

Final Project – Spring 2023

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1. High level description of the organization for which the network plan is being created.

The project is about two universities located in different logical areas. The first university, King Faisal University, has three departments: Medicine, Science, and Business. The Medicine department consists of two labs, each equipped with a PC and a laptop. The Science department has one lab with one PC and one laptop. The Business department has one lab with a laptop and a PC.

The second university, Effat University, has two departments: Engineering and Business. The Engineering department has two labs, each containing one PC and one laptop. The Business department also has two labs, each equipped with a PC and a laptop.

In addition, there will be an email server implemented to facilitate communication between any two devices from either university.

2. Description of end devices.

In each lab, we added one PC and one laptop.

To simplify the network configuration process, we utilized a DHCP server to automatically assign IP addresses to these devices.

We implemented a DNS server to manage the domain names within our network. This server was responsible for translating domain names into their corresponding IP addresses, allowing users to access resources using easy-to-remember domain names instead of complex IP addresses.

We set up a dedicated web server to host the Effat University website.

As part of our network infrastructure, we integrated an email server. It allowed both staff and students to have their own email addresses and exchange emails seamlessly within the university's network.

3. Description of intermediate devices.

In each university, there are several switches:

- 1- One switch is used to connect the devices within each lab.
- 2- Another switch is used to connect all the switches within the department.
- 3- Finally, there is a switch that connects all the switches together and links them

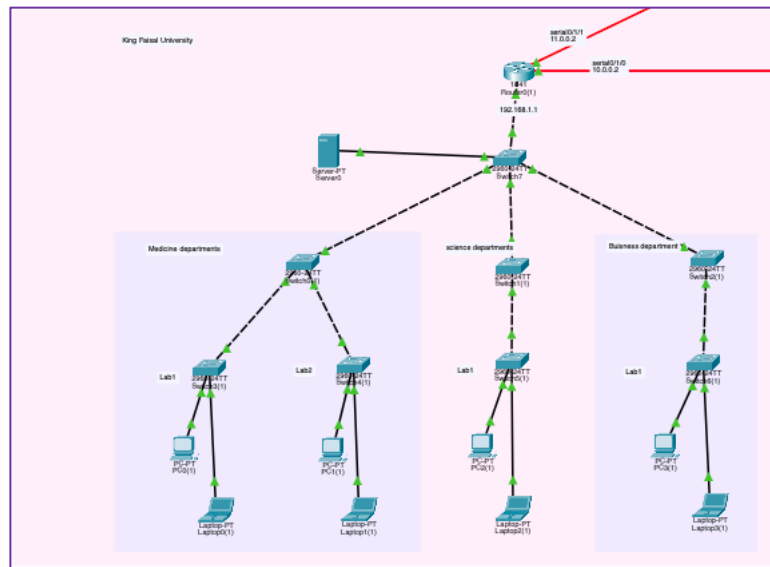
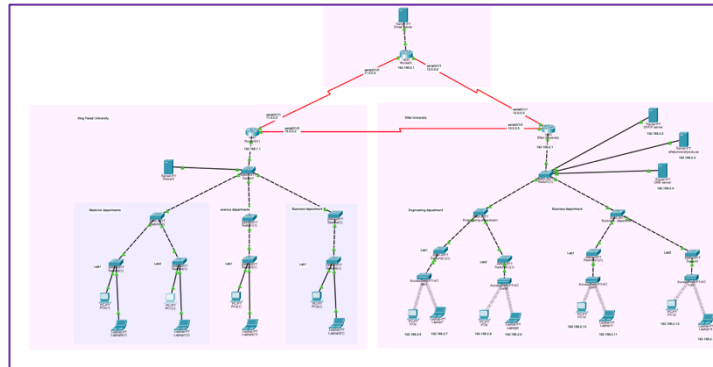
with the router. Additionally, this switch is connected to the servers in order to enable access to all the devices within the university.

We employed three routers in our network setup to facilitate connectivity between different entities. The first router was utilized to connect the first university, while the second router established connectivity with the second university. The third router played a crucial role in connecting the email server. All three routers were interconnected, enabling seamless communication and data transfer between the various network segments. This configuration ensured efficient and reliable network connectivity throughout the network infrastructure.

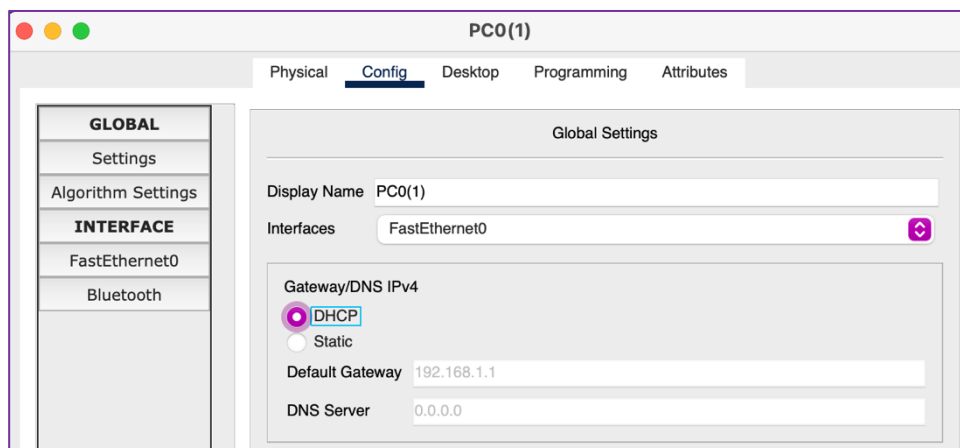
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4. Screenshots of the completed network.

The network



First LAN



Configuration from one of the PCs in the first LAN

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Configuration of the DHCP server in the first LAN

The screenshot shows the 'DHCP Server' configuration window with the 'Services' tab selected. The 'DHCP' service is enabled for the 'FastEthernet0' interface. The configuration includes a pool named 'serverPool' with a default gateway of 192.168.1.1, a DNS server of 0.0.0.0, and a start IP address of 192.168.1.3 with a subnet mask of 255.255.255.0. The maximum number of users is set to 100. A table at the bottom lists the pool configuration.

