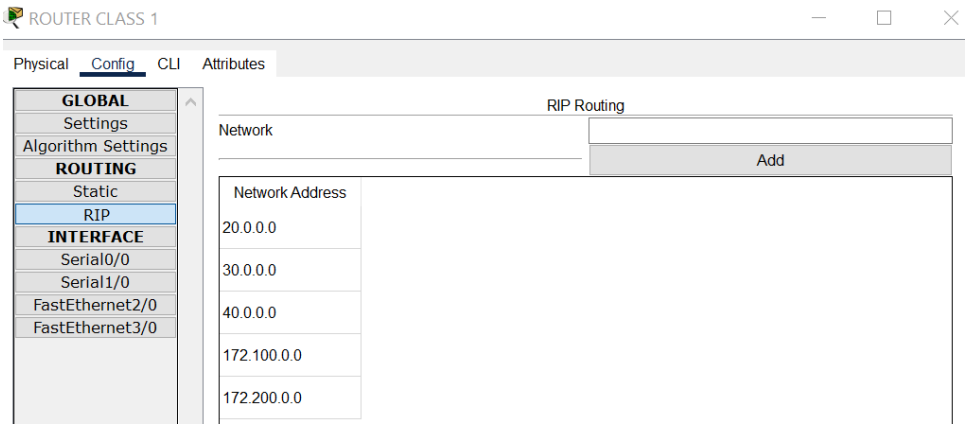
After the IP addresses have been assigned, routing will be configured, which involves creating paths to connect all of the different networks using the dynamic Routing Information Protocol (RIP), starting with the main router and continuing to the marketing router.

The rules of RIP routing, put the source network (the section IP that has been assigned) and the paths network (the IP that has been assigned into the serial interface).

