LABORATORY NO.04 - APPLICATION LAYER AND PHYSICAL LAYER PROTOCOLS

ELABORADO POR:

ESTEBAN AGUILERA CONTRERAS

JUAN DAVID RODRIGUEZ RODRIGUEZ

PROFESOR(ES):

JOHN PACHON

RECO

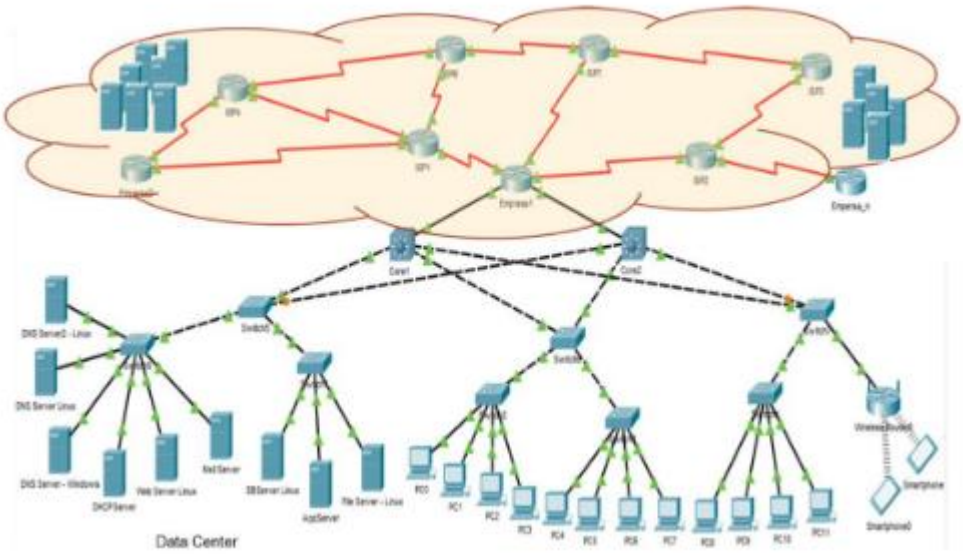
2025-1

OBJECTIVES

- Monitor the application layer protocols.
- Review the structured cabling standard and its application.
- Perform cable punching with RJ-45 connectors and patch panels

CONTEXT

We are working on the infrastructure of a company, which typically includes several IT infrastructure services. It consists of both wired and wireless user stations and servers (physical and virtualized), all connected through switches (layer 2 and 3), wireless equipment, and routers that link the network to the internet. It is also common to have cloud infrastructures where resources are provisioned based on the organization's needs. Within the servers, you can find web services, DNS, email, databases, storage, and applications, among others. Let's remember the configuration we are using as the base:



In this lab, we will focus on application layer protocol testing and perform activities related to the physical layer.

INTRODUCTION

En este laboratorio se trabajará en dos aspectos fundamentales de las redes de computadoras: la capa de aplicación y la capa física del modelo OSI. Se configurarán y analizarán protocolos de la capa de aplicación, como DNS, HTTP, FTP y por otra parte el correo electrónico, para comprender su funcionamiento y la forma en que se comunican a través de la red.

Además, se abordará la construcción de cables de red siguiendo los estándares de cableado estructurado. Se aprenderá a ponchar cables con conectores RJ45 para elaborar cables directos y cruzados, los cuales se utilizarán para conectar diferentes dispositivos en una infraestructura de red. Finalmente, se verificará la correcta instalación mediante el uso de un tester de cables.

Este laboratorio permite reforzar conocimientos sobre la infraestructura de redes, asegurando una correcta instalación y configuración de los elementos necesarios para una red eficiente.

MARCO TEORICO

1. Modelo OSI y sus Capas

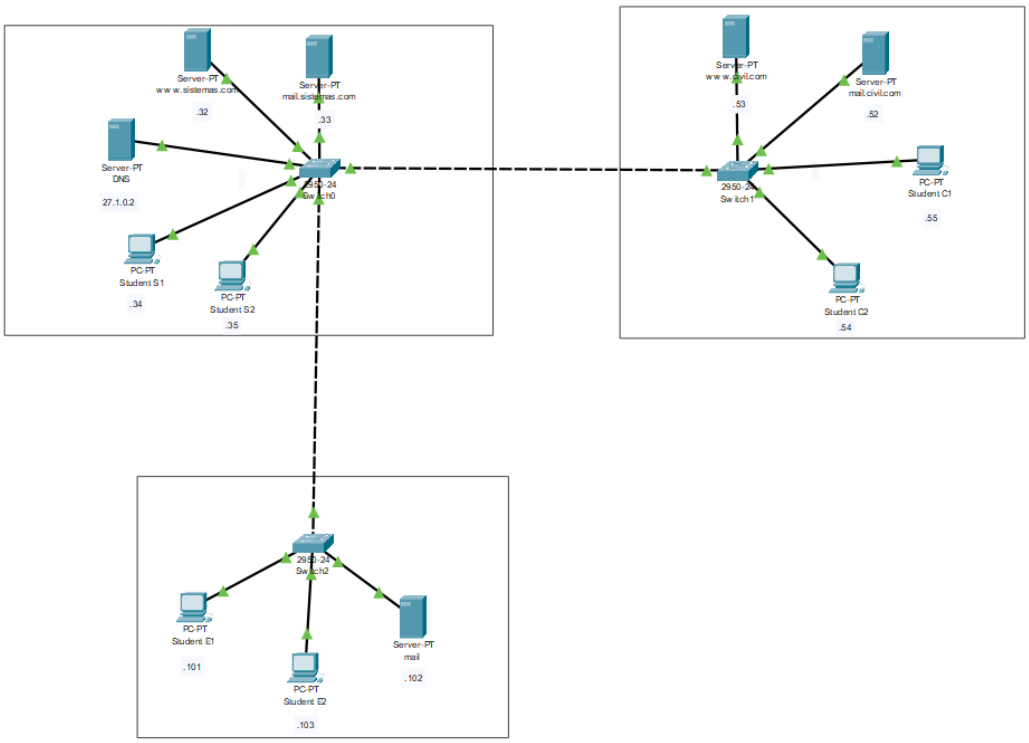
El modelo OSI divide la comunicación en siete capas. Este laboratorio se centra en:

- Capa de aplicación: Es la encargada de la comunicación entre el usuario y la red. Incluye protocolos como DNS, HTTP, FTP y correo electrónico.
- Capa física: Define las conexiones físicas entre dispositivos, incluyendo cables, conectores y la transmisión de señales eléctricas o ópticas.

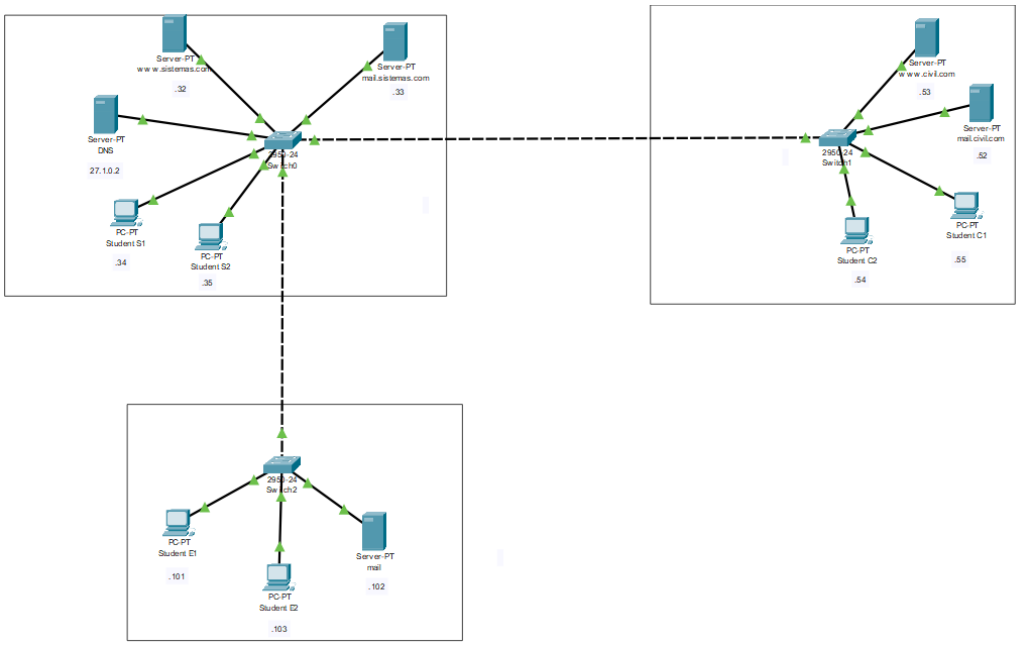
2. Protocolos de la Capa de Aplicación
    a. DNS
        i. Traduce nombres de dominio en direcciones IP.
    b. HTTP
        i. Permite la comunicación entre navegadores y servidores web.
    c. FTP
        i. Se usa para la transferencia de archivos entre computadoras.
3. Cableado Estructurado
    a. El cableado estructurado es un sistema estandarizado para la instalación de redes de comunicación. Los cables más utilizados son los UTP y FTP que pueden ser de categoría 5e, 6 o superior.
4. Tipos de Cables de Red
    a. Cable directo: Se usa para conectar dispositivos diferentes, como una computadora a un switch o router. Sigue el mismo estándar (T-568A o T-568B) en ambos extremos.
    b. Cable cruzado: Se usa para conectar dispositivos similares, como dos computadoras o dos switches. Tiene un extremo con T-568A y el otro con T-568B.
5. Proceso de Ponchado de Cable
    a. Para ensamblar un cable de red, se deben seguir los siguientes pasos:
        i. Cortar el cable UTP a la longitud deseada.
        ii. Pelar la cubierta externa para exponer los 8 hilos internos.
        iii. Ordenar los hilos según el estándar de cableado (T-568A o T-568B).
        iv. Insertar los hilos en el conector RJ45 y ponchar con la herramienta crimpadora.
        v. Probar el cable con un tester para verificar la correcta conexión.
    b. Este conocimiento es fundamental para garantizar una correcta instalación de redes, optimizando su funcionamiento y evitando problemas de conectividad.

CISCO PACKET TRACER

- Using Packet Tracer, each student should configure the network presented below and document their experience. The services for DNS, HTTP, FTP, and email must be configured on the servers for the network presented.
    - Creamos la red base presentada en el laboratorio
        - Esteban



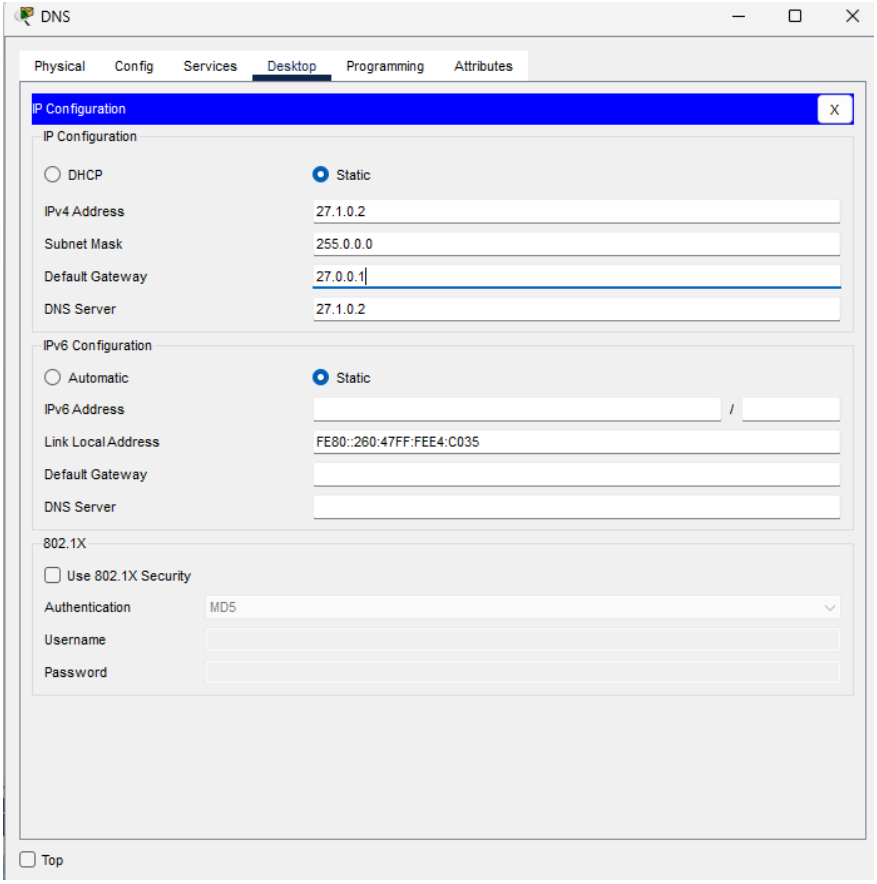
        - Juan

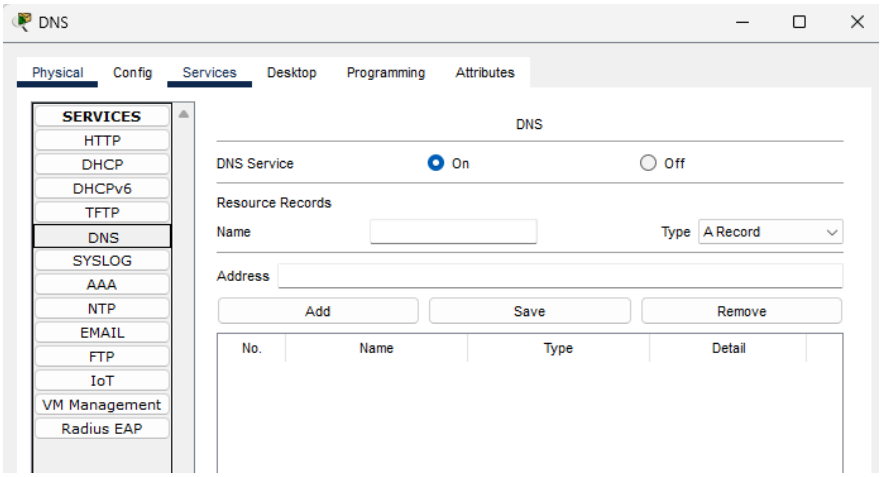


Network Configuration

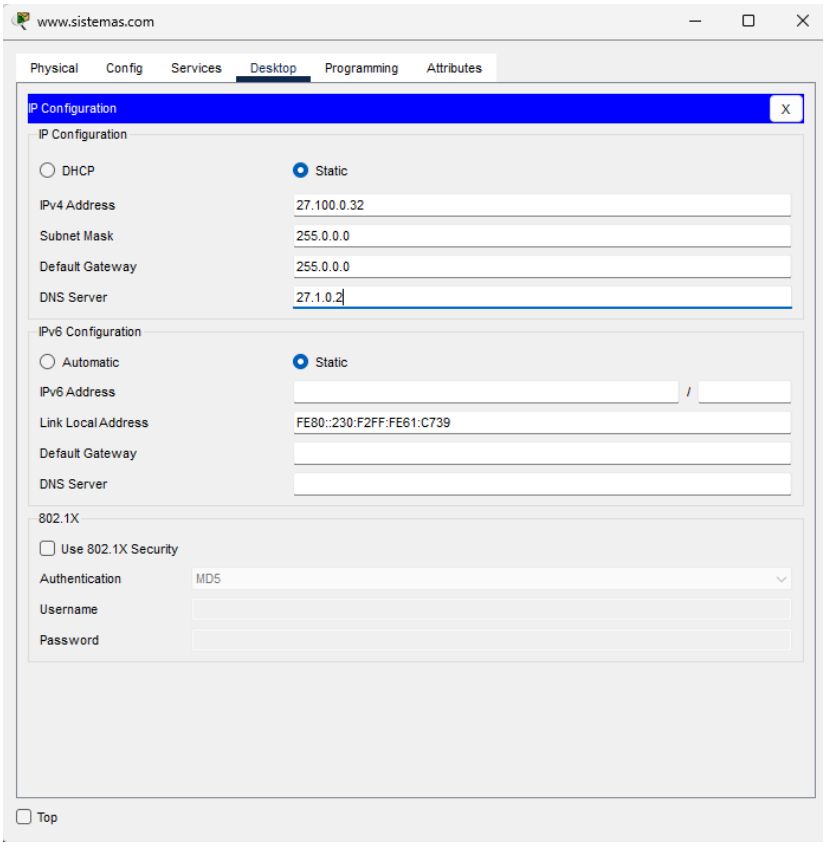
- Include the servers and clients presented, connect the cables, and assign DNS, Gateway, IP Address, and Subnet Mask to each device following the configuration shown in the diagram.
    - Por cada maquina configuramos el DNS , IP, gateway y mask en el apartado Desktop-> ipconfig
    - Si es un servidor, toca dejar activado el servicio en el cual esta trabajando y desactivar el resto de apartados
        - 1 apartado

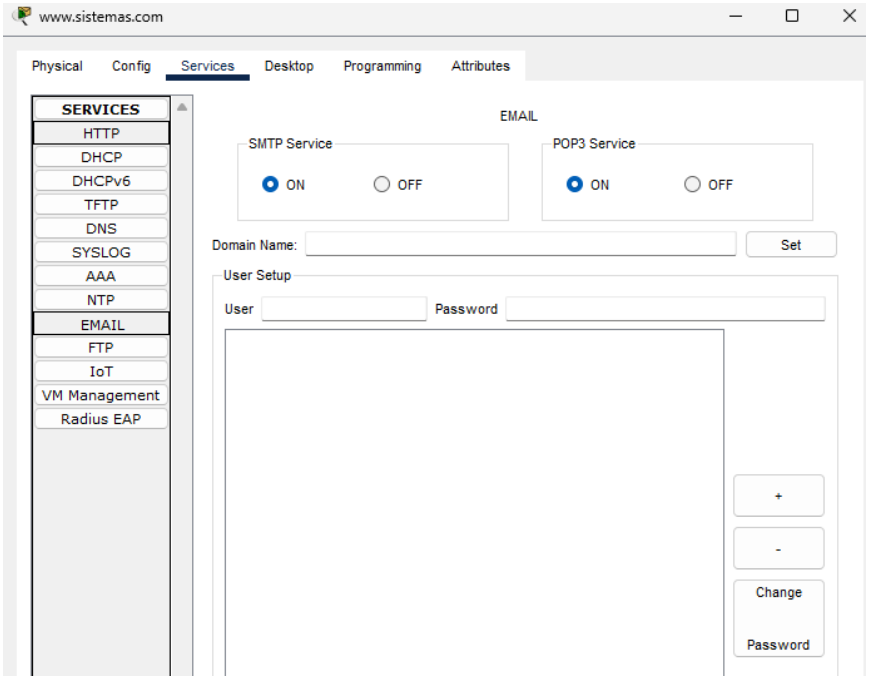
            - DNS



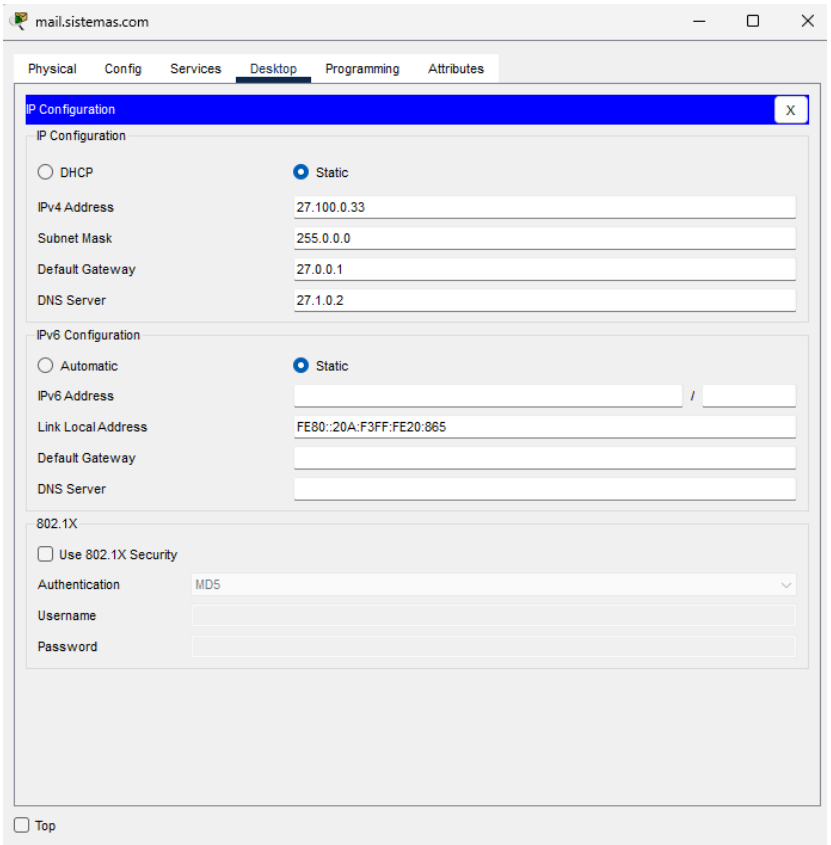


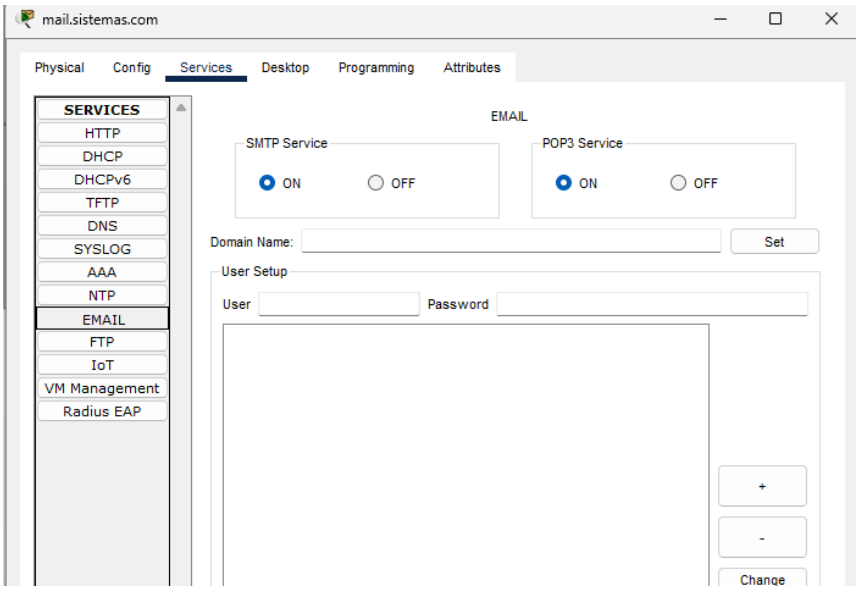
- www.sistemas.com



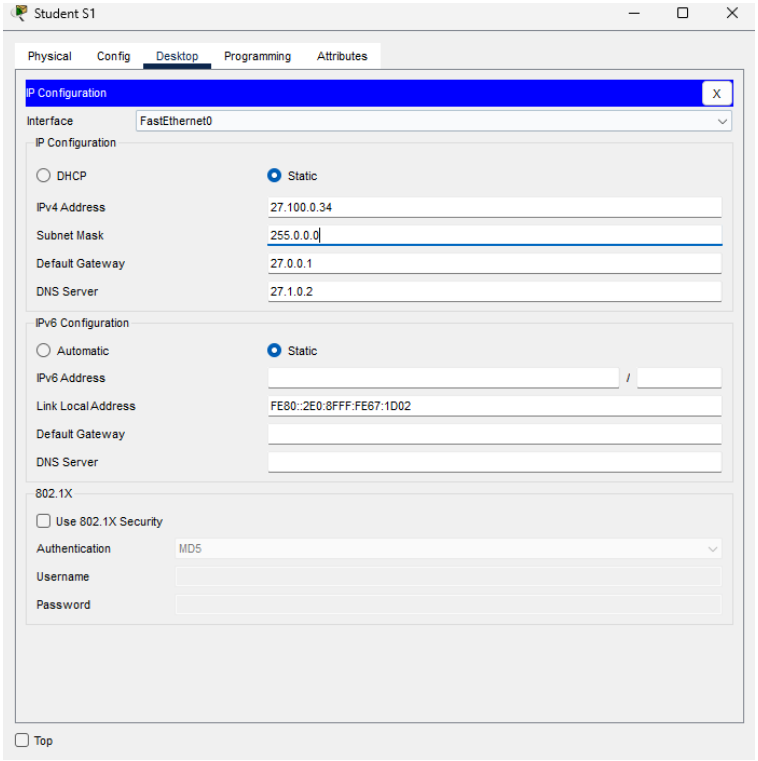


- Mail.sistemas.com

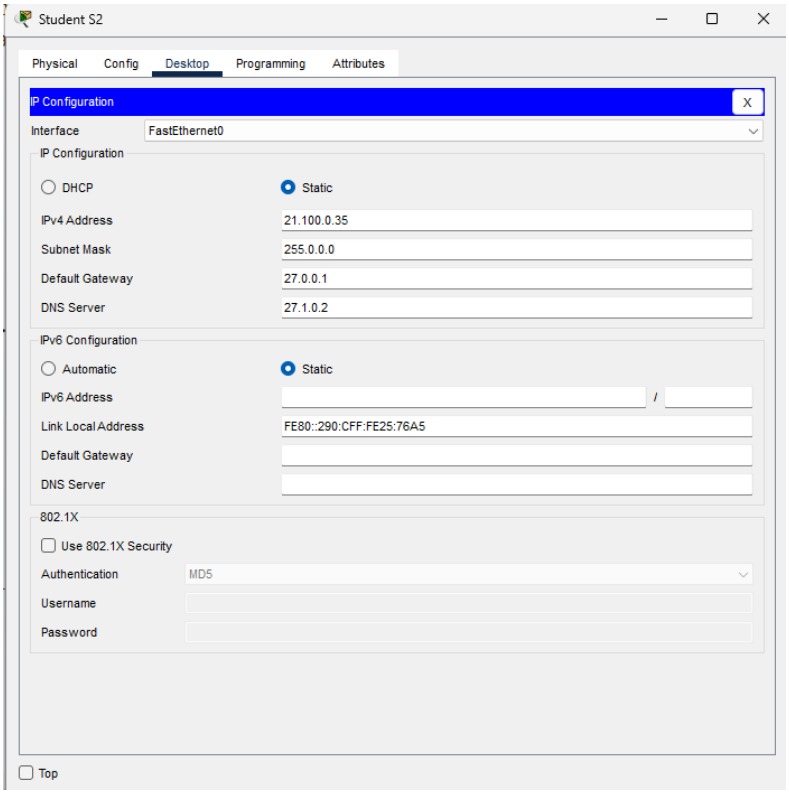



mail.sistemas.com
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
EMAIL
SMTP Service
ON
OFF
POP3 Service
ON
OFF
Domain Name:
Set
User Setup
User
Password
+
-
Change

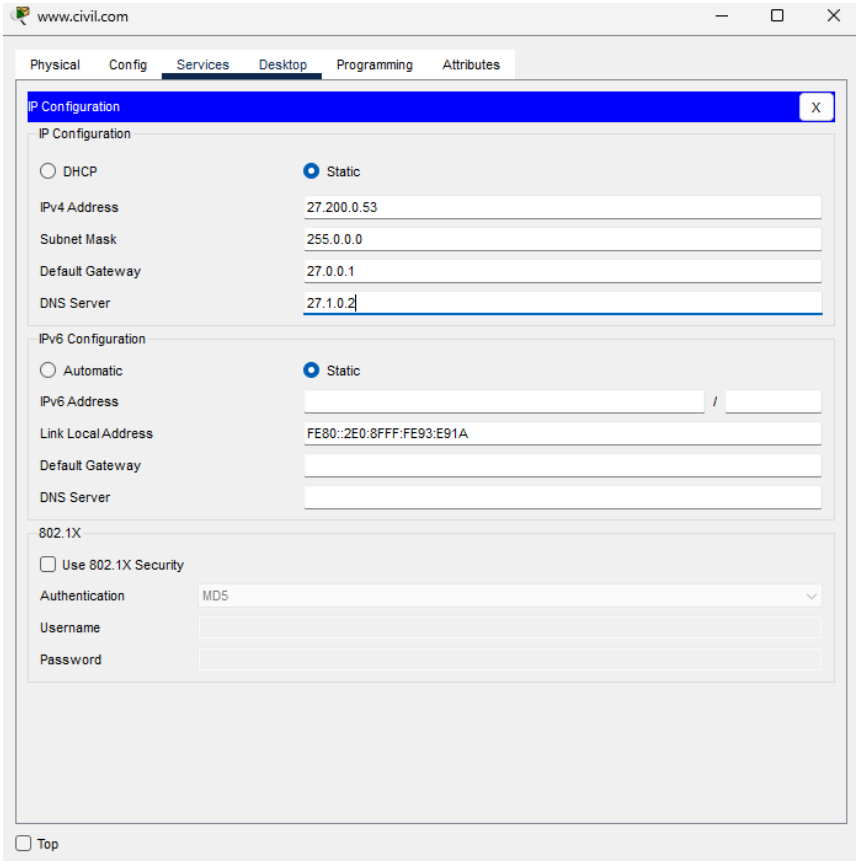
- Student S1

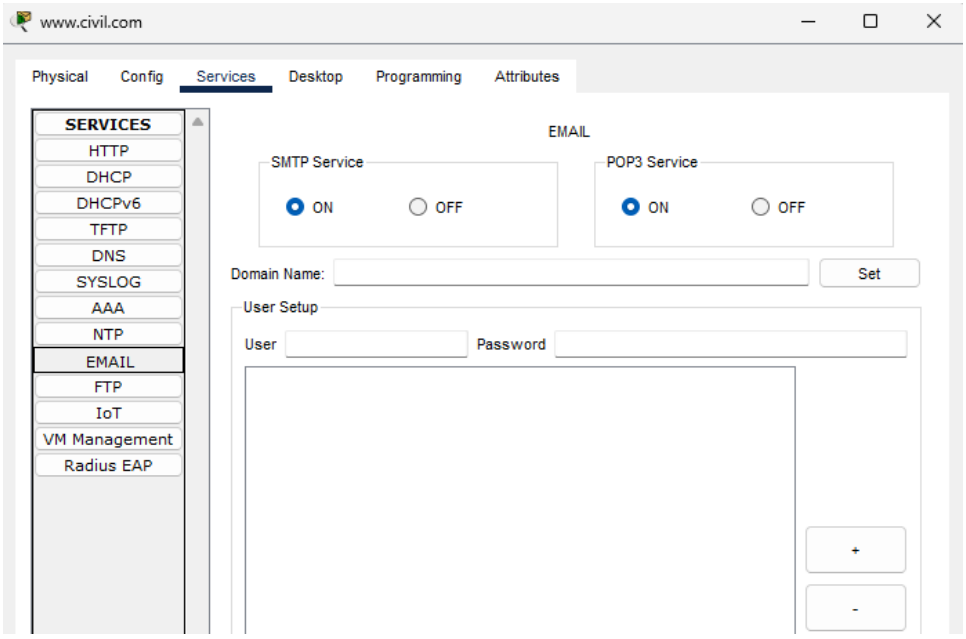

Student S1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
27.100.0.34
Subnet Mask
255.0.0.0
Default Gateway
27.0.0.1
DNS Server
27.1.0.2
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2E0:8FFF:FE67:1D02
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