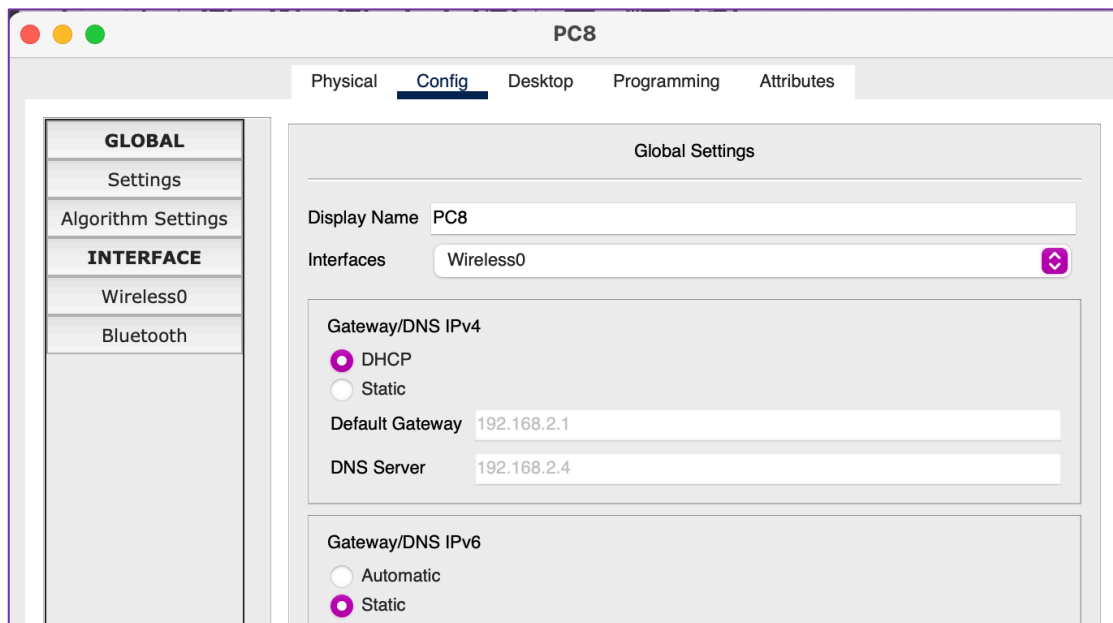
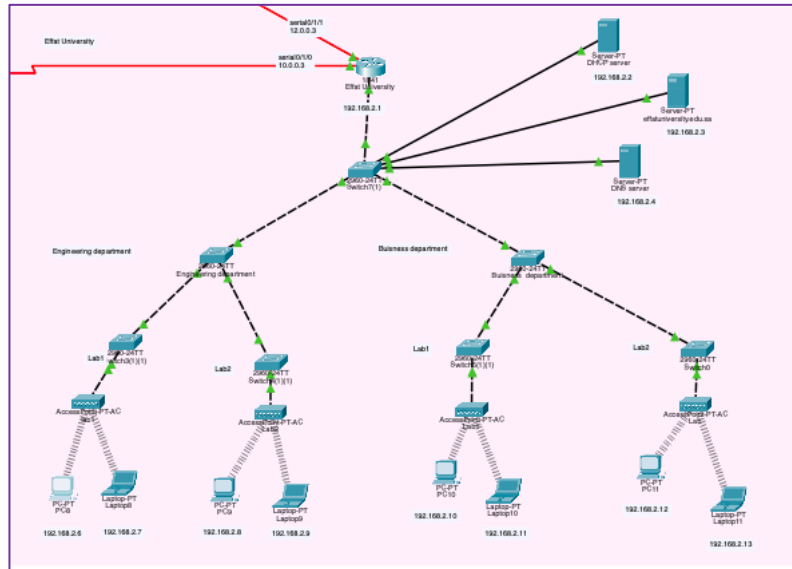
Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168...	0.0.0.0	192.168...	255.255...	100	0.0.0.0	0.0.0.0

The screenshot shows the 'DHCP Server' configuration window with the 'Config' tab selected and 'Global Settings' chosen. The 'Display Name' is 'DHCP Server'. Under 'Gateway/DNS IPv4', the 'Static' option is selected. The 'Default Gateway' is set to 192.168.1.1. The 'DNS Server' field is empty.

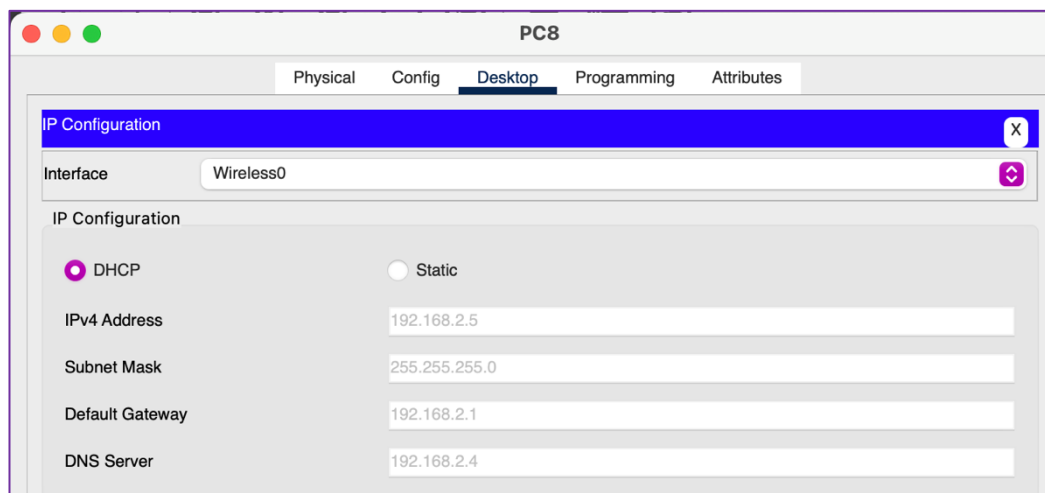
The screenshot shows the 'DHCP Server' configuration window with the 'Config' tab selected and 'FastEthernet0' chosen. The 'Port Status' is 'On'. The 'Bandwidth' is set to 'Auto'. The 'Duplex' is set to 'Full Duplex' and 'Auto'. The 'MAC Address' is 0001.97A7.2BB0. Under 'IP Configuration', the 'Static' option is selected. The 'IPv4 Address' is 192.168.1.2 and the 'Subnet Mask' is 255.255.255.0.

