

CISCO (DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN /  
WAN)

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD

CEAD MEDELLÍN

2018

CISCO (DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN /  
WAN)

Trabajo de grado

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2018

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## RESUMEN

Se ha dispuesto a realizar el desarrollo de un componente práctico, dirigido a la implementación y el diseño de una red LAN/WAN. Utilizando las debidas técnicas de configuración de routing y swiching. Permitiendo desarrollar así un sistema de red funcional y eficiente. Con unas funciones y características definidas y programadas que facilitan la utilización y rendimiento de una red.

Se realizan diferentes tipos de configuraciones y maneras de implementar una red, tales como la configuración de red con IPv4 y con IPv6 implementando protocolos como los DHCP y NAT para la IPv4 y configuración como la OSPFv2.

Se realiza unas capturas de pantalla de los detalles de los para para la configuración de una red con el programa de simulación packet tracer.

## INTRODUCCIÓN

Se ha dispuesto por parte de la UNAD el curso de profundización en redes LAN y WAN, surgiendo de esta manera un convenio entre la UNAD y la empresa CISCO, esto ha servido como complemento al conocimiento en el área de redes y telecomunicaciones, esto aplica como opción de grado y de esto surge el DIPLOMADO DE PROFUNDIZACIÓN CISCO (DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN / WAN).

En esta actividad final han propuesto tratar los temas: configuración de sistemas de red soportados en VLAN, configuración de control de ACL para IPv4, implementación de DHCP y NAT para IPv4, configuración OSPFv2

Para esta actividad hacemos uso de la herramienta de simulación cisco packet tracer, ya que esta herramienta nos ayuda a desarrollar la parte práctica a una escala muy similar a la realidad.

## **OBJETIVOS**

### **Objetivo General**

Desarrollar de manera satisfactoria todas las actividades propuestas por el DIPLOMADO DE PROFUNDIZACIÓN CISCO (DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN / WAN), obteniendo así todos los conocimientos que nos ofrece el diplomado y poniéndolos en práctica por medio del simulador packer tracer

### **Objetivos Generales**

- Realizar configuraciones de routers y swiches resolviendo problemas relacionados con la configuración de estos dispositivos.
- Configurar y controlar ACL para el protocolo de conexión IPv4 y descubrir los medios utilizados para transportar datos a través de la red.