Main Router

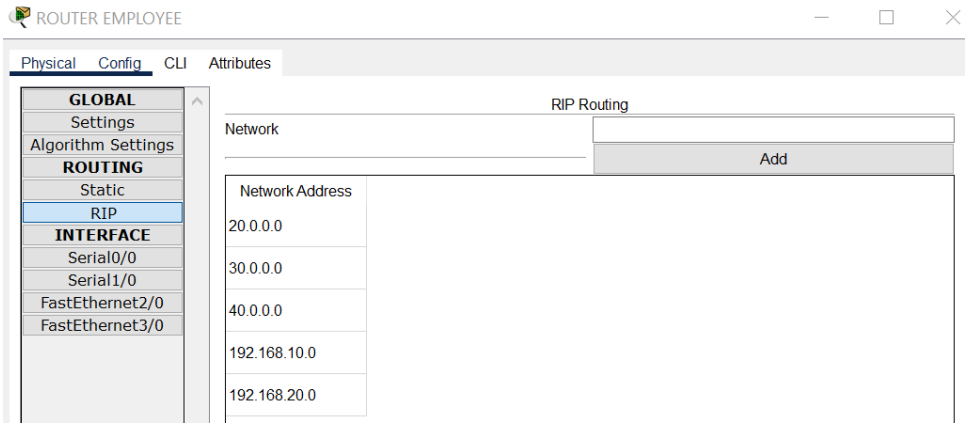


Router Class 1

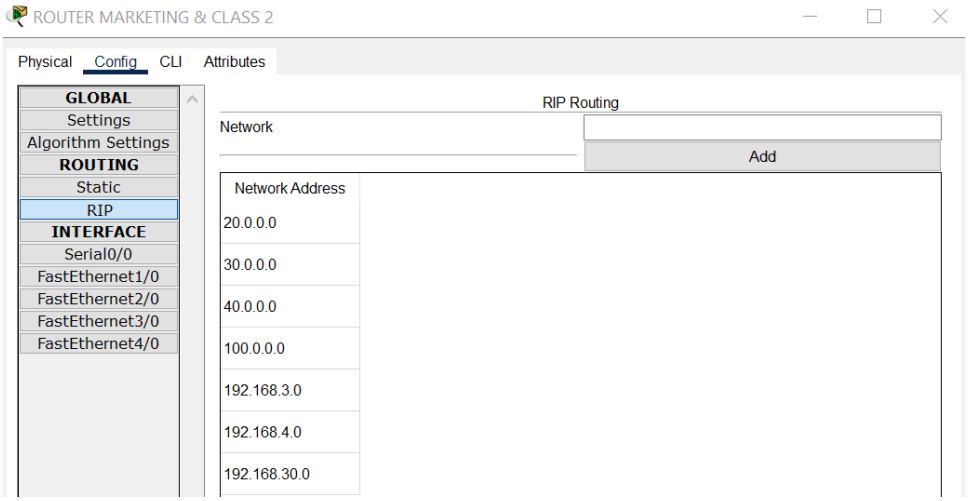


CONFIGURATION

Router Employee



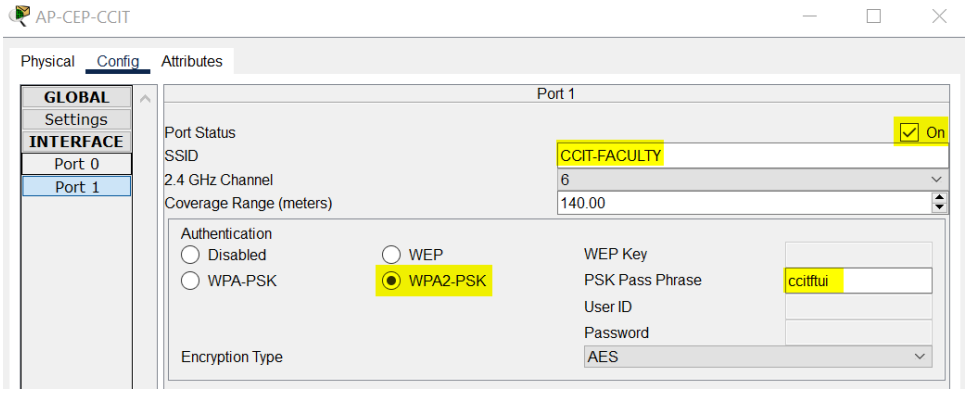
Router Marketing & Class 2

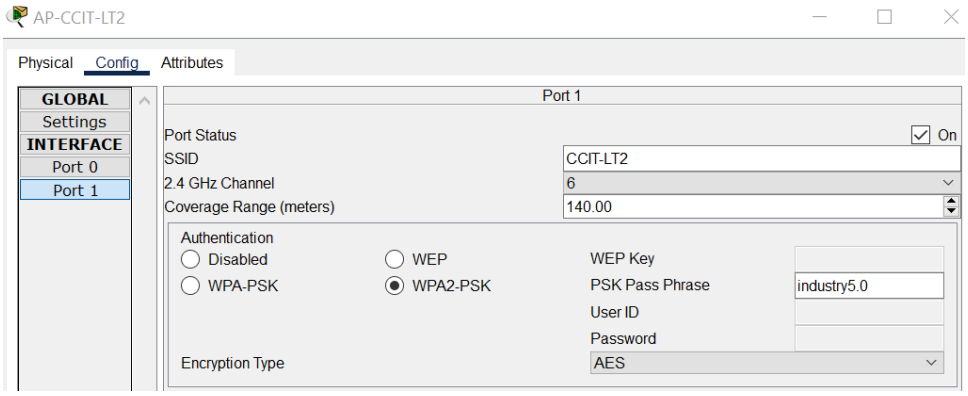


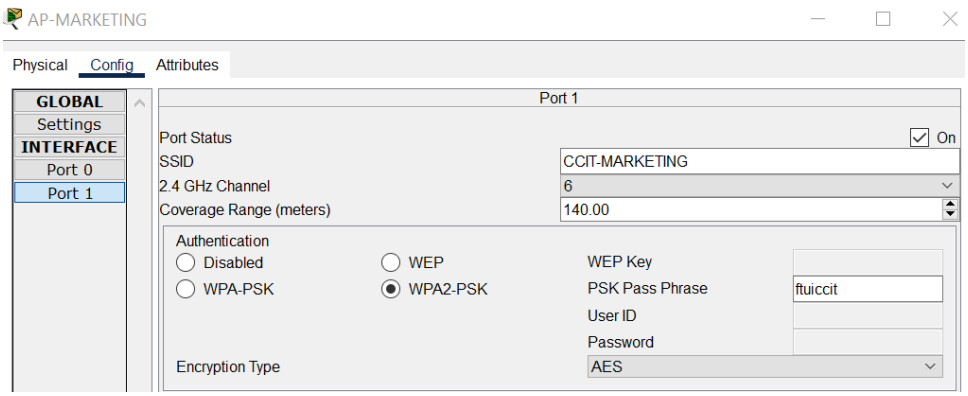
CONFIGURATION

3. Setting up Access Point for Faculty, Guest & Marketing

Setting up the access point for both CCIT guests and Faculty will be the next step, Don't forget to turn on port 0 also.







CONFIGURATION

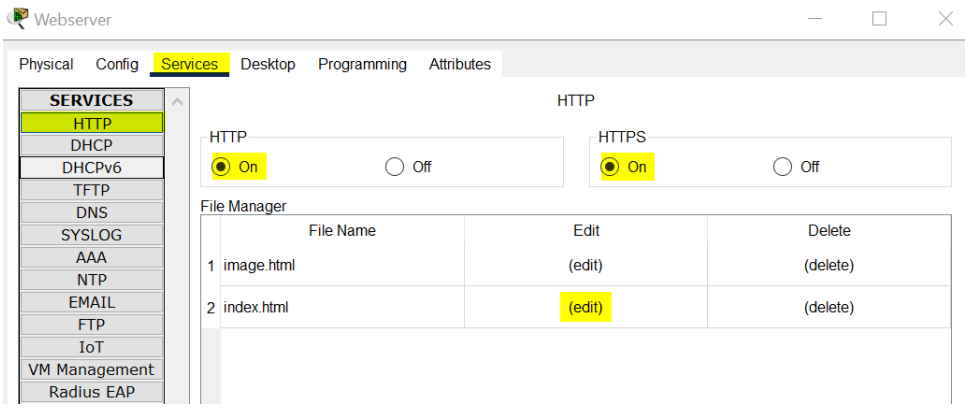
4. Server Configuration

All server services, including web, DNS, and FTP servers, will now be set up, It should be noted that modifications within index.html files are permissible.

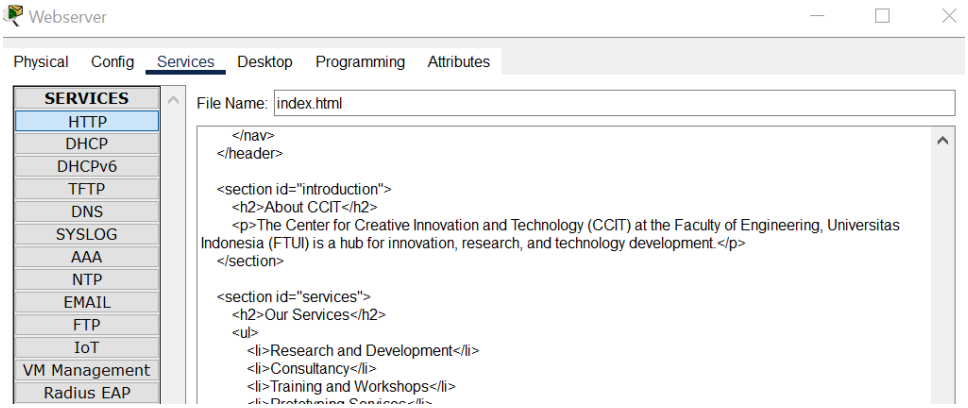
In the DNS server setup, names for web domain can be inputted, along with the address of web server (which also DNS and FTP will be set up later along with end devices), and then the "add" button can be pressed.

For the FTP server configuration, the process is similar to setting up the DNS and web server. The key difference lies in the services offered. Here, admin can input usernames and passwords for the server, along with their respective permissions.