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Second LAN



Configuration from one of the PCs in the second LAN



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Link Information
Connect
Profiles

Below is a list of available wireless networks. To search for more wireless networks, click the **Refresh** button. To view more information about a network, select the wireless network name. To connect to that network, click the **Connect** button below.


Wireless Network Name	CH	Signal
AP1	1	55%
AP2	1	55%
AP4	1	55%
Ap3	1	55%

Site Information

Wireless Mode Infrastructure
Network Type Mixed B/G/N
Radio Band Auto
Security WEP
MAC Address 00D0.9771.CEBE

Refresh
Connect

2.4GHz



Adapter is Active

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. **WPC300N**


Link Information
Connect
Profiles

Back
Statistics
Save to Profile


Wireless Network Status

Radio Band	20MHz	Network Type	Mixed B/G/N
Wireless Network Name	AP1	IP Address	192.168.2.5
Wireless Mode	Infrastructure	Subnet Mask	255.255.255.0
Wide Channel	N/A	Default Gateway	192.168.2.1
Standard Channel	1 - 2.412GHz	DNS1	192.168.2.4
Security	WEP	MAC Address	00D0.9771.CEBE
Authentication	Auto		


Signal Strength



Link Quality



2.4GHz




Adapter is Active

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. **WPC300N**

Link Information
Connect
Profiles

More Information
Infrastructure Mode

You have successfully connected to the access point



Signal Strength



Link Quality



2.4GHz

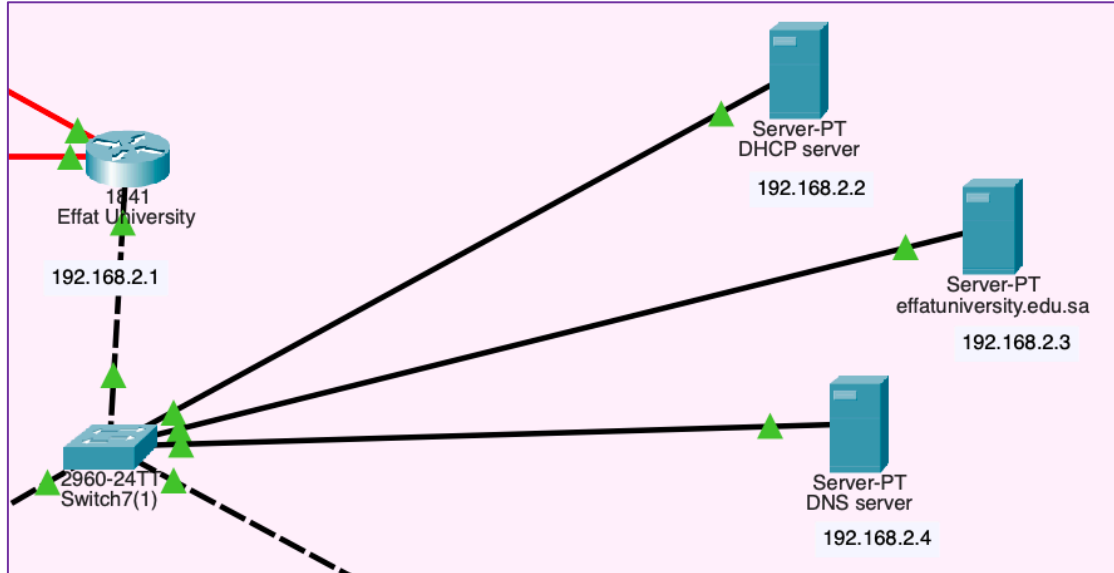


Adapter is Active

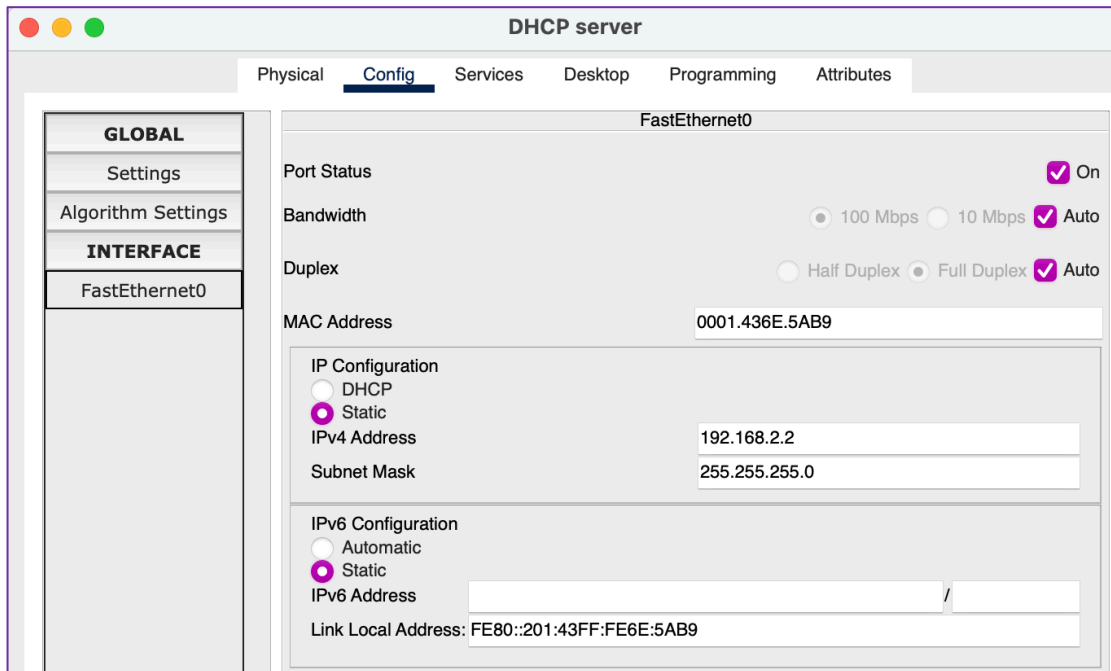
Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. **WPC300N**