## 1. Descripción Del Escenario Propuesto Para La Prueba De Habilidades

**Escenario:** Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

### Topología de la red

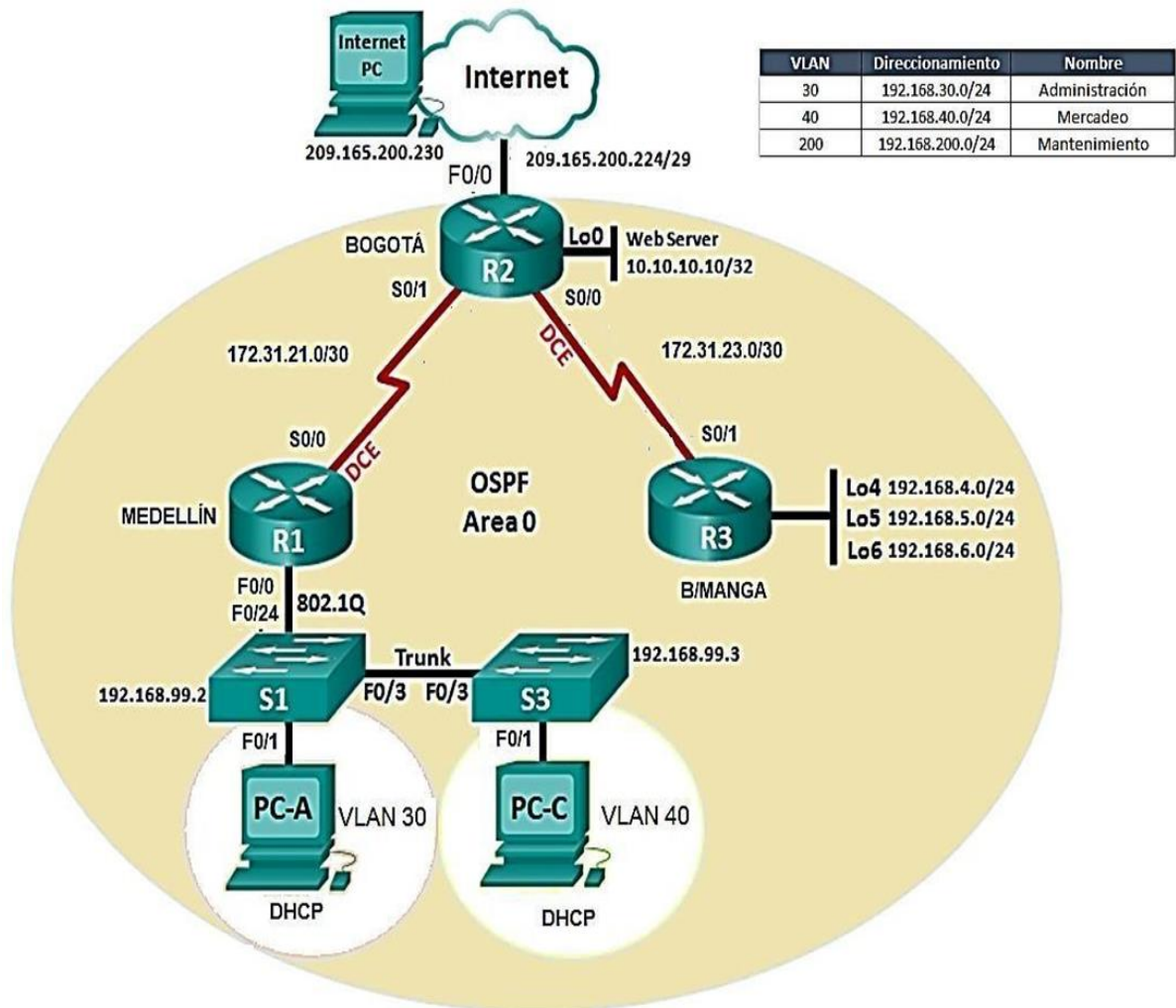


Figura 1

1. Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario

2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

### OSPFv2 área 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	2.2.2.2
Router ID R3	3.3.3.3
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	128 Kb/s
Ajustar el costo en la métrica de S0/0 a	7500

### Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2
- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.

4. En el Switch 3 deshabilitar DNS lookup

5. Asignar direcciones IP a los Switches acorde a los lineamientos.

6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

7. Implementar DHCP and NAT for IPv4

8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.

9. Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.

Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.
Configurar DHCP pool para VLAN 40	Name: MERCADEO DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.