- Student S2

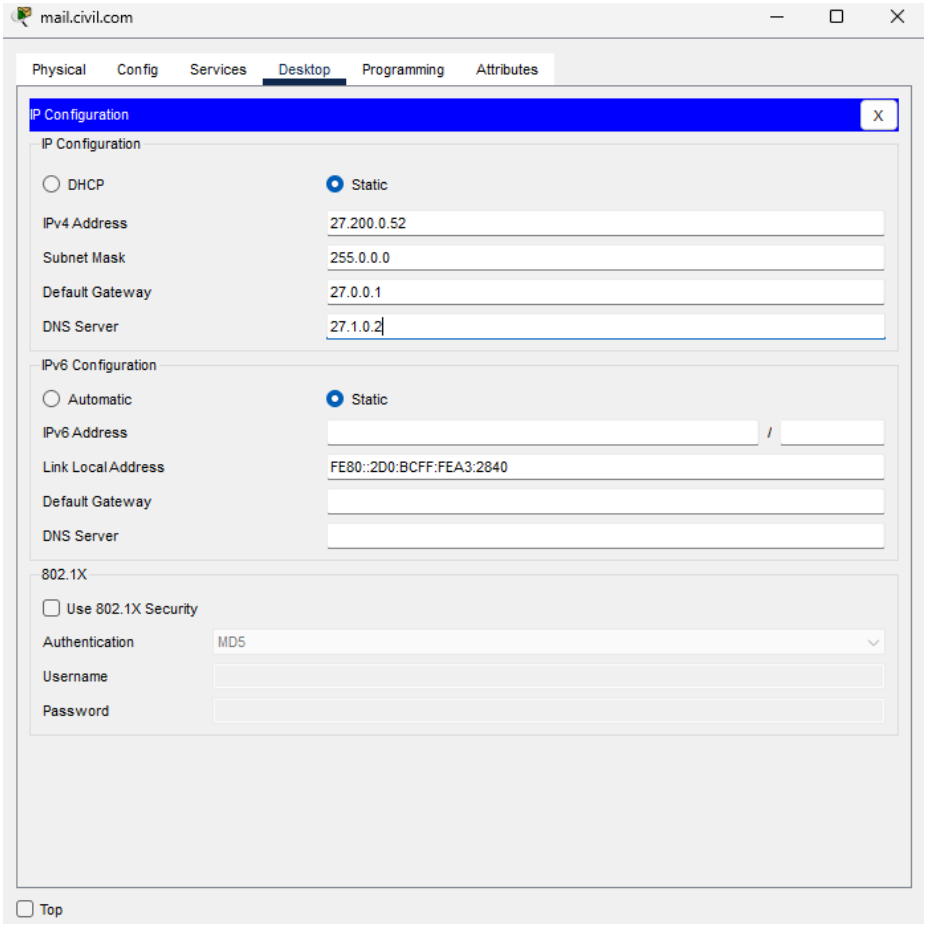


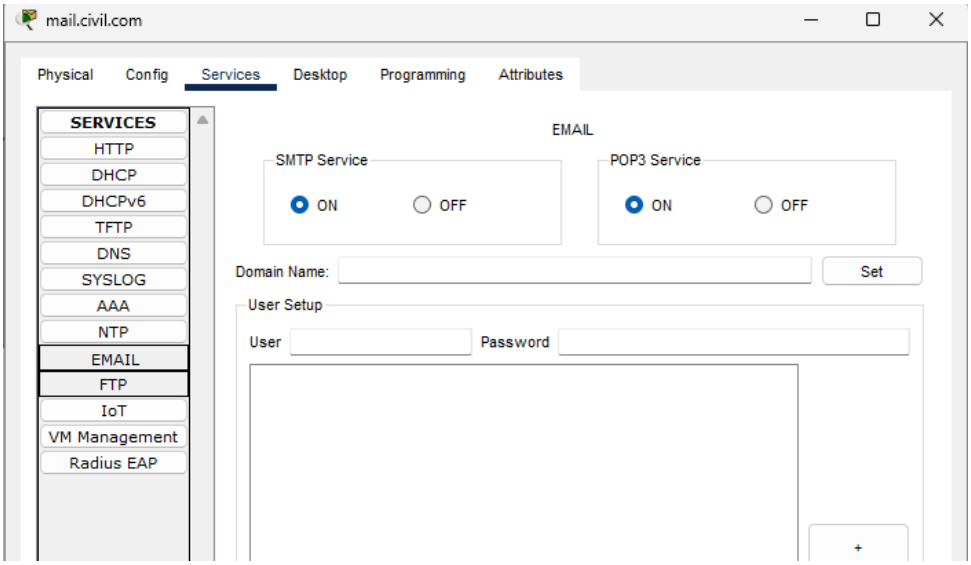
- 2 apartado
  - www.civil.com



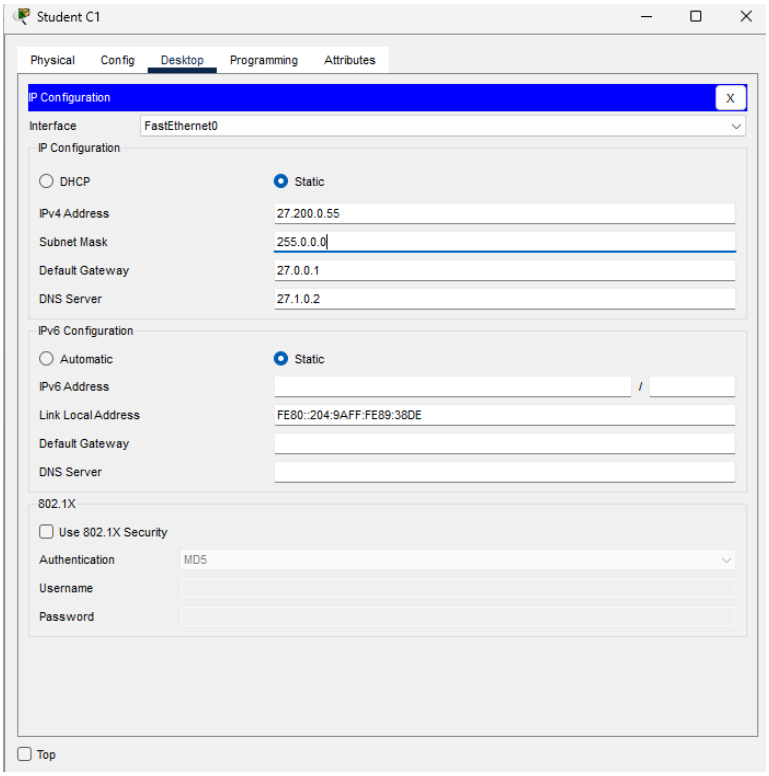


- Mail.civil.com

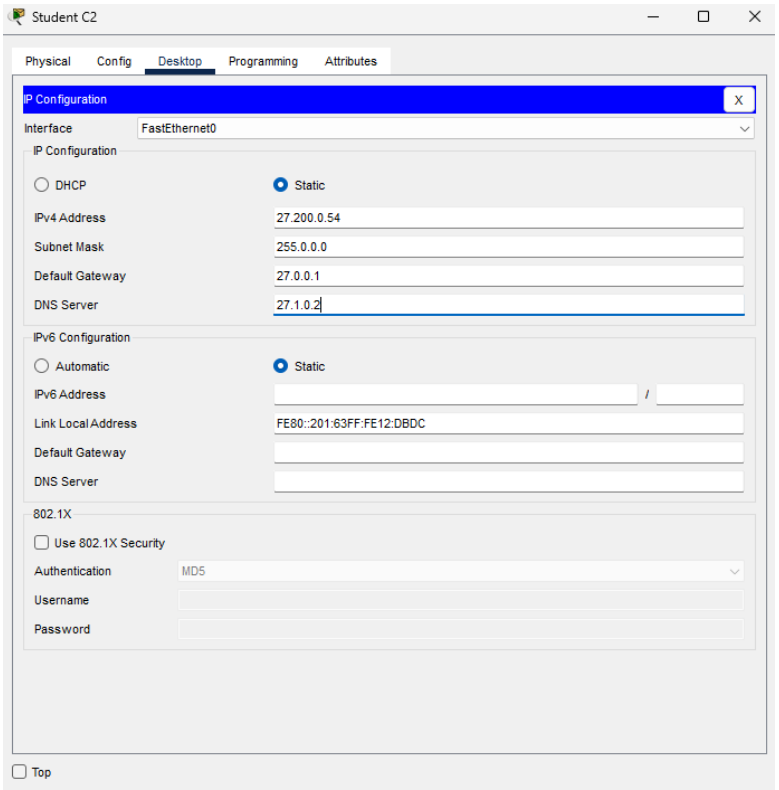

mail.civil.com
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
IPv4 Address
27.200.0.52
Subnet Mask
255.0.0.0
Default Gateway
27.0.0.1
DNS Server
27.1.0.2
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2D0:BCFF:FEA3:2840
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


mail.civil.com
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
EMAIL
SMTP Service
ON
OFF
POP3 Service
ON
OFF
Domain Name:
Set
User Setup
User
Password

- Student C1

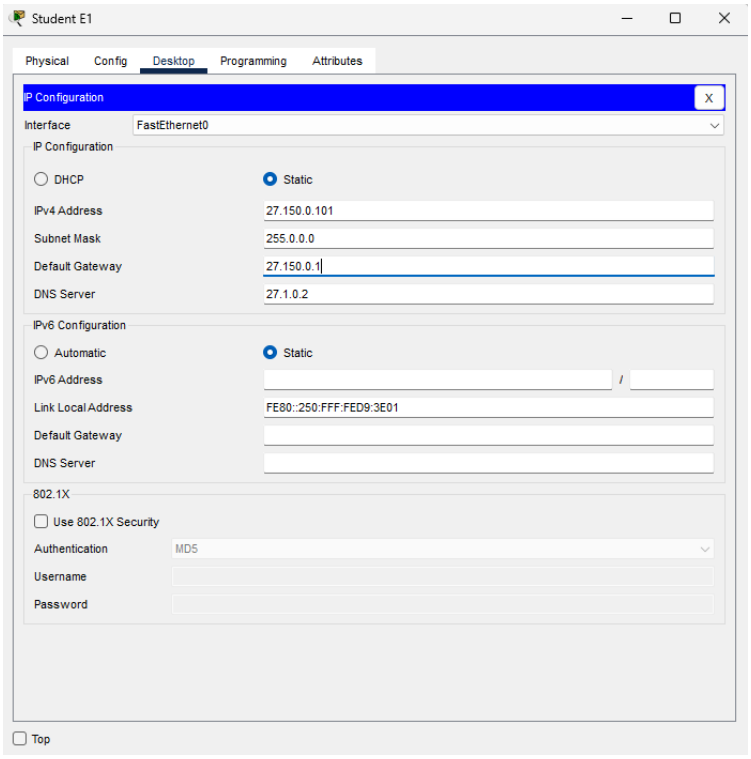


- Student C2

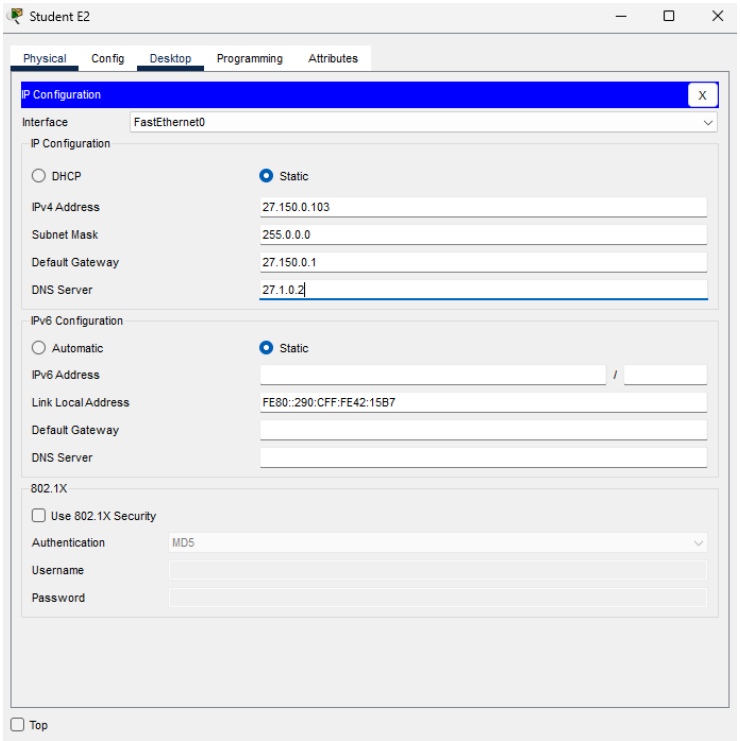


- Apartado 3

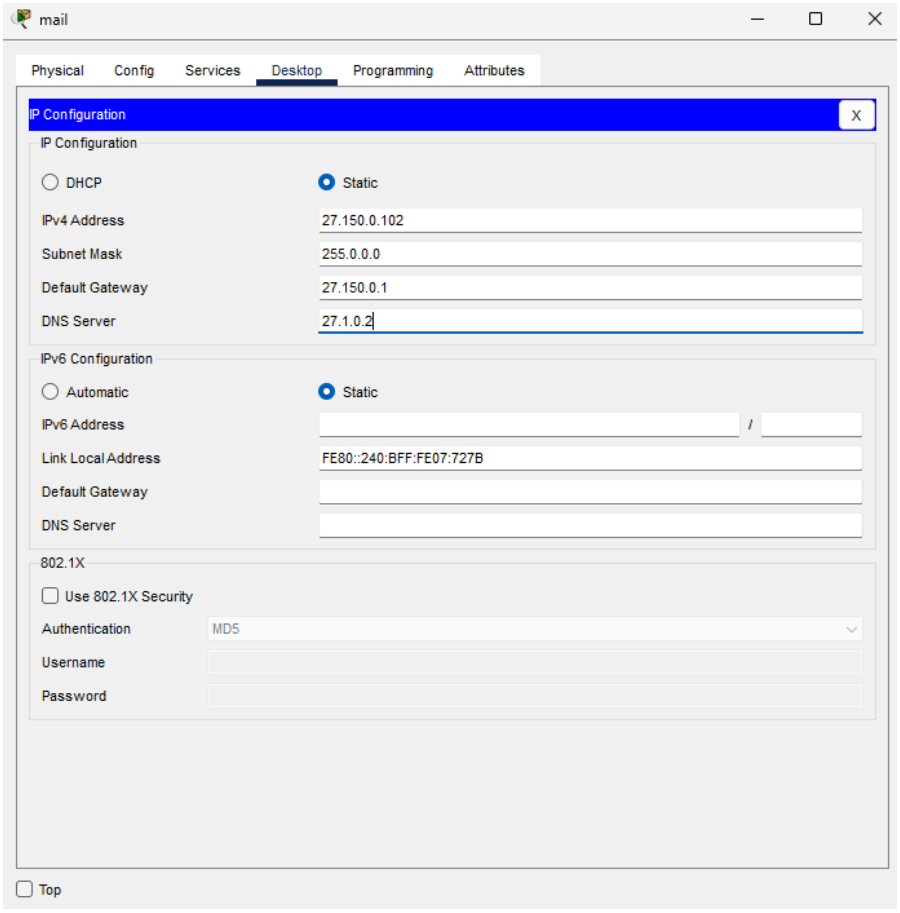
- Student E1

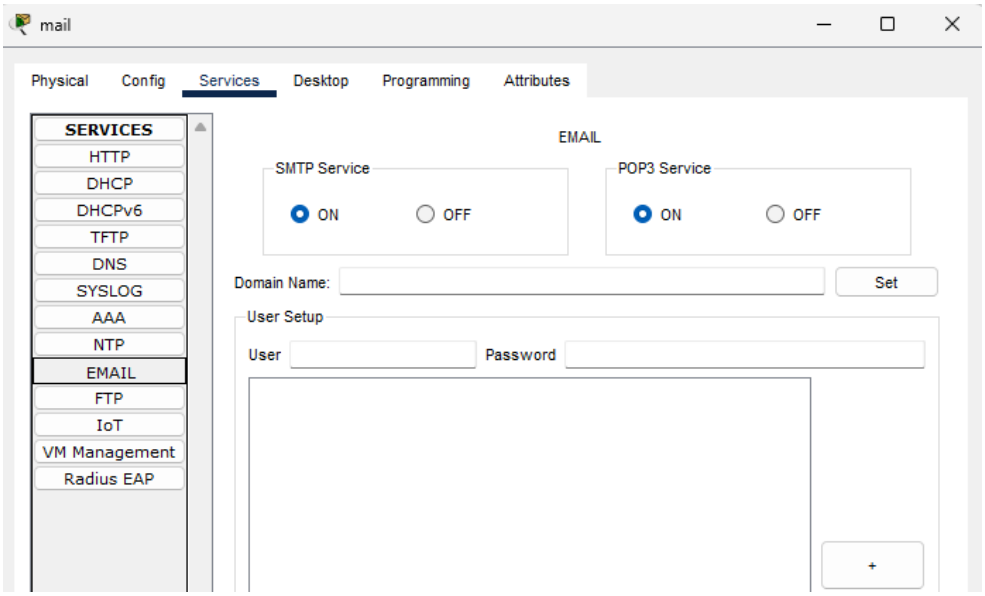


- Student E2



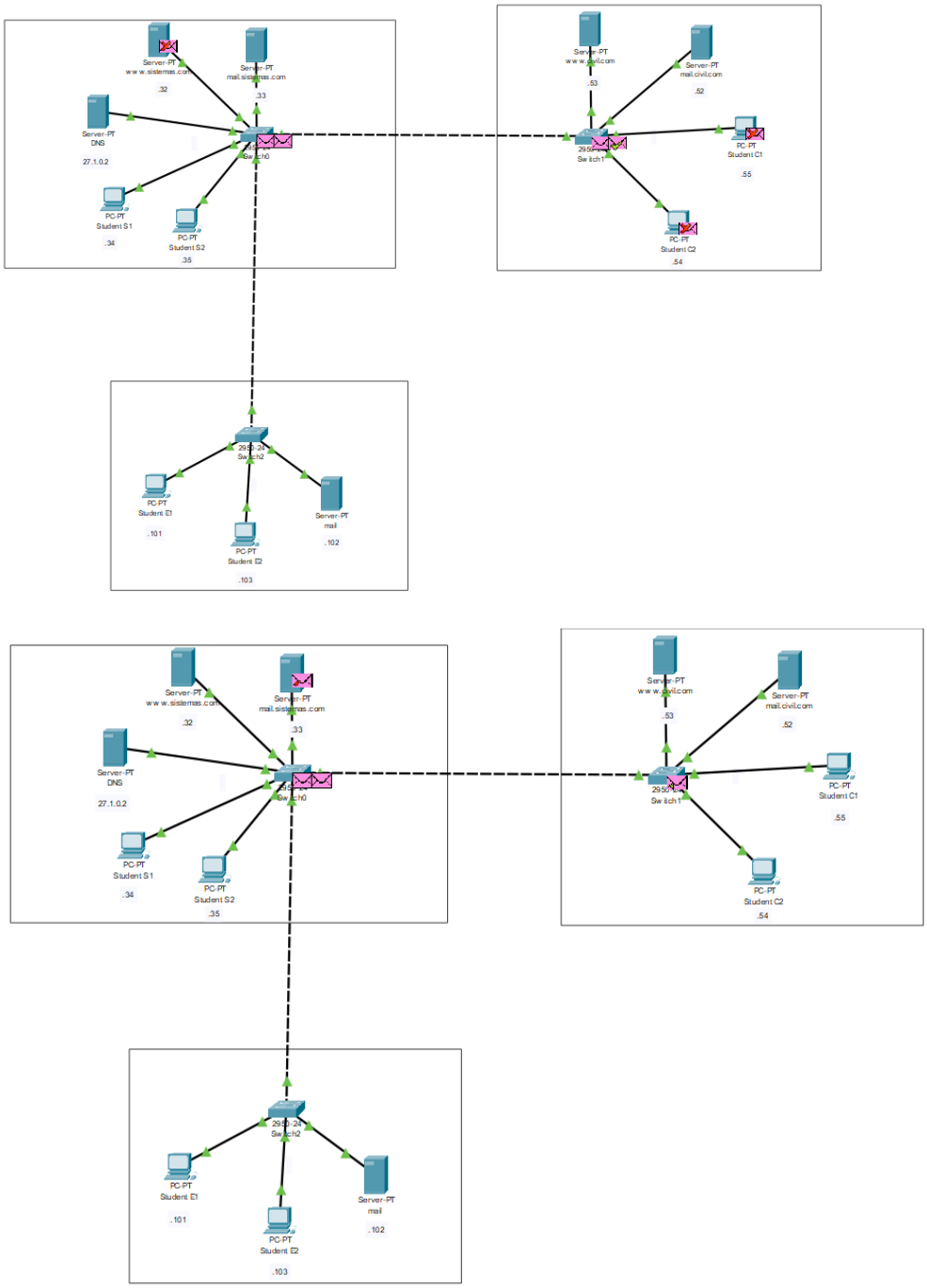
- Mail

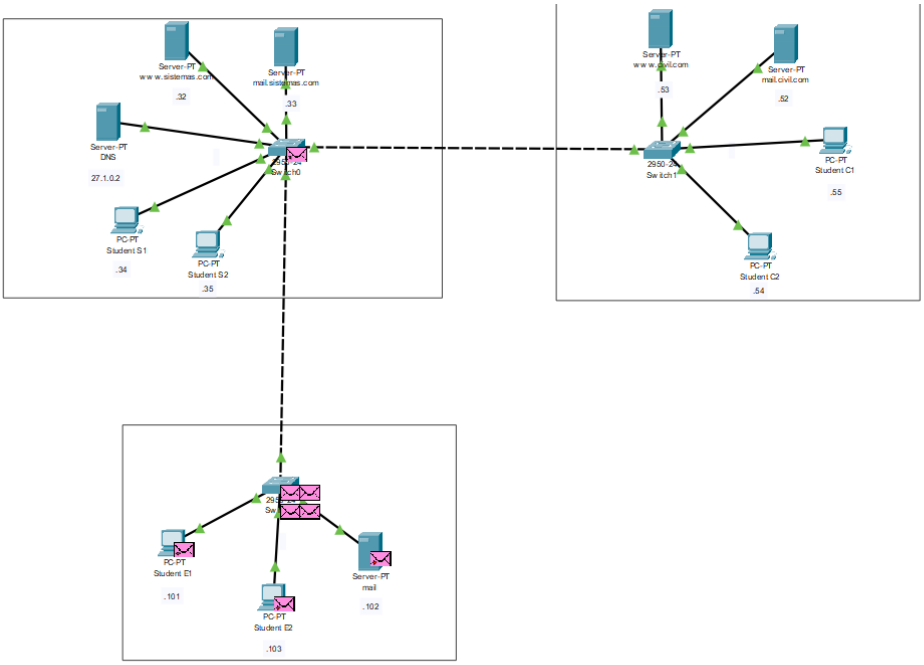


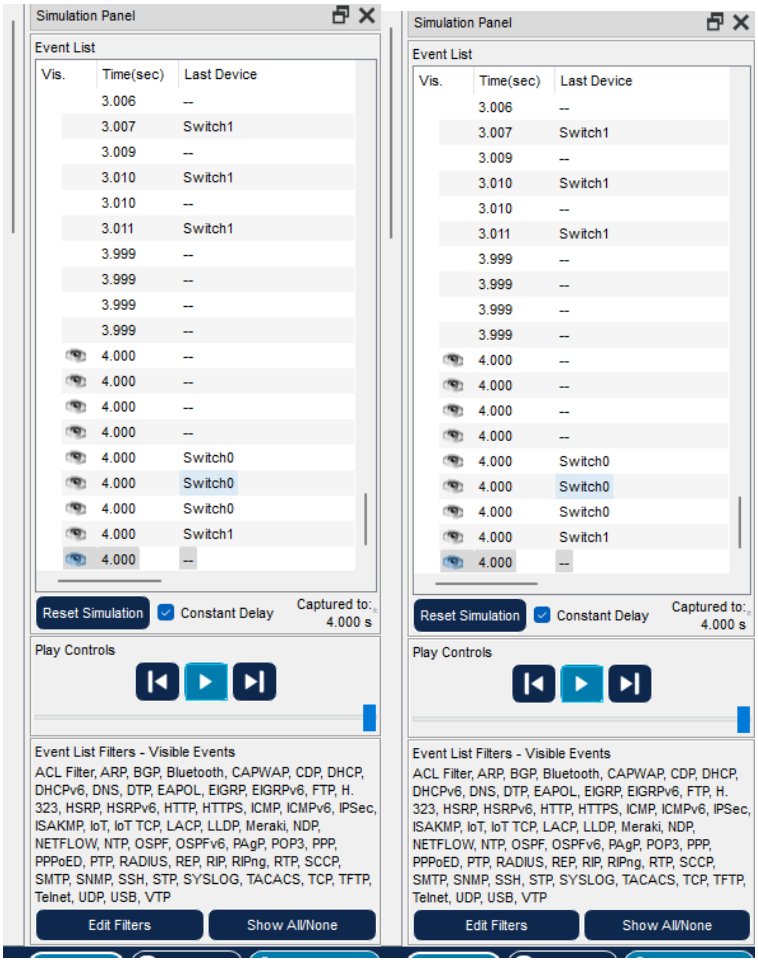


- Send messages between the devices in the network and verify connectivity between all of them

- Probamos que todo este configurado correctamente con el apartado de simulate



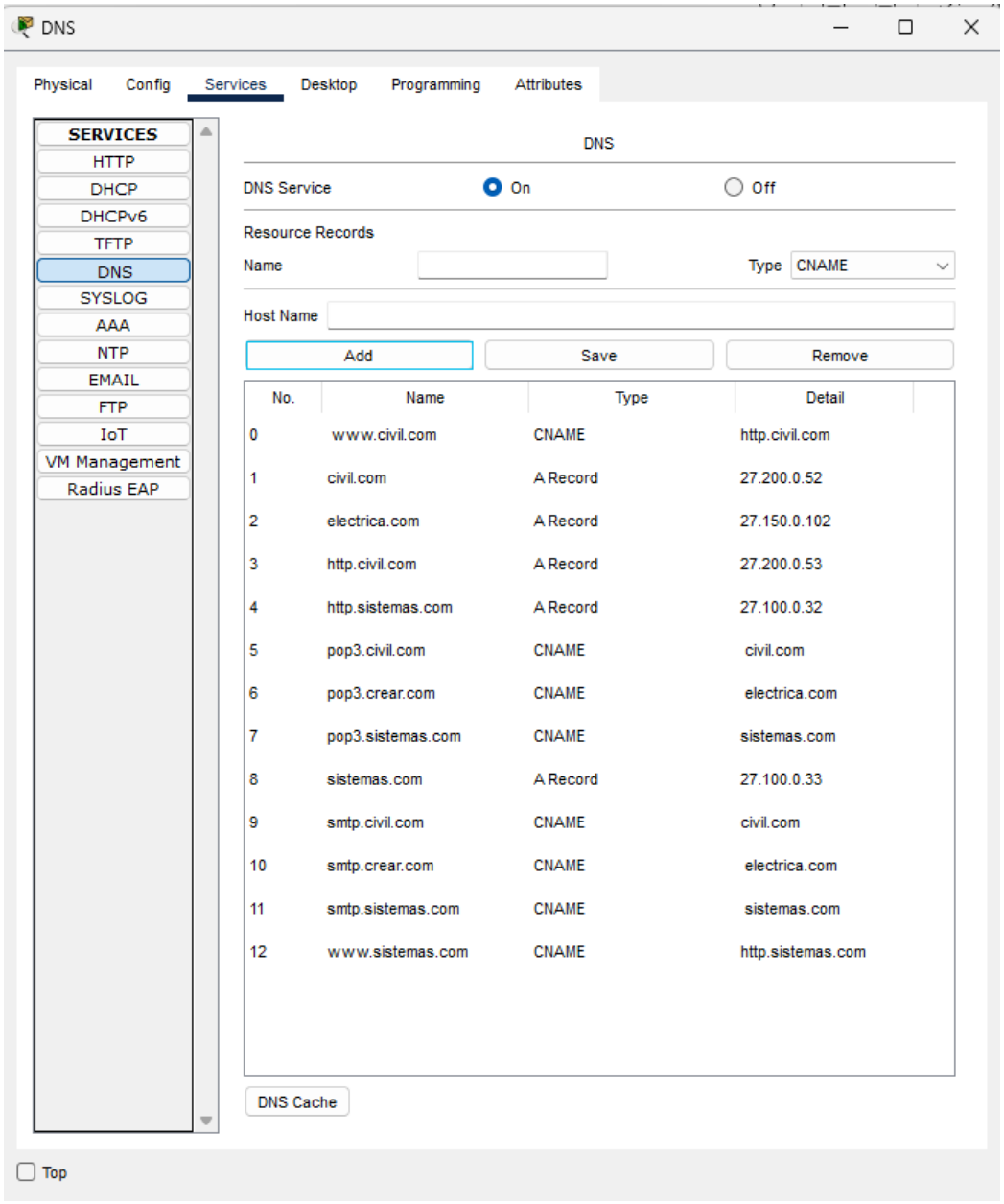

Server-PT
www.sistemas.com
.32
Server-PT
mail.sistemas.com
.33
Server-PT
DNS
27.1.0.2
PC-PT
Student S1
.34
PC-PT
Student S2
.35
Server-PT
mail.civil.com
.52
PC-PT
Student C1
.55
PC-PT
Student C2
.54
PC-PT
Student E1
.101
PC-PT
Student E2
.103
Server-PT
mail
.102


Simulation Panel
Event List
Vis. Time(sec) Last Device
3.006 --
3.007 Switch1
3.009 --
3.010 Switch1
3.010 --
3.011 Switch1
3.999 --
3.999 --
3.999 --
3.999 --
4.000 --
4.000 --
4.000 --
4.000 --
4.000 Switch0
4.000 Switch0
4.000 Switch0
4.000 Switch1
4.000 --
Reset Simulation
Constant Delay
Captured to: 4.000 s
Play Controls
Event List Filters - Visible Events
ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP
Edit Filters
Show All/None

SERVICE CONFIGURATION

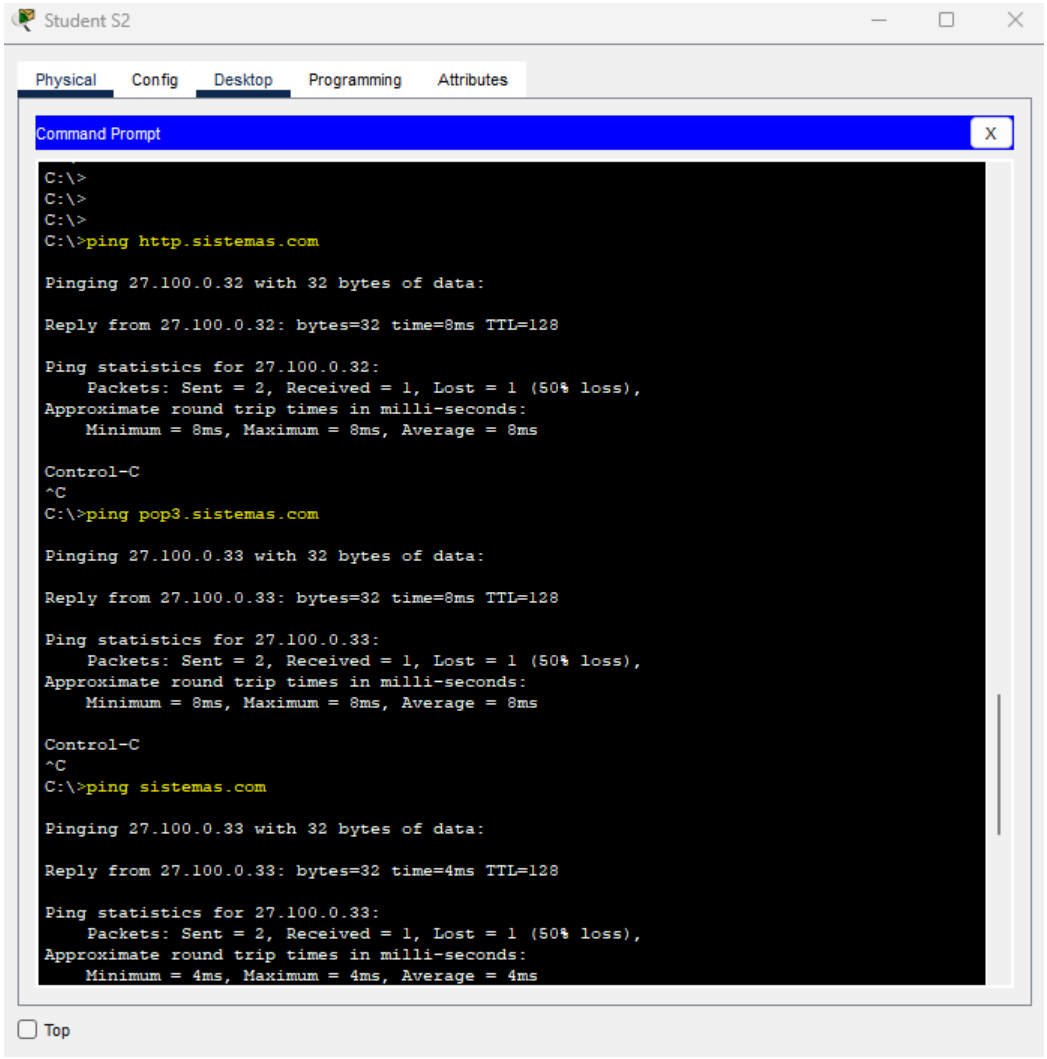
a. DNS
   - In the DNS service with IP 27.1.0.2, include the following entries:
     - sistemas.com with the IP of the mail server for sistemas.com
     - pop3.sistemas.com as an alias for sistemas.com
     - smtp.sistemas.com as an alias for sistemas.com
     - http.sistemas.com with the IP of the web server for sistemas.com
     - www.sistemas.com as an alias for http.sistemas.com
     - civil.com with the IP of the mail server for civil.com
     - pop3.civil.com as an alias for civil.com
     - smtp.civil.com as an alias for civil.com
     - http.civil.com with the IP of the web server for civil.com
     - www.civil.com as an alias for http.civil.com
   - In the DNS server with IP 27.1.0.2, include the following entries:
     - electrica.com with the IP of the mail server for electrica.com
     - pop3.crear.com as an alias for electrica.com
     - smtp.crear.com as an alias for electrica.com