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Servers room



DHCP server



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The screenshot shows the 'DHCP server' configuration window with the 'Services' tab selected. The left sidebar lists various services, with 'DHCP' highlighted. The main area shows the configuration for the 'serverPool' on the 'FastEthernet0' interface. The 'Service' is set to 'On'. The configuration includes a Default Gateway of 192.168.2.1, a DNS Server of 192.168.2.4, and a Start IP Address of 192.168.2.5 with a Subnet Mask of 255.255.255.0. The Maximum Number of Users is set to 8. There are 'Add', 'Save', and 'Remove' buttons at the bottom. A table below the form lists the configuration details for the 'serverPool'.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168...	192.168...	192.168...	255.255...	8	0.0.0.0	0.0.0.0

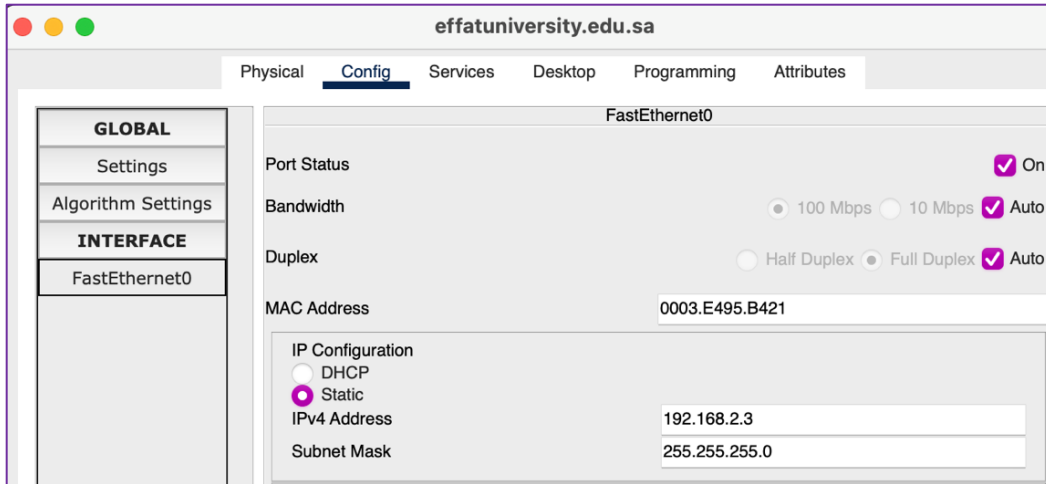
DHCP server configuration

The screenshot shows the 'DHCP server' configuration window with the 'Config' tab selected. The left sidebar shows 'GLOBAL' settings, with 'Settings' highlighted. The main area shows 'Global Settings' for the 'DHCP server'. The 'Gateway/DNS IPv4' section has 'Static' selected. The 'Default Gateway' is set to 192.168.2.1 and the 'DNS Server' is set to 192.168.2.4.