10. Configurar NAT en R2 para permitir que los hosts puedan salir a internet

11. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

12. Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

13. Verificar procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

## Desarrollo Del Proyecto

### Solución Prueba de Habilidades Prácticas CCNA

#### Armado de la Red

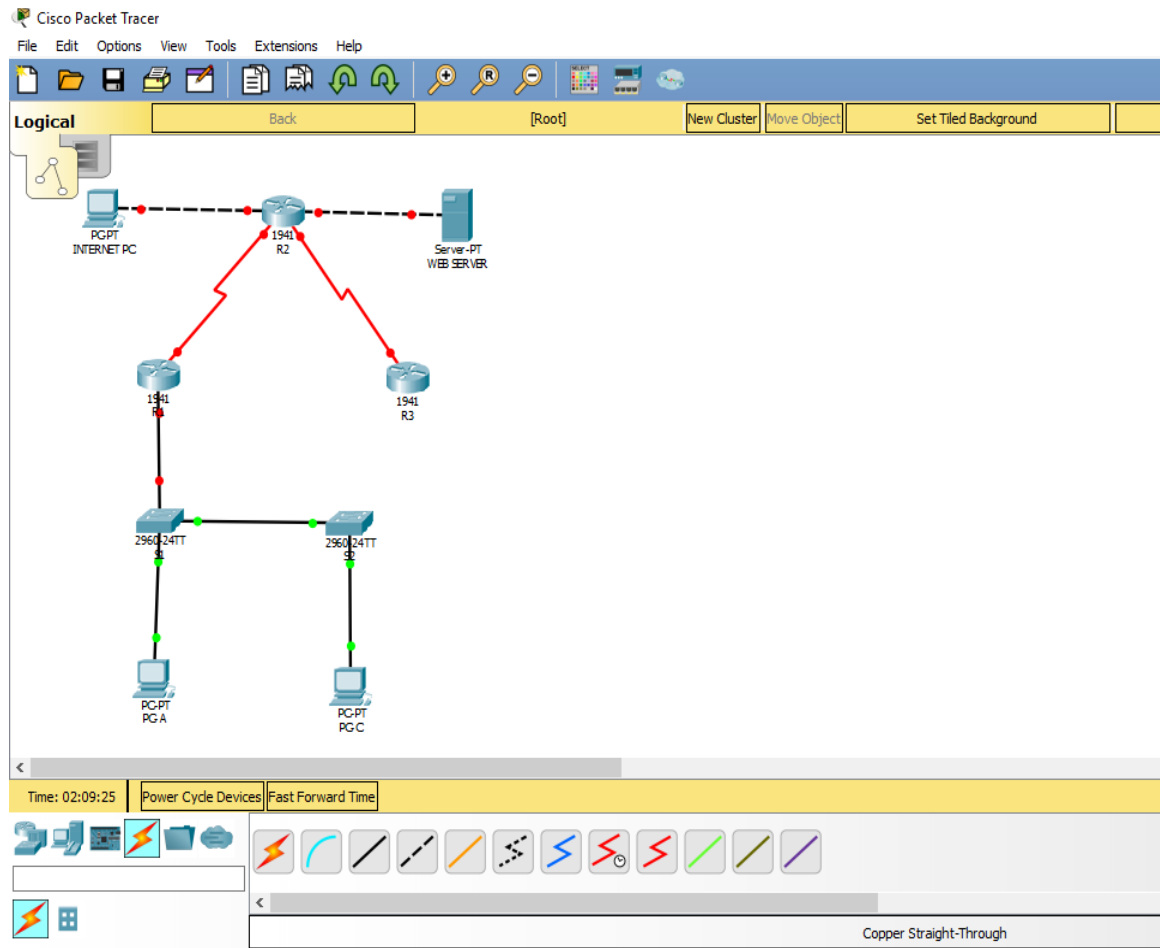