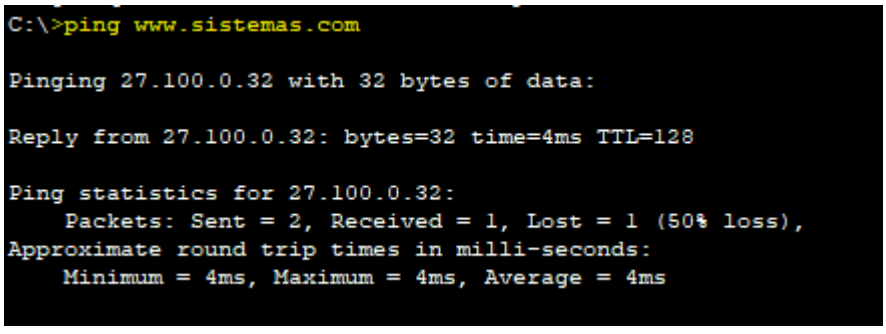
Configuramos en el servidor DNS en el apartado service -> DNS las entradas:


DNS
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DNS
DNS Service
On
Off
Resource Records
Name
Type
CNAME
Host Name
Add
Save
Remove
No.
Name
Type
Detail
0 www.civil.com CNAME http.civil.com
1 civil.com A Record 27.200.0.52
2 electrica.com A Record 27.150.0.102
3 http.civil.com A Record 27.200.0.53
4 http.sistemas.com A Record 27.100.0.32
5 pop3.civil.com CNAME civil.com
6 pop3.crear.com CNAME electrica.com
7 pop3.sistemas.com CNAME sistemas.com
8 sistemas.com A Record 27.100.0.33
9 smtp.civil.com CNAME civil.com
10 smtp.crear.com CNAME electrica.com
11 smtp.sistemas.com CNAME sistemas.com
12 www.sistemas.com CNAME http.sistemas.com
DNS Cache
Top

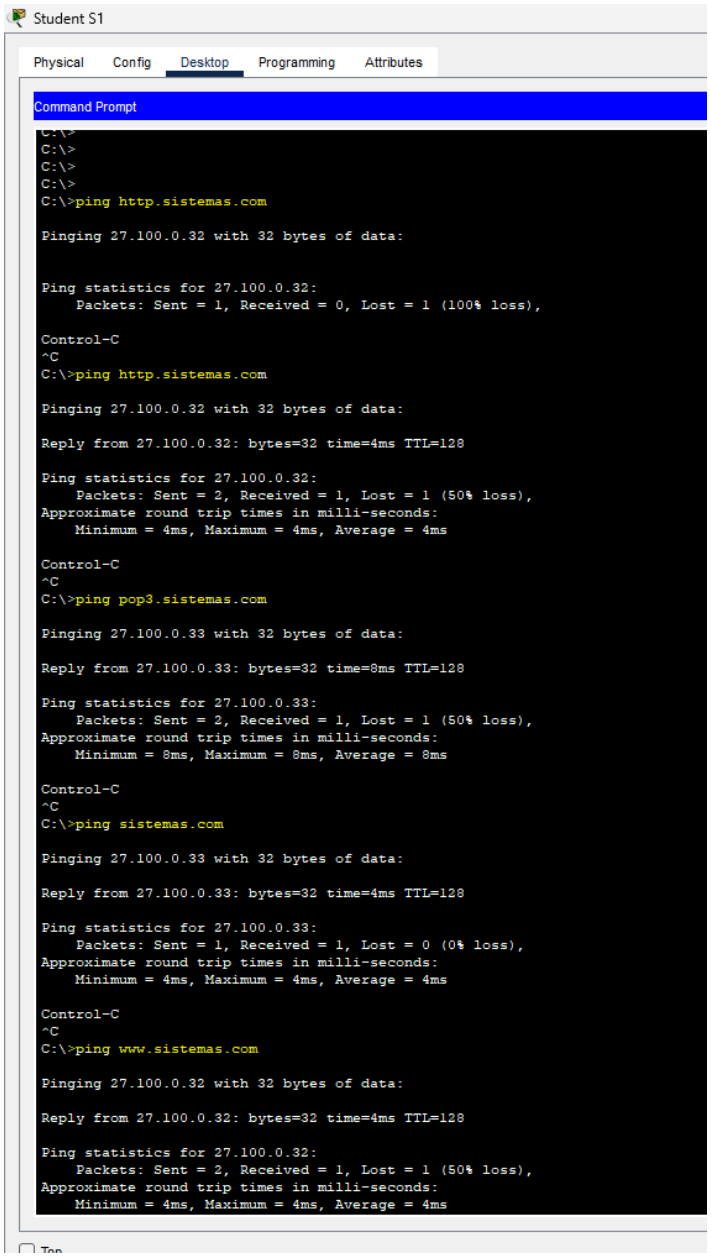
Probamos que los servidores hayan quedado bien configurados

- Student S1 /Student S2



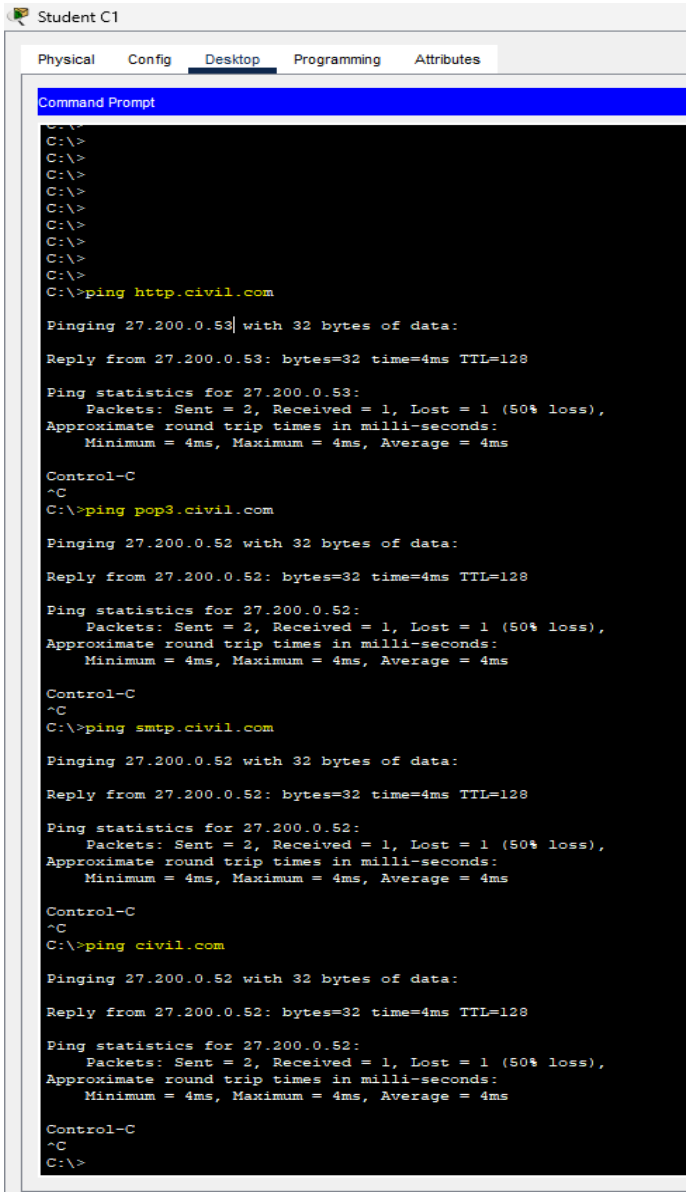


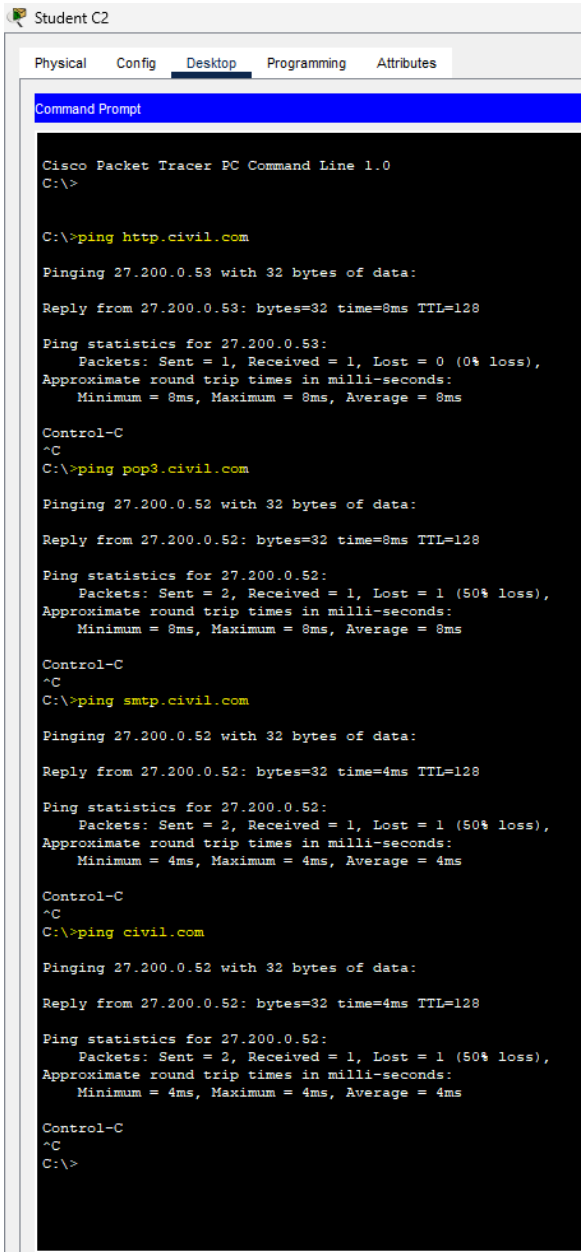
```
C:\>ping smtp.sistemas.com

Pinging 27.100.0.33 with 32 bytes of data:

Reply from 27.100.0.33: bytes=32 time=4ms TTL=128

Ping statistics for 27.100.0.33:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 4ms, Average = 4ms

Control-C
```



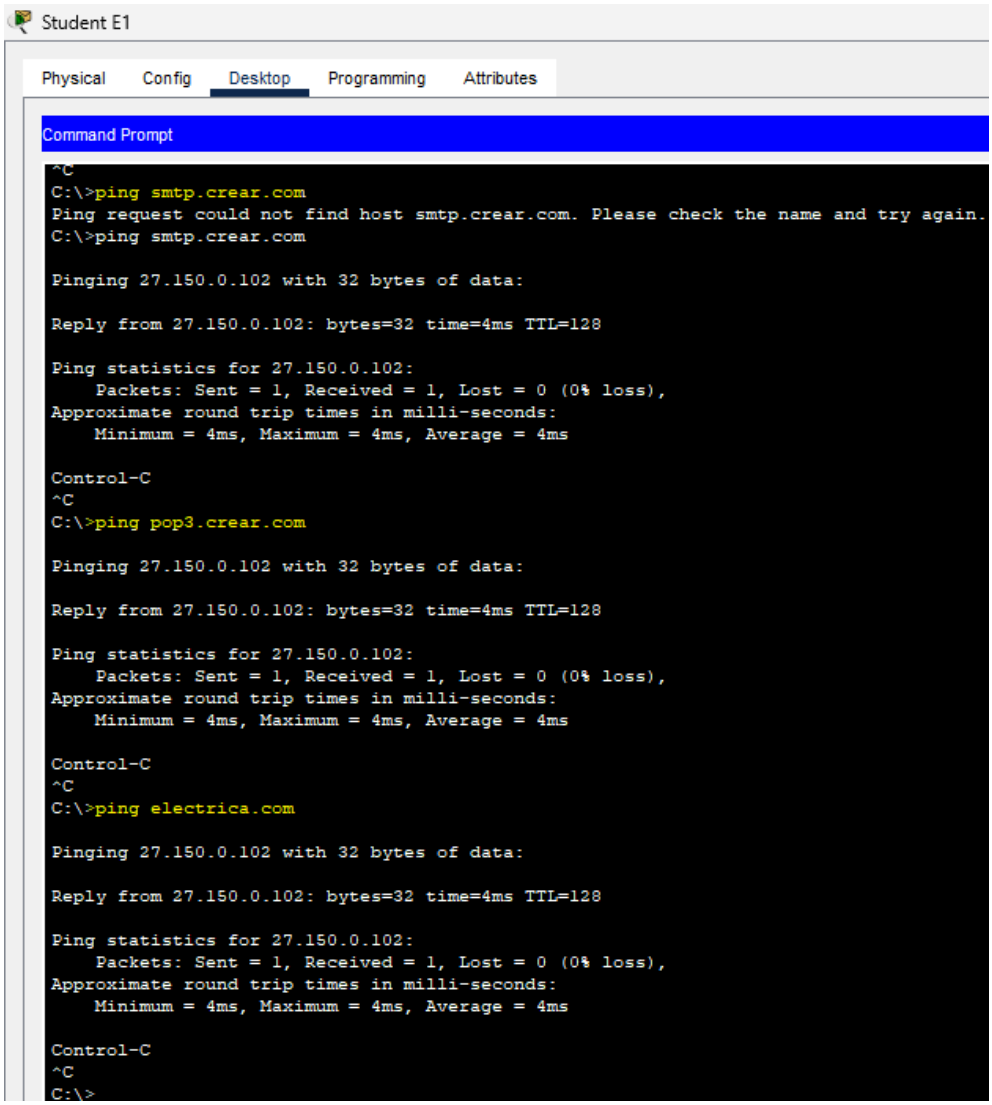
```
Control-C
^C
C:\>ping smtp.sistemas.com

Pinging 27.100.0.33 with 32 bytes of data:

Reply from 27.100.0.33: bytes=32 time=4ms TTL=128

Ping statistics for 27.100.0.33:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 4ms, Average = 4ms

Control-C
^C
C:\>
```

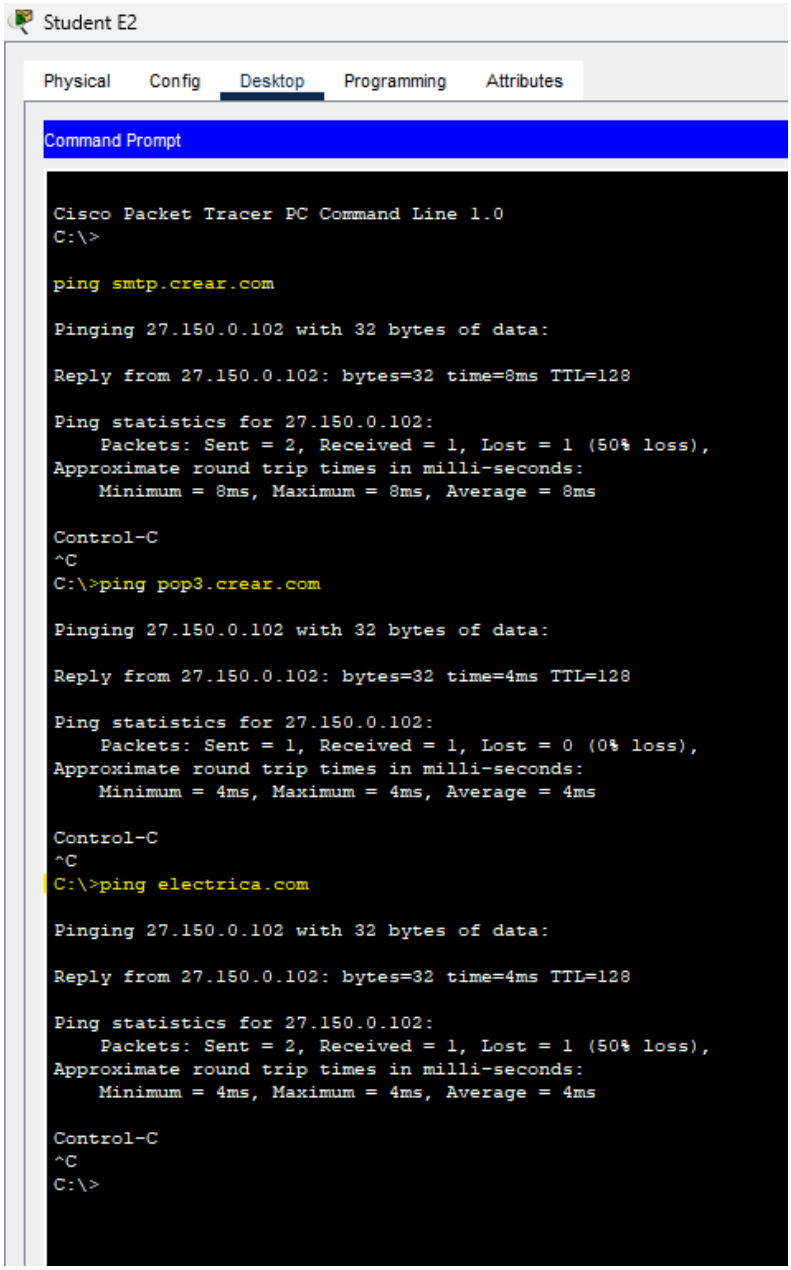
- Student C1 /Student C2




Student C2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>
C:\>ping http.civil.com
Pinging 27.200.0.53 with 32 bytes of data:
Reply from 27.200.0.53: bytes=32 time=8ms TTL=128
Ping statistics for 27.200.0.53:
Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 8ms, Maximum = 8ms, Average = 8ms
Control-C
^C
C:\>ping pop3.civil.com
Pinging 27.200.0.52 with 32 bytes of data:
Reply from 27.200.0.52: bytes=32 time=8ms TTL=128
Ping statistics for 27.200.0.52:
Packets: Sent = 2, Received = 1, Lost = 1 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 8ms, Maximum = 8ms, Average = 8ms
Control-C
^C
C:\>ping smtp.civil.com
Pinging 27.200.0.52 with 32 bytes of data:
Reply from 27.200.0.52: bytes=32 time=4ms TTL=128
Ping statistics for 27.200.0.52:
Packets: Sent = 2, Received = 1, Lost = 1 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
Control-C
^C
C:\>ping civil.com
Pinging 27.200.0.52 with 32 bytes of data:
Reply from 27.200.0.52: bytes=32 time=4ms TTL=128
Ping statistics for 27.200.0.52:
Packets: Sent = 2, Received = 1, Lost = 1 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
Control-C
^C
C:\>

- Student E1 /Student E2

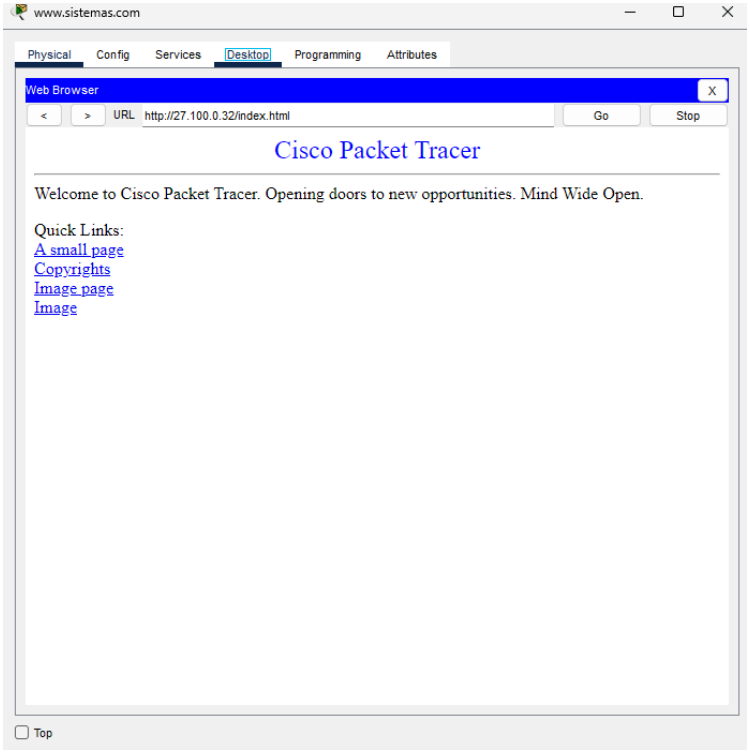



Student E2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>
ping smtp.crear.com
Pinging 27.150.0.102 with 32 bytes of data:
Reply from 27.150.0.102: bytes=32 time=8ms TTL=128
Ping statistics for 27.150.0.102:
Packets: Sent = 2, Received = 1, Lost = 1 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 8ms, Maximum = 8ms, Average = 8ms
Control-C
^C
C:\>ping pop3.crear.com
Pinging 27.150.0.102 with 32 bytes of data:
Reply from 27.150.0.102: bytes=32 time=4ms TTL=128
Ping statistics for 27.150.0.102:
Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
Control-C
^C
C:\>ping electrica.com
Pinging 27.150.0.102 with 32 bytes of data:
Reply from 27.150.0.102: bytes=32 time=4ms TTL=128
Ping statistics for 27.150.0.102:
Packets: Sent = 2, Received = 1, Lost = 1 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
Control-C
^C
C:\>

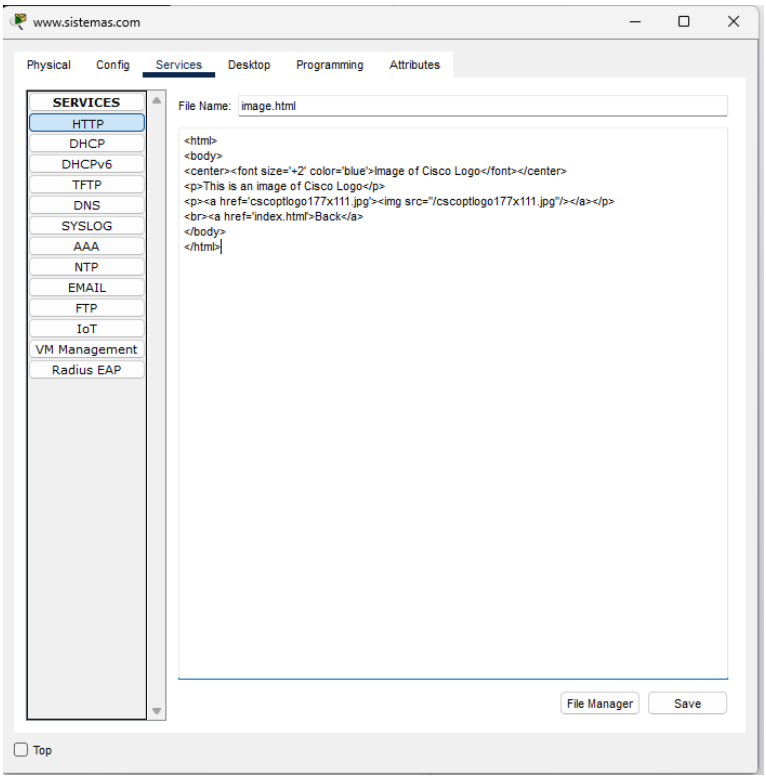
b. HTTP

- On the web servers, configure the HTTP service. Modify the web pages of the servers to recognize which faculty they belong to (personalize it for each faculty). Start the service.

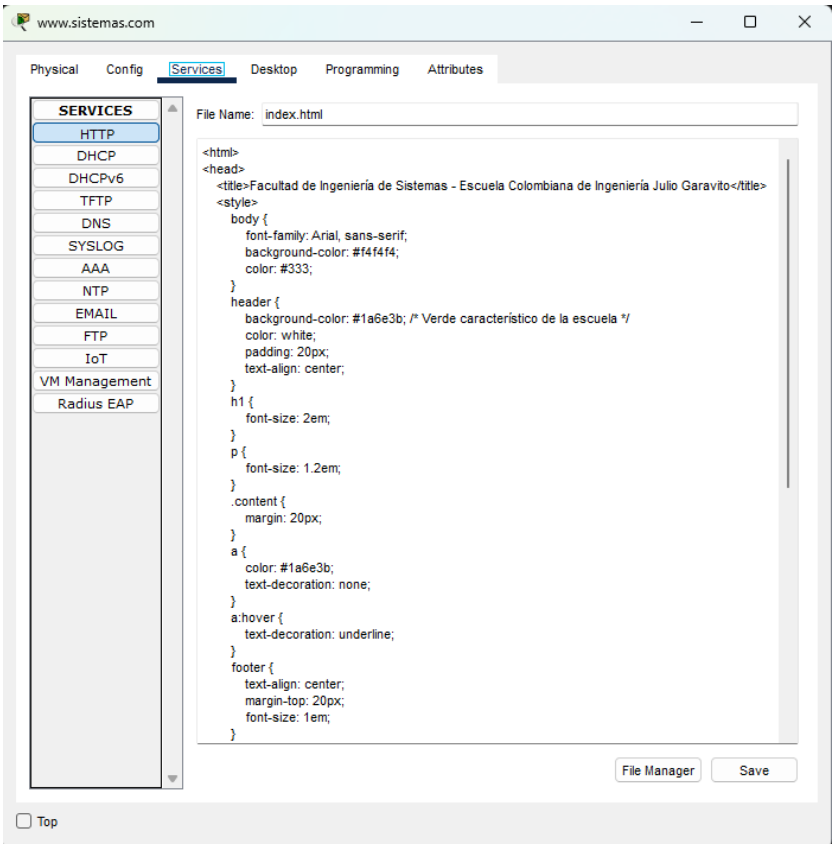
    - Entramos en el apartado de web browser y entramos en la dirección ip de sistemas.com

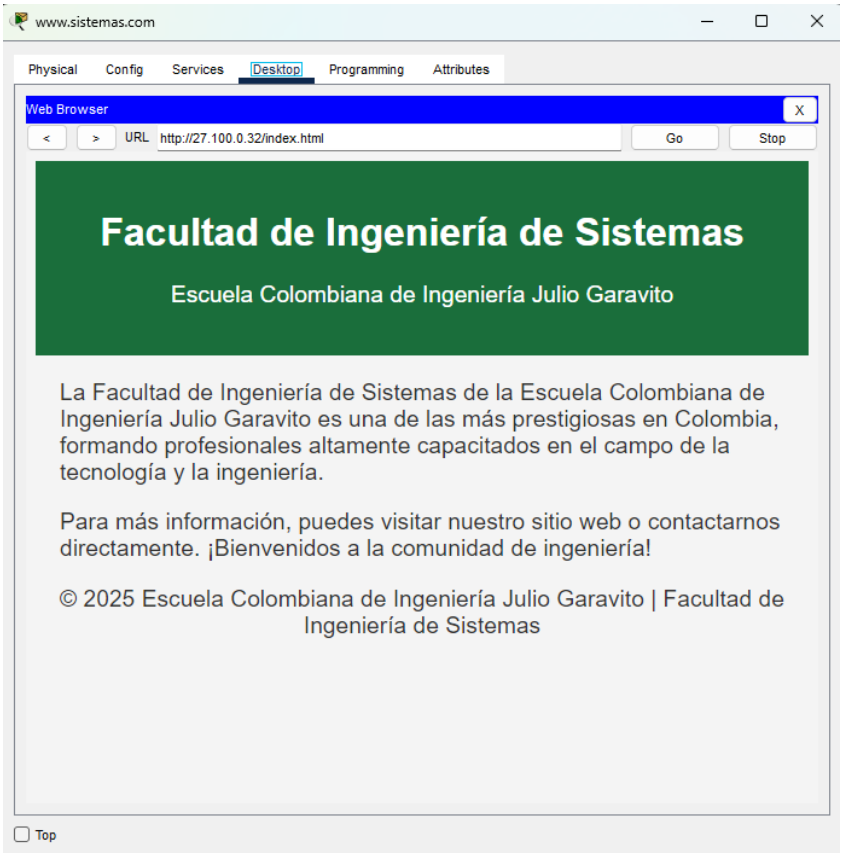


    - Nos vamos al apartado de index el cual tiene el código de lo que muestra la pagina

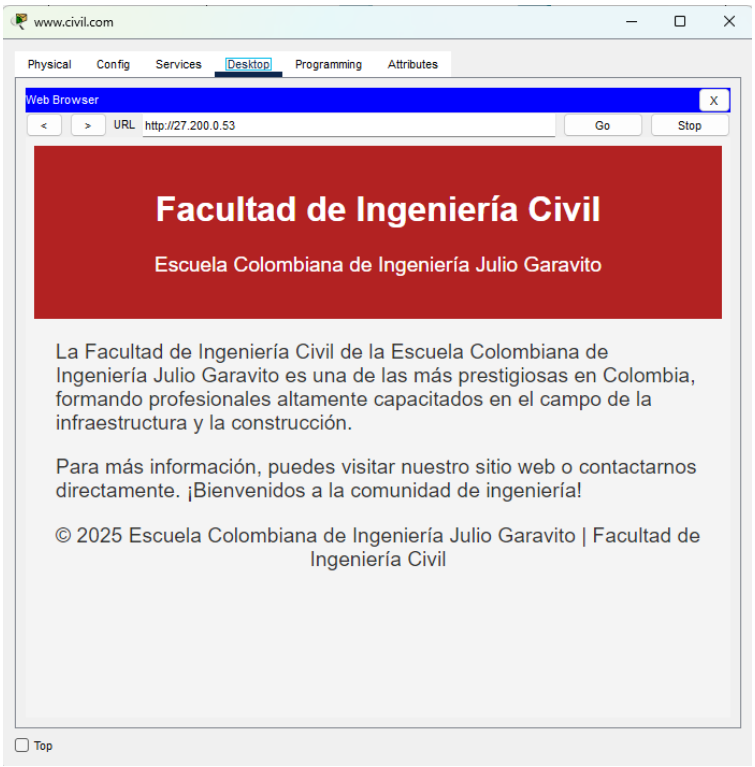


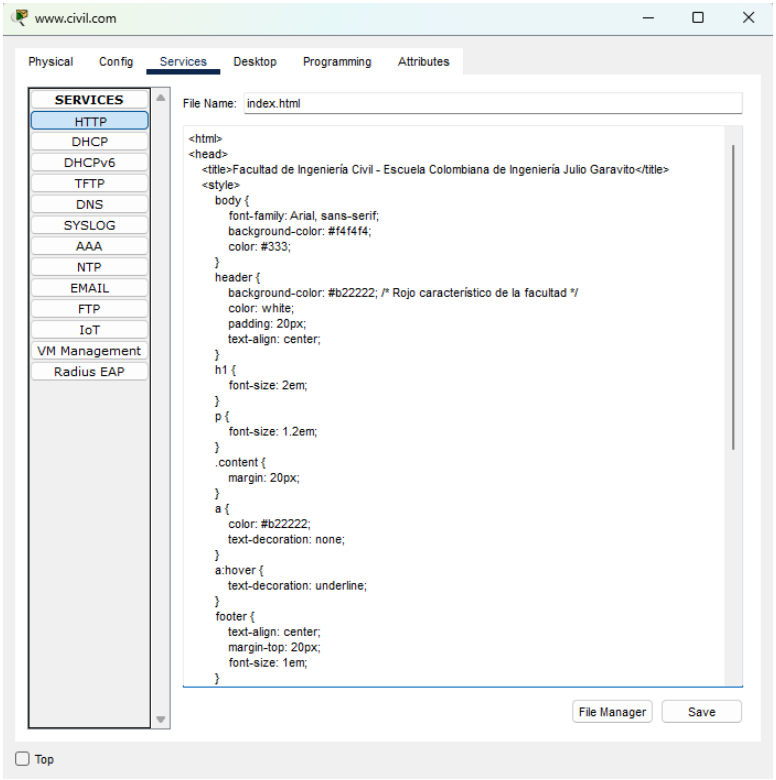
- Modificamos este para la facultad de sistemas