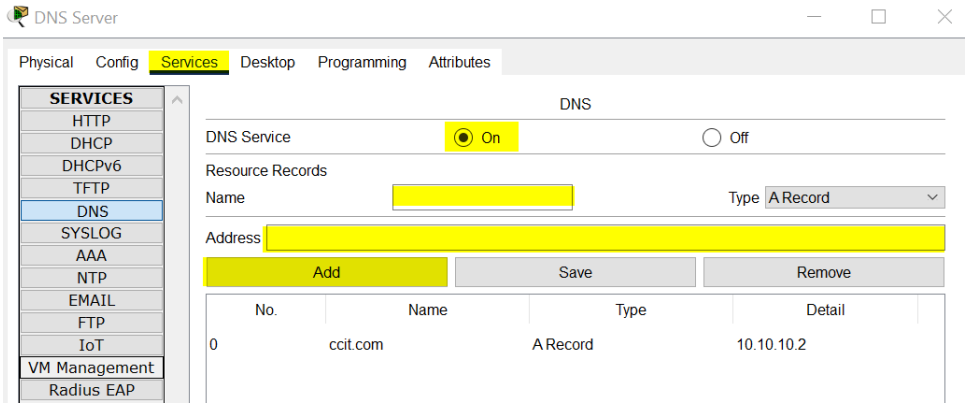
Webserver



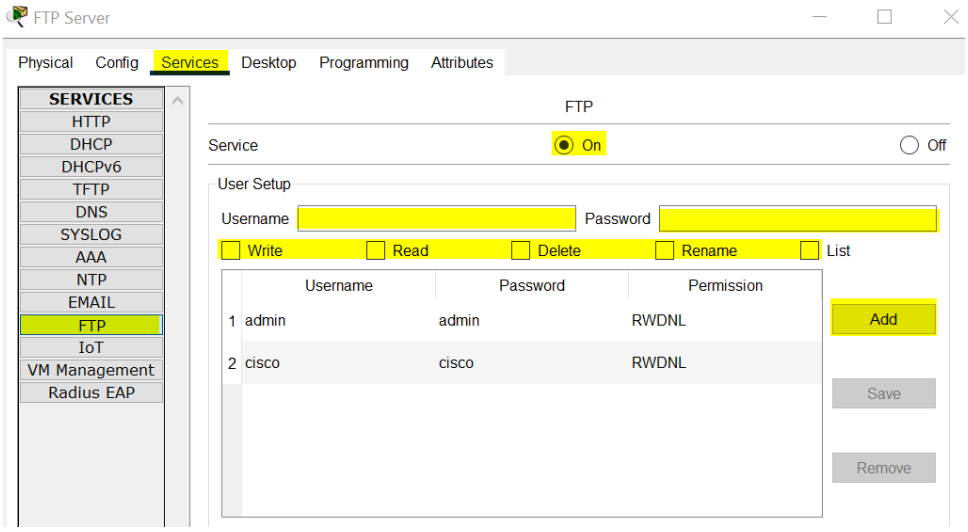
CONFIGURATION



DNS Server



FTP Server



CONFIGURATION

5. Security Configuration with Access Control List

The final configuration involves implementing a security protocol using ACL (Access Control List). Specifically, blocking incoming ICMP protocol to the server, preventing any potential DoS attacks on the web server from within the CCIT network, this setting will be initiated to routers bellow.

ROUTER CLASS 1

// **Enabling router privileges mode**
Router> enable
Router# configure terminal

// Setup ACL on Port 2/0 and 3/0
Router(config)# access-list 100 deny icmp 172.100.1.0 0.0.0.31 host 10.10.10.2
Router(config)# access-list 100 permit ip any any
Router(config)# interface 2/0
Router(config-if)# ip access-group 100 in
Router(config)-if# exit
Router(config)# access-list 101 deny icmp 172.200.1.0 0.0.0.31 host 10.10.10.2
Router(config)# access-list 101 permit ip any any
Router(config)# interface 3/0
Router(config-if)# ip access-group 101 in

CONFIGURATION

ROUTER EMPLOYEE

// **Enabling router privileges mode**
Router> enable
Router# configure terminal

// Setup ACL on Port 2/0 and 3/0
Router(config)# access-list 100 deny icmp 192.168.10.0 0.0.0.15 host 10.10.10.2
Router(config)# access-list 100 permit ip any any
Router(config)# interface 2/0
Router(config-if)# ip access-group 100 in
Router(config)-if# exit
Router(config)# access-list 101 deny icmp 192.168.20.0 0.0.0.7 host 10.10.10.2
Router(config)# access-list 101 permit ip any any
Router(config)# interface 3/0
Router(config-if)# ip access-group 101 in

CONFIGURATION

ROUTER MARKETING & CLASS 2

// **Enabling router privileges mode**
Router> enable
Router# configure terminal

// Setup ACL on Port 2/0, 1/0, 3/0 and 4/0
Router(config)# access-list 100 deny icmp 192.168.30.0 0.0.0.15 host 10.10.10.2
Router(config)# access-list 100 permit ip any any
Router(config)# interface 2/0
Router(config-if)# ip access-group 100 in
Router(config)-if# exit
Router(config)# access-list 101 deny icmp 100.100.100.0 0.0.0.255 host 10.10.10.2
Router(config)# access-list 101 permit ip any any
Router(config)# interface 1/0
Router(config-if)# ip access-group 101 in
Router(config)-if# exit
Router(config)# access-list 102 deny icmp 192.168.4.0 0.0.0.31 host 10.10.10.2
Router(config)# access-list 102 permit ip any any
Router(config)# interface 3/0
Router(config-if)# ip access-group 102 in
Router(config)-if# exit
Router(config)# access-list 103 deny icmp 192.168.3.0 0.0.0.31 host 10.10.10.2
Router(config)# access-list 103 permit ip any any
Router(config)# interface 4/0
Router(config-if)# ip access-group 103 in

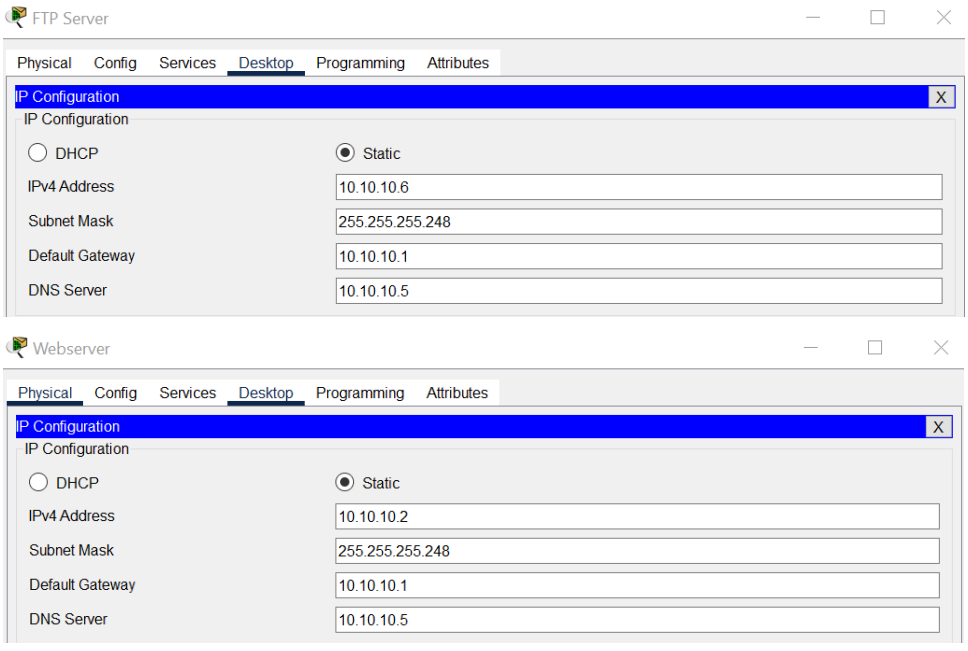
CONFIGURATION

6. End-Devices & Server setup

Now it's time to configure the end devices. Configuring end devices involves simply changing the IP mode in each device and adjusting their network settings using either static or DHCP by going to desktop and click on IP Configuration.