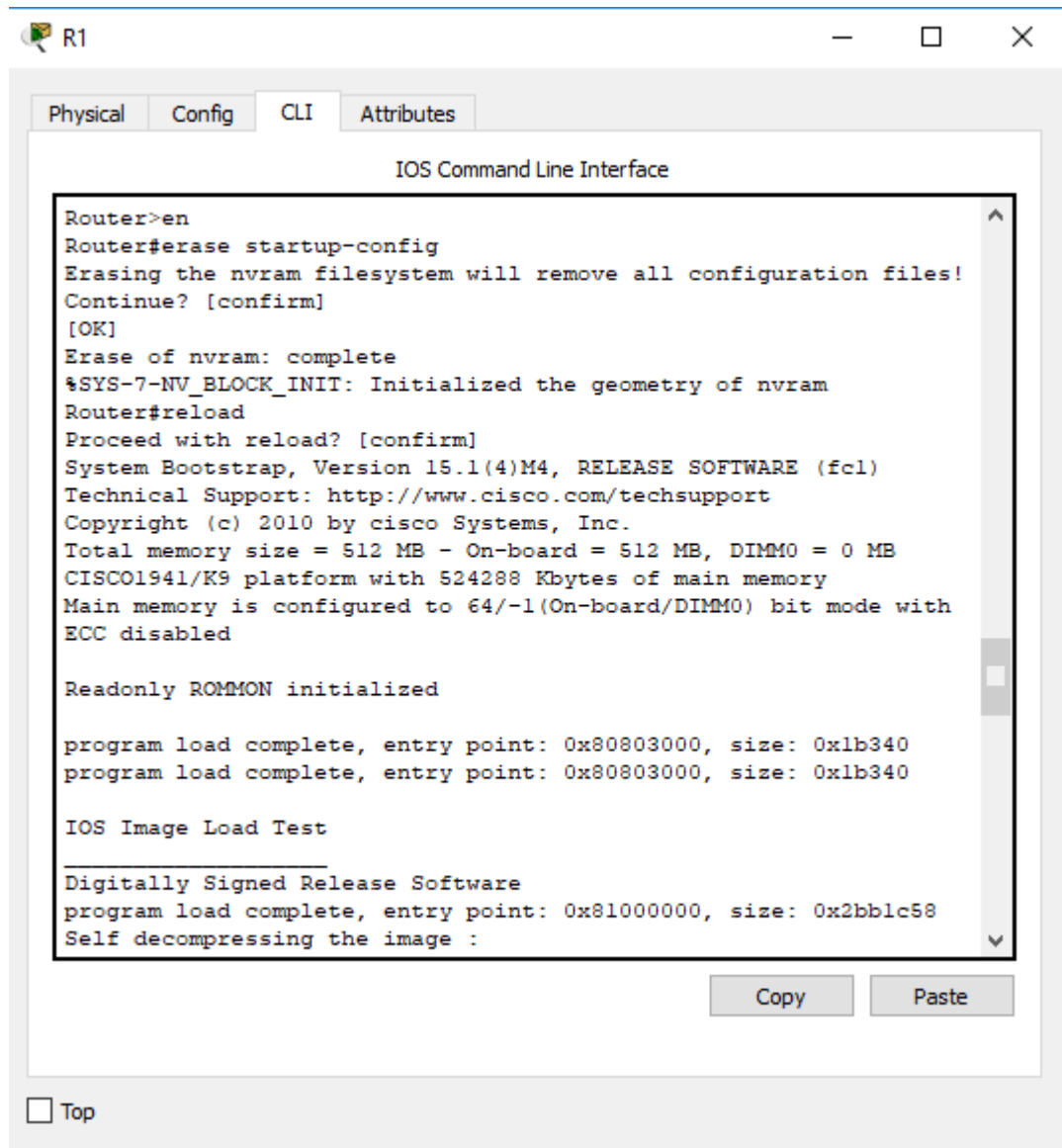
Figura 2

#### Inicializando y Cargando los Routers y Switches

Se procede a borrar las configuraciones de inicio y a recargar los dispositivos.

Para los Routers las tareas que realizo a continuación son: borrar el archivo de configuración de inicio en todos los enrutadores. Del mismo modo se procede a recargarlos.