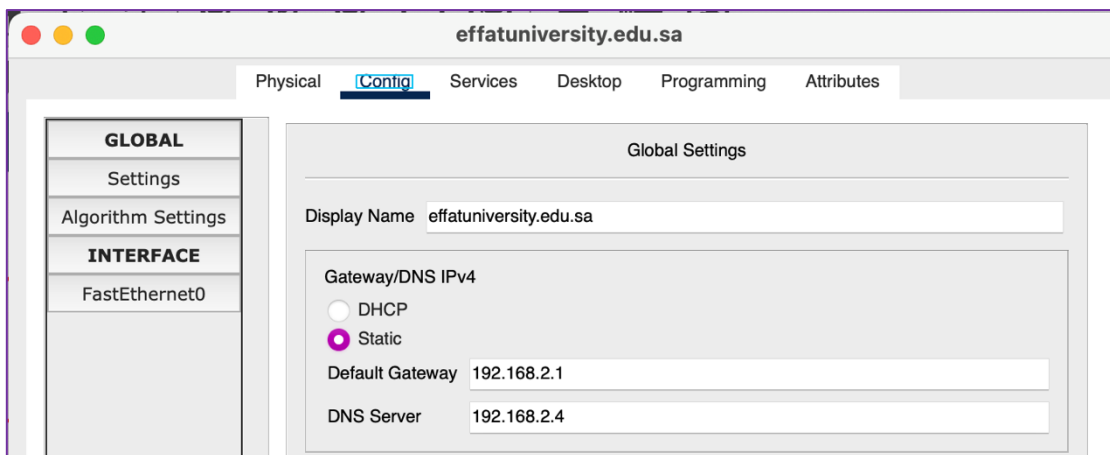
Set the default gateway

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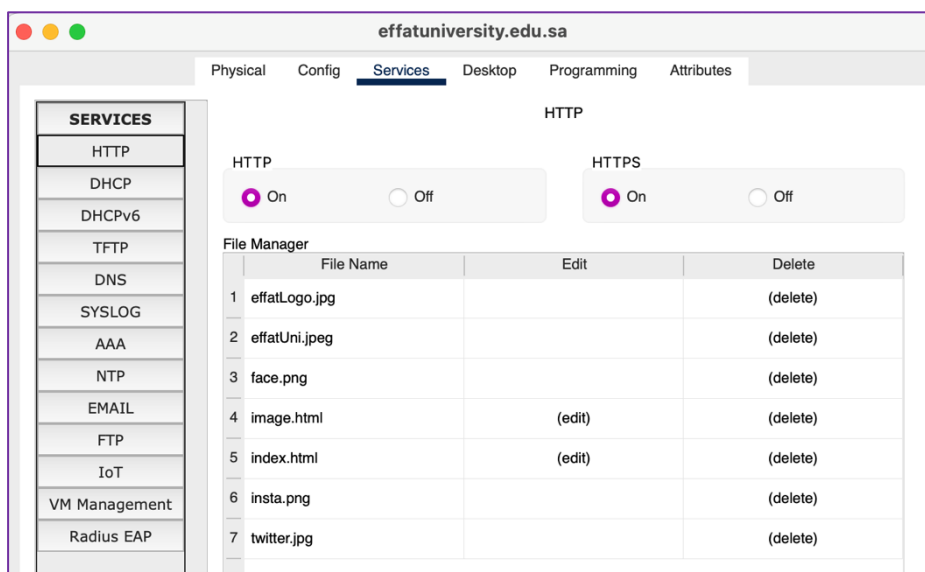
Website server