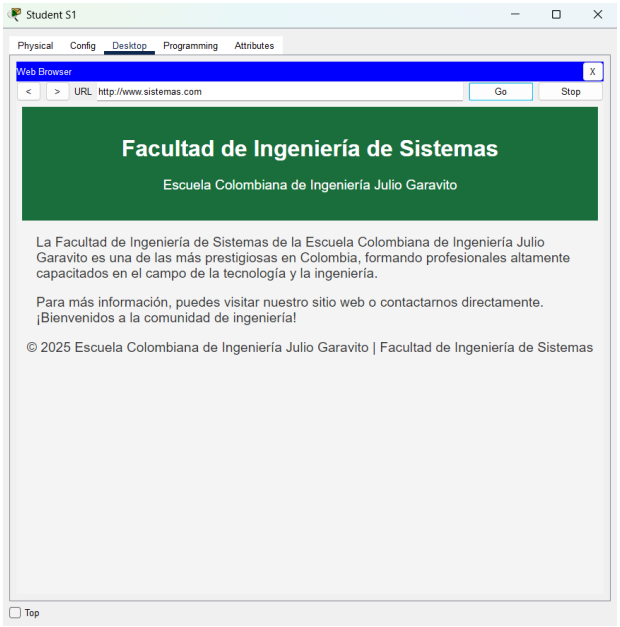
- Modificamos este para las otras dos facultades
    - Facultad de ingeniería civil


www.civil.com
Physical
Config
Services
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://27.200.0.53
Go
Stop
Facultad de Ingeniería Civil
Escuela Colombiana de Ingeniería Julio Garavito
La Facultad de Ingeniería Civil de la Escuela Colombiana de Ingeniería Julio Garavito es una de las más prestigiosas en Colombia, formando profesionales altamente capacitados en el campo de la infraestructura y la construcción.
Para más información, puedes visitar nuestro sitio web o contactarnos directamente. ¡Bienvenidos a la comunidad de ingeniería!
© 2025 Escuela Colombiana de Ingeniería Julio Garavito | Facultad de Ingeniería Civil
Top

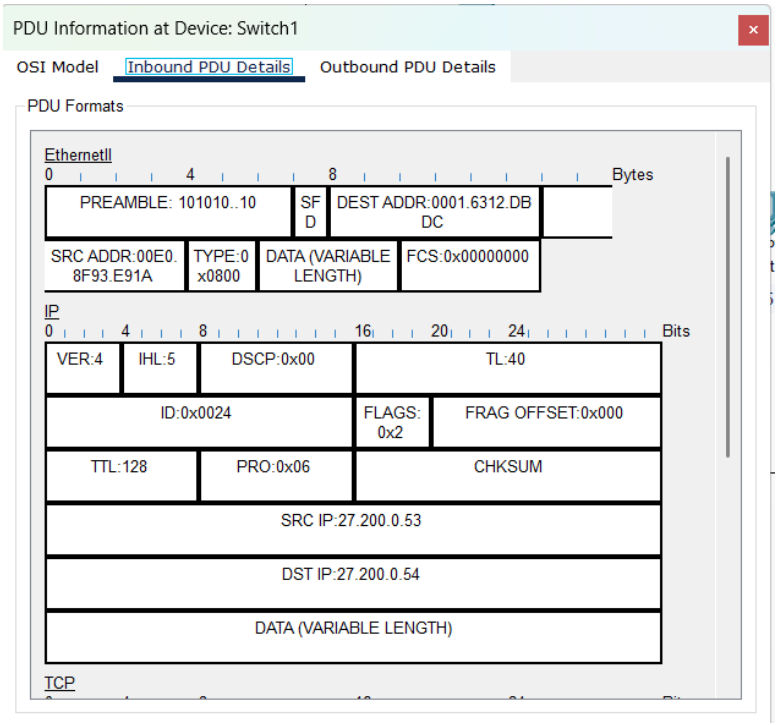

www.civil.com
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
File Name:
index.html
<html>
<head>
<title>Facultad de Ingeniería Civil - Escuela Colombiana de Ingeniería Julio Garavito</title>
<style>
body {
font-family: Arial, sans-serif;
background-color: #f4f4f4;
color: #333;
}
header {
background-color: #b22222; /* Rojo característico de la facultad */
color: white;
padding: 20px;
text-align: center;
}
h1 {
font-size: 2em;
}
p {
font-size: 1.2em;
}
.content {
margin: 20px;
}
a {
color: #b22222;
text-decoration: none;
}
a:hover {
text-decoration: underline;
}
footer {
text-align: center;
margin-top: 20px;
font-size: 1em;
}
File Manager
Save
Top

- From the client stations, try connecting to the web servers:
  - Make the request for the web page using the IP addresses of each server. (ya realizado anteriormente)
  - Make the request for the web page using the URL of each server.
    - www.civil.com

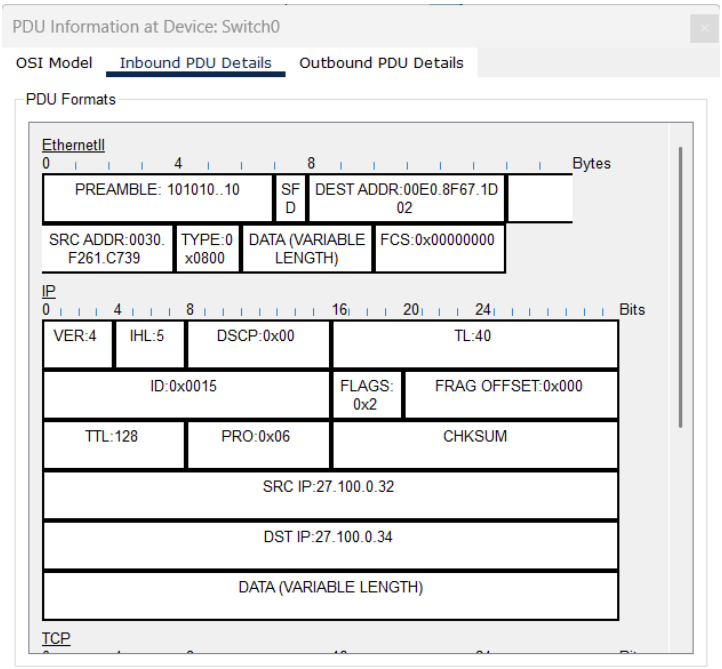
    - www.sistemas.com



- Using simulation mode, check the contents of the PDU at the application layer.
    - www.civil.com

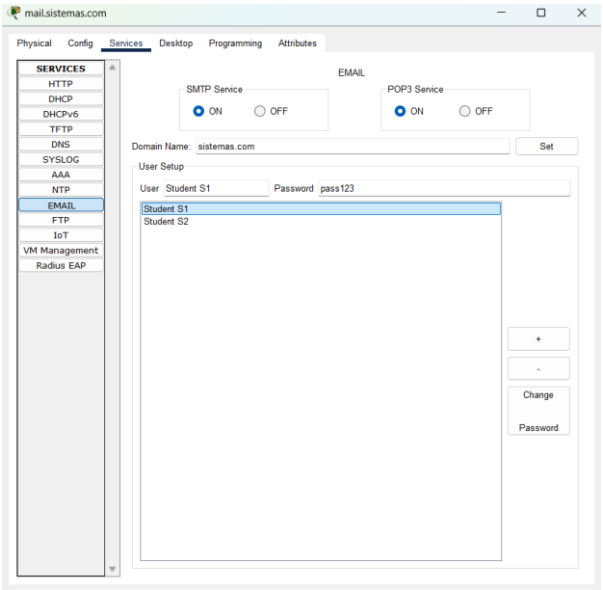


    - www.sistemas.com

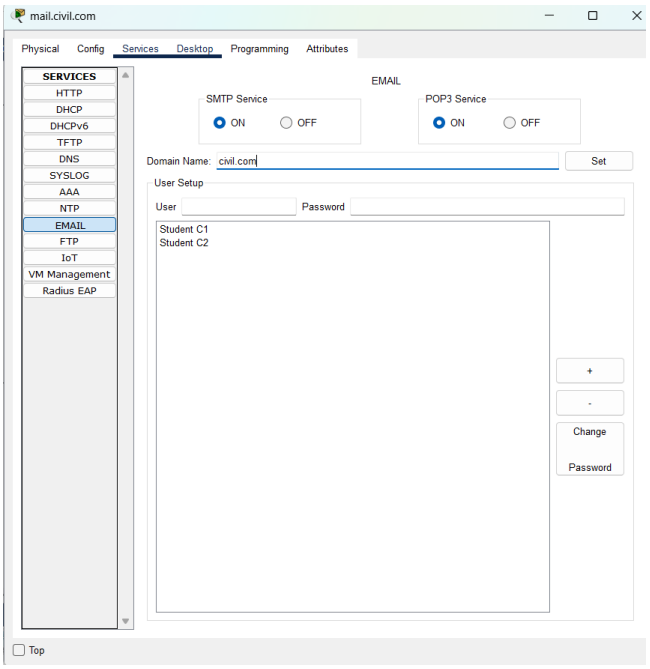


c. Email

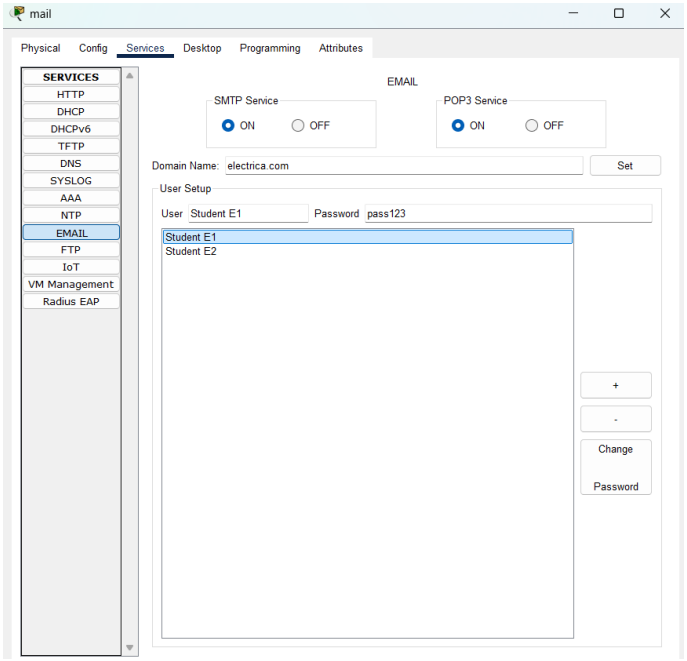
- On the mail server of each faculty, include email accounts for the users of each faculty. Use the client computer names as user names. Start the service.
  - Entramos en el apartado service -> email agregamos el nombre del dominio y los usuarios con los nombres de las otras maquinas con su respectiva contraseña
    - mail.sistemas.com



    - mail.civil.com

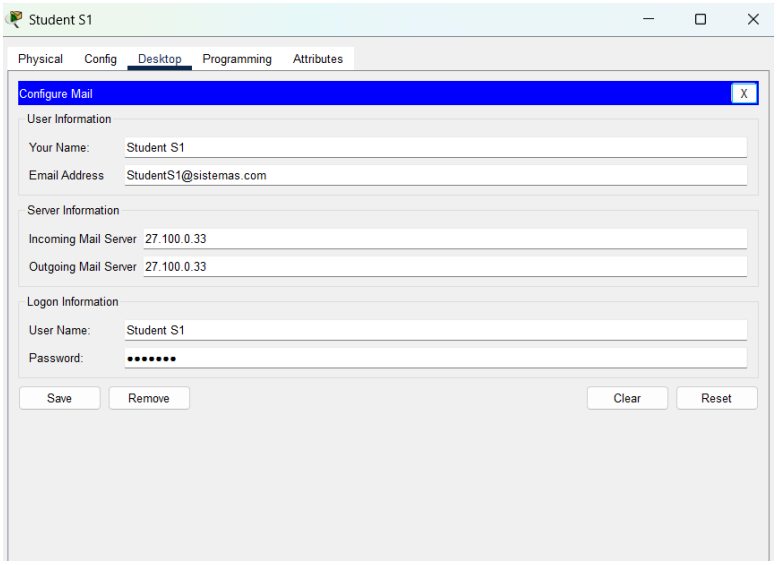


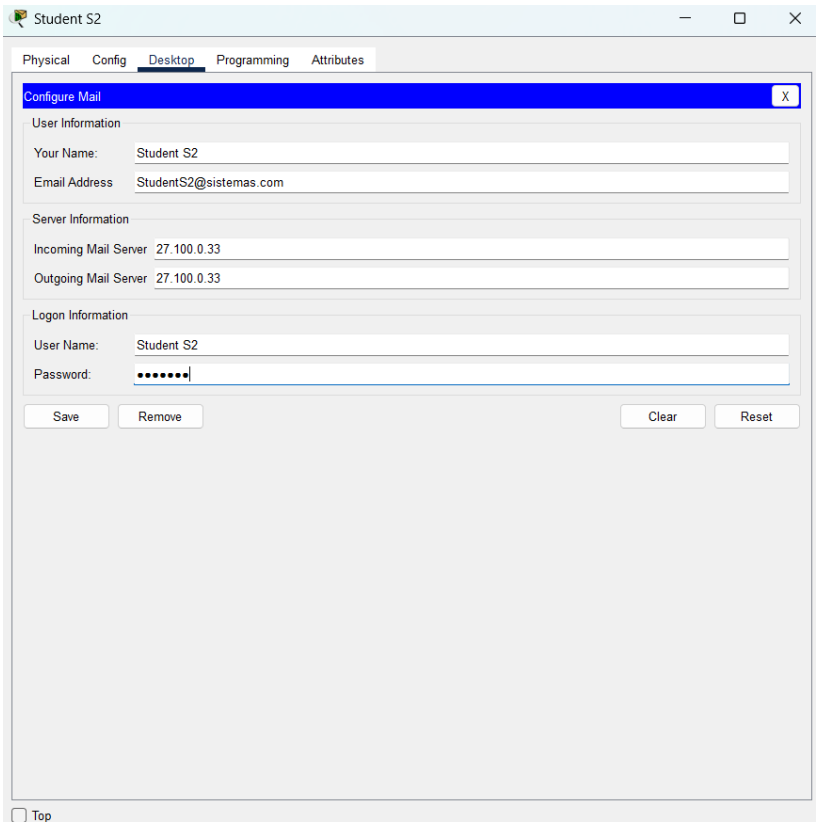
- mail



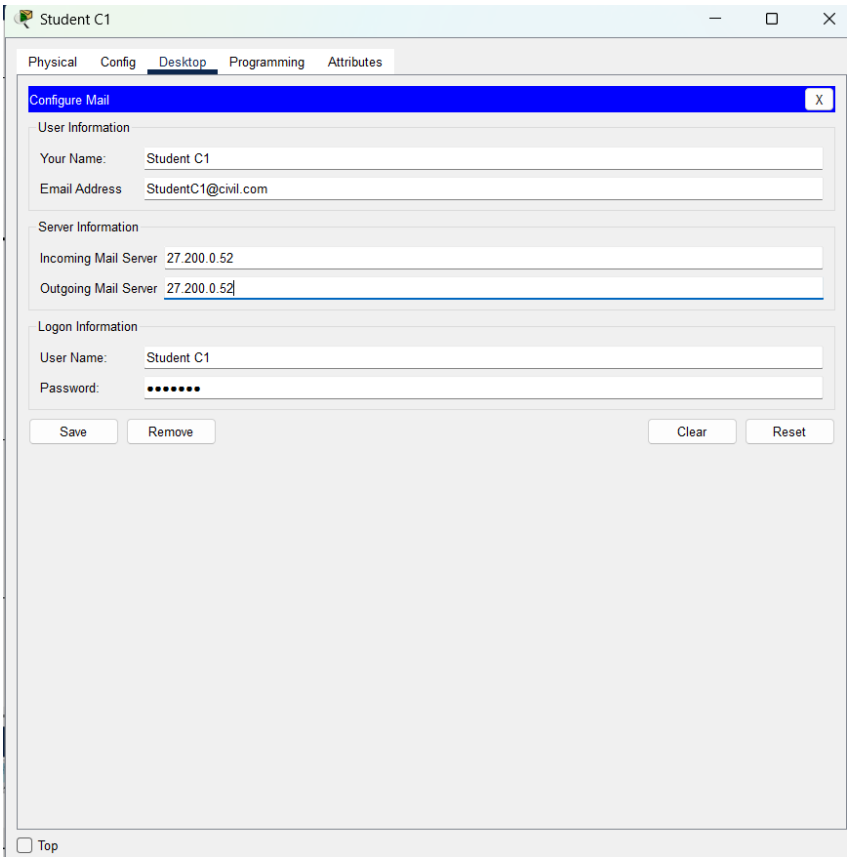
- From the client stations, test the service:

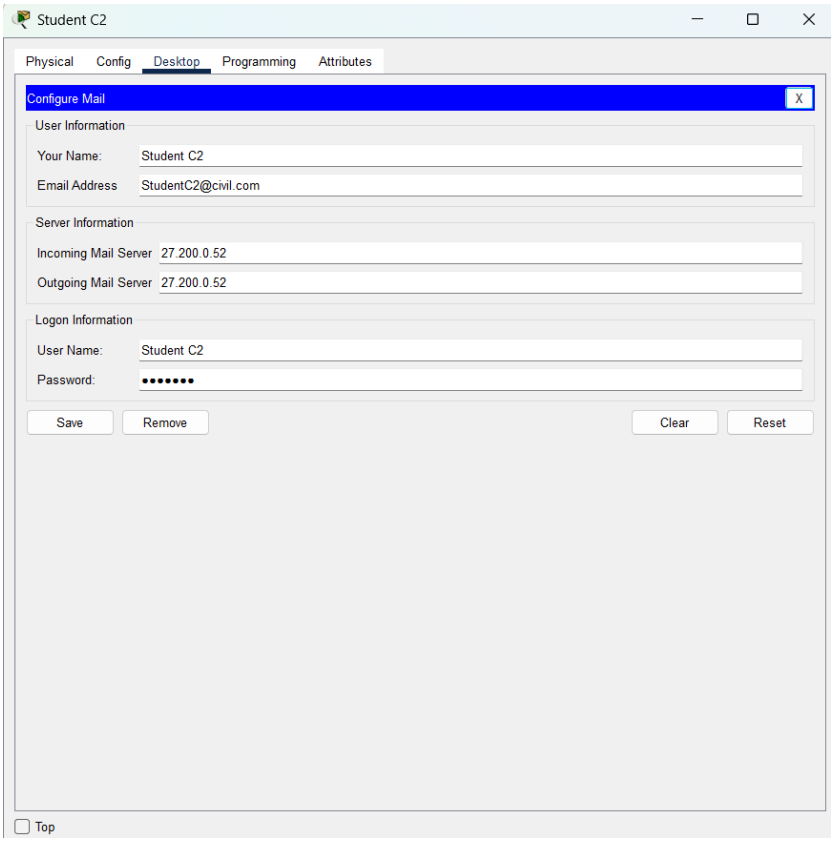
- Configure the email clients for each domain.
  - En el apartado desktop -> email de cada maquina , configuramos los correos de cada estudiante.
    - Student S1 /S2



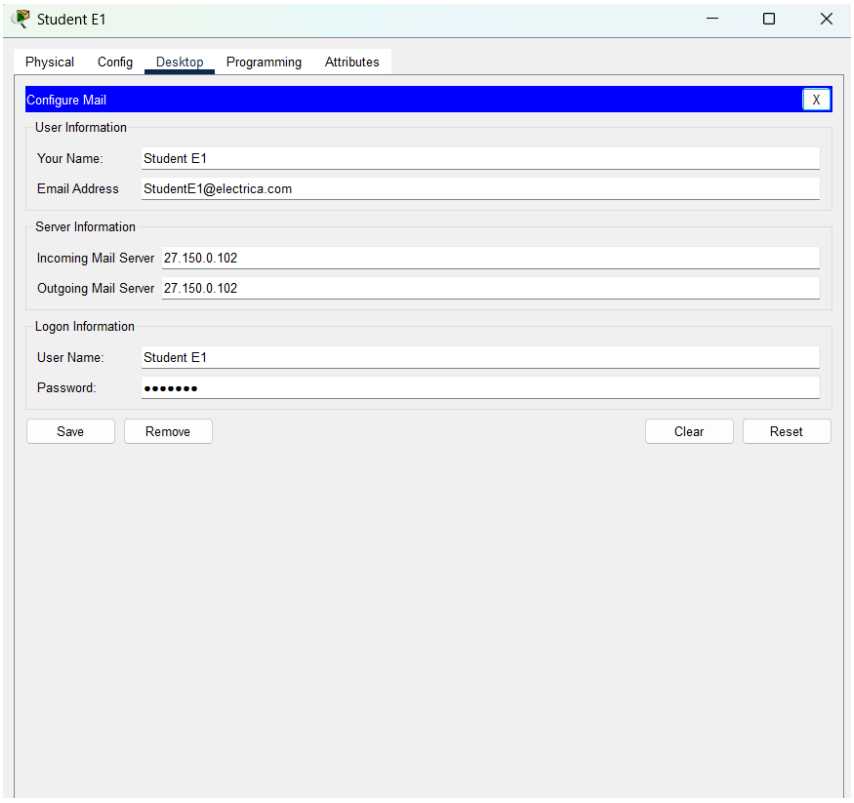


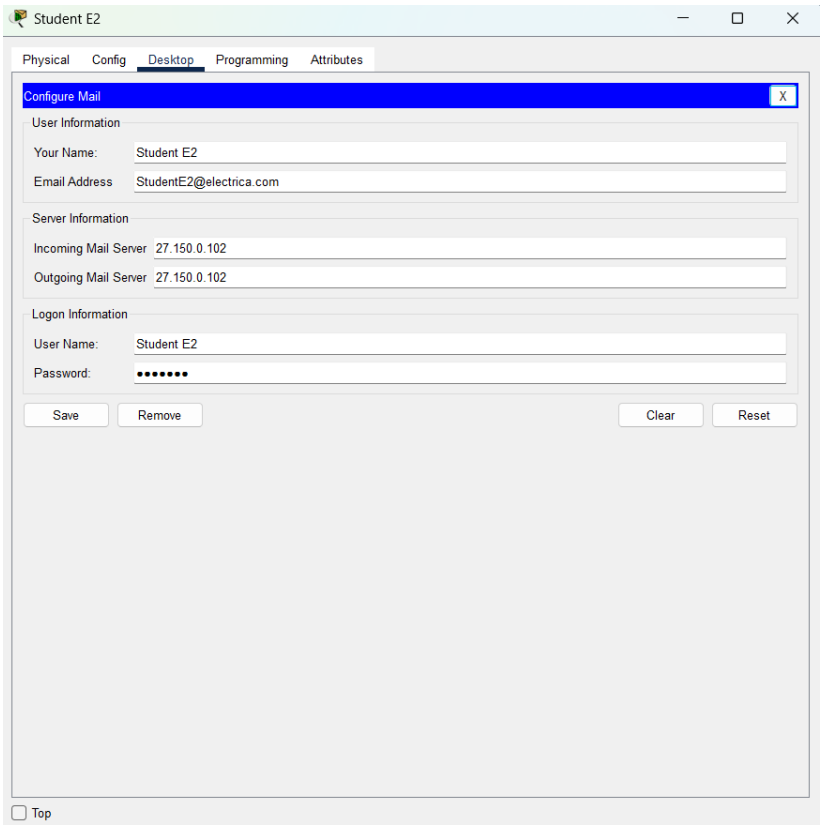
    - Student C1 /C2


Student C1
Physical
Config
Desktop
Programming
Attributes
Configure Mail
X
User Information
Your Name:
Student C1
Email Address
StudentC1@civil.com
Server Information
Incoming Mail Server
27.200.0.52
Outgoing Mail Server
27.200.0.52
Logon Information
User Name:
Student C1
Password:
Save
Remove
Clear
Reset
Top

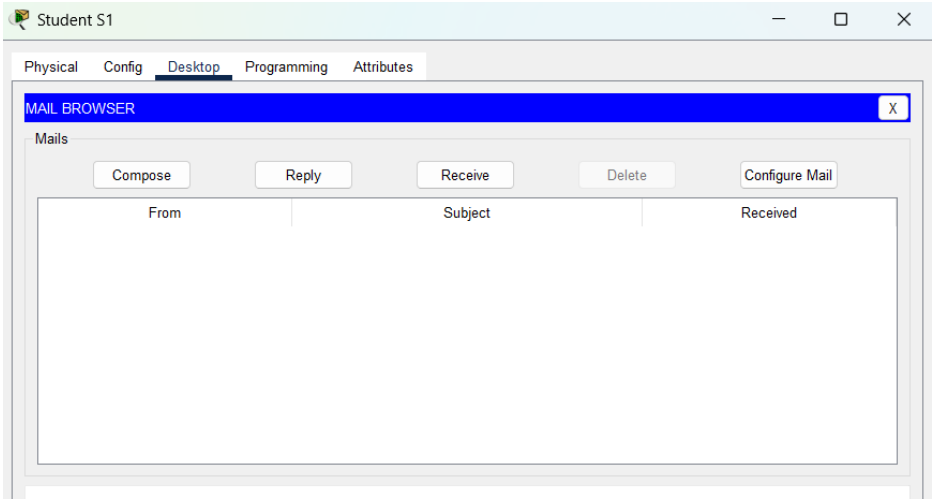

Student C2
Physical
Config
Desktop
Programming
Attributes
Configure Mail
X
User Information
Your Name:
Student C2
Email Address
StudentC2@civil.com
Server Information
Incoming Mail Server
27.200.0.52
Outgoing Mail Server
27.200.0.52
Logon Information
User Name:
Student C2
Password:
Save
Remove
Clear
Reset
Top

- Student E1 /E2

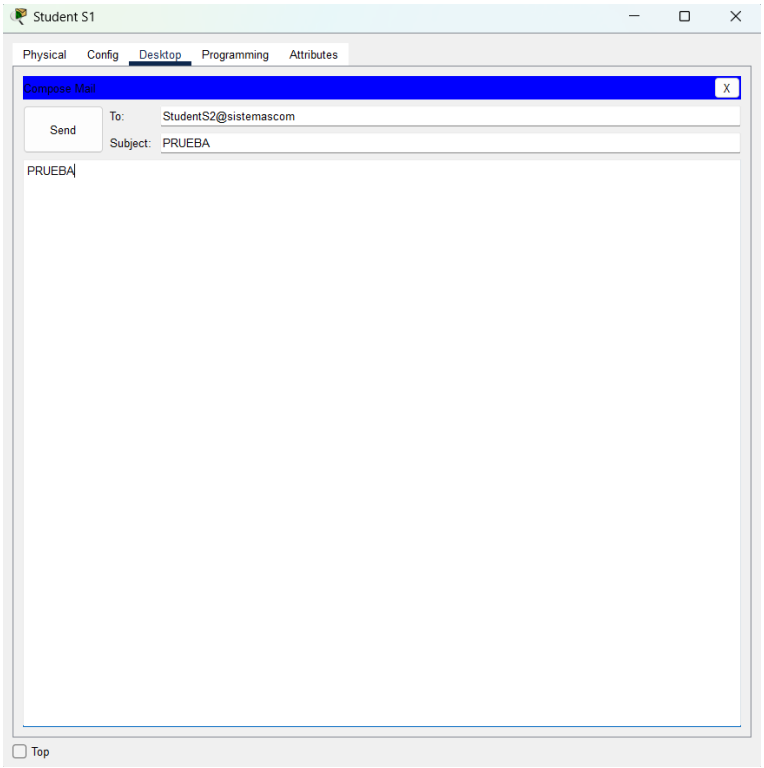




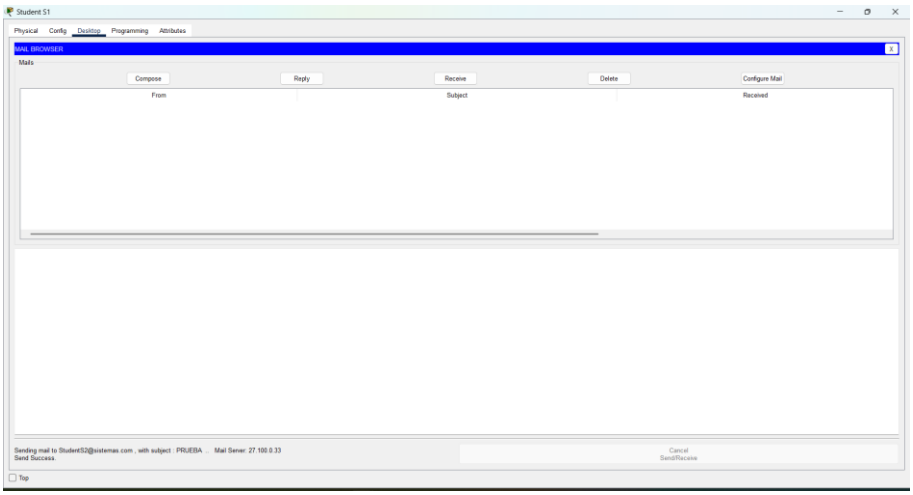
- Send emails between stations in the same domain
  - Entramos al mail de un estudiante en el apartado compose



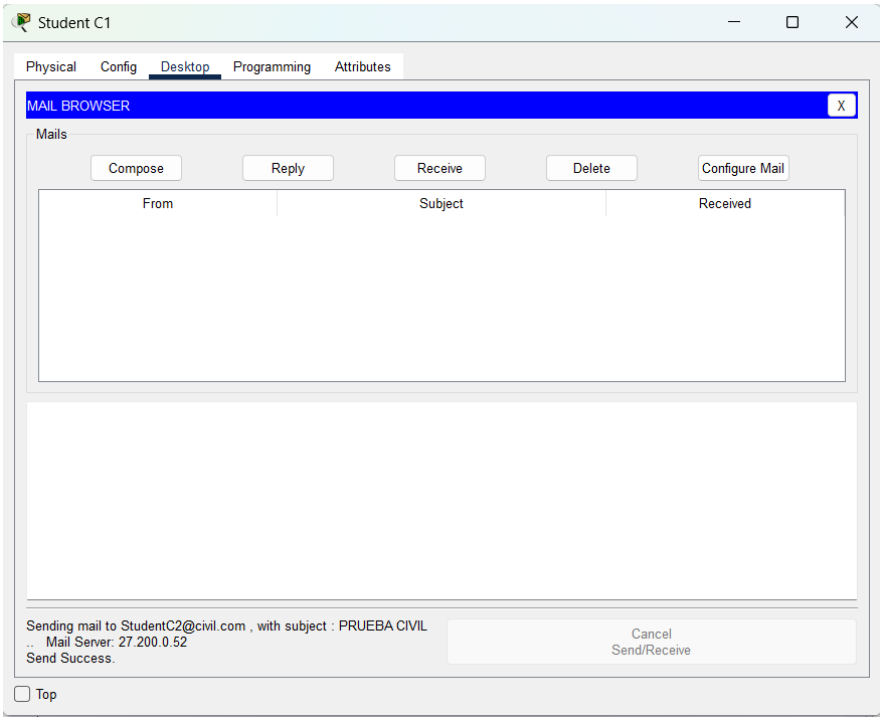
  - Llenamos los datos y enviamos el correo dándole click a Send



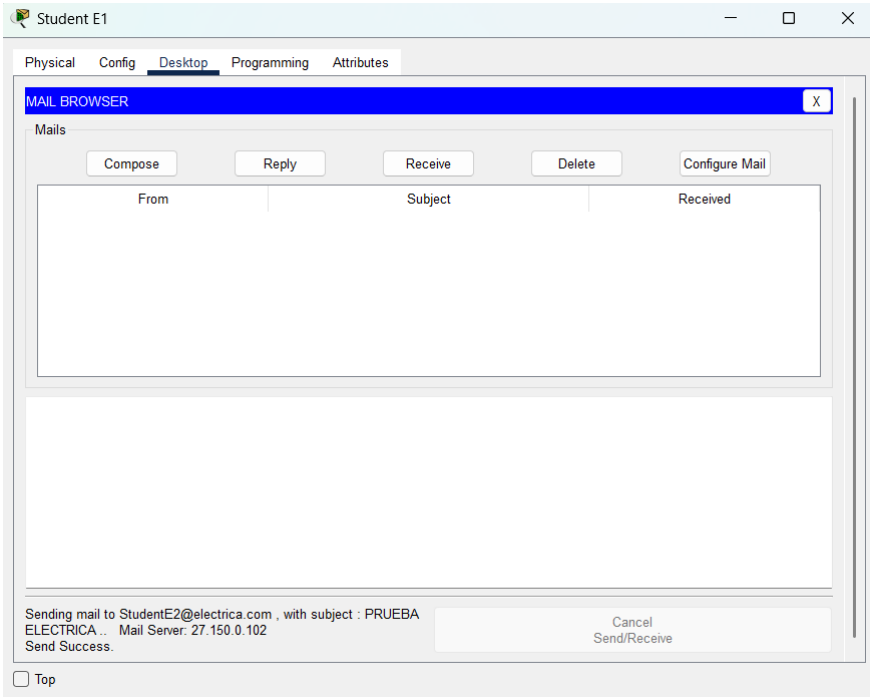
  - Verificamos que el correo se haya enviado correctamente en el modo simulación
    - Sistemas



