

# COMPUTER NETWORK

Presented by: Group 3



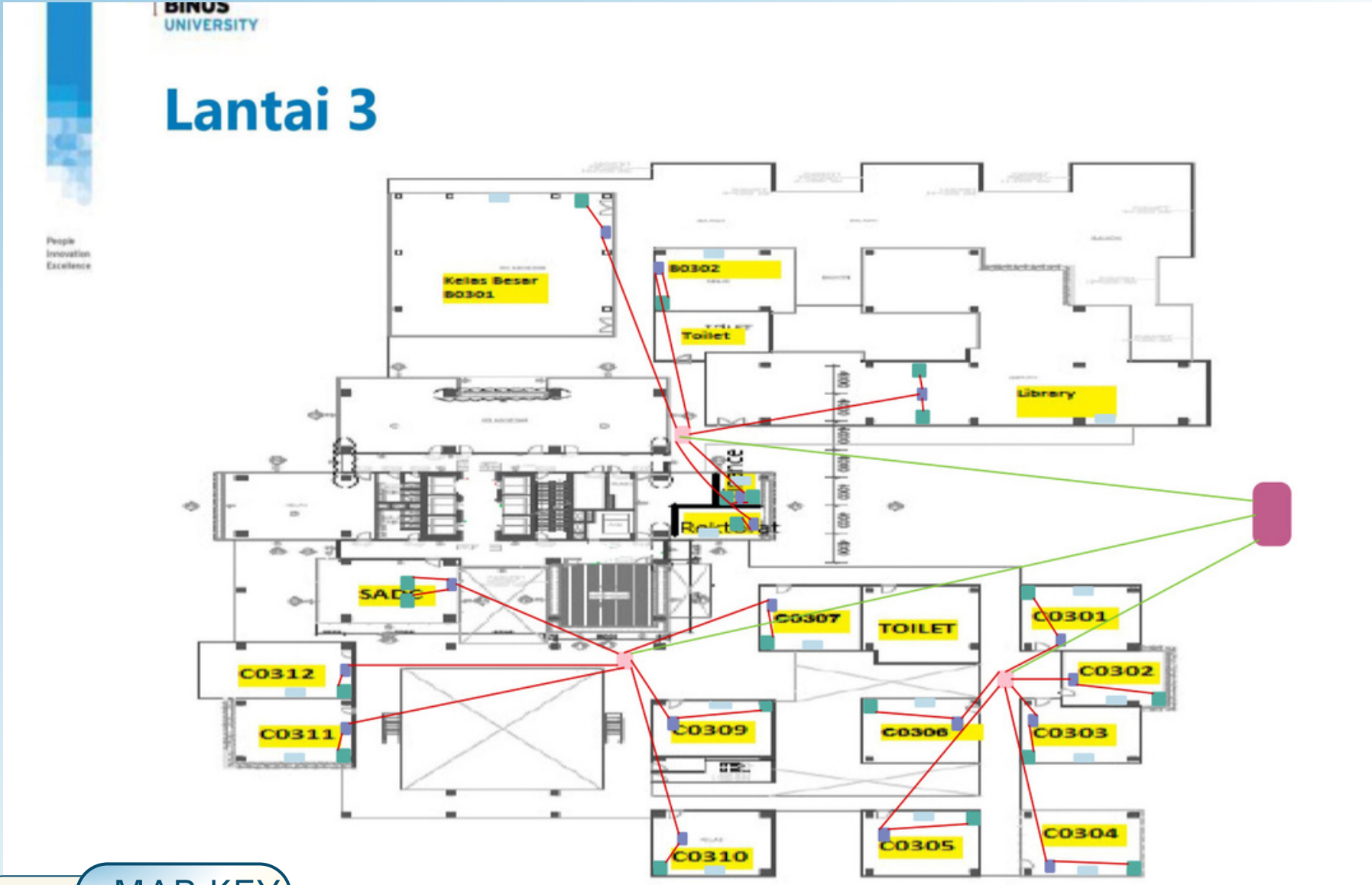
# FLOORS

- 3rd Floor
- 5th Floor
- 6th Floor

- In each room, we connect the computer to a switch.
- In each floor, we connect all the switch using a router.
- To connect each floor, we use a router.



# 3RD FLOOR LAYOUT



MAP KEY

■

 PC

■

 Wifi

■

 Switch

■

 Router

■

 Router connecting between floors

KELAS BESAR B0301  
(1 COMPUTER)

- 1X Switch
- Cable

B0302 (1 COMPUTER)

- 1X Switch
- Cable

C0308(1 COMPUTER)

- 1X Switch
- Cable

C0309(1 COMPUTER)

- 1X Switch
- Cable

C0310(1 COMPUTER)

- 1X Switch
- Cable

SADC (2 COMPUTER)

- 1X Switch
- Cable

REKTORAT (1 COMPUTER)

- 1X Switch
- Cable

LIBRARY (2 COMPUTERS)

- 1X Switch
- Cable

C0307(1 COMPUTER)

- 1X Switch
- Cable

C0306(1 COMPUTER)

- 1X Switch
- Cable

C0305(1 COMPUTER)

- 1X Switch
- Cable

C0304(1 COMPUTER)

- 1X Switch
- Cable

FINANCE (2 COMPUTERS)

- 1X Switch
- Cable

C0302(1 COMPUTER)

- 1X Switch
- Cable

CO303(1 COMPUTER)

- 1X Switch
- Cable

CO302(1 COMPUTER)

- 1X Switch
- Cable

CO301(1 COMPUTER)