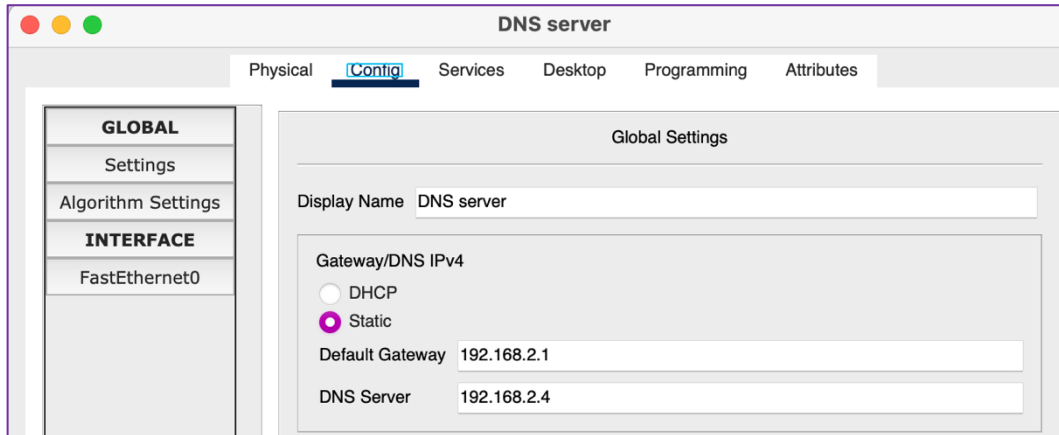
Website server configuration



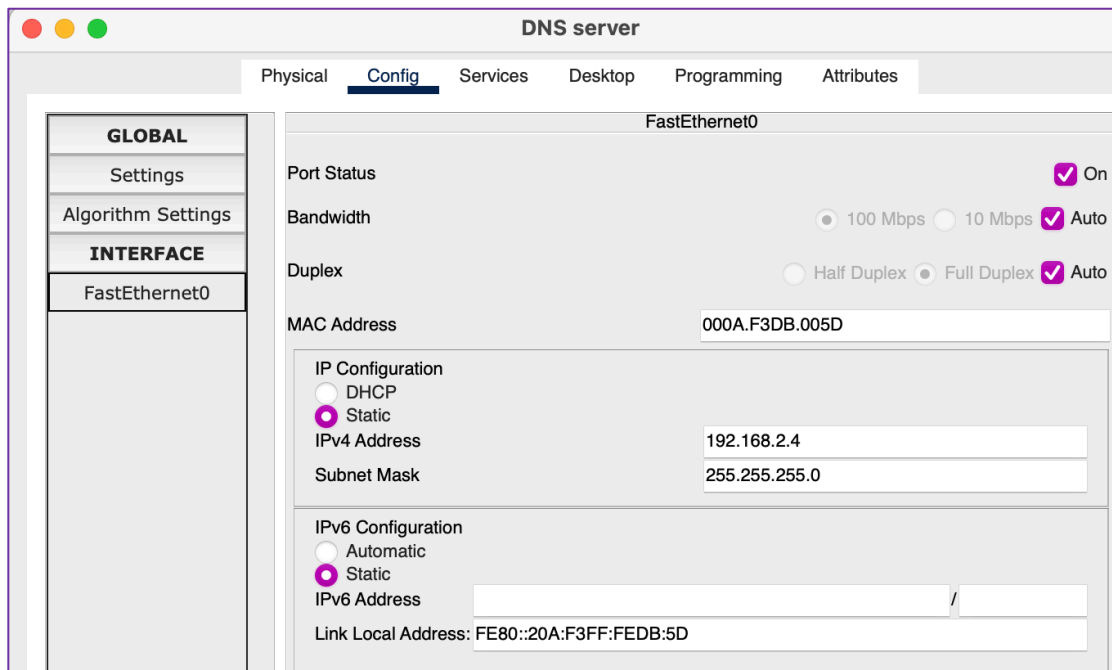
Set the default gateway



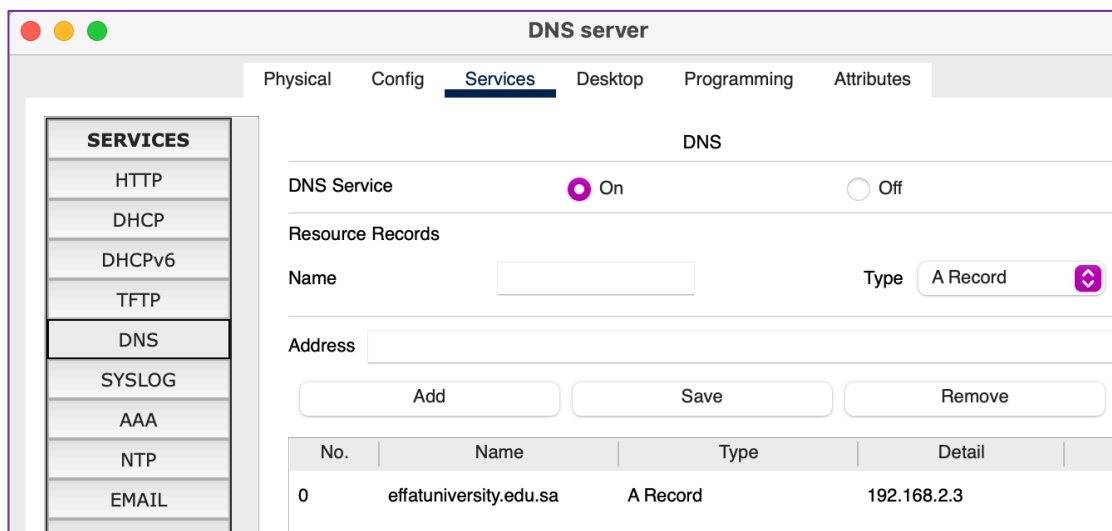
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Set the default gateway

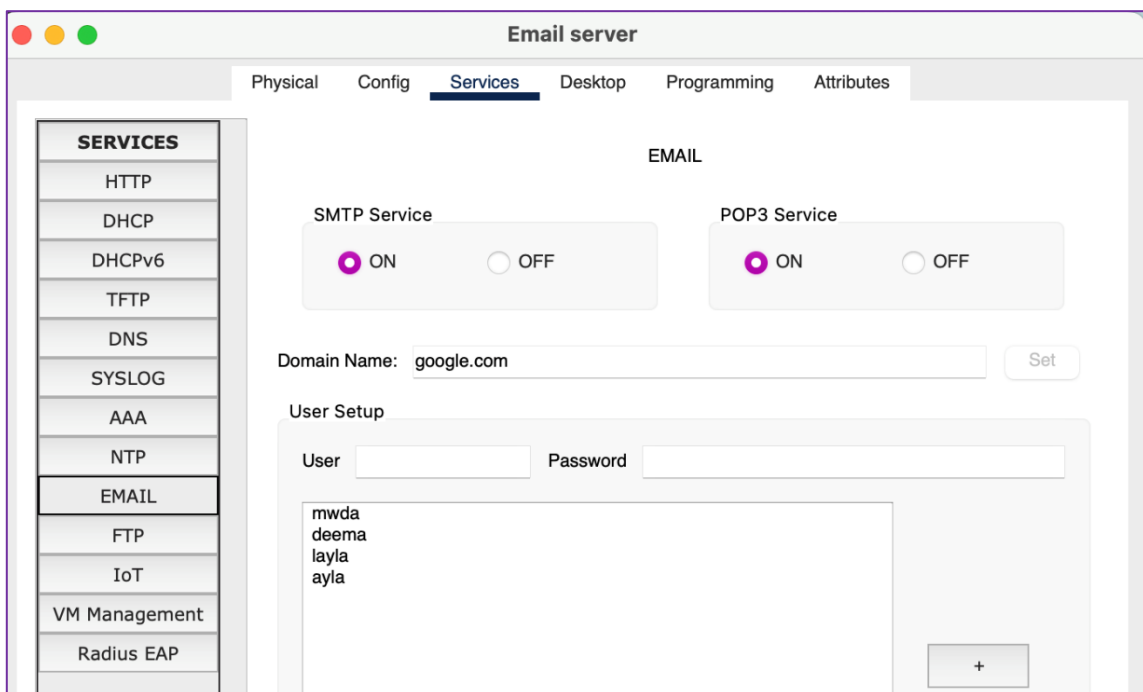
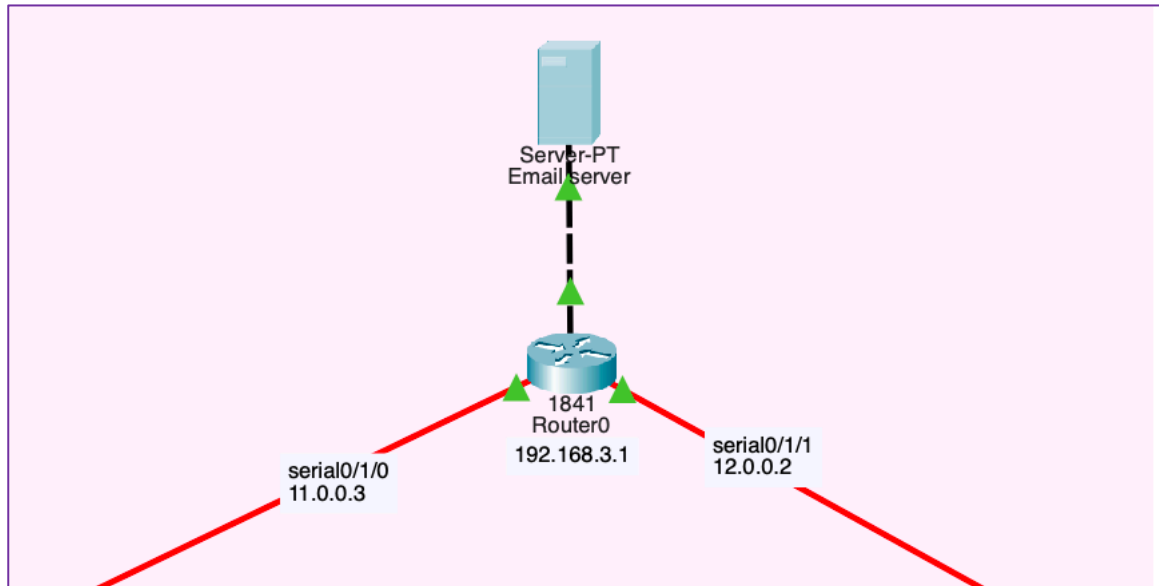