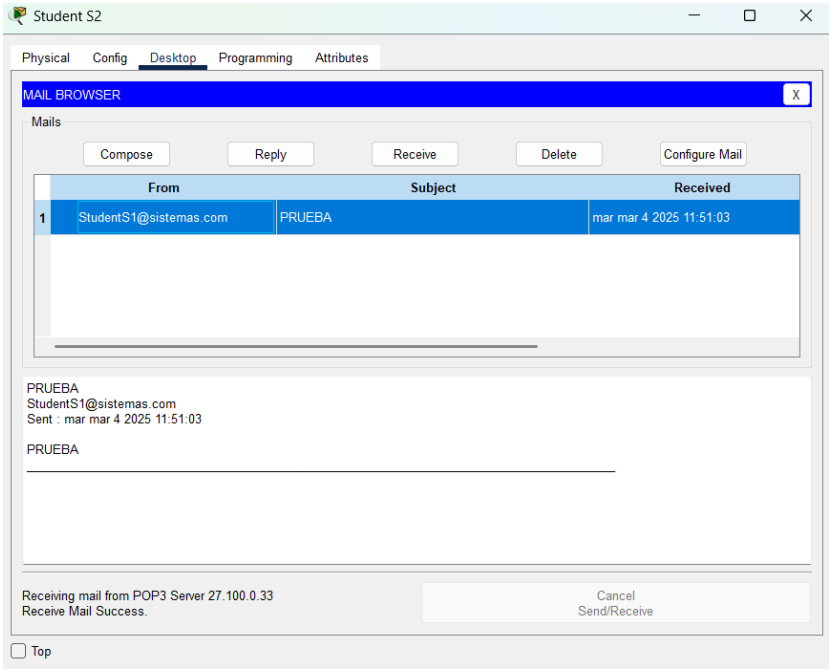
- Civil



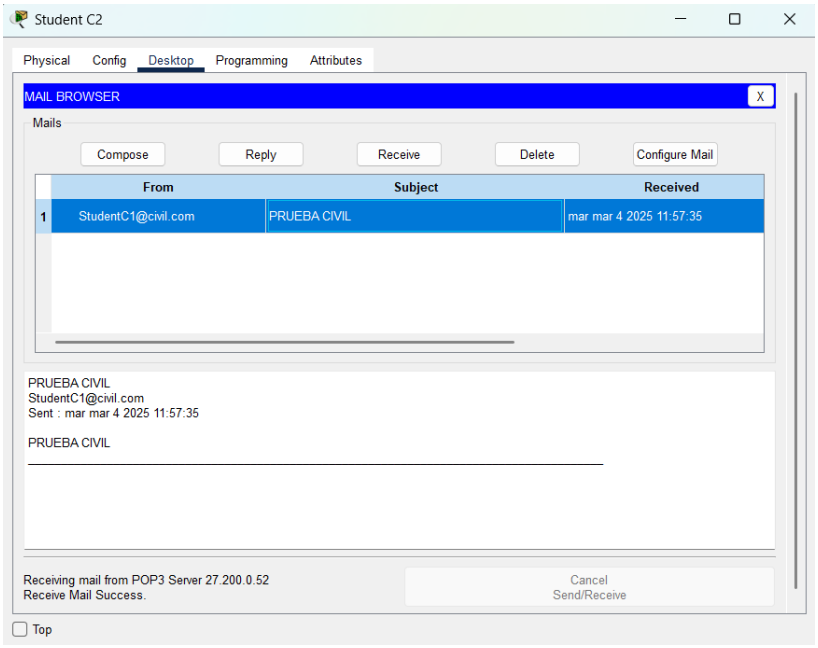
- Eléctrica



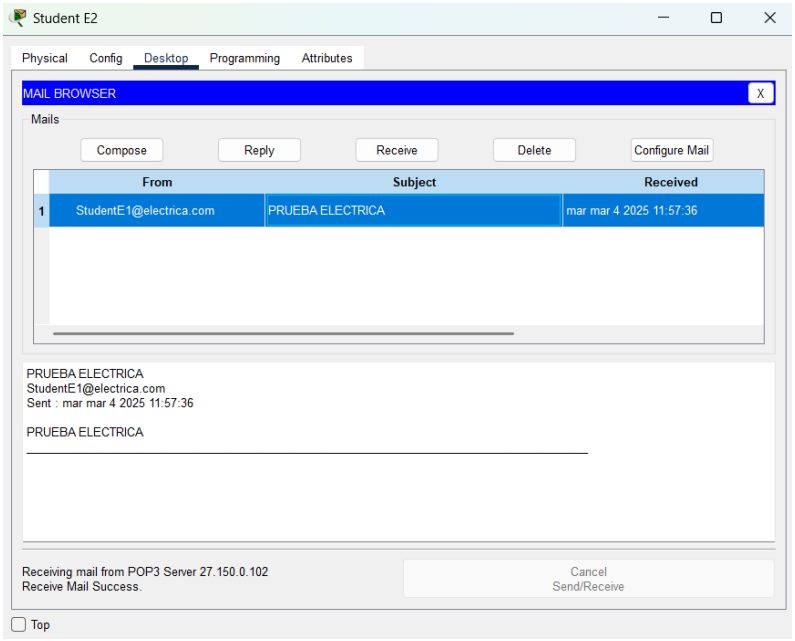
- Verify receipt of the emails on the stations and reply to the received messages
    - Damos click en receipt y efectivamente revisamos que el correo llegue a su fin (modo simulación)
        - Sistemas



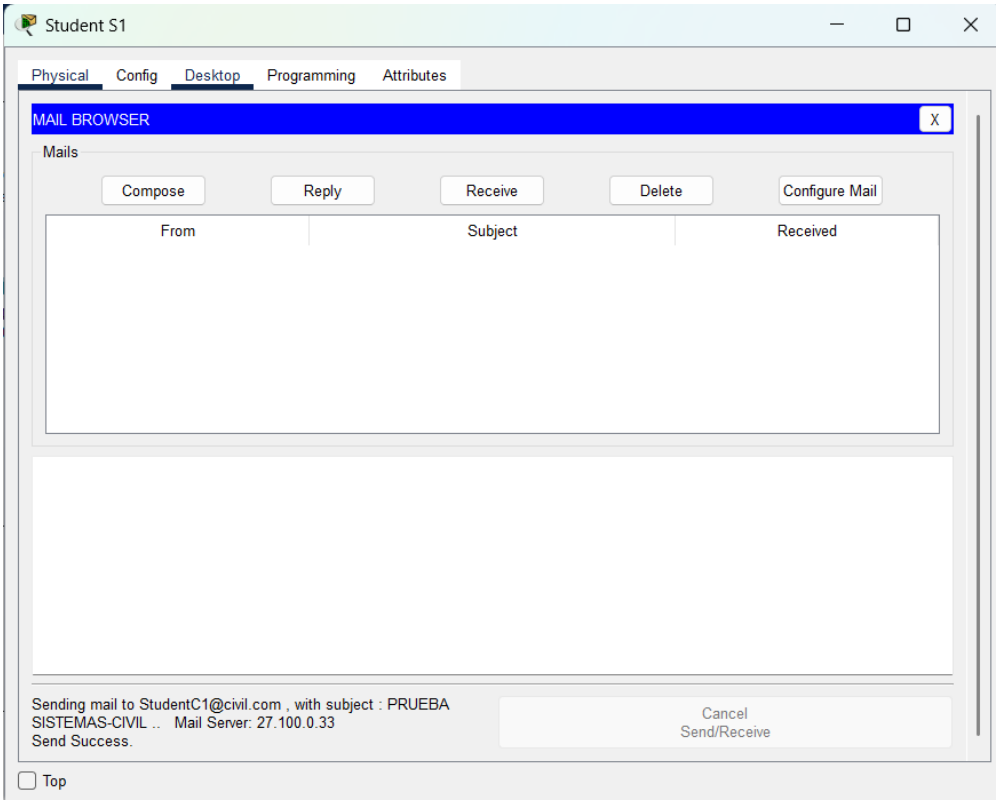
- Civil



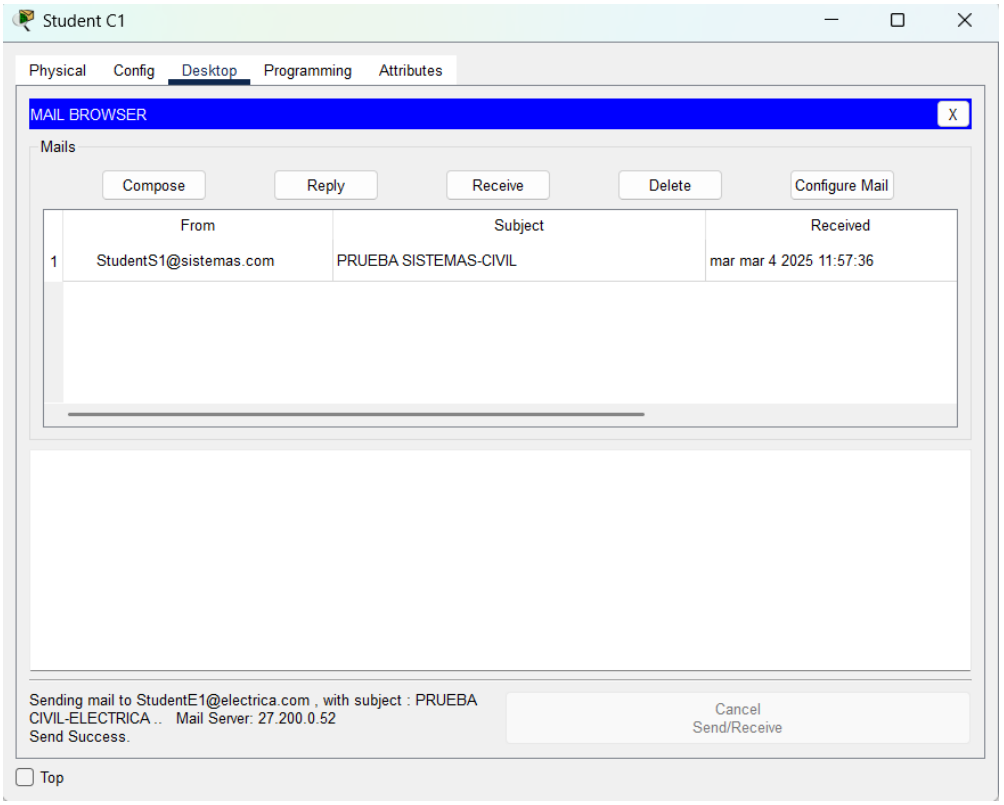
- Eléctrica



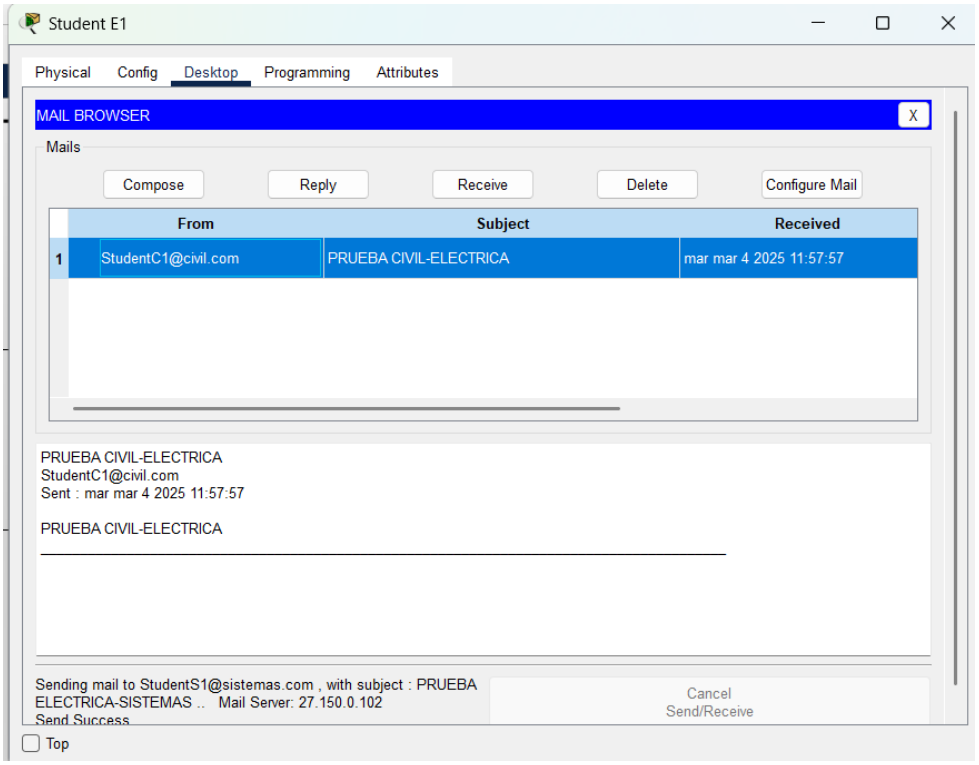
- Send emails to clients in other domains.
  - Sistemas-civil



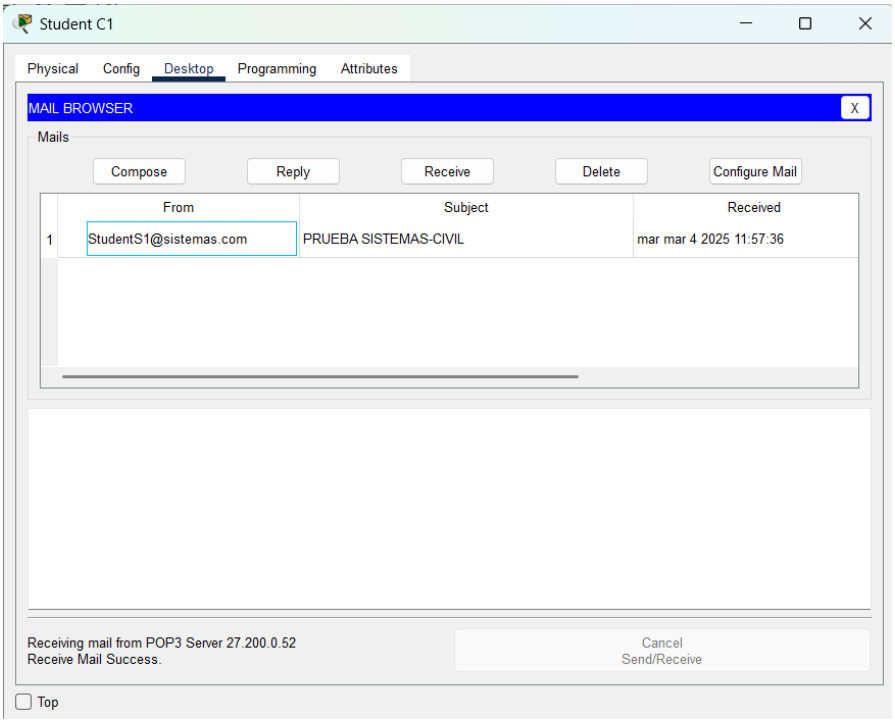
- Civil-electrica



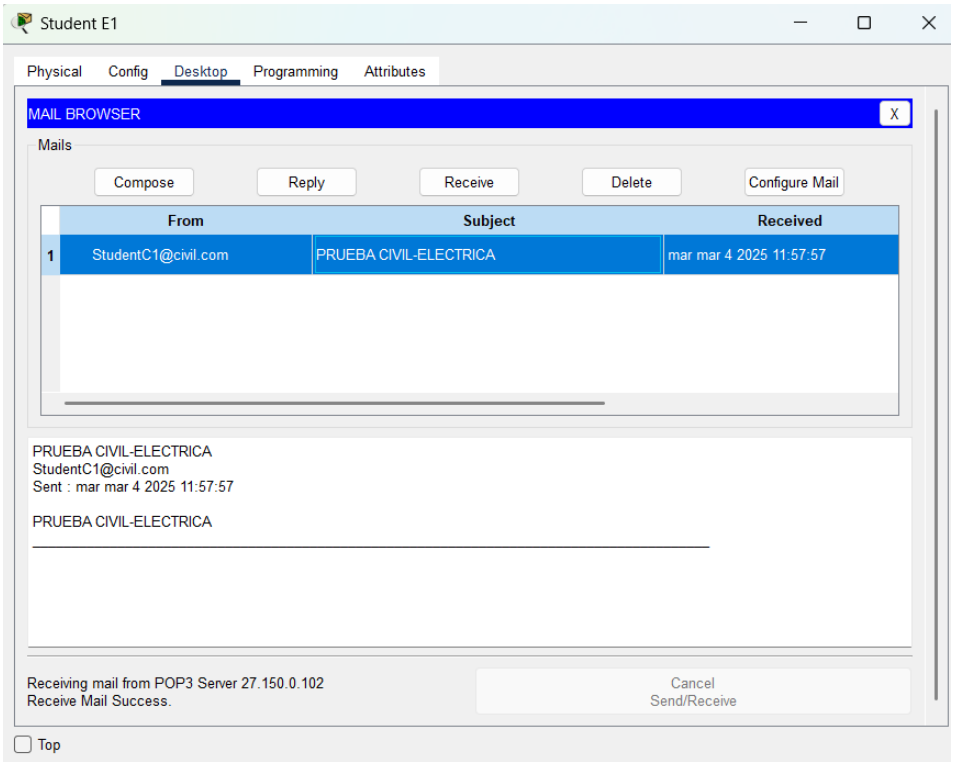
- Electrica-sistemas



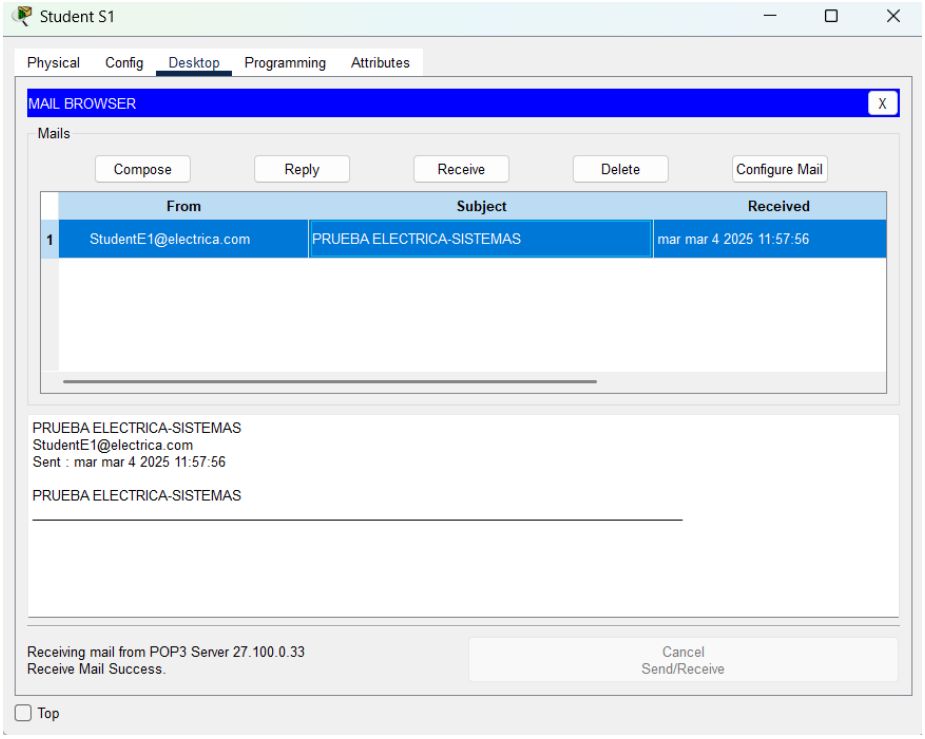
- Verify receipt of the emails on the stations and reply to the received messages.
  - Sistemas-civil



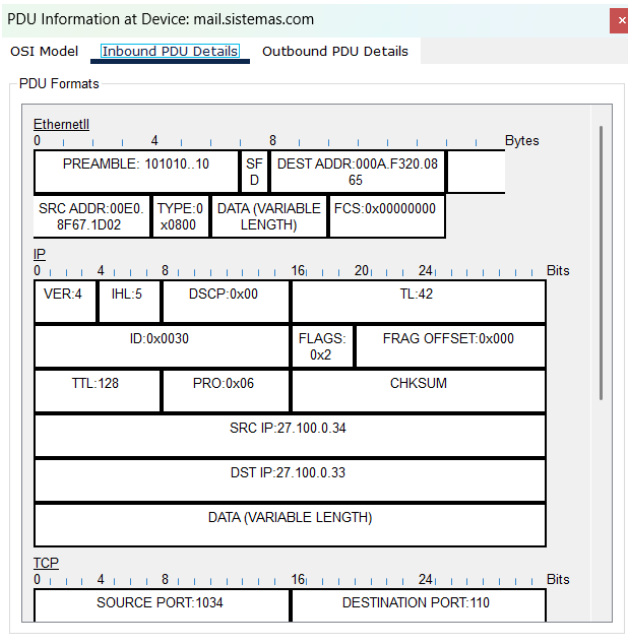
  - Civil-electrica

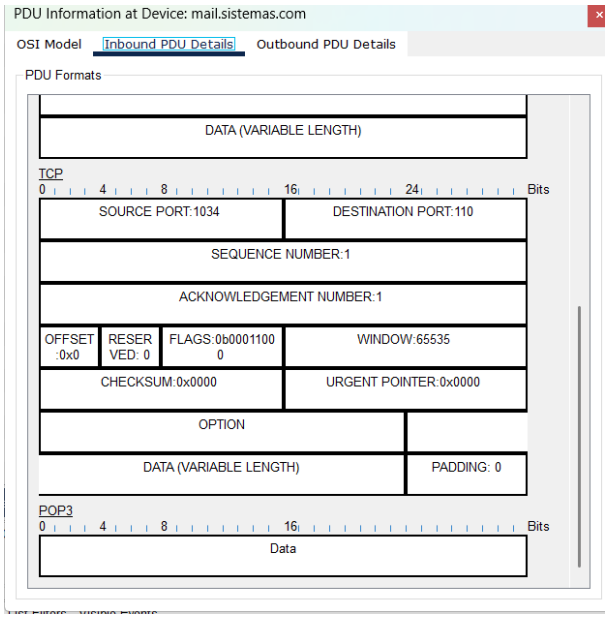


- Electrica-sistemas

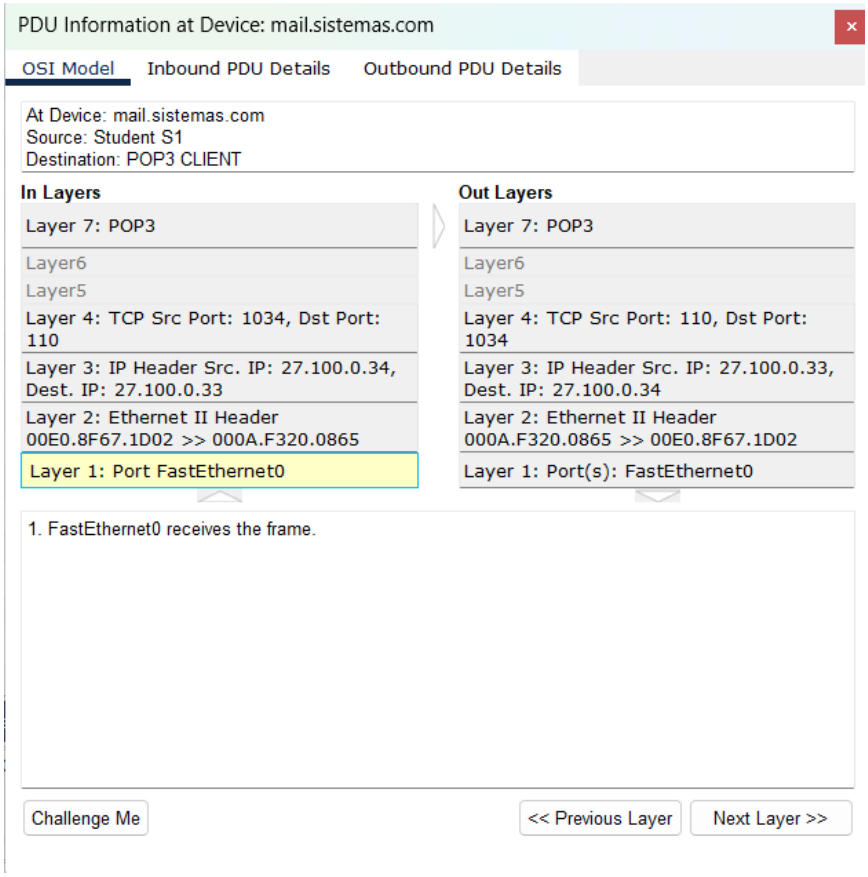


- Using the simulation tool, check the contents of the PDU at the transport and application



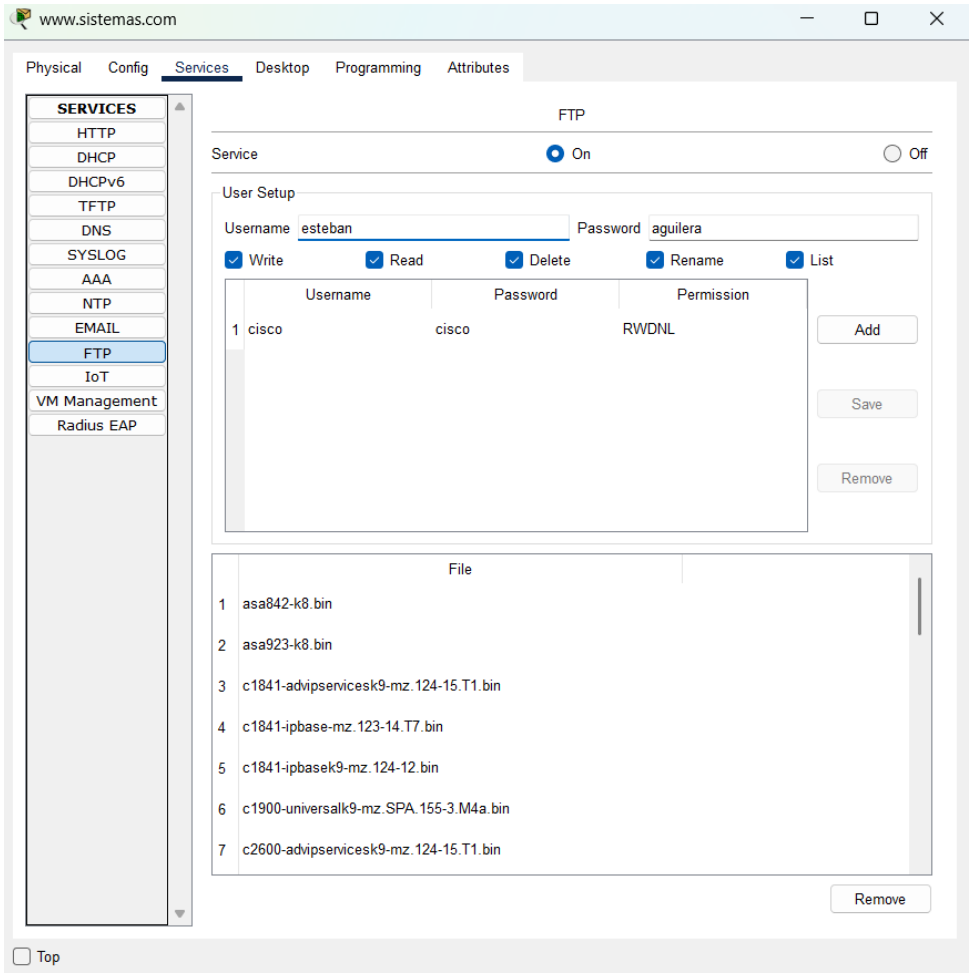


- layers during the email sending process between the sending client and its SMTP server and between the receiving client and its POP3 server.