- 1X Switch
- Cable

FLOOR

- 1X Router

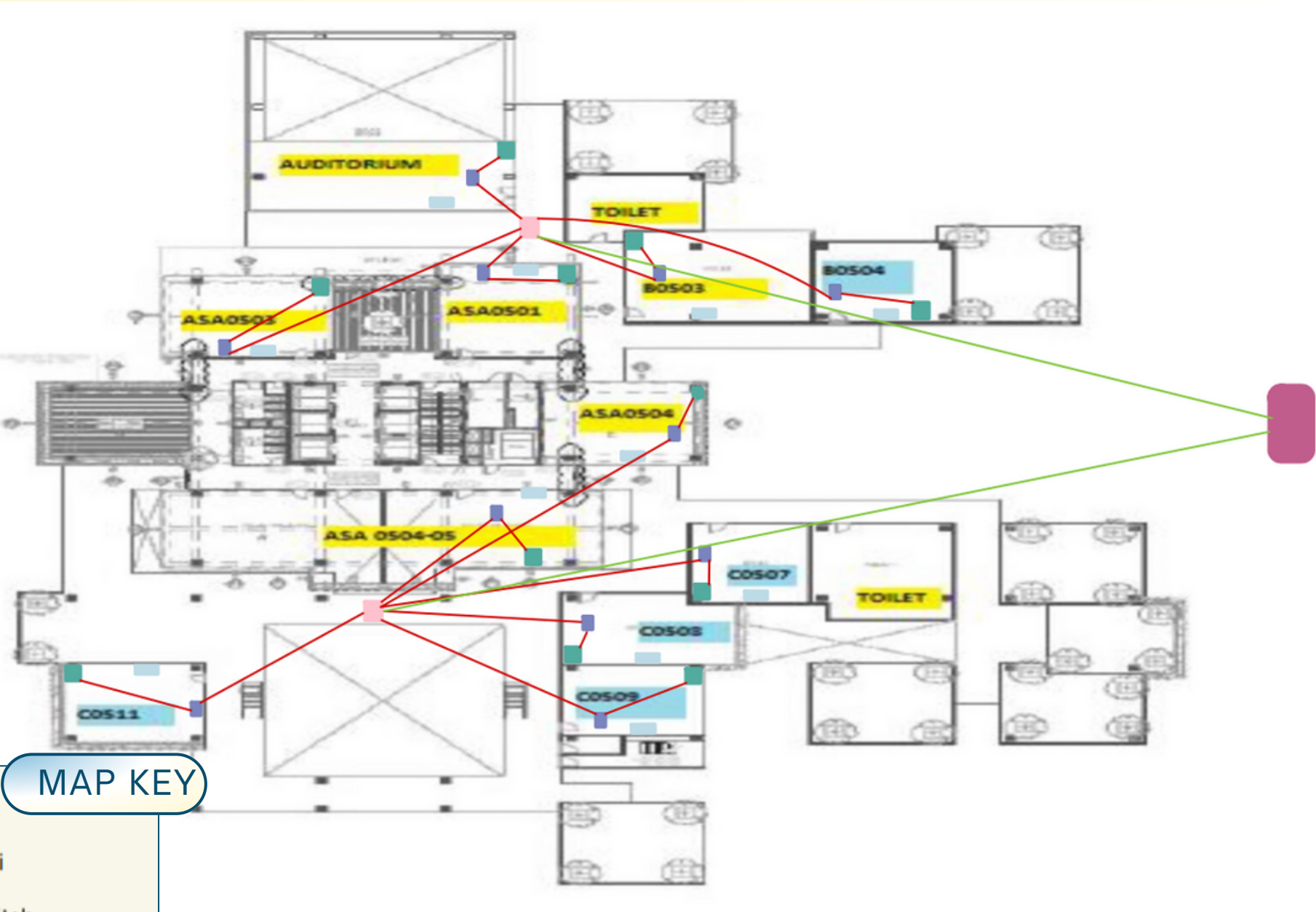
TOTAL

- 17X Switch
- 4X Router
- 200 M UTP Cable





# 5TH FLOOR LAYOUT



MAP KEY

■

 PC

■

 Wifi

■

 Switch

■

 Router

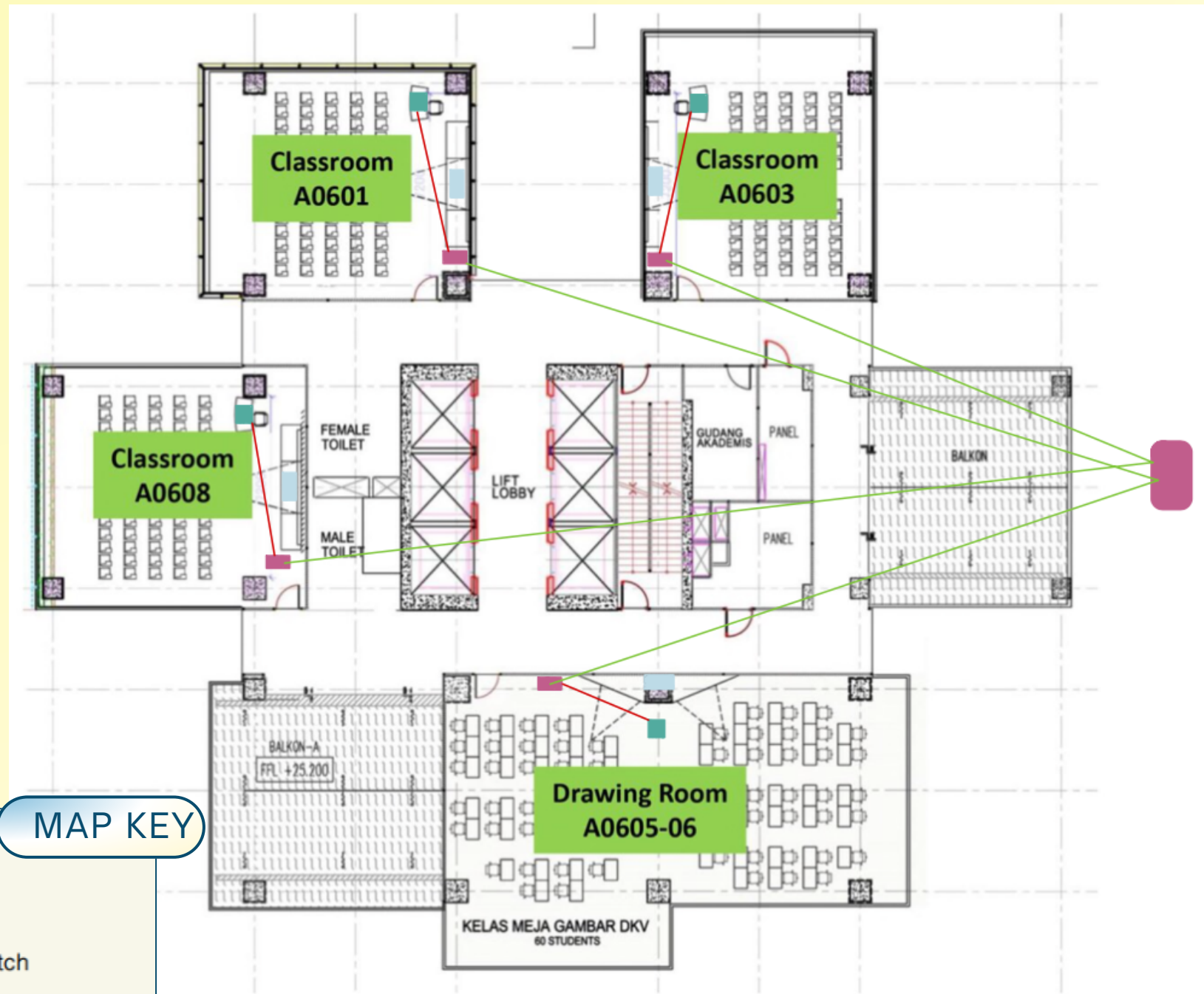
■

 Router connecting between floors

AUDITORIUM (1 COMPUTER)	B0503 (1 COMPUTER)	COS11 (1 COMPUTER)
<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>
ASA0501 (1 COMPUTER)	B0504 (1 COMPUTER)	FLOOR
<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Router</li></ul>
ASA0503 (1 COMPUTER)	C0507 (1 COMPUTER)	TOTAL
<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 11X Switch</li><li>• 3X Router</li><li>• 150 M UTP Cable</li></ul>
ASA0504 (1 COMPUTER)	C0508 (1 COMPUTER)	
<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	
ASA0504-05 (1 COMPUTER)	C0509 (1 COMPUTER)	
<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	<ul style="list-style-type: none"><li>• 1X Switch</li><li>• Cable</li></ul>	



# 6TH FLOOR LAYOUT



## MAP KEY

- PC
- Wifi
- Switch
- Router
- Router connecting between floors

### CLASSROOM A0601 (1 COMPUTER)

- 1X Switch
- Cable

### CLASSROOM A0603 (1 COMPUTER)

- 1X Switch
- UTP Cable

### CLASSROOM A0608 (1 COMPUTER)

- 1X Switch
- UTP Cable

### DRAWING ROOM A0605-06 (1 COMPUTER)

- 1X Switch
- UTP Cable

### FLOOR

- 1X Router

### TOTAL

- 4X Switch
- 1X Router
- 100 M UTP Cable



# PRICE LISTING

Below are the price for the cables, switch, and router:



## Cable UTP

*Price of UTP Cable per 20 meters: Rp 39.000*

*Price of total 450 meters: Rp 877.500*



## Switch

*Price of a Switch 4 Port:  
Rp 350.000*



## Router

*Price per router: Rp 169.999*

*Price of total 8X router: Rp 1.359.992*

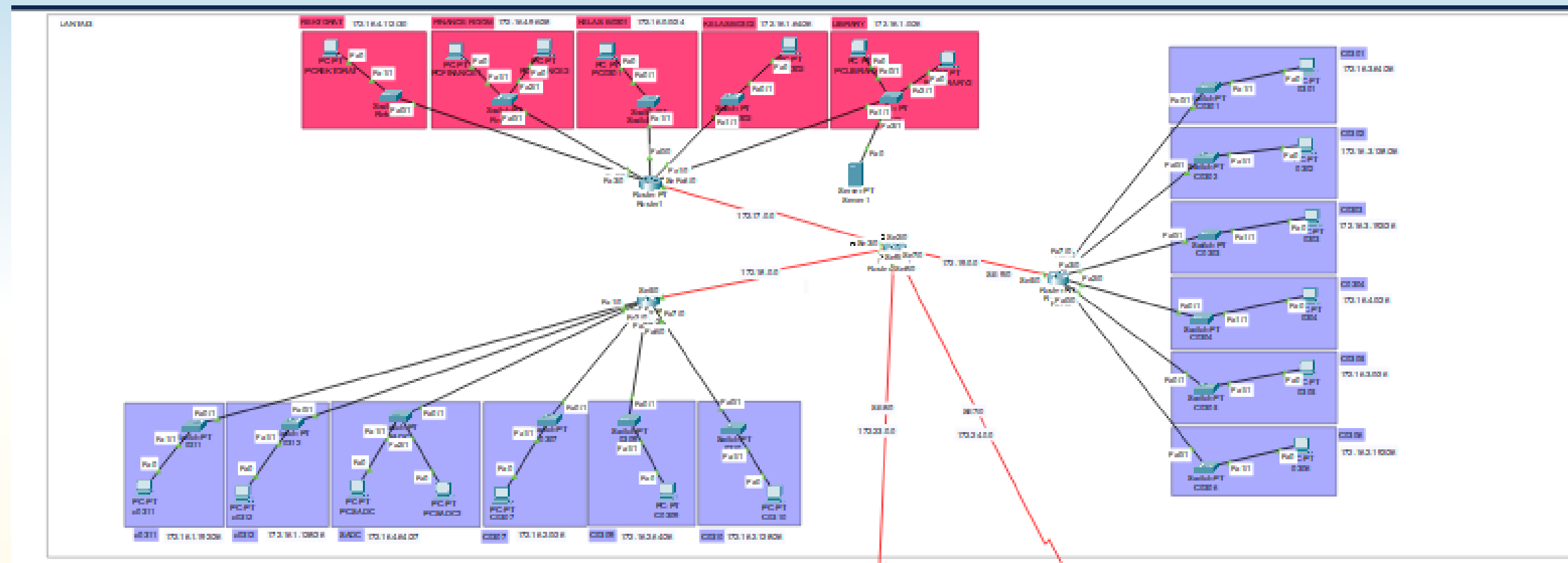




# LAYER 1 - PHYSICAL LAYER



# 3RD FLOOR



## TOTAL ROOMS

- 13 Classrooms
- 1 Finance room
- 1 Library room
- 1 Rektorat room
- 1 SADC

## UTP CABLE

Cable length: 200 m

Price:  
200 m X Rp39.000/20 m = **Rp390.000**





# 5TH FLOOR

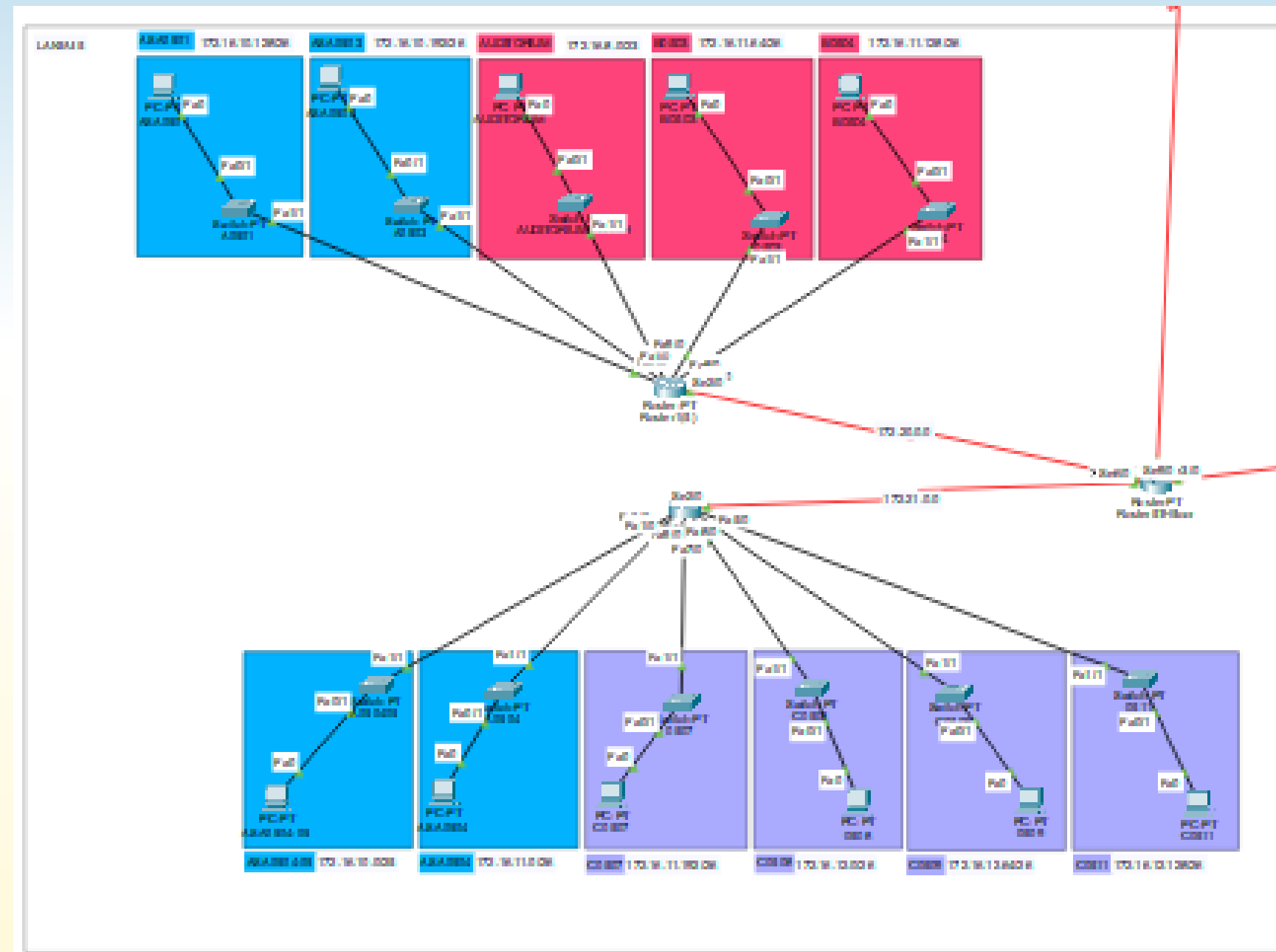
## TOTAL ROOMS

- 10 classrooms
- 1 Auditorium

## UTP CABLE

Cable length: 150 m

Price:  
160 m X Rp39.000/20 m = **Rp312.000**





# 6TH FLOOR

## TOTAL ROOMS



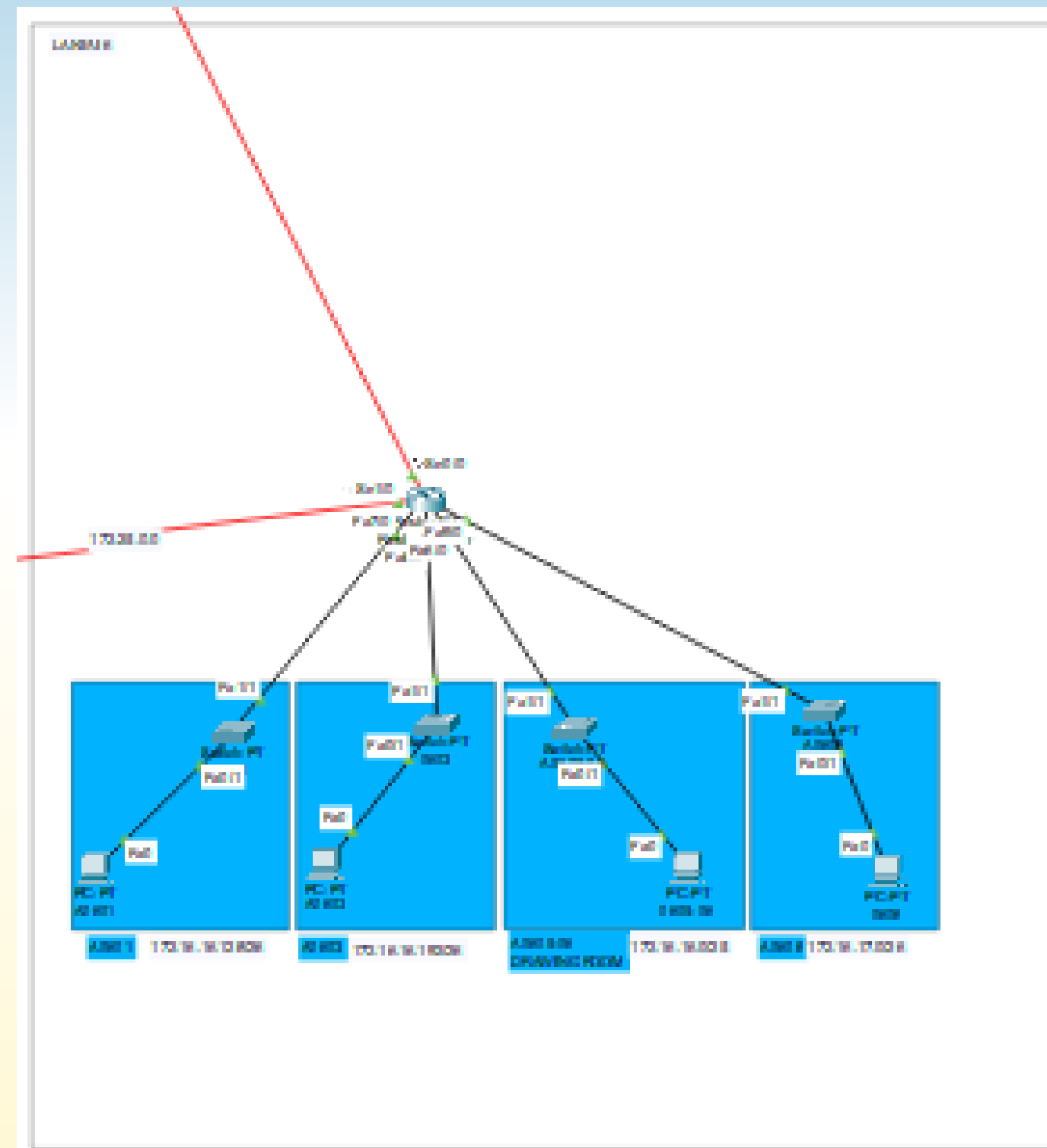
- 3 Classrooms
- 1 Drawing Room

## UTP CABLE



Cable length: 100 m

Price:  
100 m X Rp39.000/20 m = **Rp195.000**





- Type of cable: UTP Cable Cat6E
  - Accessible, affordable, reliable twisted pair cable
- Total Cable Length: 450m
- Total Price: Rp 877.500

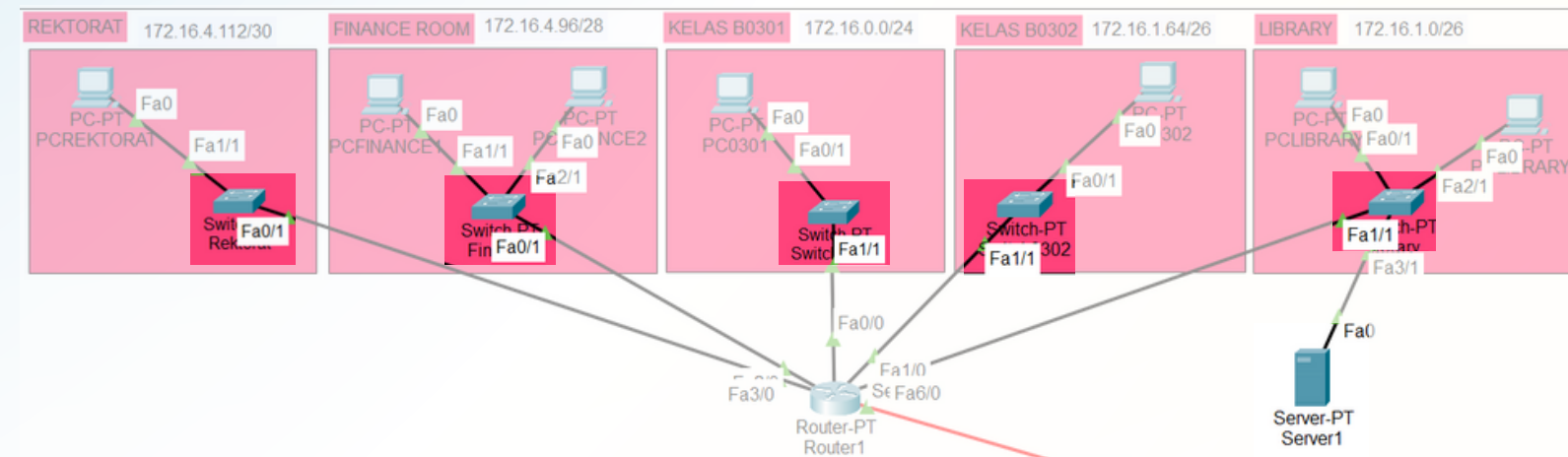


# **LAYER 2 - DATA LINK LAYER**





- Each room has only 1 switch
- 4-port switch (each room has max. 2 PCs)
- Rp 350.000





# FLOOR DETAILS

## 3rd Floor



17 rooms  
|  
17 switches

Total Price:  
**Rp 5.590.000**

## 5th Floor



11 rooms  
|  
11 switches

Total Price:  
**Rp 3.850.000**

## 6th Floor



4 rooms  
|  
4 switches

Total Price:  
**Rp 1.400.000**

## Total Switch & Price



Total Switch: 32 4-Port Switch  
Total Price: **Rp 11.200.000**