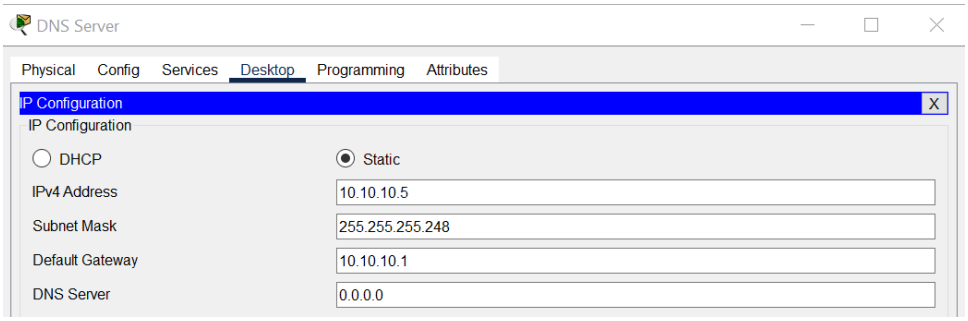
In static networks, it's important to designate the gateway IP as the IP address of the router interface leading into the network. For example, if the network's IT section is received through interface 0/0, that interface's IP should be used as the gateway IP.

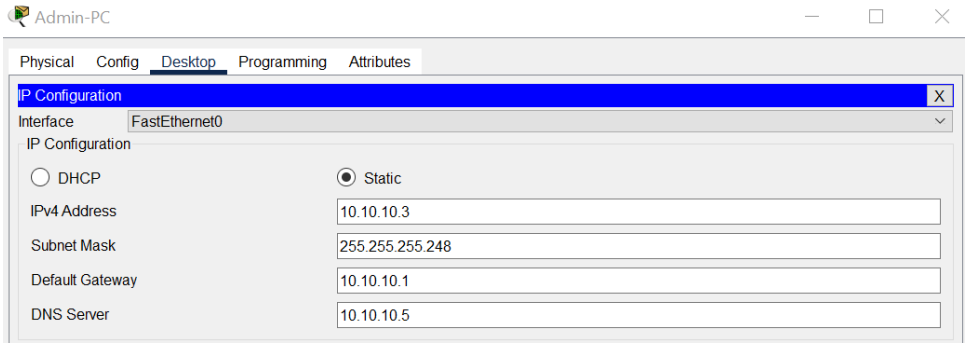
IT Support (Static)



CONFIGURATION

The DNS IP should be adjusted to match the one set in the DHCP pool setup otherwise, the DNS won't align with the network, causing the web server to be inaccessible through the domain name.

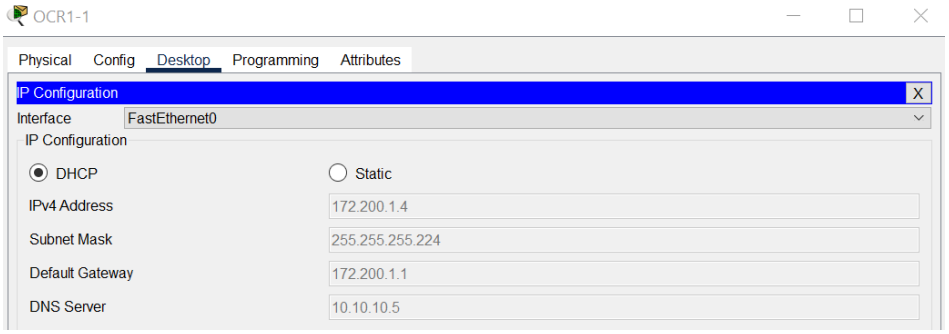


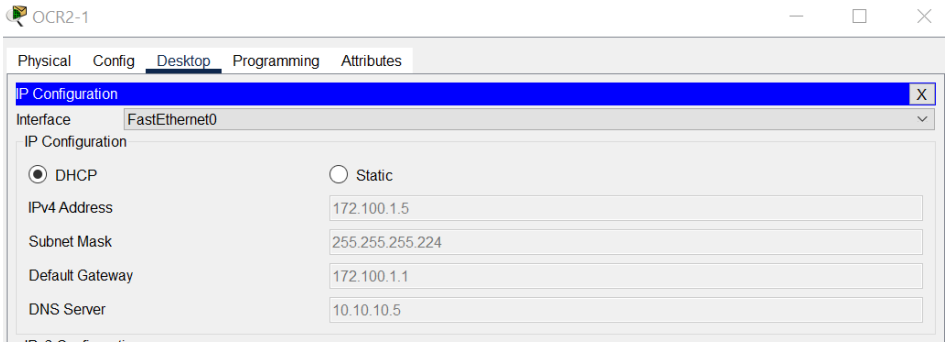


Additionally, for addresses within the network, options are limited to 2-6 due to the subnet's capacity of only allowing 6 hosts, with 1 already allocated to interface 0/0.

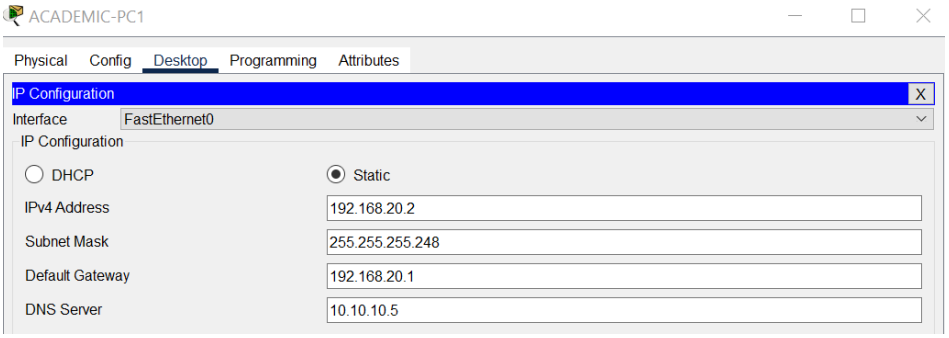
CONFIGURATION

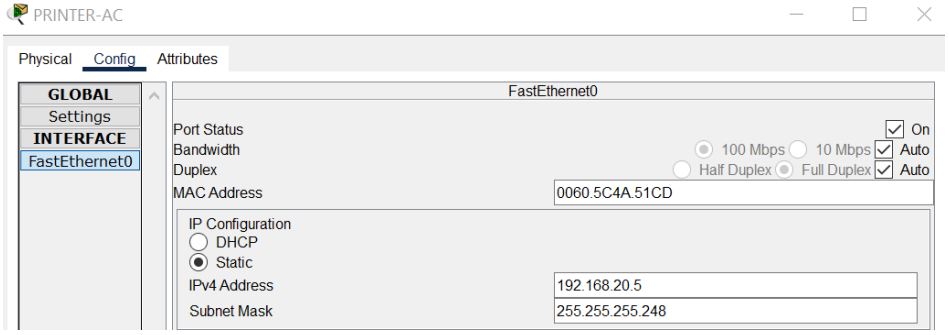
OCR1 & OCR2 (DHCP)