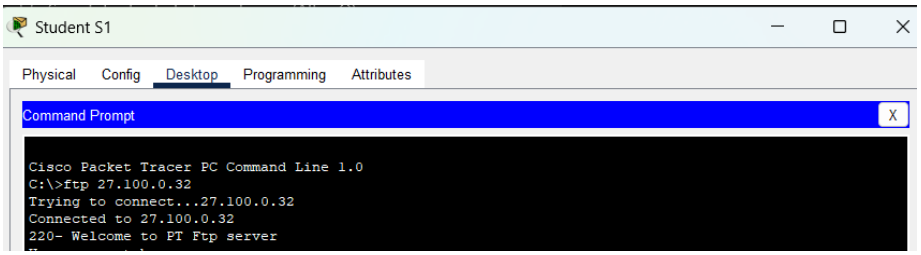


d. FTP

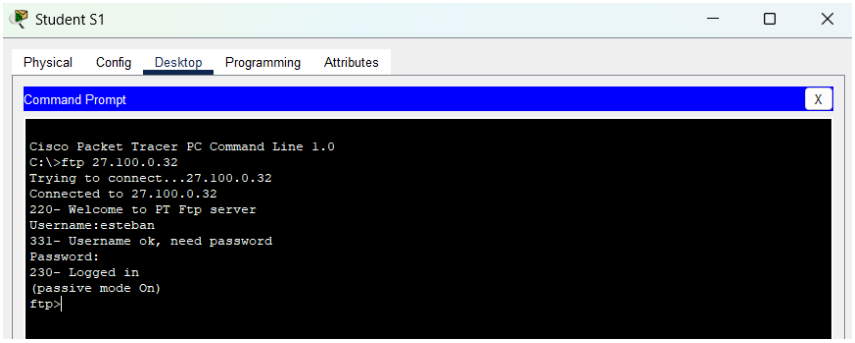
- On the sistemas web server, configure the FTP service. Create a user with your first name and password as your last name (e.g., in my case, it would be username: claudia and password: santiago). Start the service.
  - Creamos nuestro usuario y prendemos el servicio



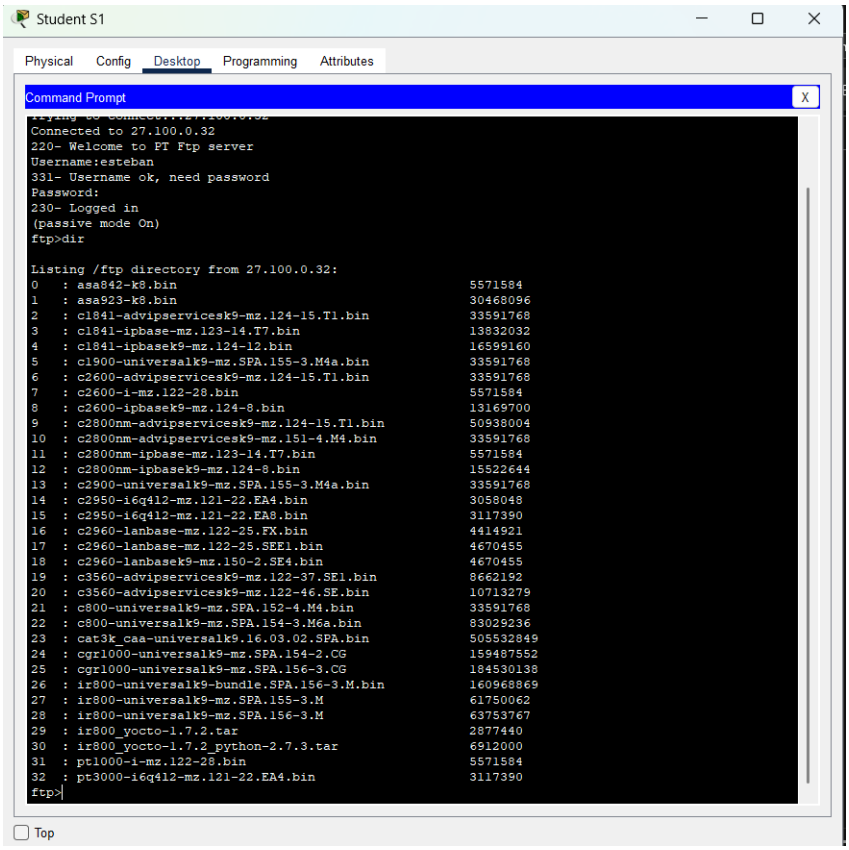
- From the client stations, try connecting to the FTP server and download a file
  - From the command line, access the FTP server (by name or IP address) using the telnet command.
    - Usamos el comando ftp ip_Server para acceder al servidro FTP



- Log in with the created username/password.
  - Iniciamos sesión con nuestro usuario



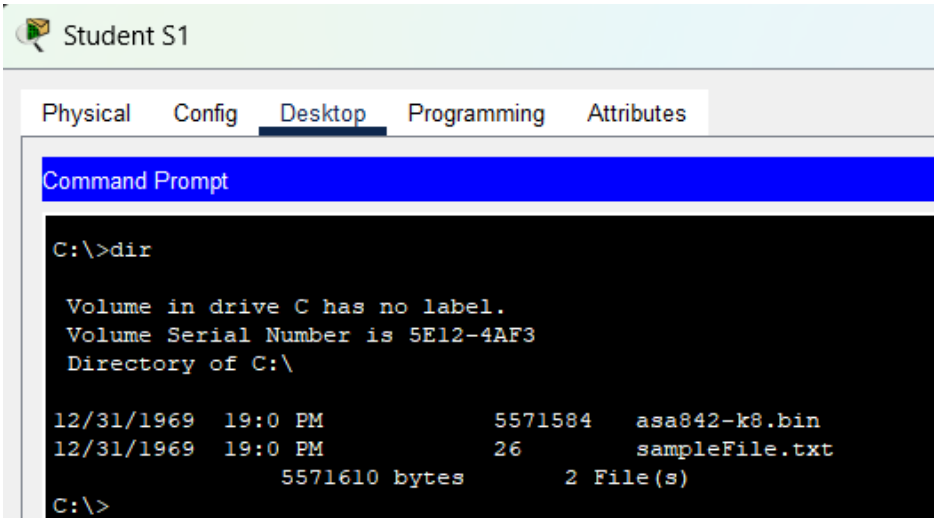
- Download one of the files from the server.
  - Usamos dir para ver que archivos hay en el servidor



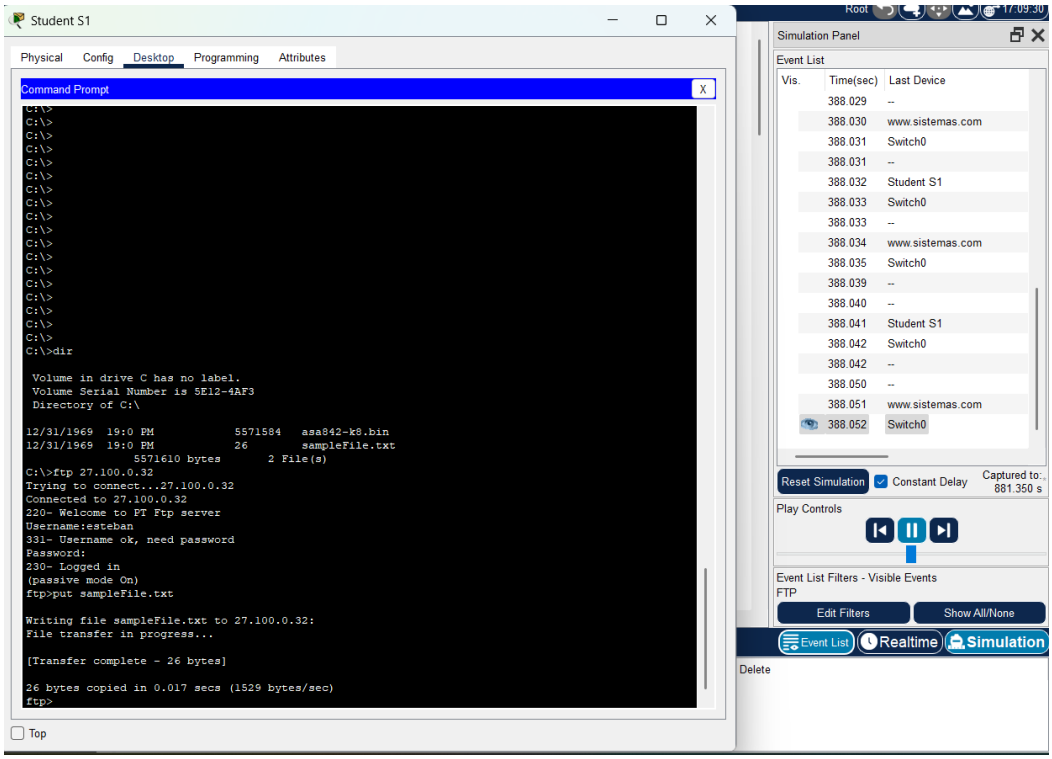
- Usamos get nombreArchivo para obtenerlo en el cliente

```
ftp>get asa842-k8.bin

Reading file asa842-k8.bin from 27.100.0.32:
File transfer in progress...

[Transfer complete - 5571584 bytes]

5571584 bytes copied in 17.551 secs (72737 bytes/sec)
ftp>
```

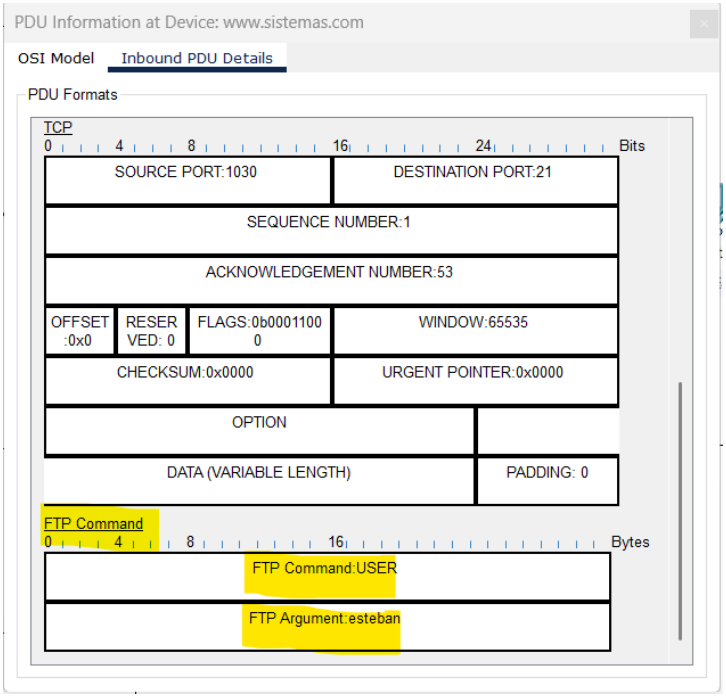
- Exit the server and verify that the file is on the client.
  - Salimos de FTP y ejecutamos el comando DIR para verificar que el archivo este en el cliente

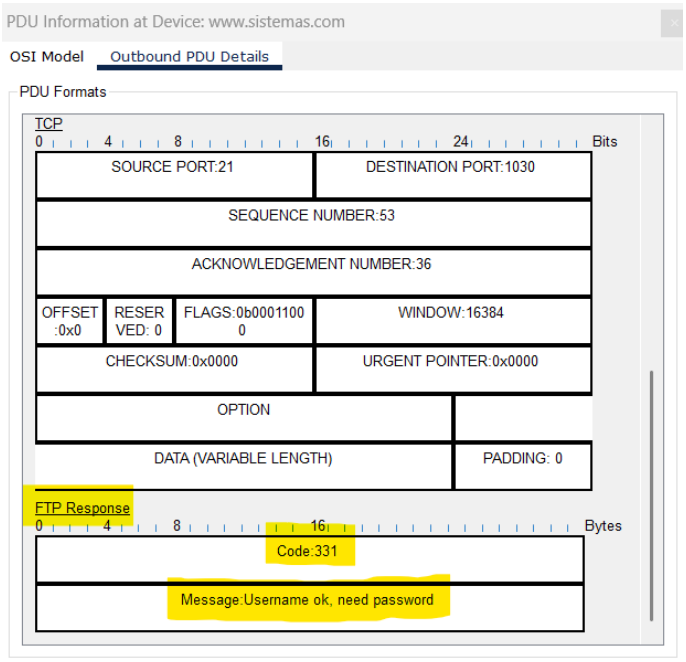


- From simulation mode, re-enter the FTP server and upload the .TXT file from the client. Check the headers at the application layer that indicate the connection, username and password sub-mission, acceptance confirmation messages, file upload, and end of communication
  - Nos conectamos a FTP nuevamente y enviamos el archivo al servidor con put nombreArchivo en el modo simulación

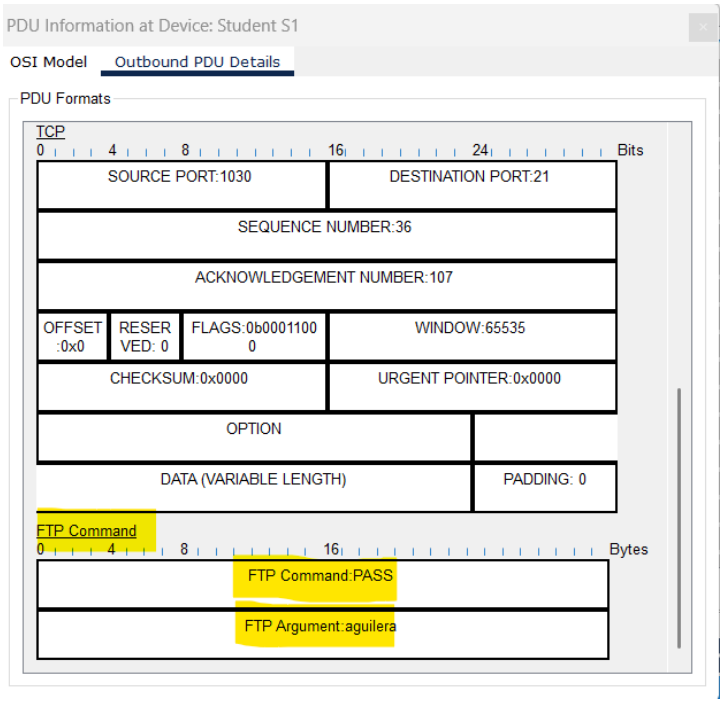


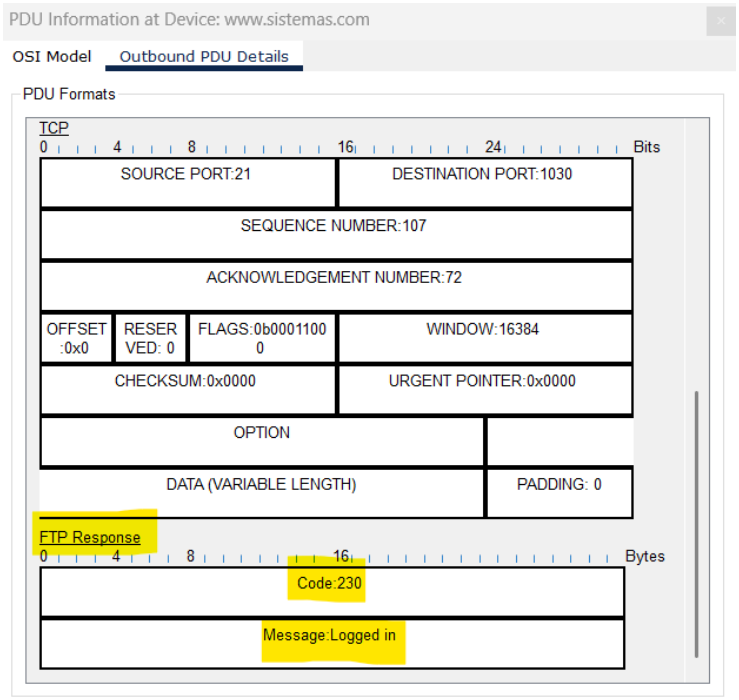
- Revisamos los encabezados requeridos
  - Se envia el argumento del usuario y se espera la respuesta del servidor FTP



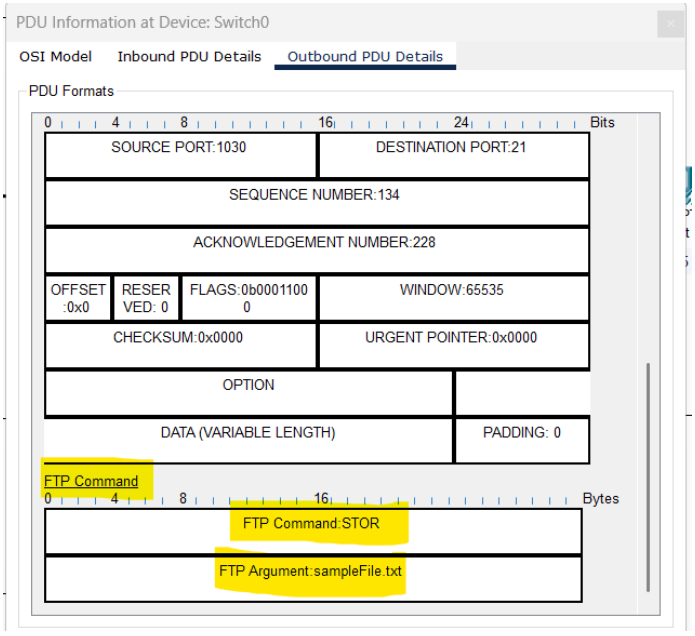


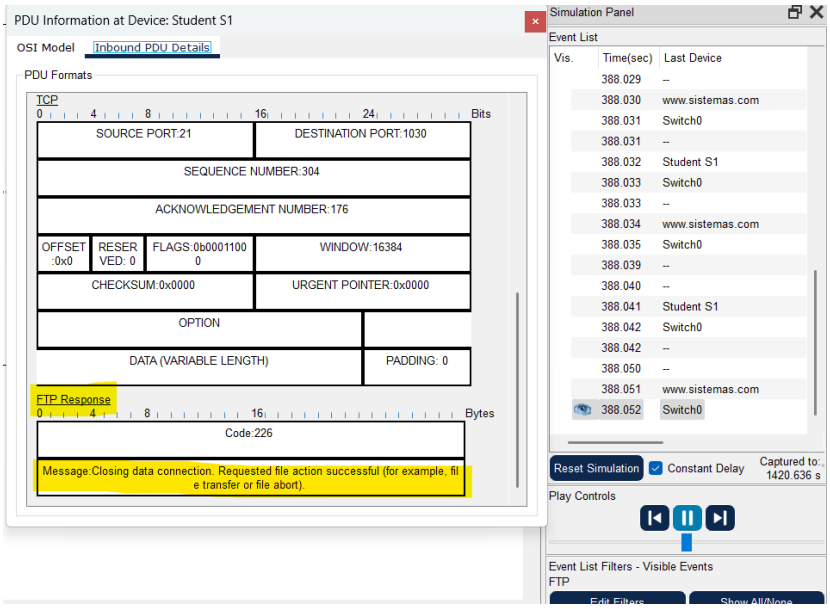
- Una vez el servidor FTP confirma el usuario, pide la contraseña al cliente , este la envia y FTP confirma de nuevo





- Una vez realizado el login el cliente realiza el proceso de subir el archivo al servidor (put nombreArchivo) y espera la respuesta del servidor para ver si se subio correctamente (fin de la comunicación



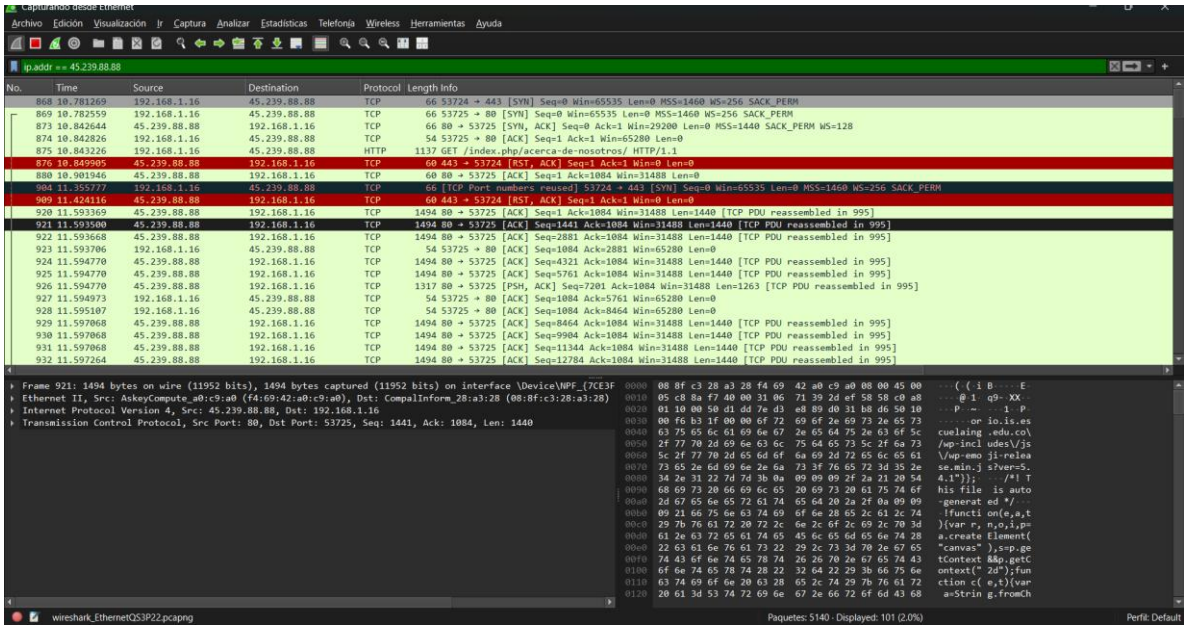

PDU Information at Device: Student S1
OSI Model
Inbound PDU Details
PDU Formats
TCP
0 4 8 16 24 Bits
SOURCE PORT:21
DESTINATION PORT:1030
SEQUENCE NUMBER:304
ACKNOWLEDGEMENT NUMBER:176
OFFSET :0x0
RESERVED: 0
FLAGS:0b00011000
WINDOW:16384
CHECKSUM:0x0000
URGENT POINTER:0x0000
OPTION
DATA (VARIABLE LENGTH)
PADDING: 0
FTP Response
0 4 8 16 Bytes
Code:226
Message:Closing data connection. Requested file action successful (for example, file transfer or file abort).
Simulation Panel
Event List
Vis. Time(sec) Last Device
388.029 --
388.030 www.sistemas.com
388.031 Switch0
388.031 --
388.032 Student S1
388.033 Switch0
388.033 --
388.034 www.sistemas.com
388.035 Switch0
388.039 --
388.040 --
388.041 Student S1
388.042 Switch0
388.042 --
388.050 --
388.051 www.sistemas.com
388.052 Switch0
Reset Simulation
Constant Delay
Captured to: 1420.636 s
Play Controls
Event List Filters - Visible Events
FTP

WIRESHARK

Using the Wireshark tool, perform and document the following tests:

a) Make a web query to the Computer Lab website and see which application layer protocols are active. Analyze the application layer information and transport layer ports in the content of the captured packets.

- Realizamos la consulta con la IP de la pagina



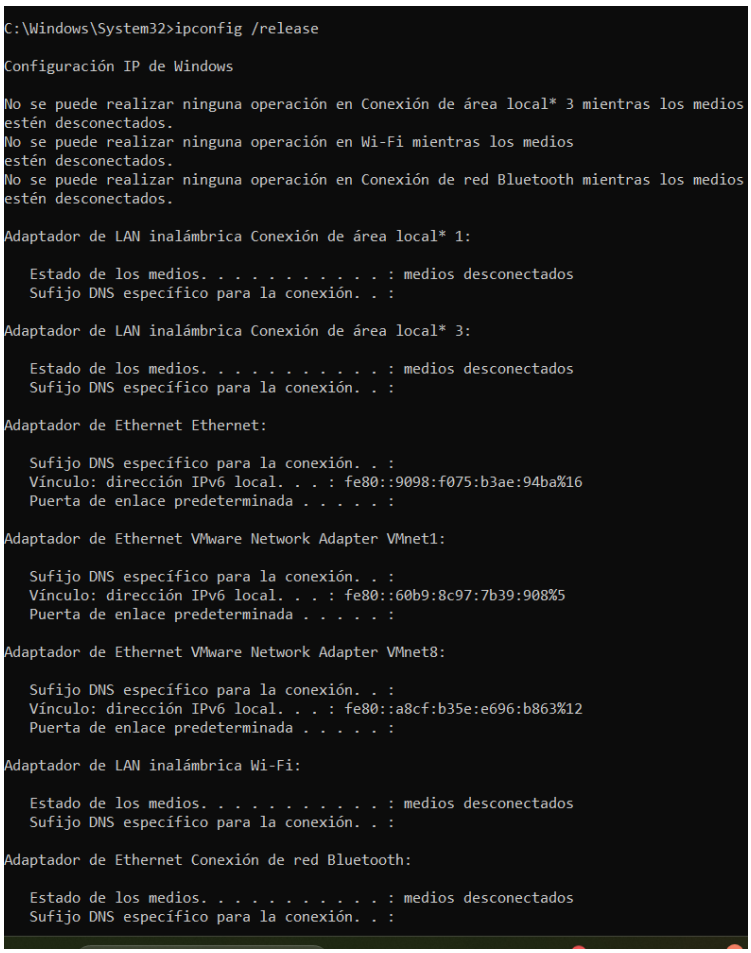
- Se pueden observar dos protocolos en la captura:
  - Capa de aplicación: HTTP
  - Capa de transporte: TCP
- En la capa de transporte :
  - El puerto de destino es 80, que es el puerto estándar para HTTP.
  - El puerto de origen es 53725, que es un puerto dinámico asignado por el sistema operativo del cliente para la conexión

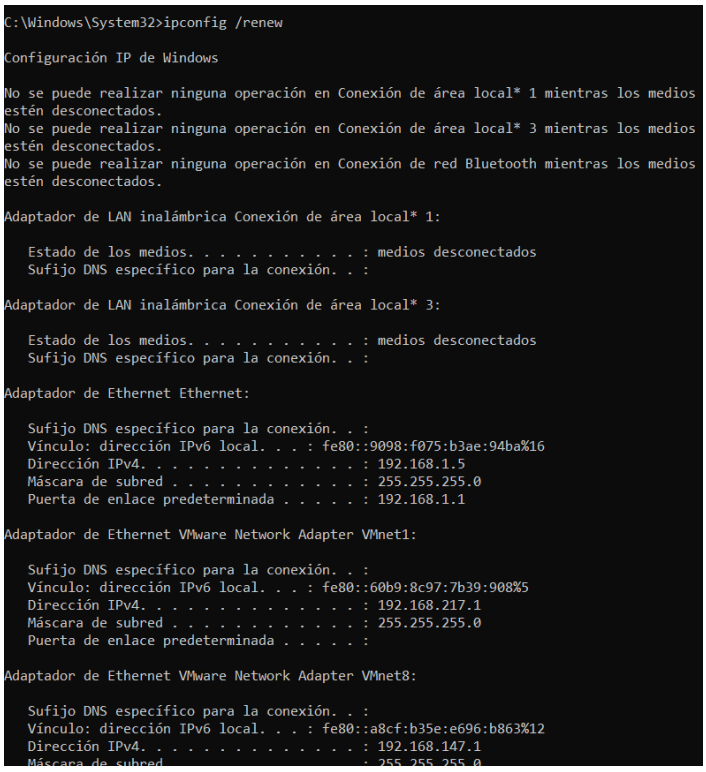
b) Capture the DHCP traffic from your computer and analyze the packets that circulate between the client and the servers offering addresses. Check the content of the packets at the application layer and transport layer ports.
Note: To perform this activity, capture the traffic, remove the IP address from the machine (type ipconfig /release in the command line) and request it again (type ipconfig /renew in the command line)

- Se realizó la captura de paquetes en Wireshark mientras se ejecutaban los comandos ipconfig /release y ipconfig /renew. Estos comandos permiten forzar al sistema a liberar y solicitar una nueva dirección IP desde un servidor DHCP, lo que facilita la observación del proceso de asignación de direcciones.
  - **ipconfig /release**

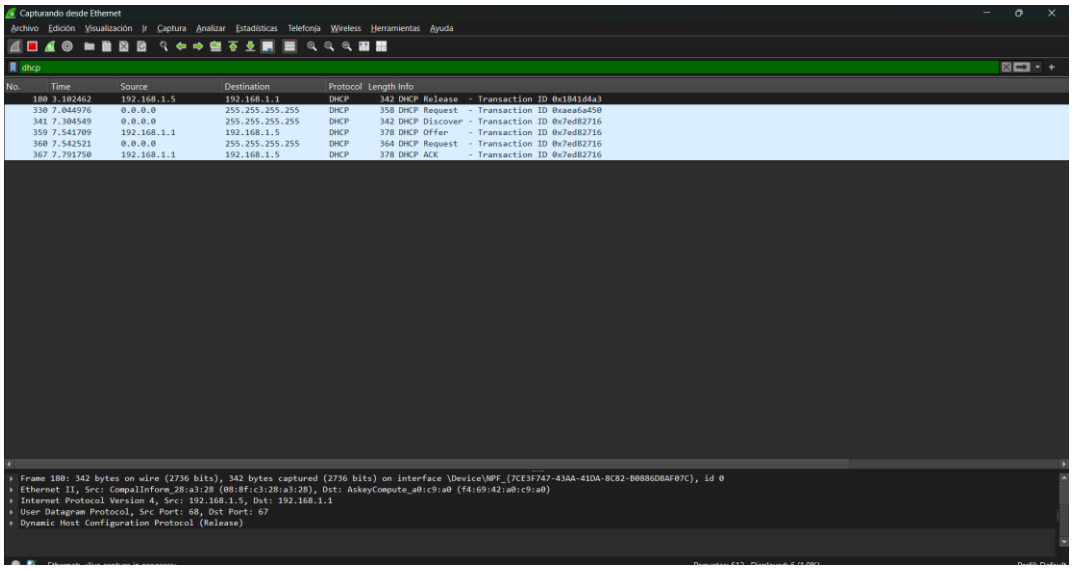
- Libera la dirección IP actual asignada al equipo.

- ipconfig /renew
  - Solicita una nueva dirección IP a un servidor DHCP



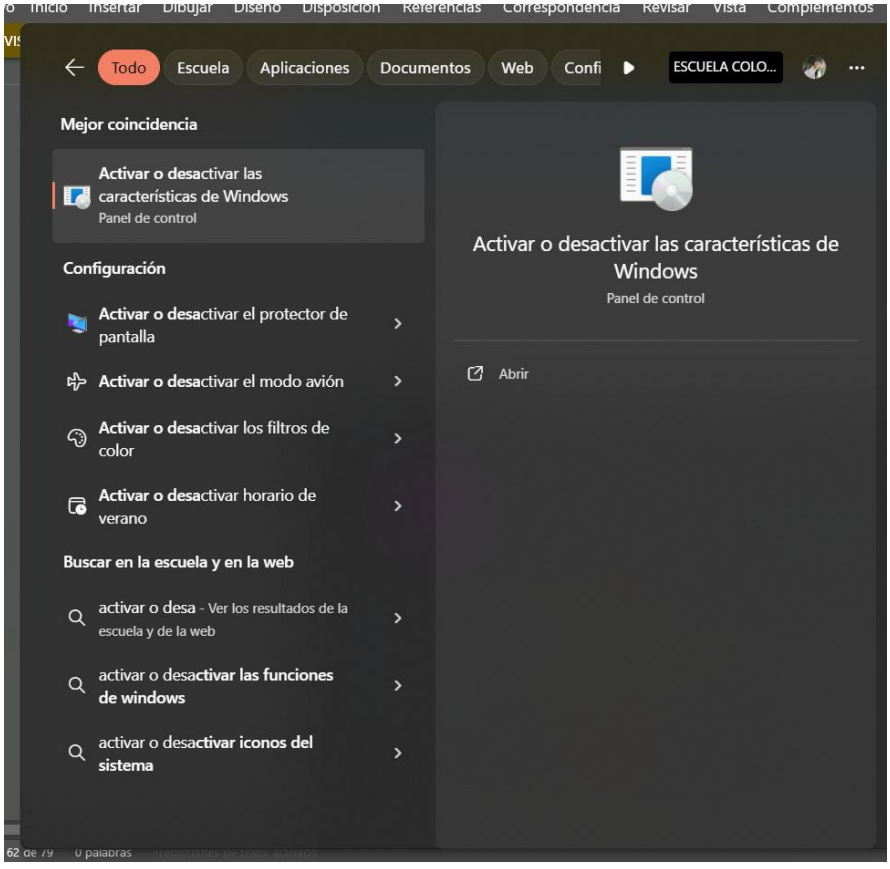


- Mientras se realizaba este proceso en wireshark con el filtro dhcp podemos ver el protocolo DHCP donde se observaron los siguientes mensajes
  - **DHCP Discover:** El cliente envía un mensaje de difusión buscando un servidor DHCP.
  - **DHCP Offer:** Un servidor DHCP responde ofreciendo una dirección IP disponible.
  - **DHCP Request:** El cliente solicita formalmente la dirección IP ofrecida.
  - **DHCP ACK:** El servidor confirma la asignación de la dirección y envía otros parámetros de configuración como la puerta de enlace y el DNS.