## Router R1



```
Router>en
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with
ECC disabled

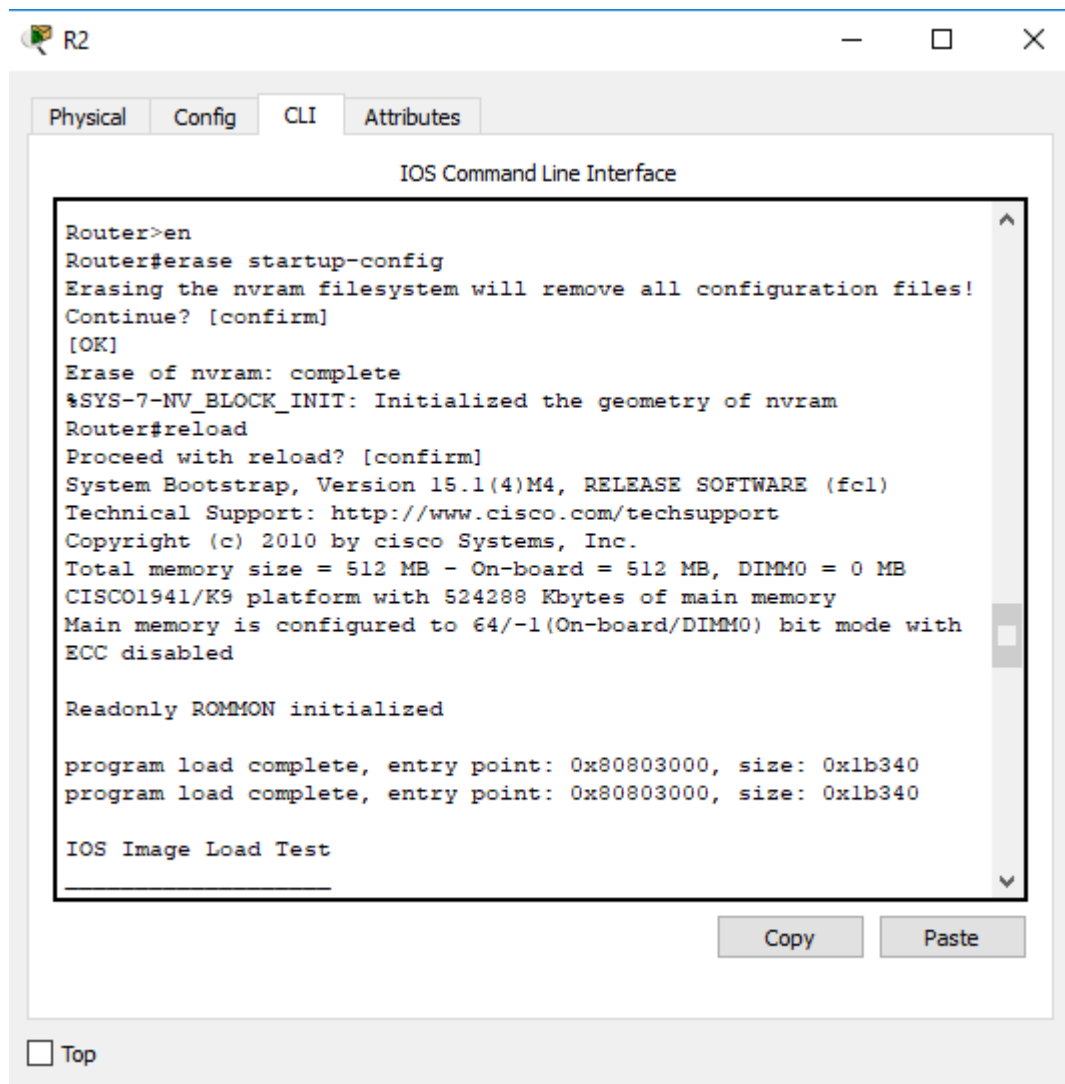
Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0x1b340
program load complete, entry point: 0x80803000, size: 0x1b340

IOS Image Load Test
-----
Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
```