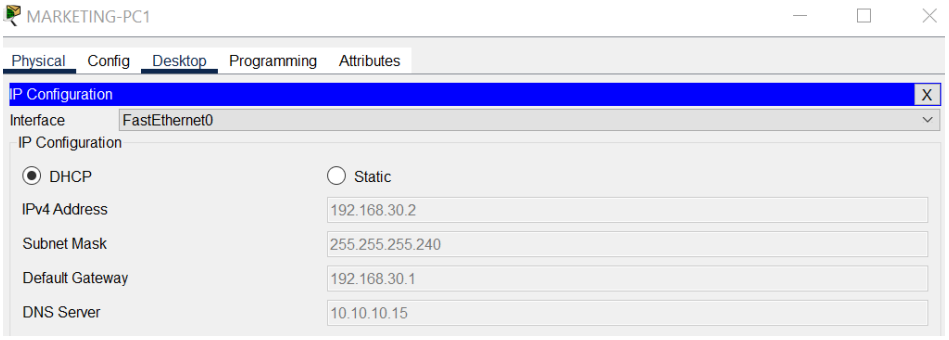
Academic (Static)



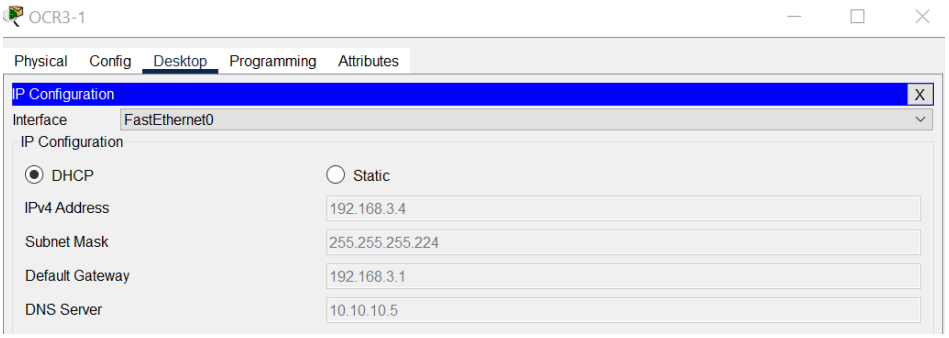


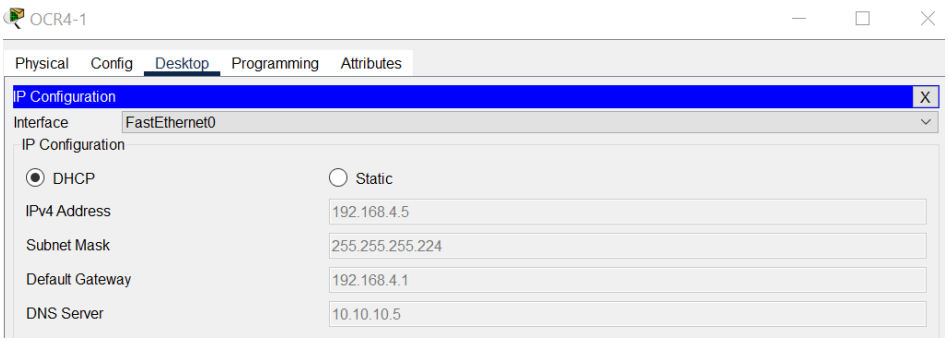
CONFIGURATION

Marketing (DHCP)



OCR 3 & OCR 4 (DHCP)

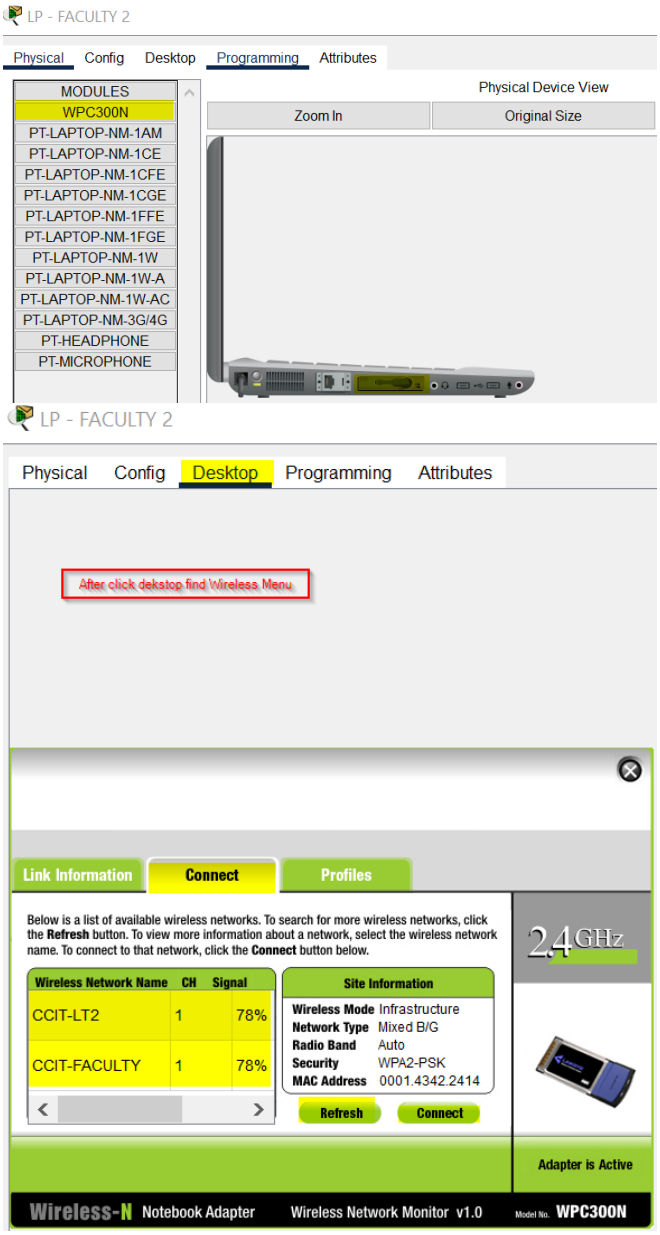




CONFIGURATION

To configure the wireless network, the initial step involves changing the interface from cable to wireless.