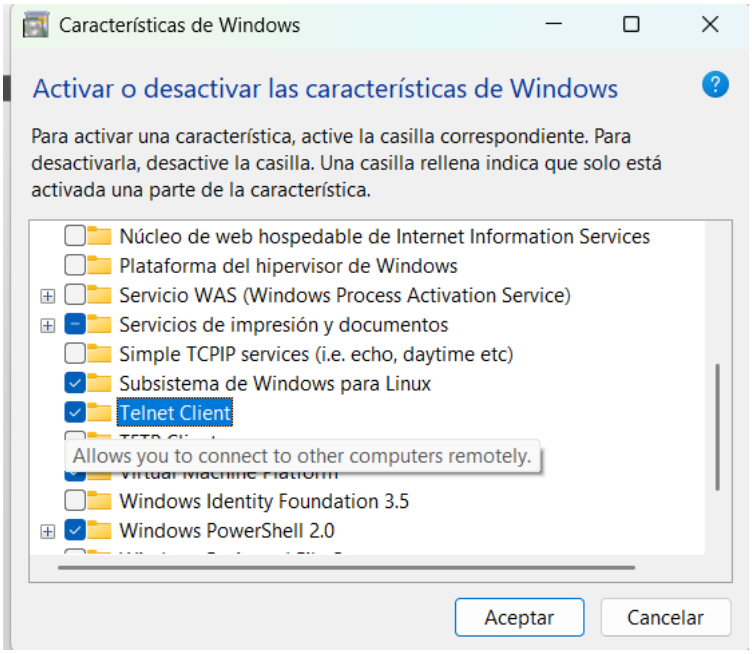


c) Analyze the application layer information and ports (transport layer) in the content of the captured packets in an HTTP connection

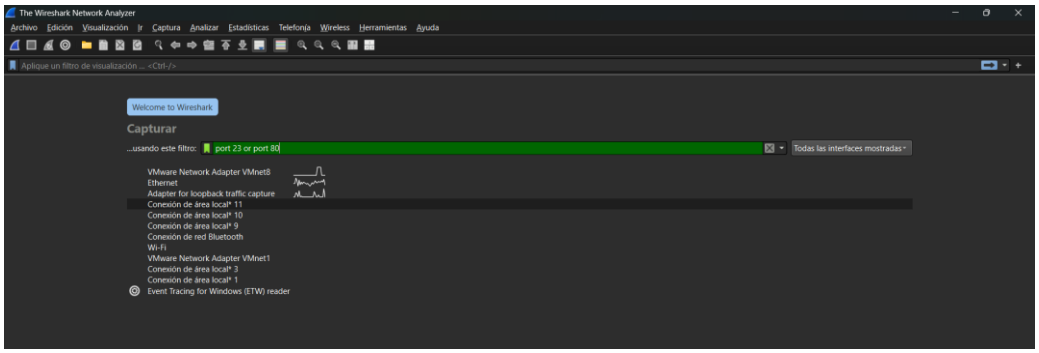
- Unlock the use of the TELNET protocol on your computer.
  - Vamos a la opción



  - Buscamos Telnet Client y lo activamos



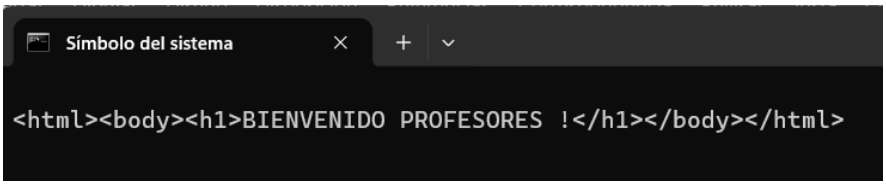
- Capture the packets when using TELNET and HTTP protocols and show the application layer messages generated in the following queries:
  - Primero ponemos en los filtros de captura los puertos de TELNET y HTTP



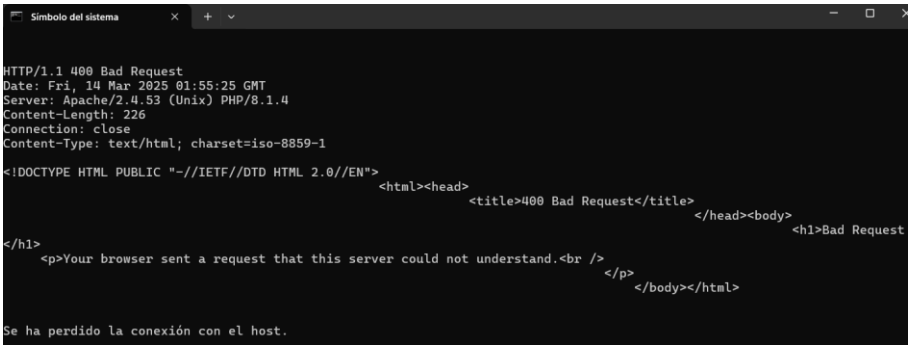
  - HTTP
  - TELNET
- Capture the following web page http://profesores.is.escuelaing.edu.co/csantiago/RECO/index.html using the protocols:
  - Telnet
    - telnet profesores.is.escuelaing.edu.co 80

```
C:\Users\Esteban Aguilera>telnet profesores.is.escuelaing.edu.co 80
```

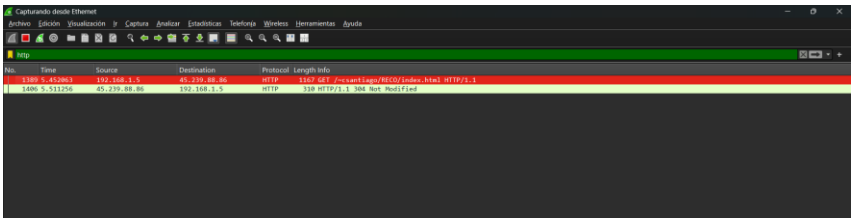
    - GET path/file (e.g., GET /index.html).



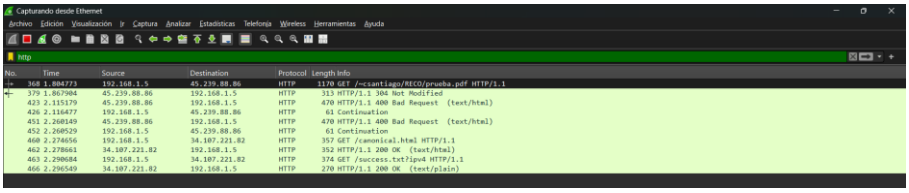
- Download the PDF file prueba.pdf
- Download the image file network.png
    - Se trato de inserter el comando en telnet pero no se llega a nada , arroja los siguientes errores:
    - Se probaron los comandos:
        - GET /~csantiago/RECO/network.png HTTP/1.1
        - GET /~csantiago/RECO/prueba.pdf HTTP/1.1



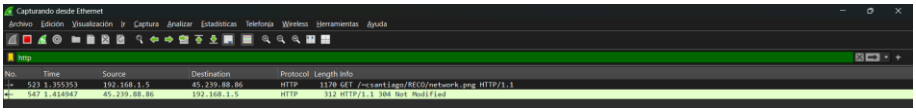
- HTTP
    - Use the browser to view the same pages you accessed with TELNET
        - Ingresamos a la pagina y capturamos index.html



        - Capturamos prueba.pdf



        - Capturamos network.png



- Present and explain the capture results.
- What difference do you find between the files downloaded via TELNET and via the browser?
    - Los archivos descargados por Telnet se reciben como texto sin procesar, mostrando encabezados HTTP junto con el contenido. Además, requiere comandos manuales y solo funciona con protocolos de texto como HTTP y FTP.
    - En cambio, el navegador maneja automáticamente los encabezados, detecta formatos de archivo, permite descargas automáticas y es compatible con HTTPS y otros protocolos avanzados.
    - Mientras que Telnet es útil para pruebas y depuración, el navegador es la mejor opción para descargar y abrir archivos correctamente.

DNS

Perform the following DNS tests. Go to https://centralops.net/co and check the domains listed below and perform the indicated tests:

- escuelaing.edu.co

Domain Whois record

Queried whois.nic.co with "escuelaing.edu.co"...

```
Domain Name: escuelaing.edu.co
Registry Domain ID: REDACTED FOR PRIVACY
Registrar WHOIS Server:
Registrar URL: www.cointernet.com.co
Updated Date: 2022-11-06T18:30:02Z
Creation Date: 1998-06-02T00:00:00Z
Registry Expiry Date: 2025-12-31T23:59:59Z
Registrar: .CO Internet S.A.S.
Registrar IANA ID: 111111
Registrar Abuse Contact Email: soporte@cointernet.com.co
Registrar Abuse Contact Phone: +57.6017948999
Domain Status: ok https://icann.org/epp#ok
Registry Registrant ID: REDACTED FOR PRIVACY
Registrant Name: REDACTED FOR PRIVACY
Registrant Organization: Escuela Colombiana de Ingenieria
Registrant Street: REDACTED FOR PRIVACY
Registrant Street: REDACTED FOR PRIVACY
Registrant Street: REDACTED FOR PRIVACY
Registrant City: REDACTED FOR PRIVACY
Registrant State/Province: Bogota
Registrant Postal Code: REDACTED FOR PRIVACY
Registrant Country: CO
Registrant Phone: REDACTED FOR PRIVACY
Registrant Phone Ext: REDACTED FOR PRIVACY
Registrant Fax: REDACTED FOR PRIVACY
Registrant Fax Ext: REDACTED FOR PRIVACY
Registrant Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Registry Admin ID: REDACTED FOR PRIVACY
Admin Name: REDACTED FOR PRIVACY
Admin Organization: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin City: REDACTED FOR PRIVACY
Admin State/Province: REDACTED FOR PRIVACY
Admin Postal Code: REDACTED FOR PRIVACY
Admin Country: REDACTED FOR PRIVACY
Admin Phone: REDACTED FOR PRIVACY
Admin Phone Ext: REDACTED FOR PRIVACY
Admin Fax: REDACTED FOR PRIVACY
Admin Fax Ext: REDACTED FOR PRIVACY
Admin Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Registry Tech ID: REDACTED FOR PRIVACY
Tech Name: REDACTED FOR PRIVACY
Tech Organization: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech City: REDACTED FOR PRIVACY
Tech State/Province: REDACTED FOR PRIVACY
Tech Postal Code: REDACTED FOR PRIVACY
Tech Country: REDACTED FOR PRIVACY
Tech Phone: REDACTED FOR PRIVACY
Tech Phone Ext: REDACTED FOR PRIVACY
Tech Fax: REDACTED FOR PRIVACY
Tech Fax Ext: REDACTED FOR PRIVACY
Tech Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Name Server: ns1.escuelaing.edu.co
Name Server: ns2.escuelaing.edu.co
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of WHOIS database: 2025-03-09T03:46:29Z <<<
```

- How many domain servers does it have?
  - 2

```
Name Server: ns1.escuelaing.edu.co
Name Server: ns2.escuelaing.edu.co
```

- How long ago was this domain assigned?
  - Fue asignado en Junio 2 de 1998

```
Creation Date: 1998-06-02T00:00:00Z
```

- Who is it registered with?
  - .CO Internet S.A.S.

```
Registrar: .CO Internet S.A.S.
```

- What is the registration entity's ID?
  - El ID del dominio de registro y el ID del registrante están redactados por cuestiones de privacidad.

```
Registry Registrant ID: REDACTED FOR PRIVACY
Registrant Name: REDACTED FOR PRIVACY
```

- When was the record last updated?
  - 6 de noviembre de 2022

```
Updated Date: 2022-11-06T18:30:02Z
```

- How long is the record valid for?
  - Hasta el 31 de diciembre de 2025

```
Registry Expiry Date: 2025-12-31T23:59:59Z
```

- What is the assigned IP range and by which registration authority was it given?
  - El rango de IP asignado es **45.239.88.0/22**.

Network Whois record

Queried **whois.lacnic.net** with "**45.239.88.68**"...

```
inetnum:     45.239.88.0/22
status:      assigned
```

- Which company was it assigned to?
  - Fue asignado por **LACNIC**

Network Whois record

Queried **whois.lacnic.net** with "**45.239.88.68**"...

```
inetnum:     45.239.88.0/22
status:      assigned
aut-num:     N/A
owner:       ESCUELA COLOMBIANA DE INGENIERIA
ownerid:     CO-ECIN2-LACNIC
```

- jbb.gov.co

Domain Dossier Investigate domains and IP addresses

domain or IP address: jbb.gov.co

☑ domain whois record ☑ DNS records ☐ traceroute

☑ network whois record ☐ service scan [go]

user: anonymous [152.203.234.39]
balance: 45 units
log in | account info

CentralOps.net

To obtain Whois data redacted because of the GDPR or privacy services, try ICANN's RDRS. [more information]

Address lookup

canonical name **jbb.gov.co.**
aliases
addresses **20.94.123.146**
20.119.228.39
2603:1030:403:3::a2

Domain Whois record

Queried **whois.nic.co** with "**jbb.gov.co**"...

```
Domain Name: jbb.gov.co
Registry Domain ID: REDACTED FOR PRIVACY
Registrar WHOIS Server:
Registrar URL: www.cointernet.com.co
Updated Date: 2021-05-14T03:12:05Z
Creation Date: 2000-01-20T00:00:00Z
Registry Expiry Date: 2026-01-20T23:59:59Z
Registrar: .CO Internet S.A.S.
Registrar IANA ID: 111111
Registrar Abuse Contact Email: soporte@cointernet.com.co
Registrar Abuse Contact Phone: +57.6017948999
Domain Status: ok https://icann.org/epp#ok
Registry Registrant ID: REDACTED FOR PRIVACY
Registrant Name: REDACTED FOR PRIVACY
Registrant Organization: Jardin Botanico Jose Celestino Mutis
Registrant Street: REDACTED FOR PRIVACY
Registrant Street: REDACTED FOR PRIVACY
Registrant Street: REDACTED FOR PRIVACY
Registrant City: REDACTED FOR PRIVACY
Registrant State/Province: Bogota
Registrant Postal Code: REDACTED FOR PRIVACY
Registrant Country: CO
Registrant Phone: REDACTED FOR PRIVACY
Registrant Phone Ext: REDACTED FOR PRIVACY
Registrant Fax: REDACTED FOR PRIVACY
Registrant Fax Ext: REDACTED FOR PRIVACY
Registrant Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Registry Admin ID: REDACTED FOR PRIVACY
Admin Name: REDACTED FOR PRIVACY
Admin Organization: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin City: REDACTED FOR PRIVACY
Admin State/Province: REDACTED FOR PRIVACY
Admin Postal Code: REDACTED FOR PRIVACY
Admin Country: REDACTED FOR PRIVACY
Admin Phone: REDACTED FOR PRIVACY
Admin Phone Ext: REDACTED FOR PRIVACY
Admin Fax: REDACTED FOR PRIVACY
Admin Fax Ext: REDACTED FOR PRIVACY
Admin Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Registry Tech ID: REDACTED FOR PRIVACY
Tech Name: REDACTED FOR PRIVACY
Tech Organization: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech Street: REDACTED FOR PRIVACY
Tech City: REDACTED FOR PRIVACY
Tech State/Province: REDACTED FOR PRIVACY
Tech Postal Code: REDACTED FOR PRIVACY
Tech Country: REDACTED FOR PRIVACY
Tech Phone: REDACTED FOR PRIVACY
Tech Phone Ext: REDACTED FOR PRIVACY
Tech Fax: REDACTED FOR PRIVACY
Tech Fax Ext: REDACTED FOR PRIVACY
Tech Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Registrant, Admin, or Tech contact of the queried domain name.
Name Server: ns31.domaincontrol.com
Name Server: ns32.domaincontrol.com
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of WHOIS database: 2025-03-09T19:32:57Z <<<
```

Network Whois record

Queried **whois.arin.net** with "**n 20.94.123.146**"...

```
NetRange:       20.33.0.0 - 20.128.255.255
CIDR:           20.64.0.0/10, 20.34.0.0/15, 20.48.0.0/12, 20.128.0.0/16, 20.40.0.0/13, 20.33.0.0/16, 20.36.0.0/14
NetName:        MSFT
NetHandle:      NET-20-33-0-0-1
Parent:         NET20 (NET-20-0-0-0-0)
NetType:        Direct Allocation
OriginAS:
Organization:   Microsoft Corporation (MSFT)
RegDate:        2017-10-18
Updated:        2021-12-14
Ref:            https://rdap.arin.net/registry/ip/20.33.0.0
```

- How many domain servers does it have?
  - 2

    ```
    Name Server: ns31.domaincontrol.com
    Name Server: ns32.domaincontrol.com
    ```
- How long ago was this domain assigned?
  - Fue asignado el 20 de enero del 2000

    ```
    Creation Date: 2000-01-20T00:00:00Z
    ```
- Who is it registered with?
  - .CO Internet S.A.S

    ```
    Registrar: .CO Internet S.A.S.
    ```
- What is the registration entity's ID?
  - Esta redacted for privacy

    ```
    Registry Registrant ID: REDACTED FOR PRIVACY
    Registrant Name: REDACTED FOR PRIVACY
    ```
- When was the record last updated?
  - 14 de mayo de 2021

    ```
    Updated Date: 2021-05-14T03:12:05Z
    ```
- How long is the record valid for?
  - Hasta el 20 de enero de 2026

    ```
    Registry Expiry Date: 2026-01-20T23:59:59Z
    ```
- What is the assigned IP range and by which registration authority was it given?
  - El rango de IP asignado es 20.33.0.0 - 20.128.255.255.

    Network Whois record

    Queried **whois.arin.net** with "**n 20.94.123.146**"...

    ```
    NetRange:       20.33.0.0 - 20.128.255.255
    CIDR:           20.64.0.0/10, 20.34.0.0/15, 20.48.0.0/12, 20.128.0.0/16, 20.40.0.0/13, 20.33.0.0/16, 20.36.0.0/14
    ```
- Which company was it assigned to?
  - Microsoft Corporation (MSFT)

    ```
    Organization:   Microsoft Corporation (MSFT)
    ```

- google.com
  - How many domain servers does it have?
    - 4

      ```
      Name Server: ns2.google.com
      Name Server: ns1.google.com
      Name Server: ns3.google.com
      Name Server: ns4.google.com
      ```
  - How long ago was this domain assigned?
    - Se asigno el 15 de septiembre de 1997

      ```
      Creation Date: 1997-09-15T07:00:00+0000
      ```
  - Who is it registered with?
    - MarkMonitor Inc.

```
Registrar: MarkMonitor, Inc.
Registrar IANA ID: 292
```

- What is the registration entity's ID?
  - Registrar IANA ID: 292

    ```
    Registrar IANA ID: 292
    ```
- When was the record last updated?
  - 2 de Agosto de 2024

    ```
    Updated Date: 2024-08-02T02:17:33+0000
    ```
- How long is the record valid for?
  - Es valido hasta el 13 de septiembre de 2028

    ```
    Registrar Registration Expiration Date: 2028-09-13T07:00:00+0000
    ```
- What is the assigned IP range and by which registration authority was it given?
  - 142.250.0.0 - 142.251.255.255

    Network Whois record

    Queried **whois.arin.net** with "**n 142.250.114.101**"...

    ```
    NetRange:       142.250.0.0 - 142.251.255.255
    ```
- Which company was it assigned to?
  - Google LLC

    ```
    OrgName:        Google LLC
    ```

- Test one more domain from a non-American organization
  - www.gov.co

- How many domain servers does it have?
  - 4

```
Name Server: ns-943.awsdns-53.net
Name Server: ns-1823.awsdns-35.co.uk
Name Server: ns-479.awsdns-59.com
Name Server: ns-1462.awsdns-54.org
```

- How long ago was this domain assigned?
  - Fue asignado el 21 de mayo de 2014

```
Creation Date: 2014-05-21T11:23:59Z
```

- Who is it registered with?
  - .CO Internet S.A.S.

```
Registrar: .CO Internet S.A.S.
```

- What is the registration entity's ID?
  - Es 111111

```
Registrar IANA ID: 111111
```

- When was the record last updated?
  - 27 de mayo de 2021

```
Updated Date: 2021-05-27T11:28:11Z
```

- How long is the record valid for?
  - Es válido hasta 20 de mayo de 2026

```
Registry Expiry Date: 2026-05-20T23:59:59Z
```

- What is the assigned IP range and by which registration authority was it given?
  - Rango de IP: 13.249.0.0 - 13.249.255.255

Network Whois record

Queried **whois.arin.net** with **"n ! NET-13-249-0-0-1"**..

```
NetRange:       13.249.0.0 - 13.249.255.255
```

- Which company was it assigned to?
  - Ministerio TIC de Colombia.

```
Registrant Organization: Ministerio TIC
```

NTP SERVER

Why is it important to ensure all computing devices in an infrastructure have the same time? Install an NTP server on one of your machines and configure the other machines (Linux Slackware, NetBSD, Windows Server, and CentOS for groups of 3) to sync their time with the NTP server. A total of 1 NTP server should be configured on NetBSD or Linux Slackware, and the other operating systems installed in Lab No. 1 and 2 on virtual machines, with all the physical machines configured as NTP clients.

NETBSD

- Abrimos el archivo de configuración de ntp:

```
Juanito# nano /etc/ntp.conf
```

- Agregamos los servidores de los cuales se va obtener la hora en el servidor ntp
- Ademas permitimos que las Ips del rango 10.2.78.* puedan acceder al servidor con el comando restrict

```
  GNU nano 8.3                          /etc/ntp.conf

server 0.pool.ntp.org iburst
server 1.pool.ntp.org iburst
server 2.pool.ntp.org iburst

restrict default limited kod nomodify notrap nopeer noquery
restrict 10.2.78.0  mask 255.255.0.0 nomodify notrap
restrict 127.0.0.1
restrict ::1


driftfile /var/db/ntp.drift
logfile /var/log/ntp.log

                              [ Read 16 lines ]
^G Help      ^O Write Out ^F Where Is  ^K Cut       ^T Execute   ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify   ^/ Go To Line
```

- Probamos el servidor NTP con el comando ntpq -p

```
Juanito# ntpq -p
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 2.netbsd.pool.n .POOL.          16 p    -   64    0    0.000   +0.000   0.000
-1.co.ntp.edgeun 169.229.128.142  2 u   25   64   17    4.035  +813.26 532.332
*0.co.ntp.edgeun 129.6.15.27      2 u   20   64   17    6.224  +813.60   3.499
 co.ntp.nu       .STEP.          16 u    -   64    0    0.000   +0.000   0.000
+co.ntp.nu       72.239.115.57    2 u   58   64   17   12.749  +808.38   2.533
+cronos.unad.edu 200.25.3.11      3 u   55   64   17    5.714  +812.45   2.551
Juanito# ln -sf /usr/share/zoneinfo/America/Bogota /etc/localtime
Juanito# date
Thu Mar 13 12:48:46 -05 2025
```

SLACKWARE

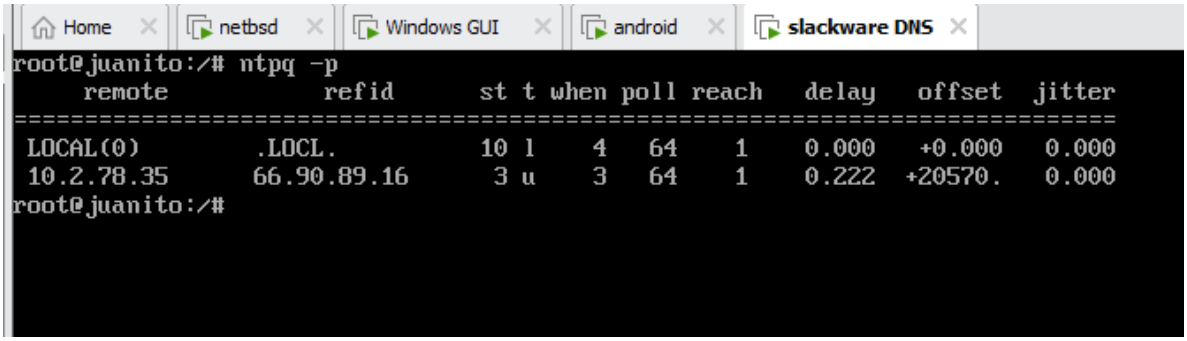
- Abrimos el archivo de configuración etc/ntp.conf

```
root@juanito:~# nano /etc/ntp.conf_
```

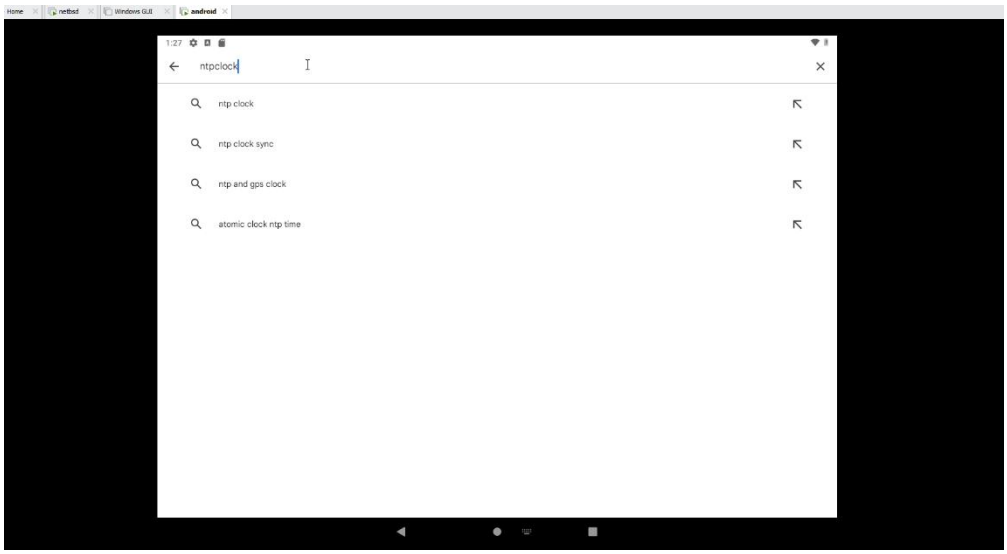
- Agregamos el server(NTP netBSD) de donde va sacar la información el computador para colocar la hora y fecha del sistema

```
  GNU nano 6.0                                  /etc/ntp.conf
# controlled by some external source, such as an external oscillator or
# another protocol, the prefer keyword would cause the local host to
# disregard all other synchronization sources, unless the kernel
# modifications are in use and declare an unsynchronized condition.
#
server  127.127.1.0     # local clock
fudge   127.127.1.0 stratum 10

#
# NTP server (list one or more) to synchronize with:
#server 0.pool.ntp.org iburst
#server 1.pool.ntp.org iburst
#server 2.pool.ntp.org iburst
#server 3.pool.ntp.org iburst
server 10.2.78.35 prefer
#
```

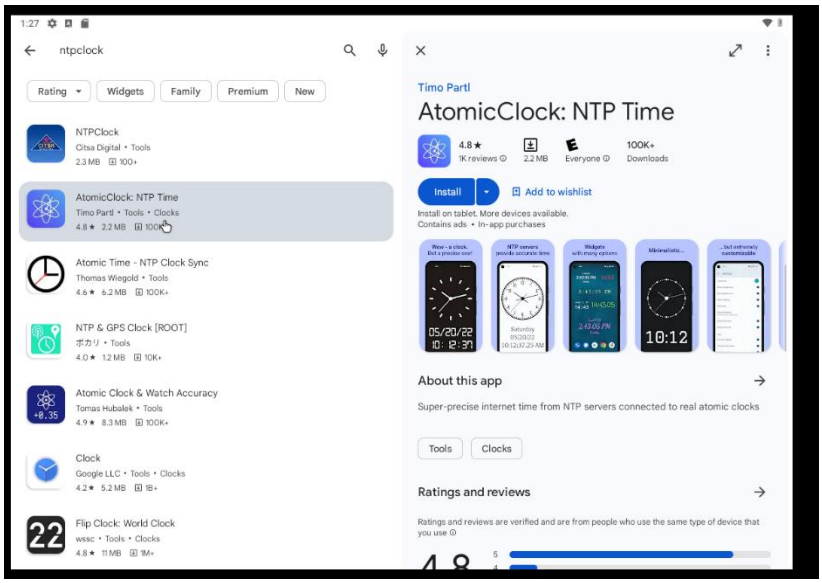
- Probamos que el servidor haya quedado configurado correctamente



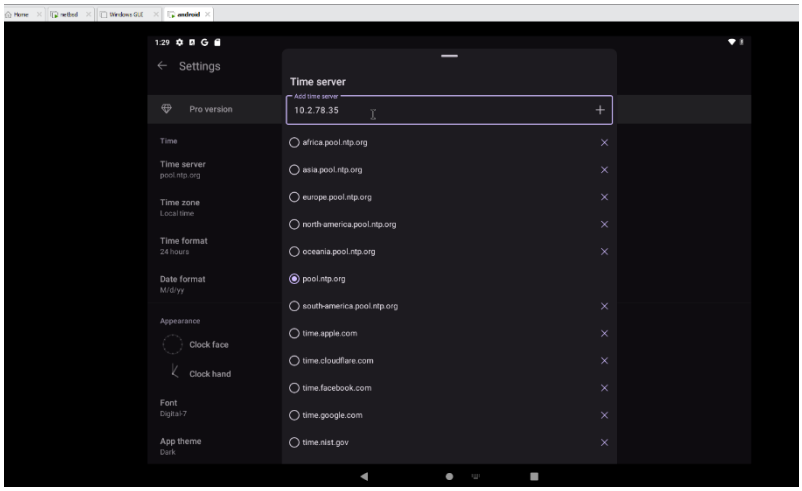
- ANDROID
  - Abrimos la play store y buscamos ntpclock



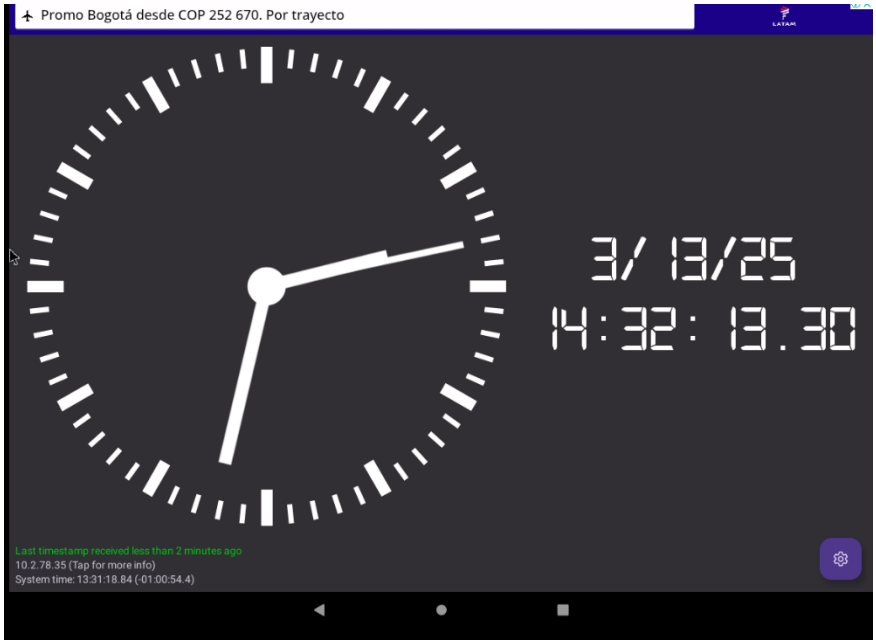
  - Instalamos la siguiente aplicación



- Abrimos la aplicación y agregamos el servidor NTP (ip de netBSD)

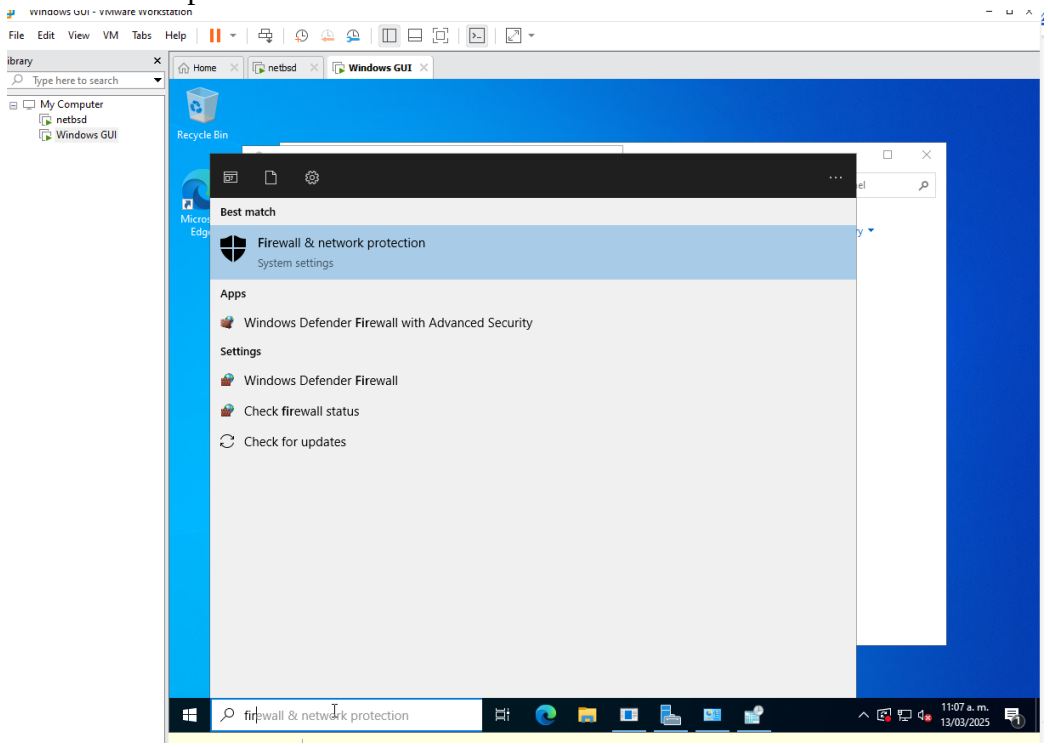


- Ya quedo configurado. Se puede ver con la hora mostrada por la aplicación

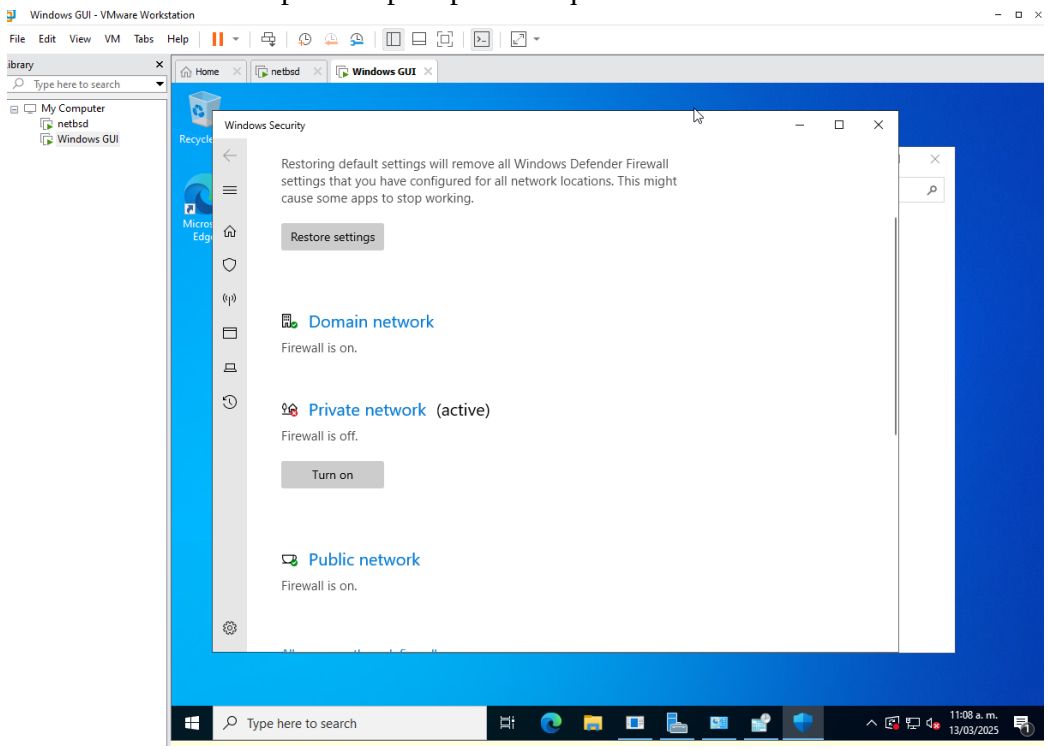


WINDOWS CON INTERFAZ

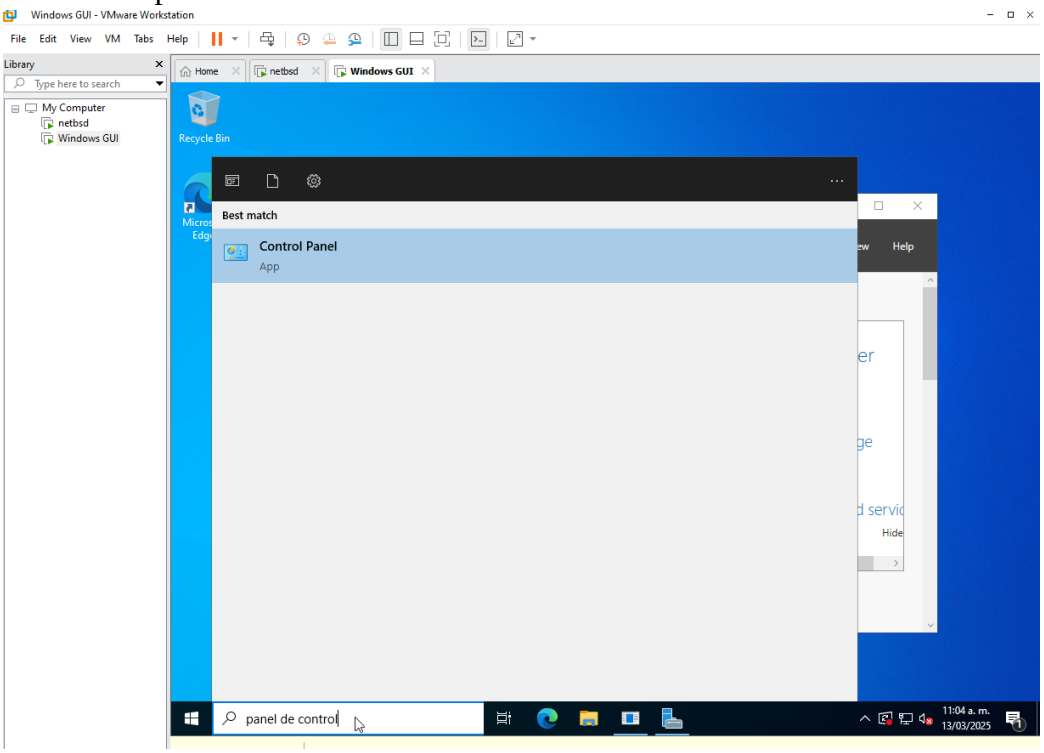
- Abrimos las opciones del firewall.