Figura 3

## Router R2



The screenshot shows a window titled "R2" with a tabbed interface. The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following sequence of commands and responses:

```
Router>en
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fcl)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with
ECC disabled

Readonly ROMMON initialized

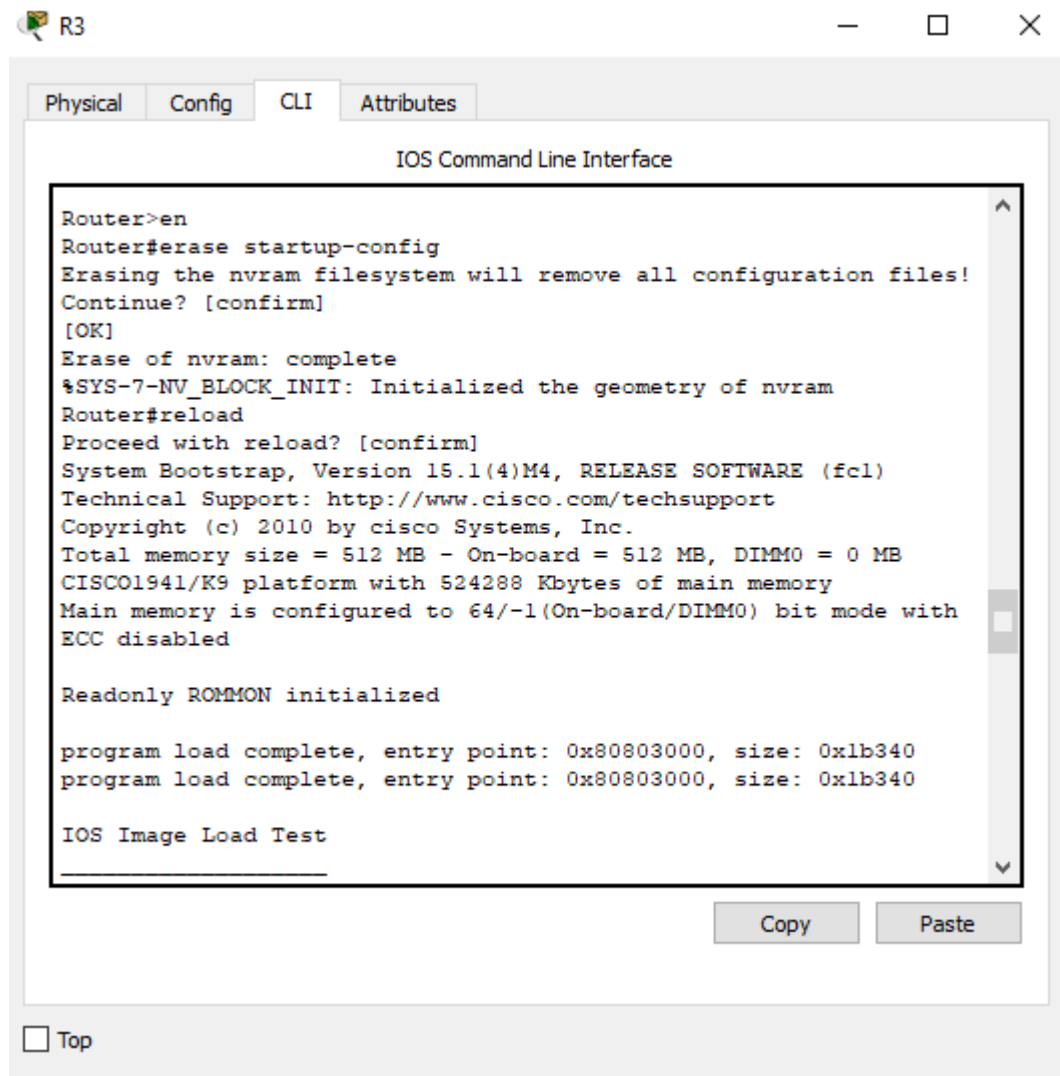
program load complete, entry point: 0x80803000, size: 0x1b340
program load complete, entry point: 0x80803000, size: 0x1b340

IOS Image Load Test
```