Faculty & Guest (Wireless DHCP)

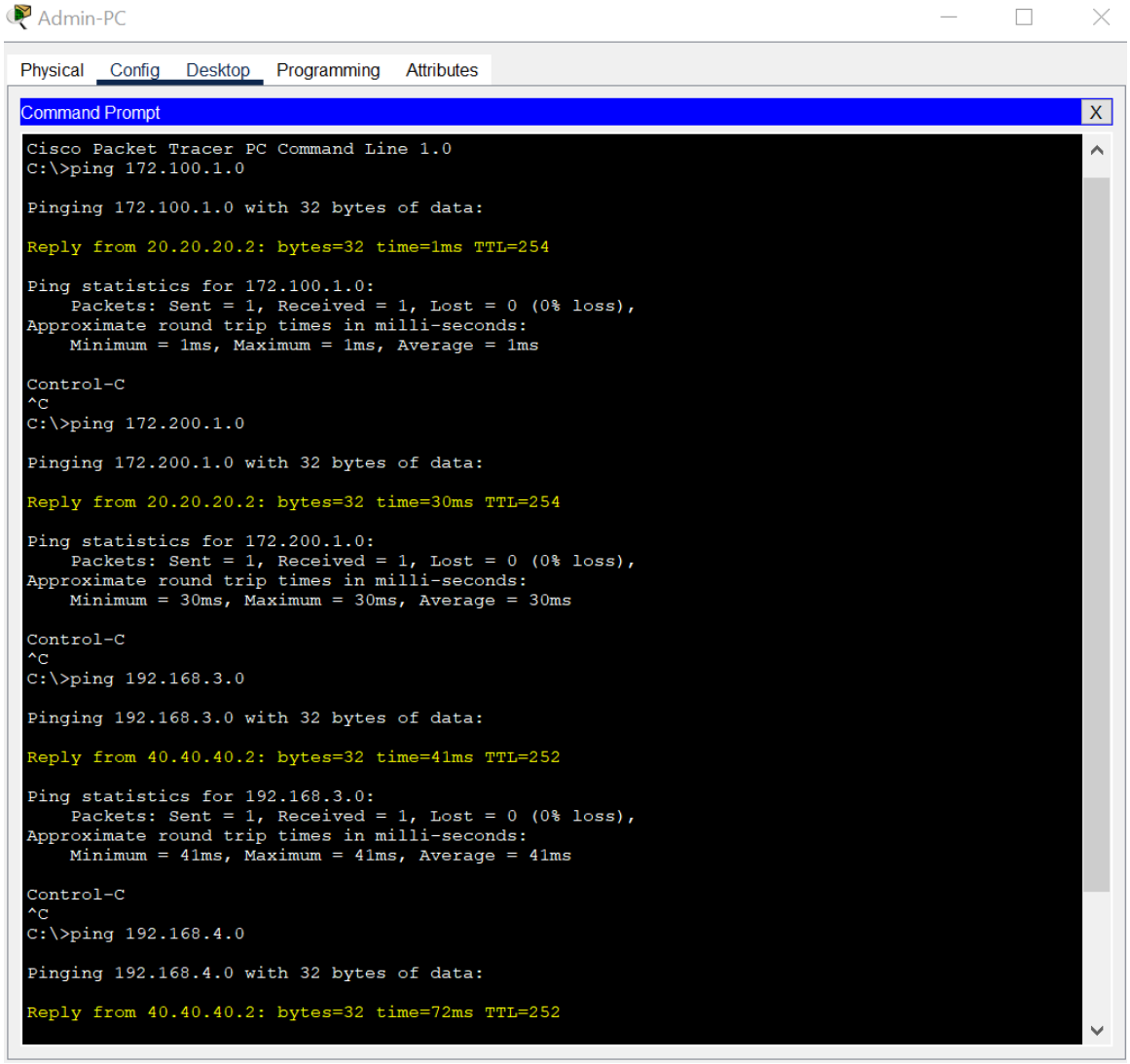


SIMULATION

1. Connection Testing

IT Support to all Class

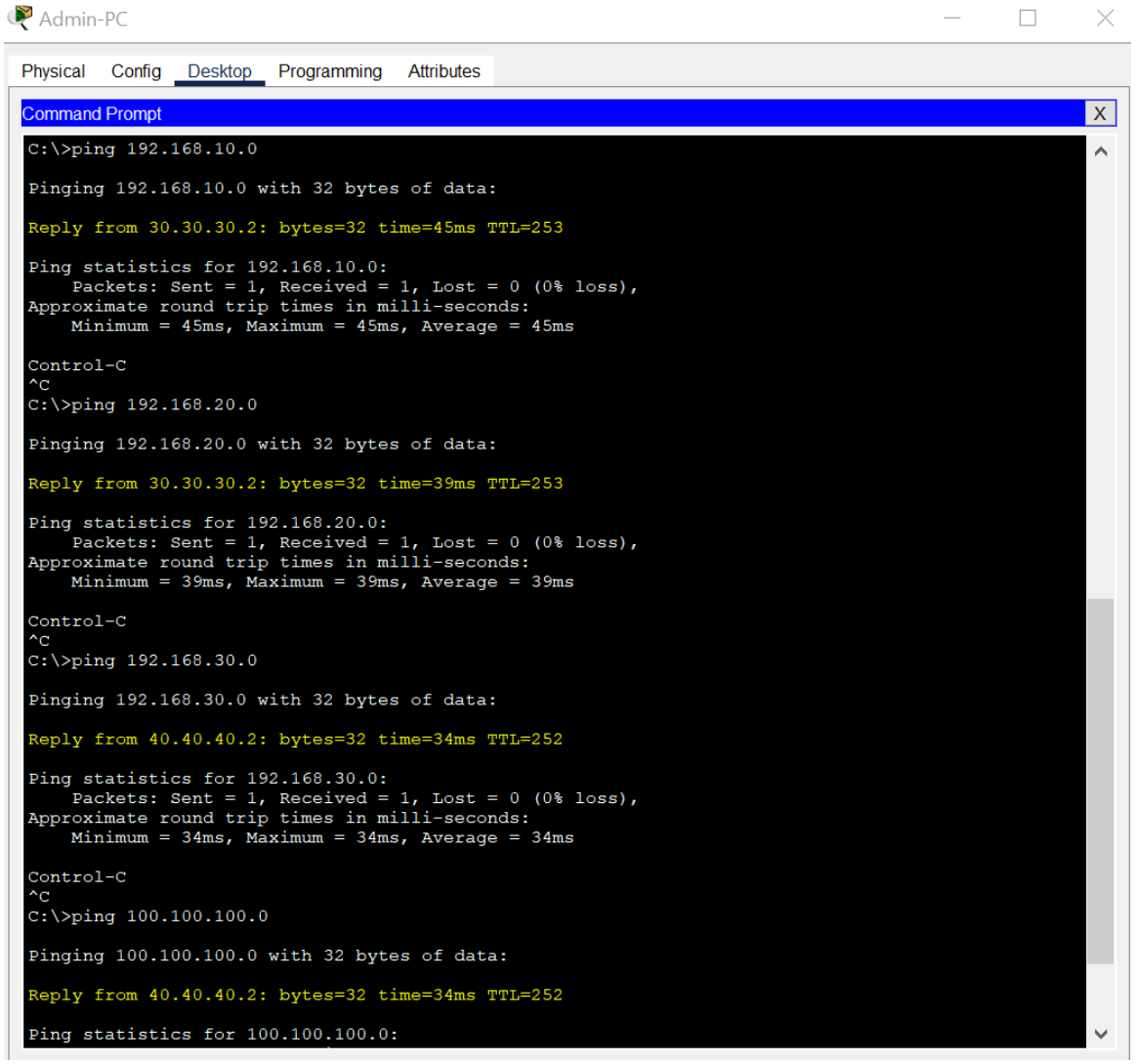
ICMP Testing



SIMULATION

IT Support to all non Class

ICMP Testing