# LAYER 3 - NETWORK LAYER



# FLOOR DETAILS

## 3rd Floor



We use 4 routers on the 3rd floor. 3 routers are divided based on the proximity of each router to the classes, and these 3 routers are connected to 1 main router for the 3rd floor, which will be used to connect to other floors. By dividing the entire floor using 3 routers, we can reduce delays and waiting times when passing or delivering messages between devices and increase efficiency.

Total Price for 4 Routers:  
**Rp 679.996**

## 5th Floor



There are 3 routers on the fifth floor, with two of them divided based on the proximity to the classes and 1 main router to connect the 2 routers. This main router is used for communication between floors

Total Price for 3 Routers:  
**Rp 509.997**

## 6th Floor



On the sixth floor, there are only four classes close to each other. We use just one router for these classes and also to connect between floors. Since the distance is short, even with only one router, there will be minimal interference

Total Price for 1 Router:  
**Rp 169.999**

## Total Router & Price



Total Router: 8 Routers  
Total Price: **Rp 1.359.992**





# IP ADDRESSES



- Class B
  - Hosts a big amount of devices.
  - Allocate extra IP addresses.
- Private addresses
  - Safer for sharing information among devices and PCs



## OBTAINING IP ADDRESS



Starting IP Address of each floor (FLSM)

Floor with most devices: Floor 5, 1400 devices

$$2^n - 3 \geq 1400$$

$$2^{11} - 3 \geq 1400$$

$$n = 11$$

$$32 - 11 = 21$$

\* $2^n - 3 \rightarrow -3$ : NA, BA, Default Gateway

The subnet mask is /21.