At the bottom of the terminal window, there are "Copy" and "Paste" buttons. Below the terminal window, there is a "Top" button with a small square icon to its left.

Figura 4

## Router R3



```
Router>en
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with
ECC disabled

Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0x1b340
program load complete, entry point: 0x80803000, size: 0x1b340

IOS Image Load Test
_____

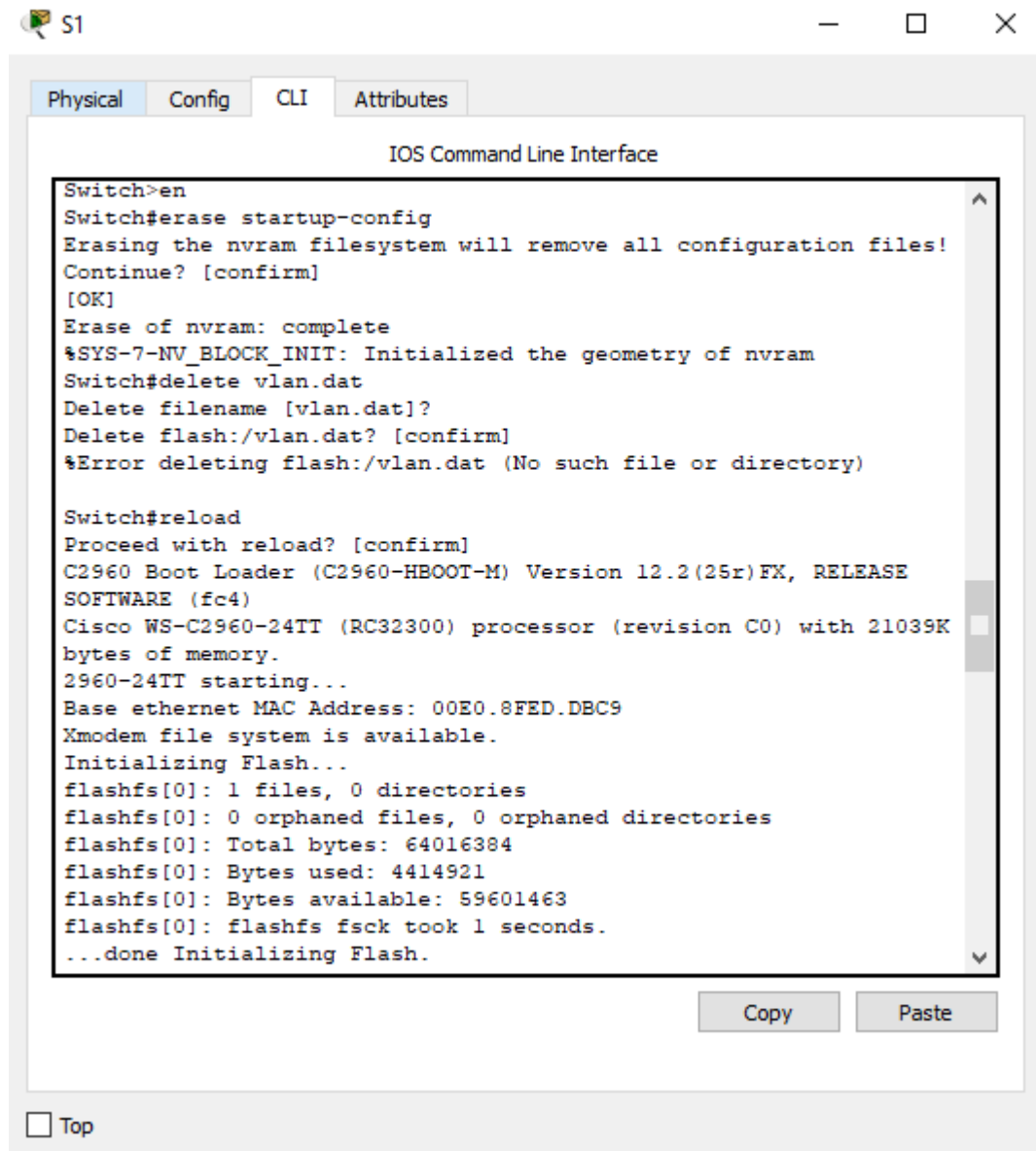
Copy Paste
```