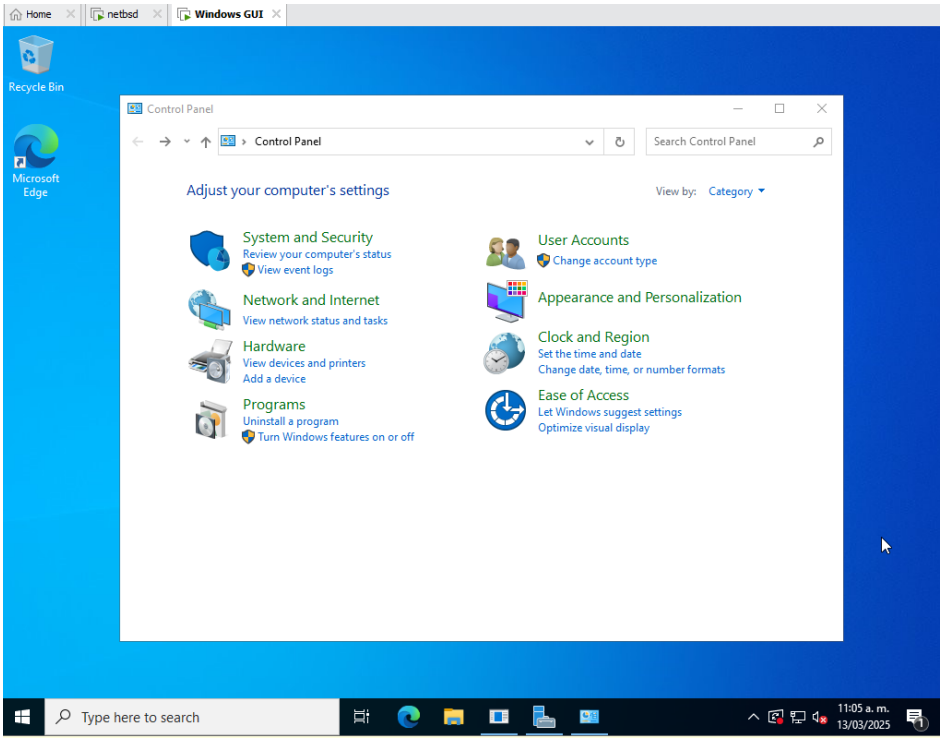
- Desactivamos estas opciones para permitir que el servidor NTP se conecte



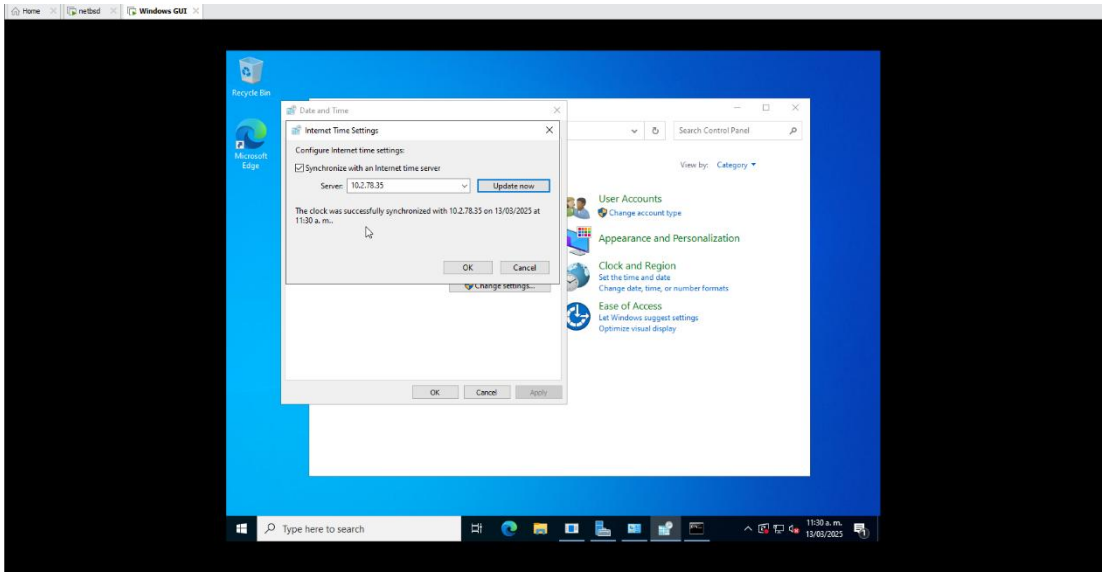
- Abrimos el panel de control



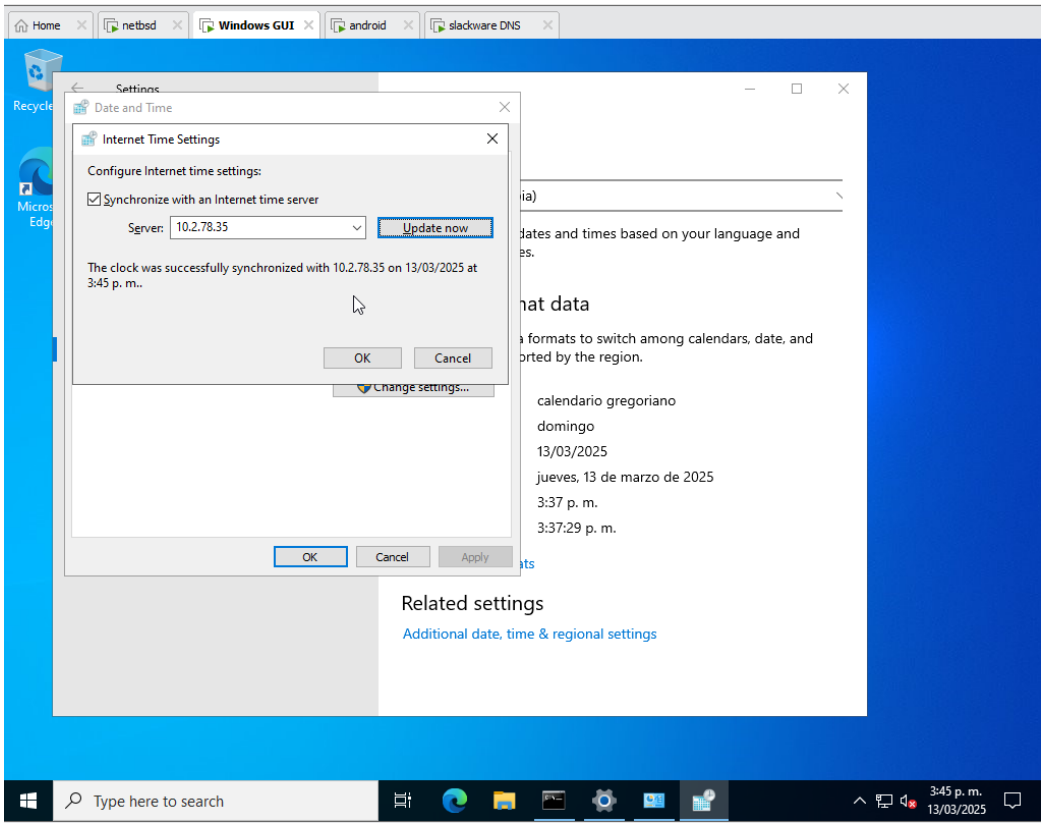
- Seleccionamos la opcion Set the time and Date



- Configuramos la fecha y hora asignando la IP del servidor NTP (netBSD)

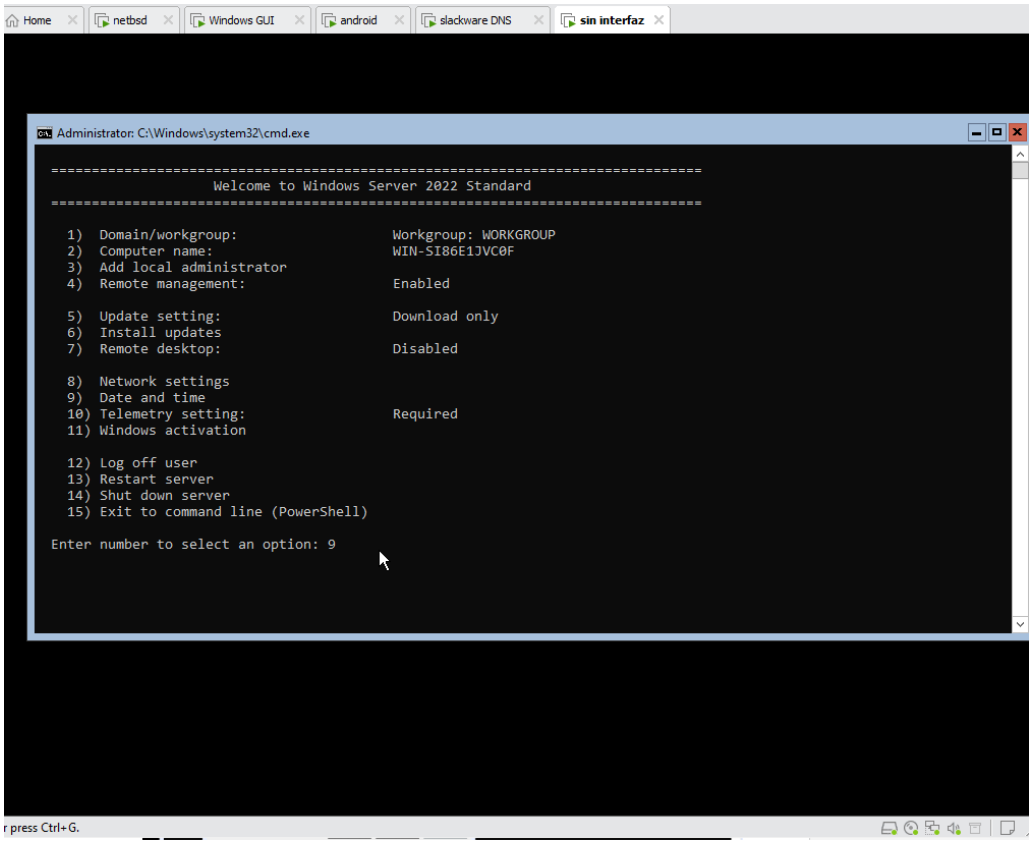


- Damos click en Update now y nos arrojara el mensaje de que el reloj fue sincronizado correctamente

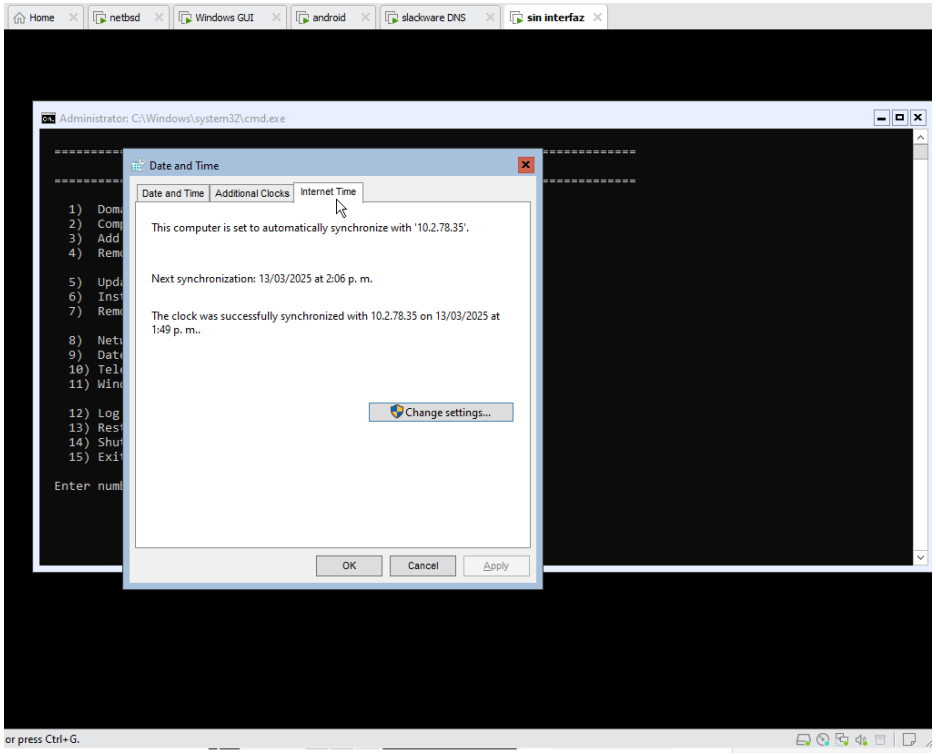


WINDOWS SIN INTERFAZ

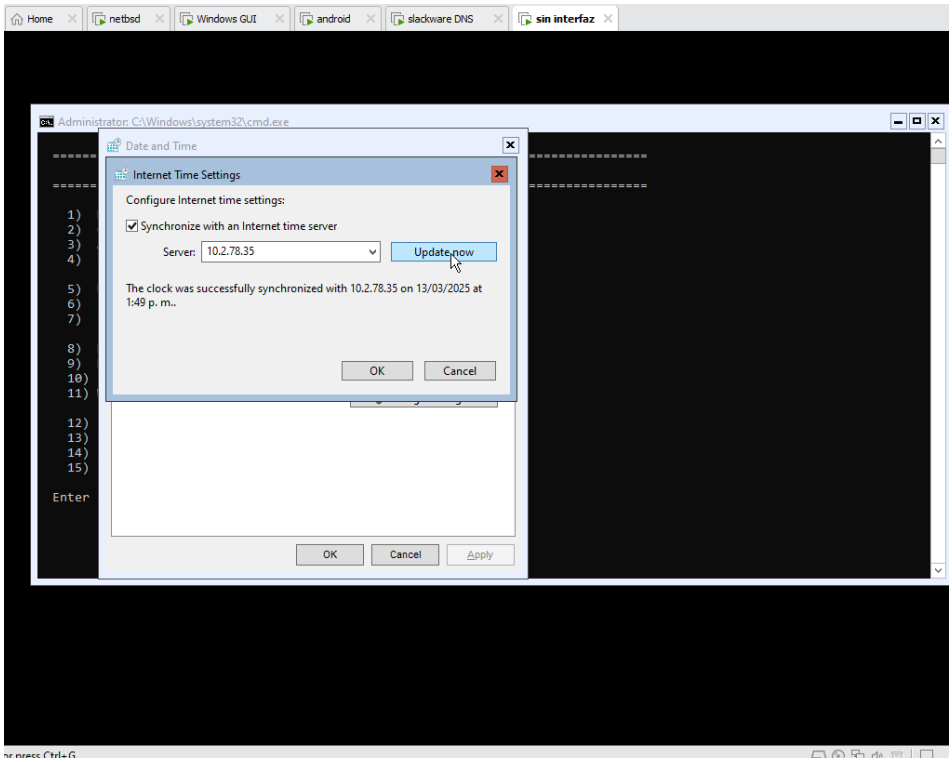
- Seleccionamos la opción 9 en el menú



- Seleccionamos la opción Internet Time y damos click en Change settings



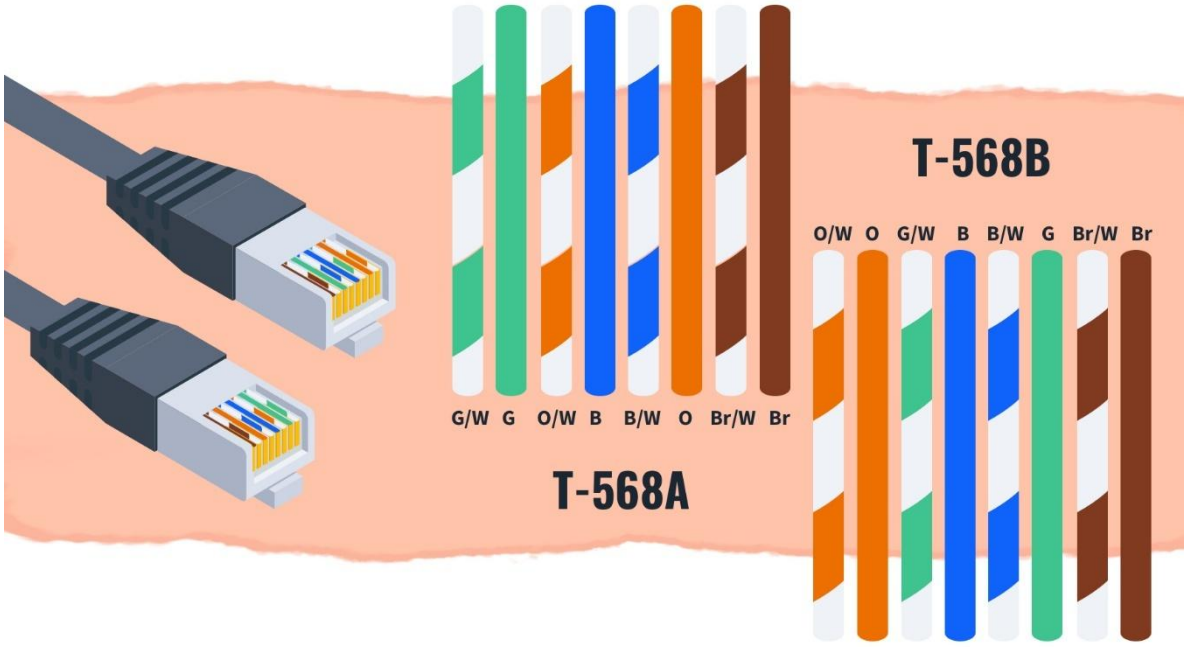
- Agregamos el servidor ntp (netBSD) y damos click en Update Now
- Nos arrojara el mensaje de que el reloj fue sincronizado correctamente



STRUCTURED CABLING AND CABLE CONSTRUCTION

To build a technological infrastructure, elements are required to connect computing devices. The struc-tured cabling standards are used to connect elements, maintain order, facilitate growth, and promote the management of network physical elements. The following activities are focused on understanding this structure.

a) Patch Cord Construction
   a. Following the professor's instructions and the presentation posted in the classroom, crimp two
   b. RJ45-RJ45 cables, one straight and one crossover.
   c. What is the purpose of each one?



   i. Cable directo
      1. Se usa para conectar dispositivos diferentes, como una computadora a un switch o router. Ambos extremos deben tener el mismo orden de cables, siguiendo el estándar T-568A o T-568B.
   ii. Cable cruzado
      1. Sirve para conectar dispositivos iguales, como dos computadoras o dos switches. Se hace con un extremo siguiendo el estándar T-568A y el otro con T-568B.

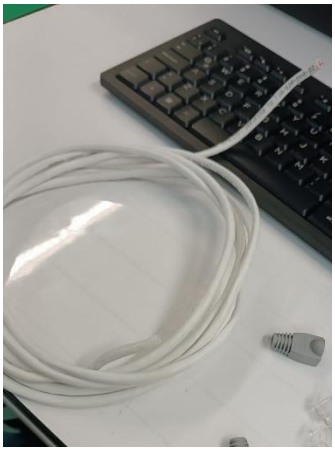
   d. Use the cable tester to check that the cable was correctly made.

i. Cable directo (T-568B en ambos extremos)
    1. Los números deben aparecer en el mismo orden en ambos extremos:
        a. 1 - 1
        b. 2 - 2
        c. 3 - 3
        d. 4 - 4
        e. 5 - 5
        f. 6 - 6
        g. 7 - 7
        h. 8 - 8
ii. Cable cruzado (T-568A en un extremo y T-568B en el otro)
    1. Algunas líneas estarán intercambiadas:
        a. 1 - 3
        b. 2 - 6
        c. 3 - 1
        d. 4 - 4
        e. 5 - 5
        f. 6 - 2
        g. 7 - 7
        h. 8 – 8
iii. Pruebas:
    1. https://www.canva.com/design/DAGhuzkzSNU/qy-paDB2d-pr00K6TPZBAA/edit?utm_content=DAGhuzkzSNU&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

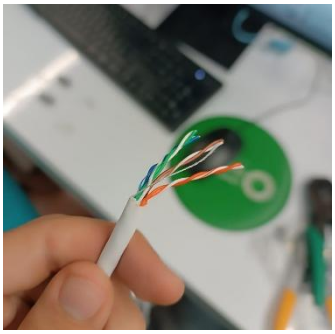
e. Document the process and include photos proving you made it.
    i. Materiales
        1. Cable UTP (cat5)
        2. Conectores RJ45.
        3. Ponchadora
        4. Pelacables
        5. Tester de cables de red.
        6. Capuchones

ii. Pasos

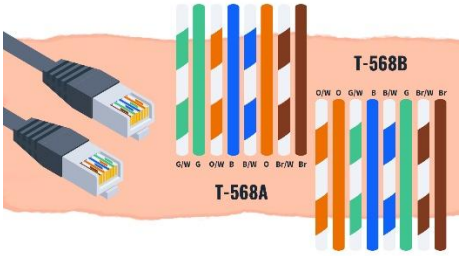
1. Cortar el cable UTP a la longitud deseada (aproximadamente 1 m)



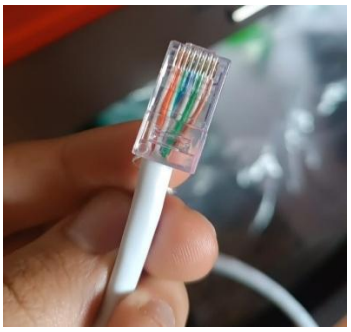
2. Pelar la cubierta externa (aprox. 2-3 cm) para exponer los 8 hilos internos.



3. Separar y alinear los hilos según el estándar requerido:
    a. En nuestro caso del cable directo se usó T-568B (Juan-Esteban)

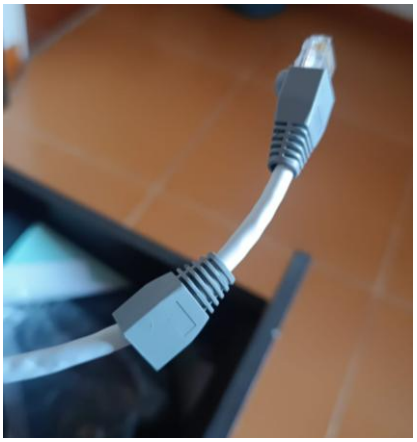


4. Cortar los hilos para que queden parejos y alineados, luego insertarlos en el conector RJ45 en el orden correcto



5. Ponchar el conector usando la ponchadora, aplicando presión para asegurar los contactos

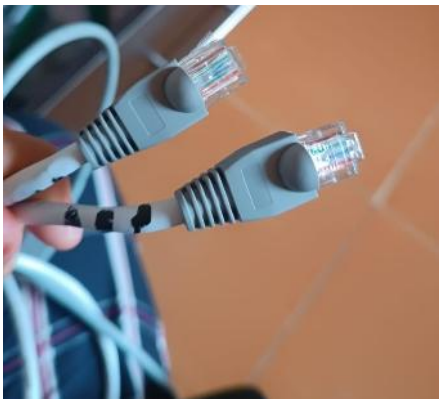
6. Repetir el mismo proceso para el otro extremo del cable
    a. Si es cable cruzado, un extremo usa T-568A y el otro T-568B.
    b. Si es cable directo, ambos extremos usan el mismo estándar (T-568A - T-568A o T-568B - T-568B).
    c. NOTA: Antes de ponchar el segundo conector, insertar los capuchones en el cable para colocarlos después en los RJ45



7. Probar el cable con un tester para verificar que la conexión es correcta

f. Show your professor the result of your work.
    i. Cables Esteban
        1. Cruzado

2. Directo



ii. Cables Juan

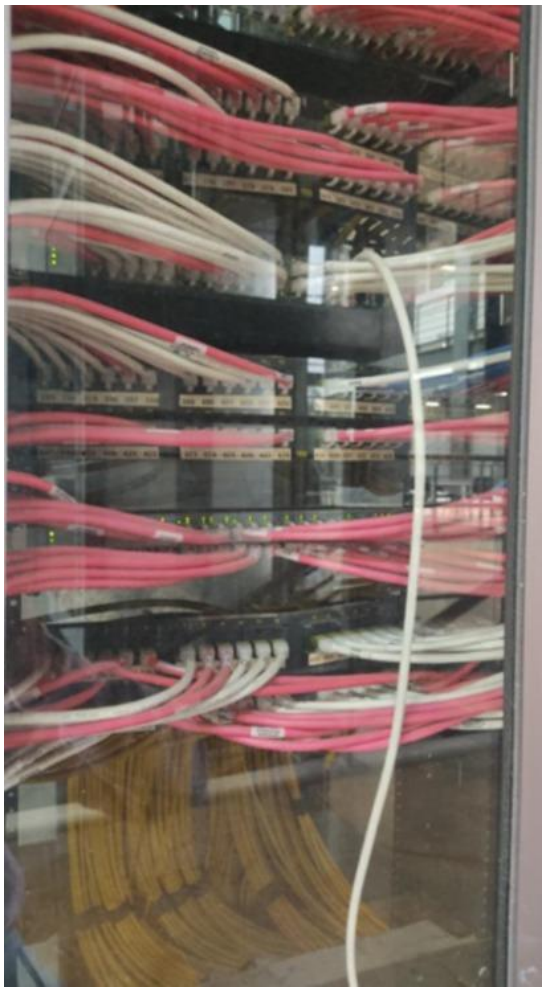
1. Cruzado

2. Directo

b) Patch Panel Crimping
    a. Perform a horizontal cabling crimping test to connect two computers using a patch panel and two faceplates (each with at least one information outlet).
    b. Use the following diagram to perform the crimping:
    c. To test the operation, you can do it in two ways:
        i. Connect the lab computers and ping between them.
        ii. Use the cable tester to check the continuity in the connection and crimping
    d. Document the process. Include photos proving that you did it
    e. Show your professor the setup.

KNOWLEDGE OF THE UNIVERSITY'S STRUCTURED CABLING

Observe the structured cabling in Building I at the School and identify the components of the structured cabling in the building. Include photos related to the topic (which prove that you took them).



En la imagen se ve un armario de redes con diferentes equipos usados para organizar y distribuir la conexión de internet o red dentro de un lugar.

- Patch panels
    - Son paneles que sirven para conectar muchos cables de red en un solo lugar. Facilitan la organización y permiten hacer cambios en las conexiones sin mover los cables principales.
- Cables de red
    - Son los cables que transportan la señal de internet o red entre dispositivos. En la imagen se ven principalmente rojos y blancos, conectados a los patch panels y otros equipos.
- Switches de red

    - Son dispositivos que reciben la conexión de red y la reparten a diferentes computadoras u otros aparatos. Son esenciales para que todo funcione correctamente.

- Organizadores de cables
    - Son estructuras que ayudan a mantener los cables ordenados, evitando enredos y facilitando el mantenimiento.

CONCLUSIONS

Comprensión de la capa de aplicación y física.

- Se logró configurar y analizar protocolos de la capa de aplicación como DNS, HTTP, FTP y además el correo electrónico, entendiendo su función y forma de comunicación en la red.
- Se identificó la importancia de la capa física la cual garantiza infraestructura de red mediante el uso de cableado estructurado.

Construcción y Pruebas de Cables de Red

- Se fabricaron cables directos y cruzados siguiendo los estándares T-568A y T-568B, asegurando su correcto funcionamiento mediante pruebas con un tester de cables.

Configuración y Simulación de Redes

- Se estableció una red en Cisco Packet Tracer, configurando dispositivos con direcciones IP, gateway y DNS, permitiendo la correcta comunicación entre ellos.
- Se verificó la conectividad mediante simulación y pruebas de mensajes entre dispositivos y servidores.

Uso de Wireshark para Análisis de Tráfico

- Se capturaron paquetes de HTTP y TELNET, comparando las diferencias entre la descarga de archivos por estos protocolos.
- Se identificó el funcionamiento de DHCP, analizando cómo un cliente obtiene una dirección IP a través de este servicio.

Sincronización de Hora con un Servidor NTP

- Se instaló y configuró un servidor NTP en NetBSD, sincronizando la hora de otras máquinas.

Conexión y Organización del Cableado

- Se realizó el ponchado en un patch panel, entendiendo la importancia de una infraestructura ordenada para la administración de la red.

Este laboratorio permitió reforzar conocimientos sobre la instalación y configuración de redes, desde la configuración de protocolos hasta la correcta construcción de cables y organización de la infraestructura física. Se comprendió la importancia de seguir estándares de cableado y realizar pruebas para garantizar un funcionamiento eficiente de la red.

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raspberrypi.com**. (s. f.). raspberrypi.com.** https://forums.raspberrypi.com/viewtopic.php?t=308207