DNS server configuration



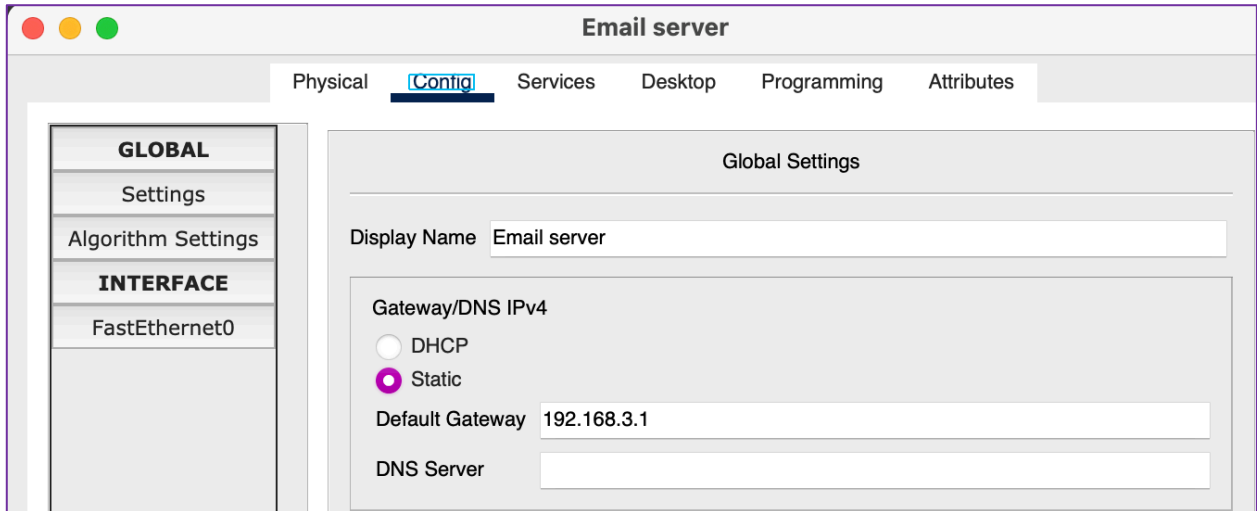
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Email server



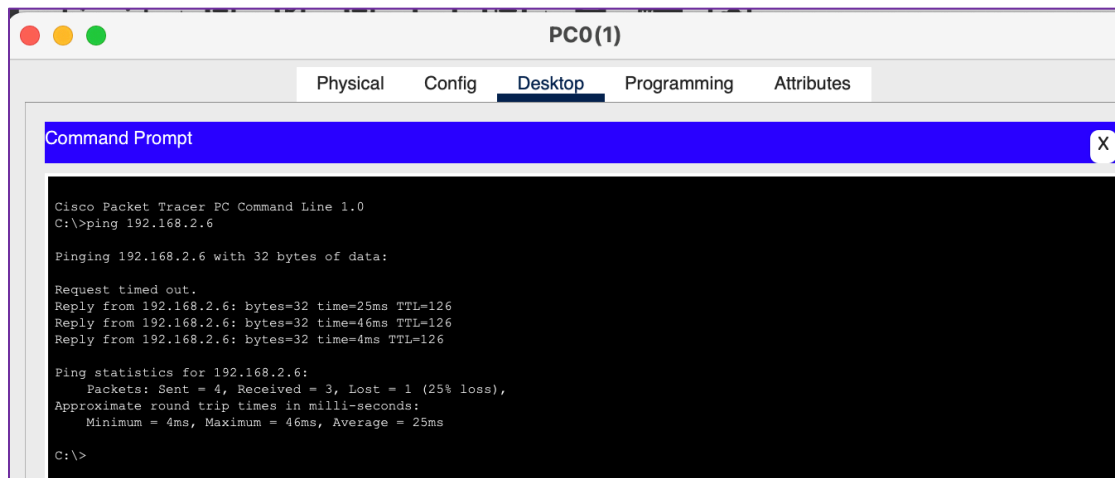
Configuration of the email server

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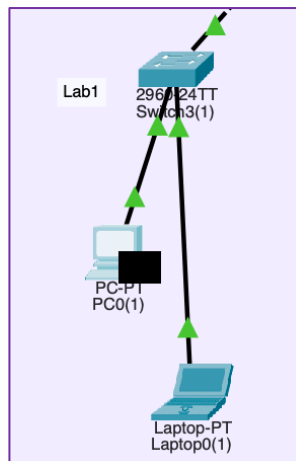


Set the default gateway as the IP address of the router

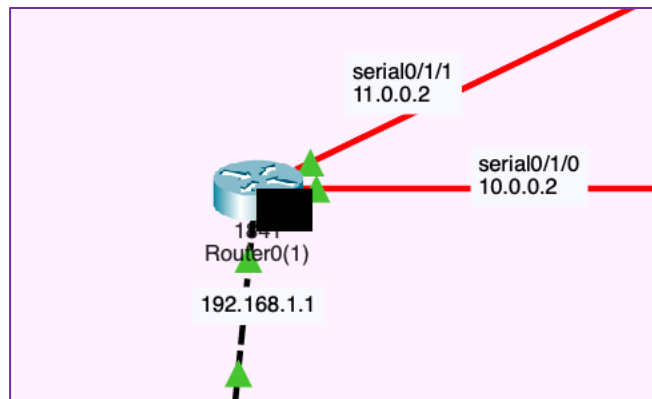
5. Screenshots demonstrating working of the network in packet tracer.