## STARTING IP ADDRESS



Third floor: 172.16.0.0/21  
Fifth floor: 172.16.8.0/21  
Sixth floor: 172.16.16.0/21



# STATIC ROUTING

## USAGE

*Static routing is done to connect  
all devices between different  
floors.*

### Third Floor:

Destination	Next Hop
Fifth floor	172.23.0.1
Sixth floor	172.24.0.2

### Fifth Floor:

Destination	Next Hop
Third floor	172.23.0.2
Sixth floor	172.25.0.2

### Sixth Floor:

Destination	Next Hop
Third floor	172.24.0.1
Fifth floor	172.25.0.1





# **LAYER 4 - TRANSPORT LAYER**



# BENEFITS OF 4TH LAYER

The 4th layer is the transport layer, it is responsible for providing communication means between the network layer and the application layer. Besides that, the 4th layer also provides several services such as:

- Error Control
- Sequence Control
- Loss control
- Duplication control
- Flow control
- Multiplexing
- Many more

# TCP AND UDP PROTOCOLS

The two main protocols we will use for our transportation layer will be TCP and UDP. Two of these protocols will establish communication between application layer and network layer, each with different methods.

## TCP

- Connection based
- Guaranteed complete delivery
- Able to retransmit lost data
- Uses 3 way handshake
- Slower than UDP

## UDP

- Connectionless based
- Cannot retransmit lost data
- Does not establish connection first
- Faster than TCP
- Prioritizes sending data real time over complete data

# PORTS

TCP and UDP both provides a connection from the network layer to the application layer. To do this, they also need to track activities in case several web pages are opened in one host. We can achieve this using ports.

Ports are divided into three ranges:

- Well known ports (0 - 1023)
- Registered ports (1024 - 49151)
- Dynamic or private ports (49152 - 65535)

For Binusmaya specific activities like authentication, etc. We can register our own ports to the registered ports range, we will automatically use the well known ports for common protocols like https, ftp, smtp, etc. And we will use dynamic ports for the rest



# SOCKET ADDRESS

After deciding the port number, we now have two identifiers, the IP Address, and the socket number. We can combine both the IP Address and the Port number to become a socket address

IP Address: 127.67.55.12

Port Number: 64

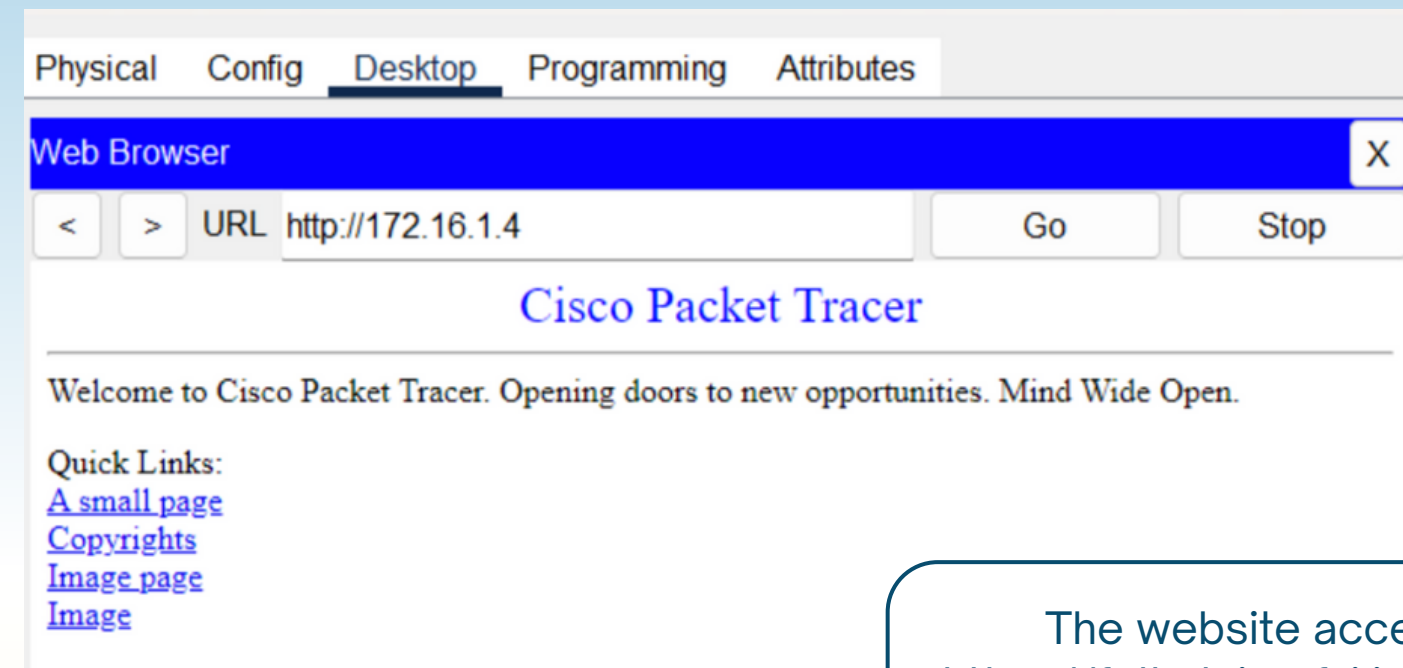
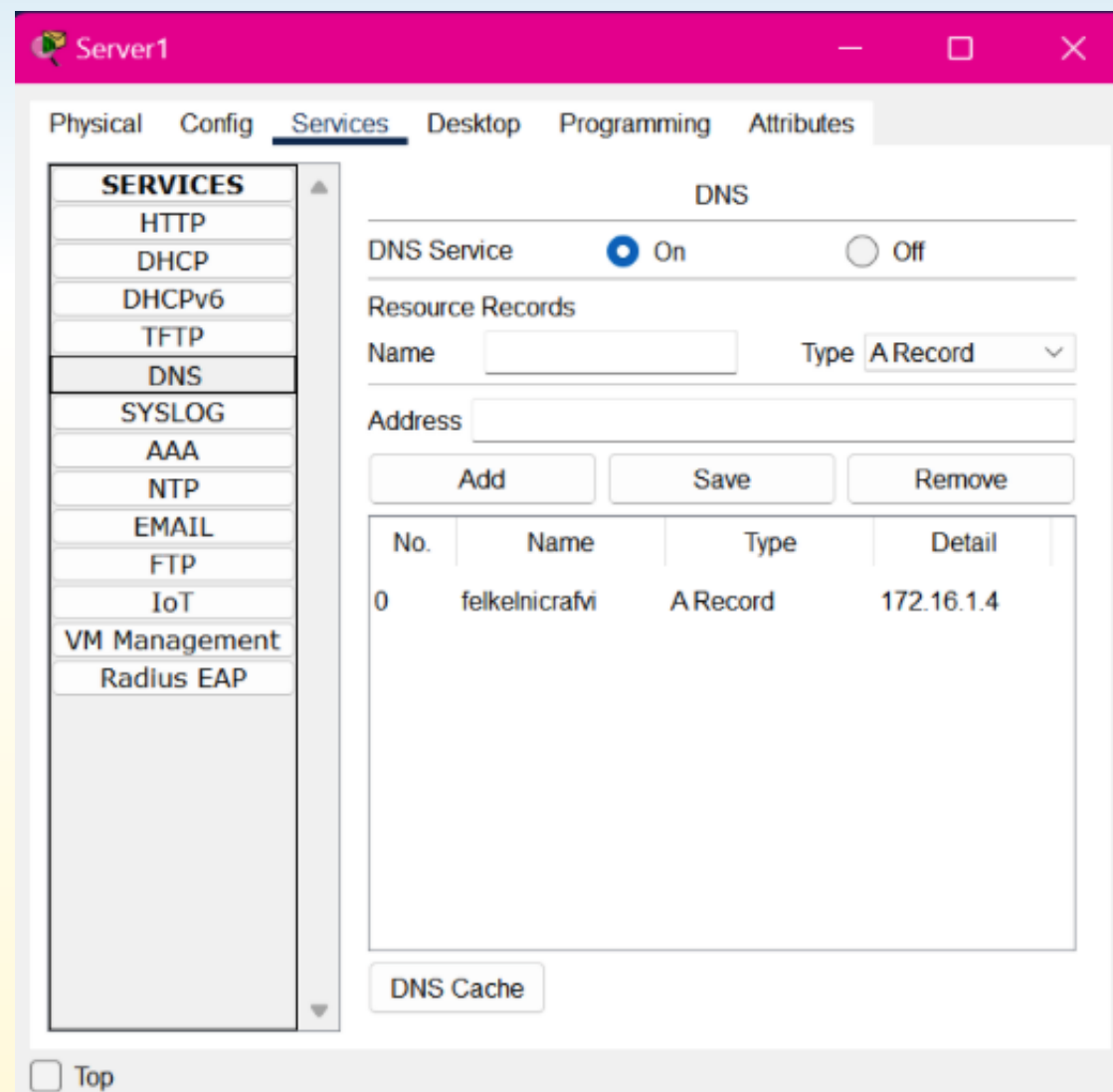
Socket Address: 127.67.55.12      64