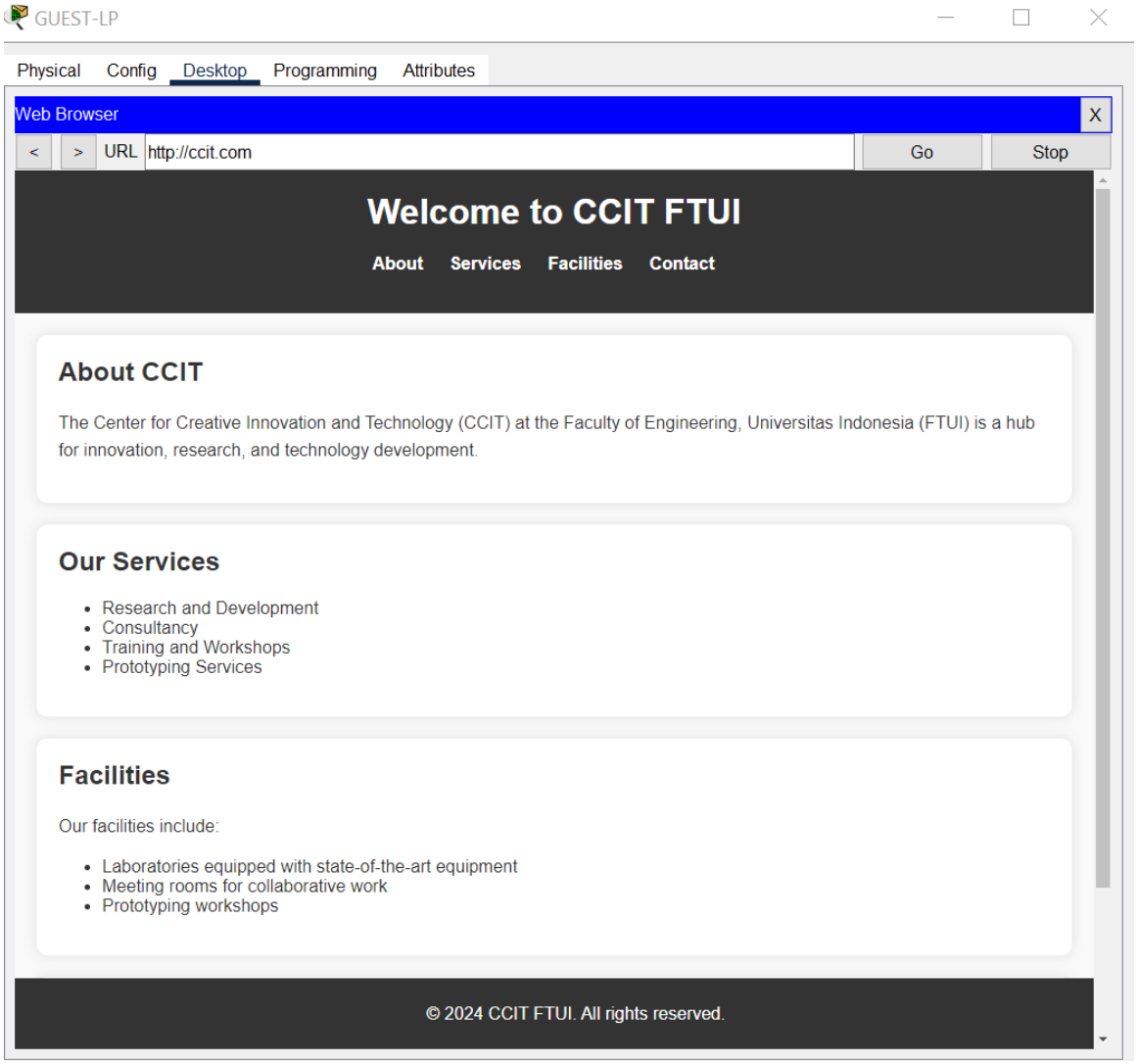


SIMULATION

2. Server Testing

DNS & Webserver

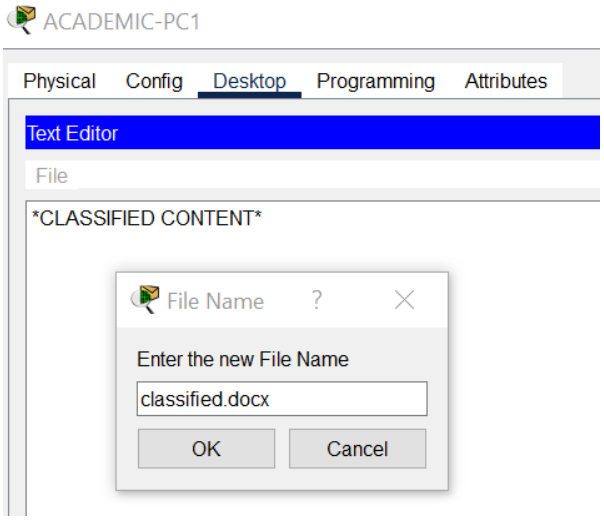
DNS and web server functionality will be tested by simply navigating to the desktop and entering the domain name, which is ccit.com.