We want to ping from LAN 1 to a device in LAN2 (PC0 to PC8)



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The packet reached to the router successfully

PDU Information at Device: Router0(1)

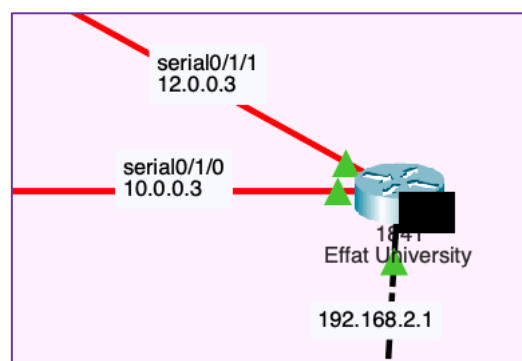
OSI Model Inbound PDU Details Outbound PDU Details

At Device: Router0(1)
Source: PC0(1)
Destination: 192.168.2.6

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 192.168.1.8, Dest. IP: 192.168.2.6 ICMP Message Type: 8	Layer 3: IP Header Src. IP: 192.168.1.8, Dest. IP: 192.168.2.6 ICMP Message Type: 8
Layer 2: Ethernet II Header 0060.70C5.24C5 >> 0001.63D3.86CC	Layer 2: HDLC Frame HDLC
Layer 1: Port FastEthernet0/0	Layer 1: Port(s): Serial0/1/0

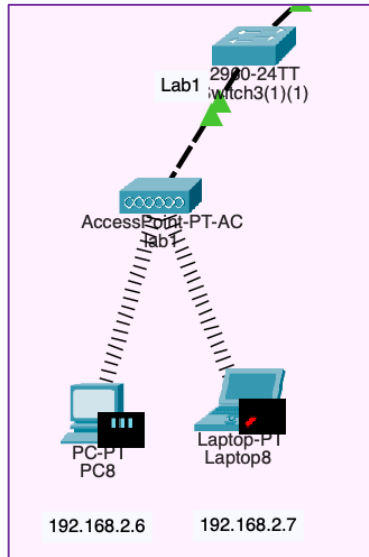
- The routing table finds a routing entry to the destination IP address.
- The destination network can be reached via 10.0.0.3.
- The device decrements the TTL on the packet.

PDU of the packet



The packet reached to the router of the second LAN

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Packet reached to PC8

PDU Information at Device: PC8

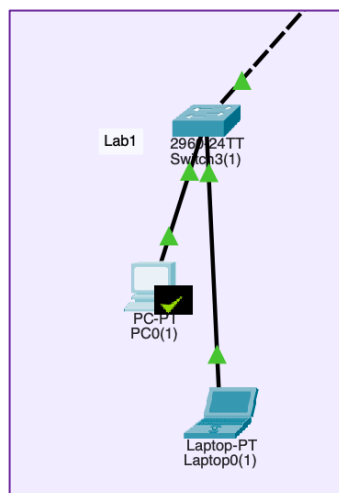
OSI Model Outbound PDU Details

At Device: PC8
Source: PC0(1)
Destination: 192.168.2.6

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer3	Layer3
Layer2	Layer2
Layer1	Layer 1: Port(s): Wireless0

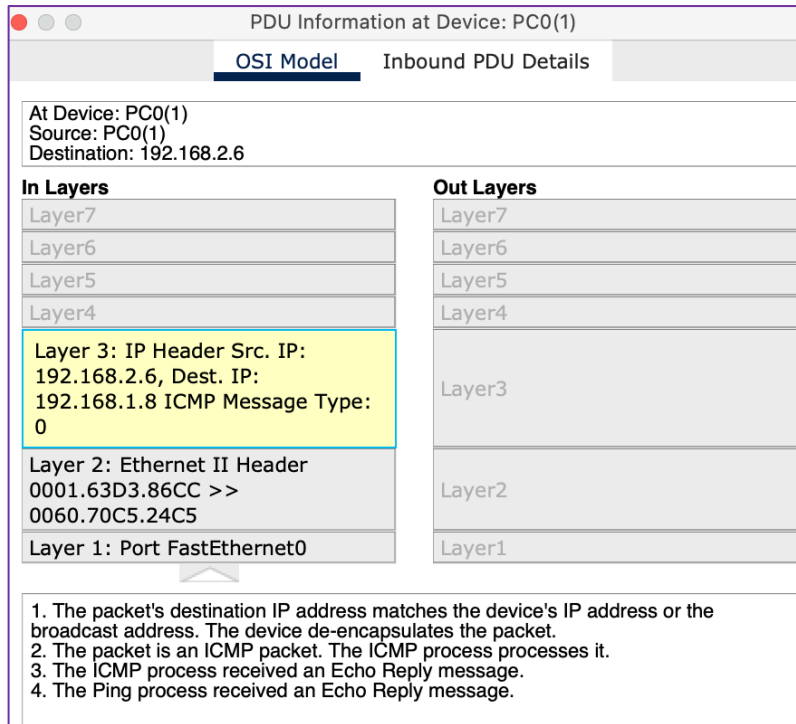
1. The device takes out this frame from the buffer and sends it.
2. Wireless0 sends out the frame.

PDU of the packet



Acknowledgment sent to PC1

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PDU Information at Device: PC0(1)

OSI Model Inbound PDU Details

At Device: PC0(1)
Source: PC0(1)
Destination: 192.168.2.6

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 192.168.2.6, Dest. IP: 192.168.1.8 ICMP Message Type: 0	Layer3
Layer 2: Ethernet II Header 0001.63D3.86CC >> 0060.70C5.24C5	Layer2
Layer 1: Port FastEthernet0	Layer1

1. The packet's destination IP address matches the device's IP address or the broadcast address. The device de-encapsulates the packet.
2. The packet is an ICMP packet. The ICMP process processes it.
3. The ICMP process received an Echo Reply message.
4. The Ping process received an Echo Reply message.

PDU of the packet that reached to PC1

6. Any other content needed. Refer to the project grading rubric for further details.