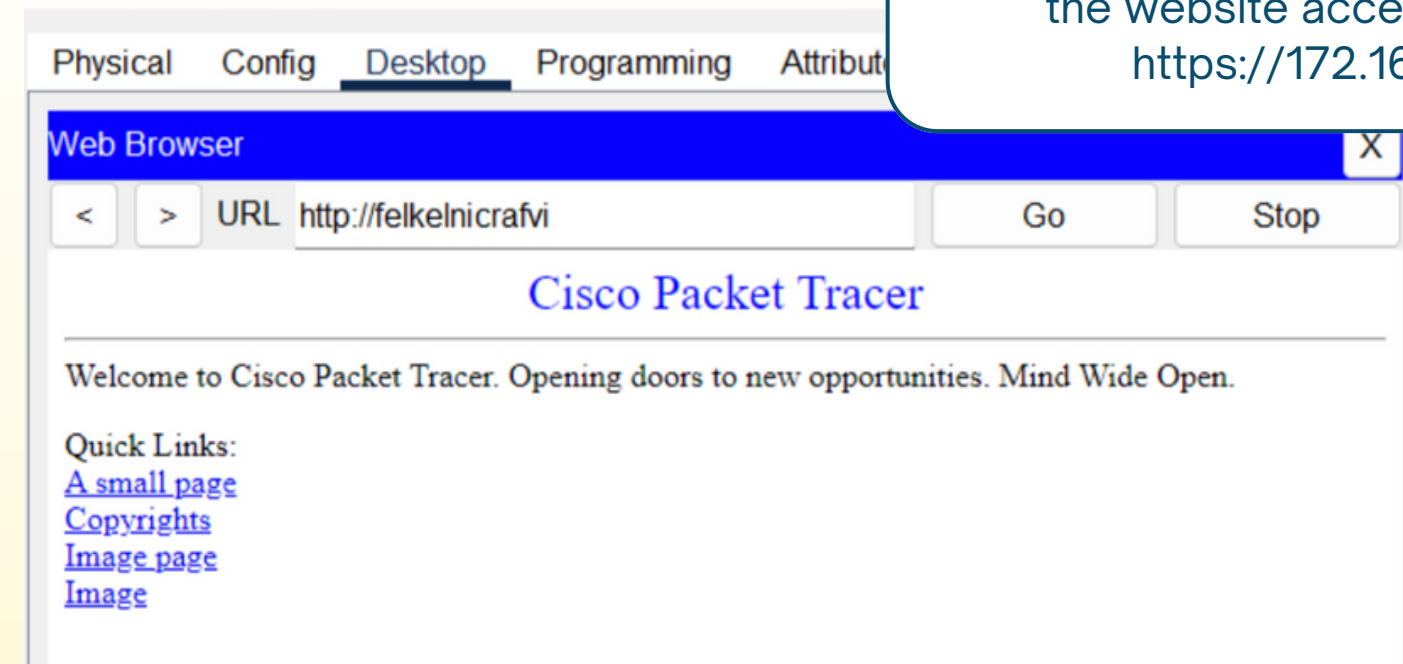
# LAYER 5 - APPLICATION LAYER

# DOMAIN NAME SERVER (DNS)

DNS translates domain names to readable IP addresses for the computer. We have established a DNS server for our AOL on the third floor, linked to the library room's switch.



The website accessed by <https://felkelnicrafvi> is the same as the website accessed by <https://172.16.1.4>