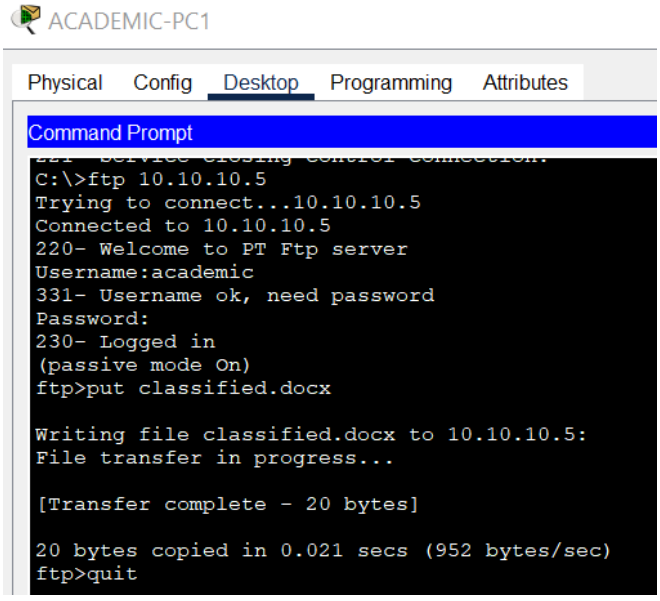
SIMULATION

FTP Server

Before attempting to access the server, example files will be created for later distribution to other networks.

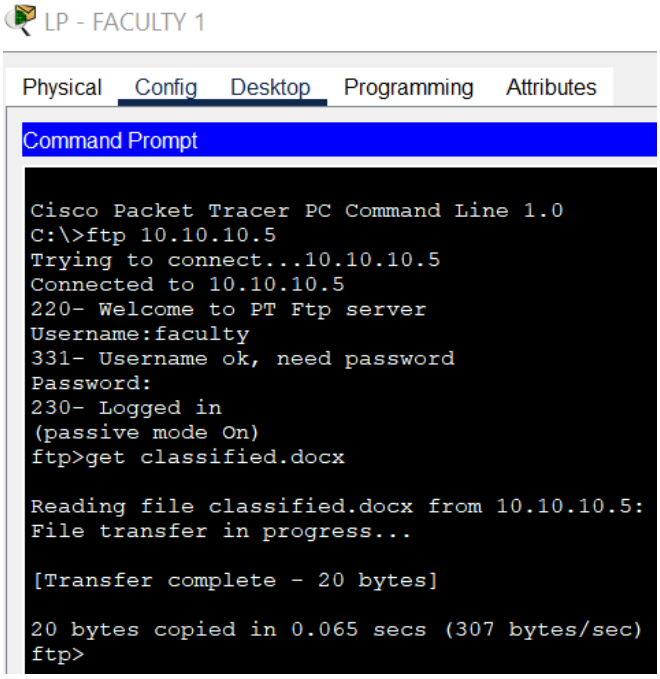


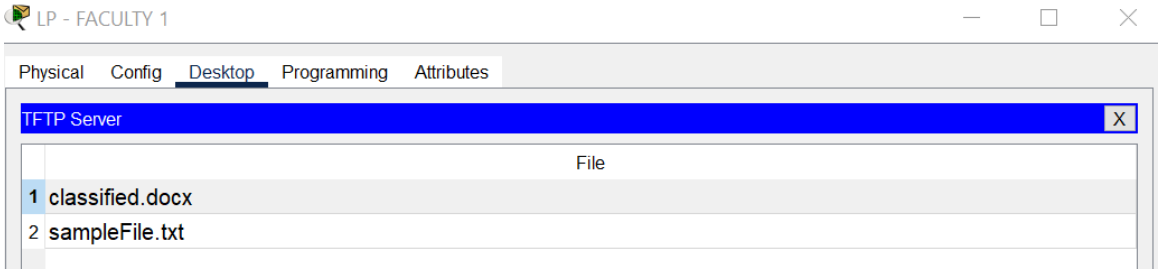
Next, these files will be uploaded to the server, enabling access for other networks.



SIMULATION

"Classified.docx" will be accessed in another network using the FTP server.



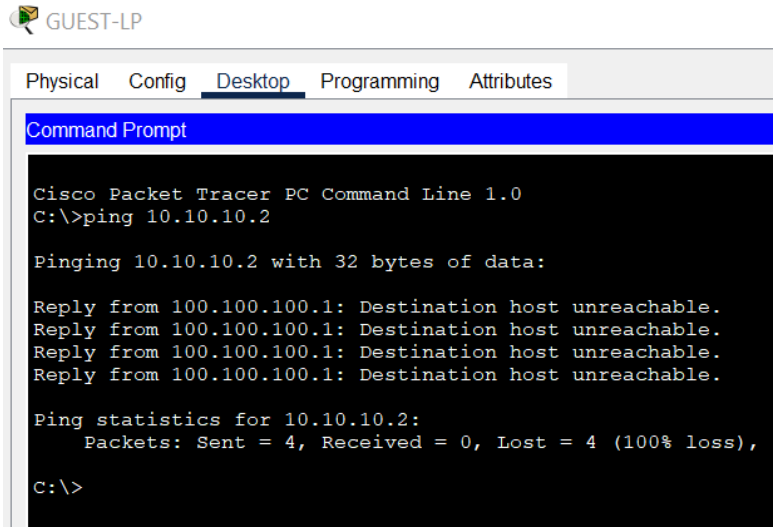


SIMULATION

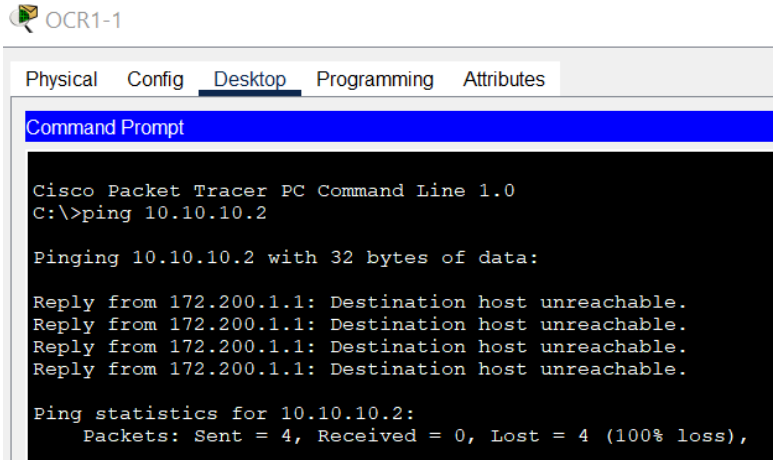
3. Security Testing

The security scenario primarily involves implementing ACL to prevent the ICMP protocol from reaching the web server.

Guest ICMP



Class ICMP



REQUIREMENTS

Hardware :

1. Lenovo V14 G2

Operating System :

1. Windows 10 64-bit

Software :

1. Cisco Packet Tracer
2. Ms. Word
3. Google Chrome

PROJECT FILE DETAILS

No	Filename	Remarks
1	2CS1 Project 1.pdf	Microsoft Words contain research paper about the project
2	ccitnetworks.pkt	Packet Tracer file contains the network simulation
3	Project 1 Presentation.pptx	Presentation file