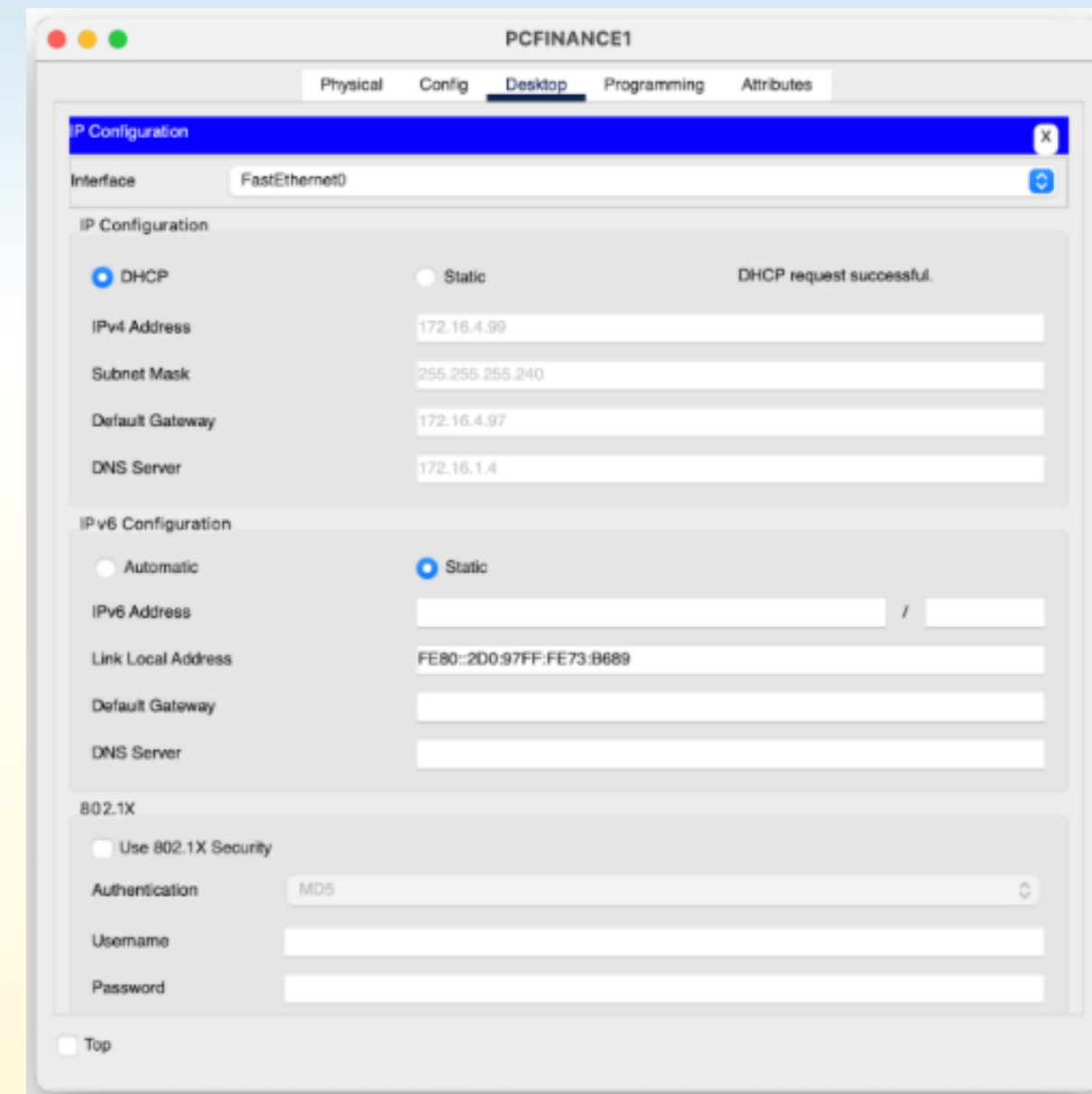


# DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

Dynamic Host Configuration Protocol (DHCP) is a network protocol that automatically assigns IP addresses and other network settings to devices on a network.

In our Cisco Packet Tracer, we can see a successful DHCP implementation in the image on the right, where the PC in the Finance room has been assigned the correct IP address.

While the image above provides a visual example, it's important to note that DHCP has been successfully implemented throughout the entire topology, not just for the PC in the Finance room.

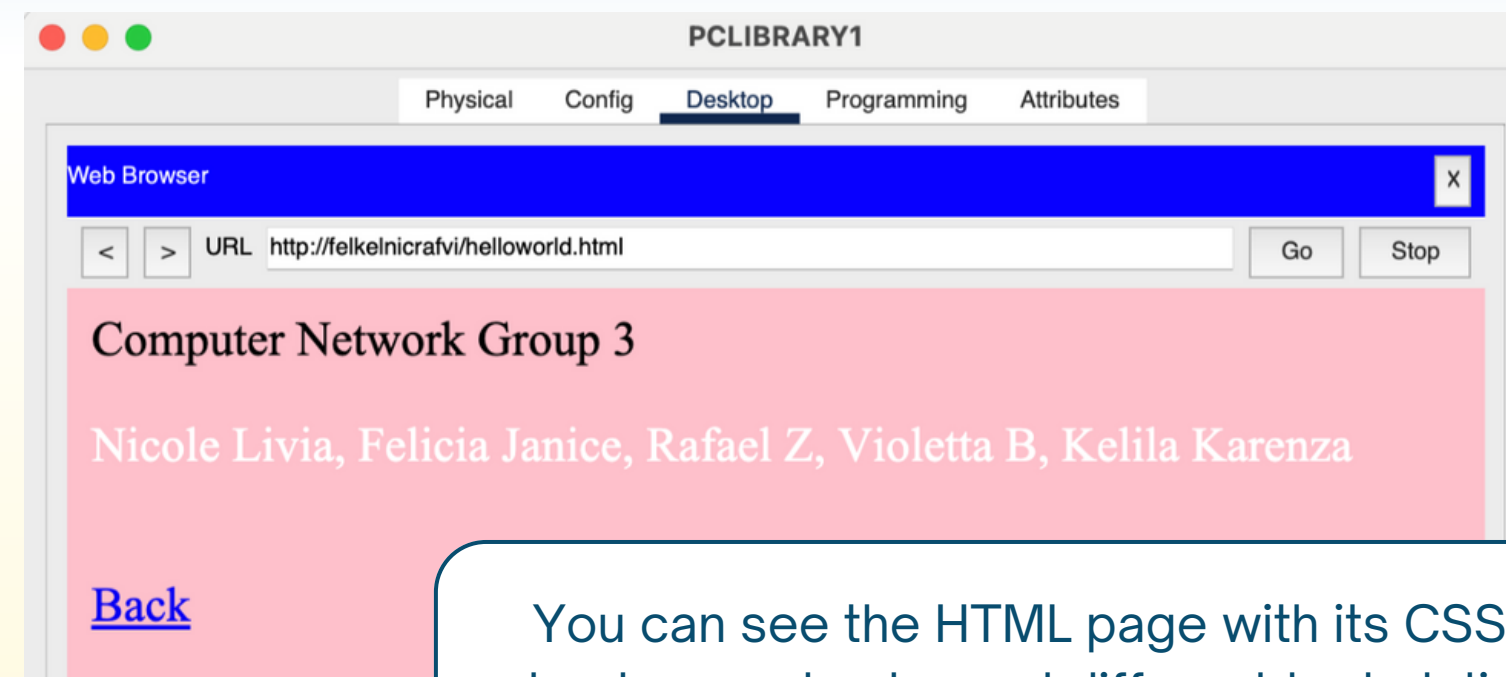
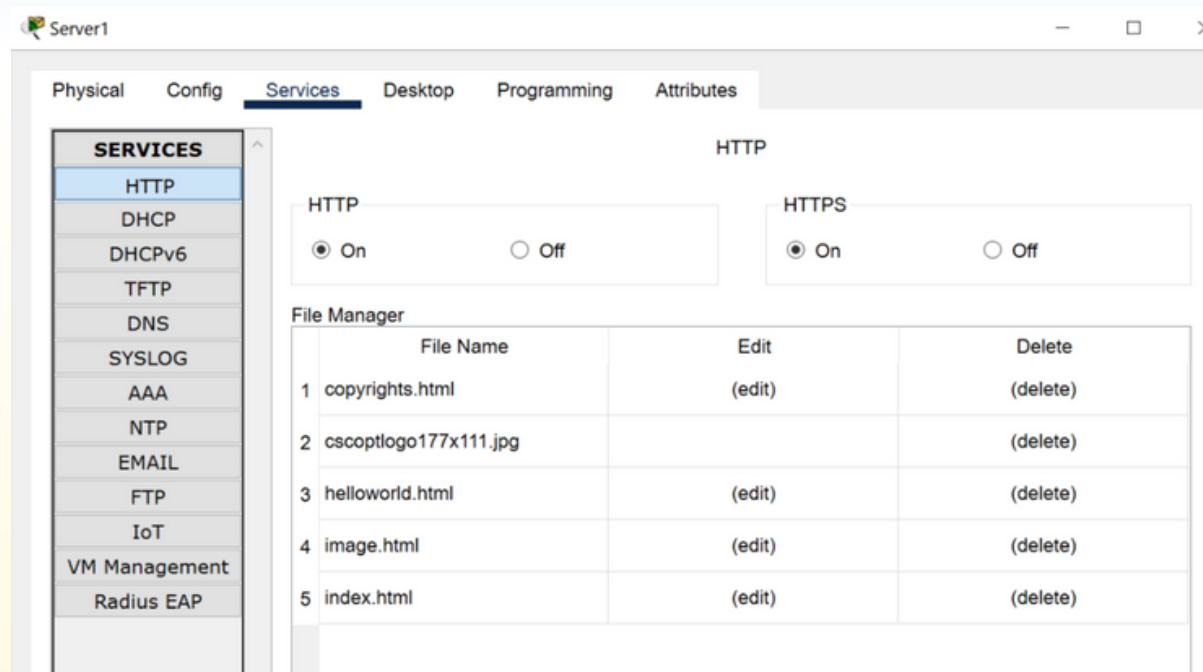




# HYPERTEXT TRANSFER PROTOCOL (HTTP)

Hypertext Transfer Protocol (HTTP) is an application protocol that loads web pages using hypertext links.

We turned on access to both HTTP and HTTPS in Server1 in the library room.

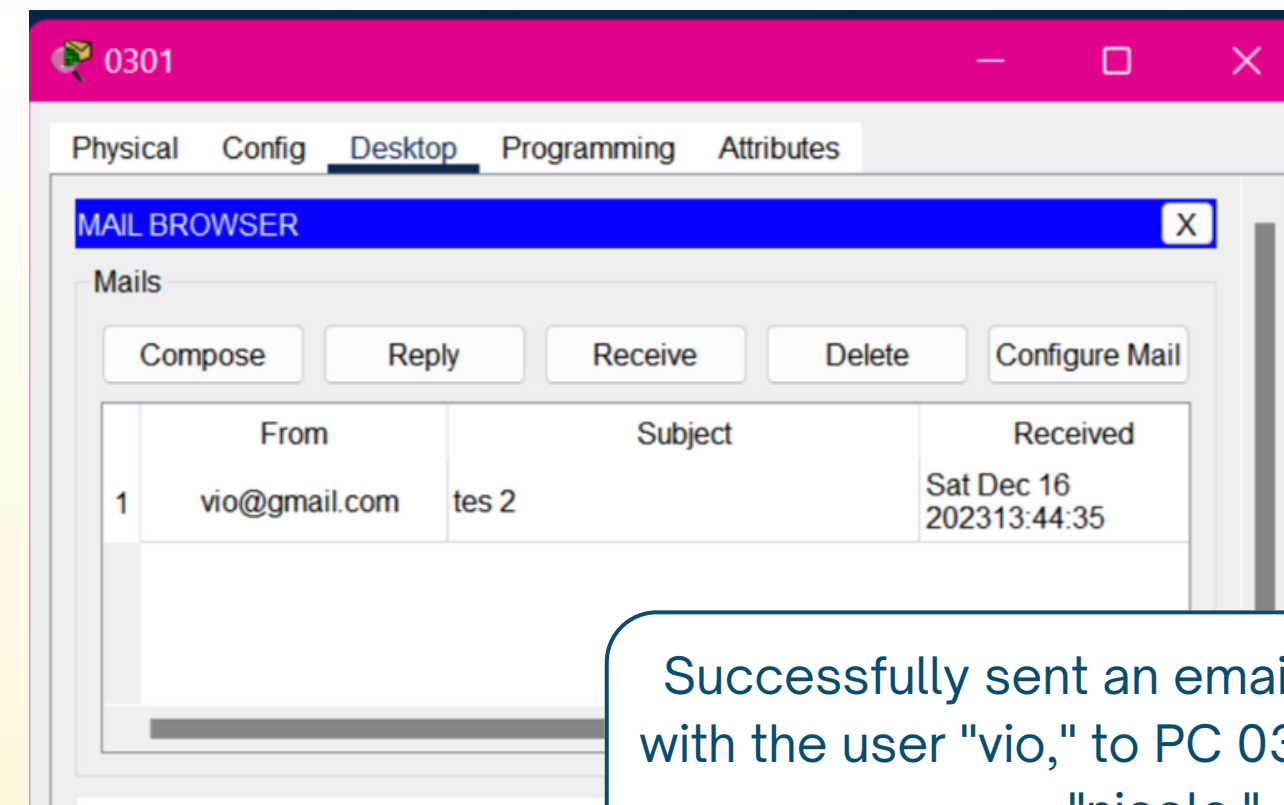
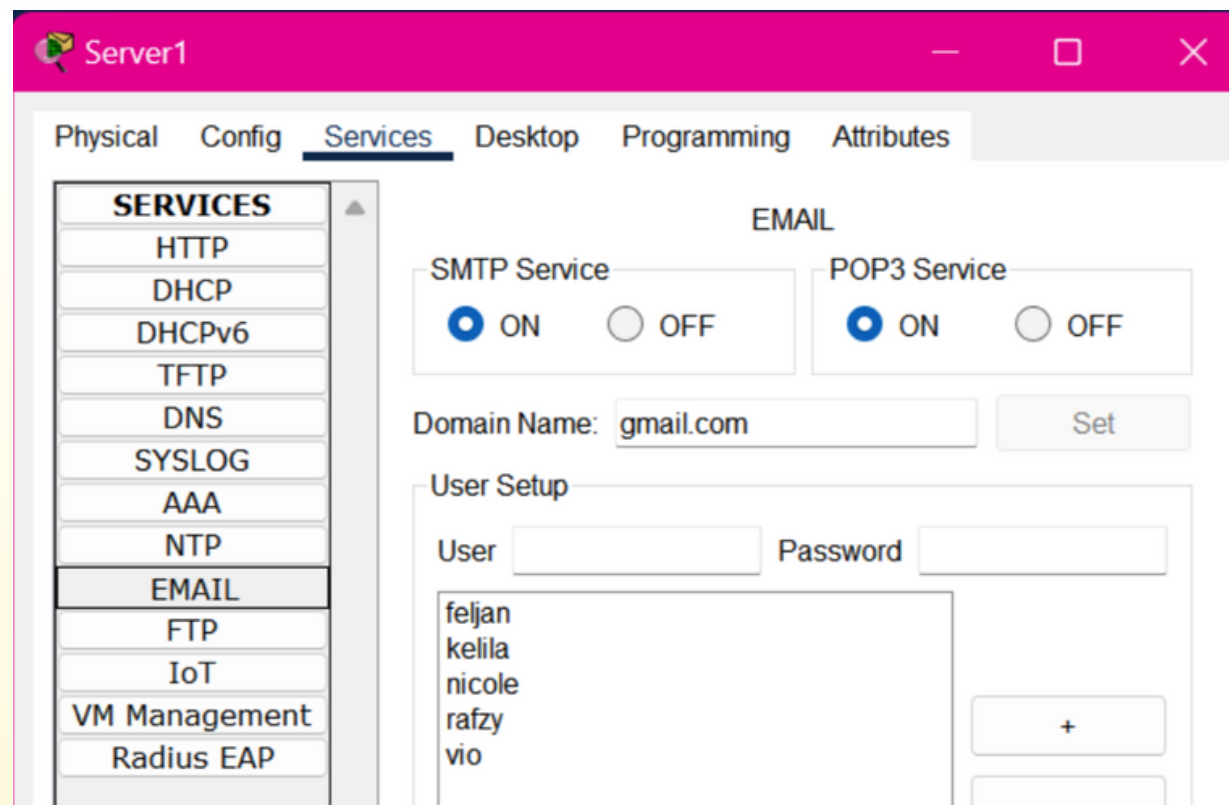


You can see the HTML page with its CSS – the pink background color and different text styling – which indicates that it's an actual web structure and that the http is working.

# SIMPLE MAIL TRANSFER PROTOCOL (SMTP)

Simple Mail Transfer Protocol (SMTP) can be defined as a transport protocol used by mail servers to send, receive, and relay outgoing emails between senders and receivers.

We placed the SMTP server on the third floor linked to the library and configured it for five users.



Successfully sent an email from PC 0302, with the user "vio," to PC 0301, with the user "nicole."





# SIMPLE MAIL TRANSFER PROTOCOL (SMTP)

0302

Physical Config Desktop Programming Attributes

Configure Mail X

User Information

Your Name: vio

Email Address: vio@gmail.com

Server Information

Incoming Mail Server: 172.16.1.4

Outgoing Mail Server: 172.16.1.4

Logon Information

User Name: vio

Password: ●●●

Save Remove Clear Reset

☐ Top

0301

Physical Config Desktop Programming Attributes

Configure Mail X

User Information

Your Name: nicole

Email Address: nicole@gmail.com

Server Information

Incoming Mail Server: 172.16.1.4

Outgoing Mail Server: 172.16.1.4

Logon Information

User Name: nicole

Password: ●●●●●●

Save Remove Clear Reset

Sender and receiver's  
information



# CISCO PACKET TRACER SIMULATION



**Thank  
You!**