Top

Figura 5

Se procede a borrar el archivo startup-config en todos los switches y se elimina la antigua base de datos VLAN.

## Switch S1



The screenshot shows a terminal window titled "S1" with a tabbed interface. The active tab is "CLI", and the window title is "IOS Command Line Interface". The terminal output shows the following sequence of commands and responses:

```
Switch>en
Switch#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Switch#delete vlan.dat
Delete filename [vlan.dat]?
Delete flash:/vlan.dat? [confirm]
%Error deleting flash:/vlan.dat (No such file or directory)

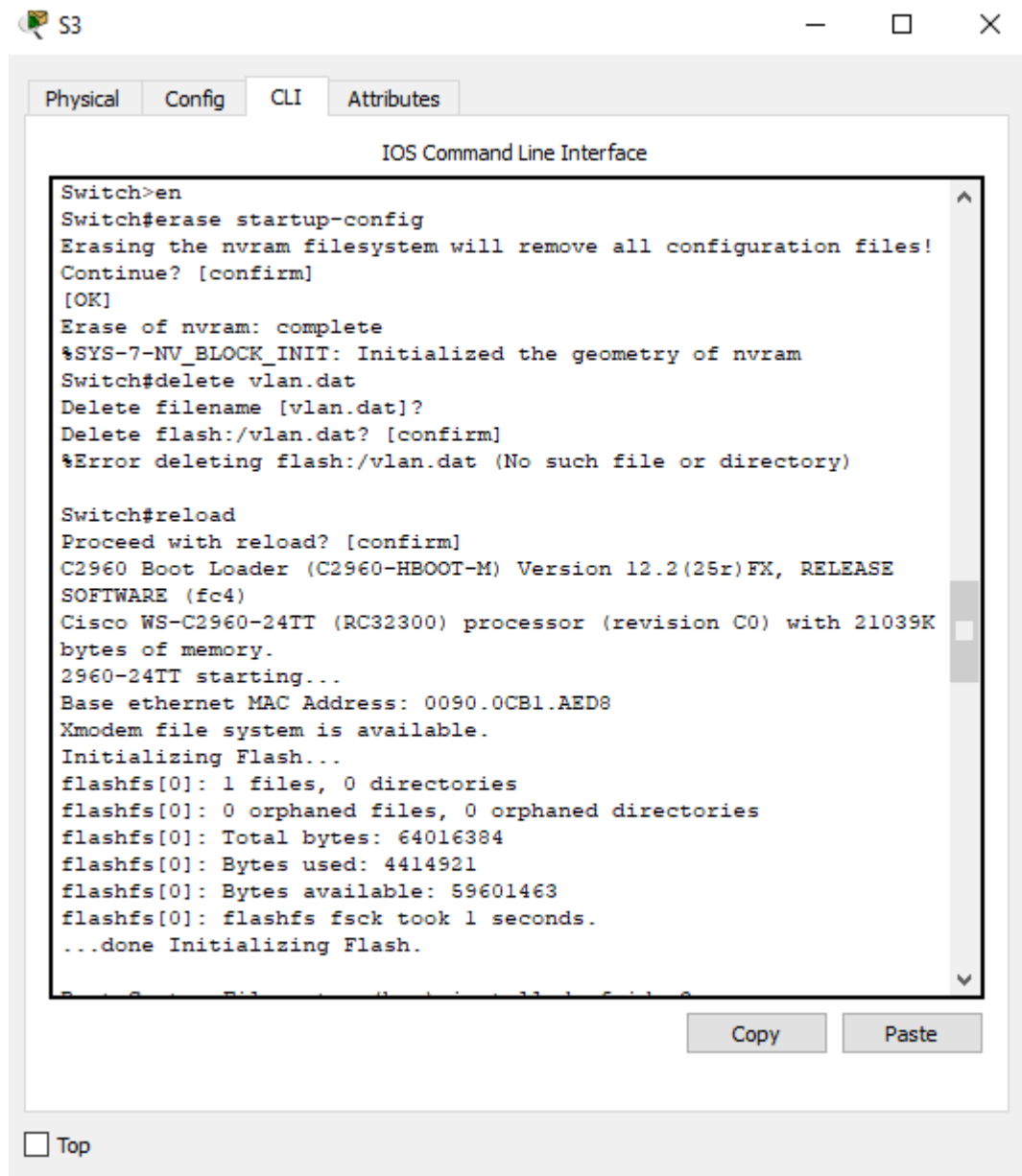
Switch#reload
Proceed with reload? [confirm]
C2960 Boot Loader (C2960-HBOOT-M) Version 12.2(25r)FX, RELEASE
SOFTWARE (fc4)
Cisco WS-C2960-24TT (RC32300) processor (revision C0) with 21039K
bytes of memory.
2960-24TT starting...
Base ethernet MAC Address: 00E0.8FED.DBC9
Xmodem file system is available.
Initializing Flash...
flashfs[0]: 1 files, 0 directories
flashfs[0]: 0 orphaned files, 0 orphaned directories
flashfs[0]: Total bytes: 64016384
flashfs[0]: Bytes used: 4414921
flashfs[0]: Bytes available: 59601463
flashfs[0]: flashfs fsck took 1 seconds.
...done Initializing Flash.
```

At the bottom of the terminal window, there are "Copy" and "Paste" buttons. Below the terminal window, there is a "Top" button with a square icon.

Figura 6



## Switch S2



The screenshot shows a terminal window titled "S3" with a window title bar containing a minus sign, a square icon, and a close button. The terminal content is as follows:

```
Switch>en
Switch#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Switch#delete vlan.dat
Delete filename [vlan.dat]?
Delete flash:/vlan.dat? [confirm]
%Error deleting flash:/vlan.dat (No such file or directory)

Switch#reload
Proceed with reload? [confirm]
C2960 Boot Loader (C2960-HBOOT-M) Version 12.2(25r)FX, RELEASE
SOFTWARE (fc4)
Cisco WS-C2960-24TT (RC32300) processor (revision C0) with 21039K
bytes of memory.
2960-24TT starting...
Base ethernet MAC Address: 0090.0CB1.AED8
Xmodem file system is available.
Initializing Flash...
flashfs[0]: 1 files, 0 directories
flashfs[0]: 0 orphaned files, 0 orphaned directories
flashfs[0]: Total bytes: 64016384
flashfs[0]: Bytes used: 4414921
flashfs[0]: Bytes available: 59601463
flashfs[0]: flashfs fsck took 1 seconds.
...done Initializing Flash.
```

At the bottom of the terminal window, there are "Copy" and "Paste" buttons. Below the terminal window, there is a "Top" button with a square icon to its left.

Figura 7

## Configuración Básica de los Dispositivos “Direccionamiento IPV4”

Tareas de configuración para la Internet PC incluyendo: IP Address, Subnet Mask, Default Gateway.

### Configurando la Internet PC.

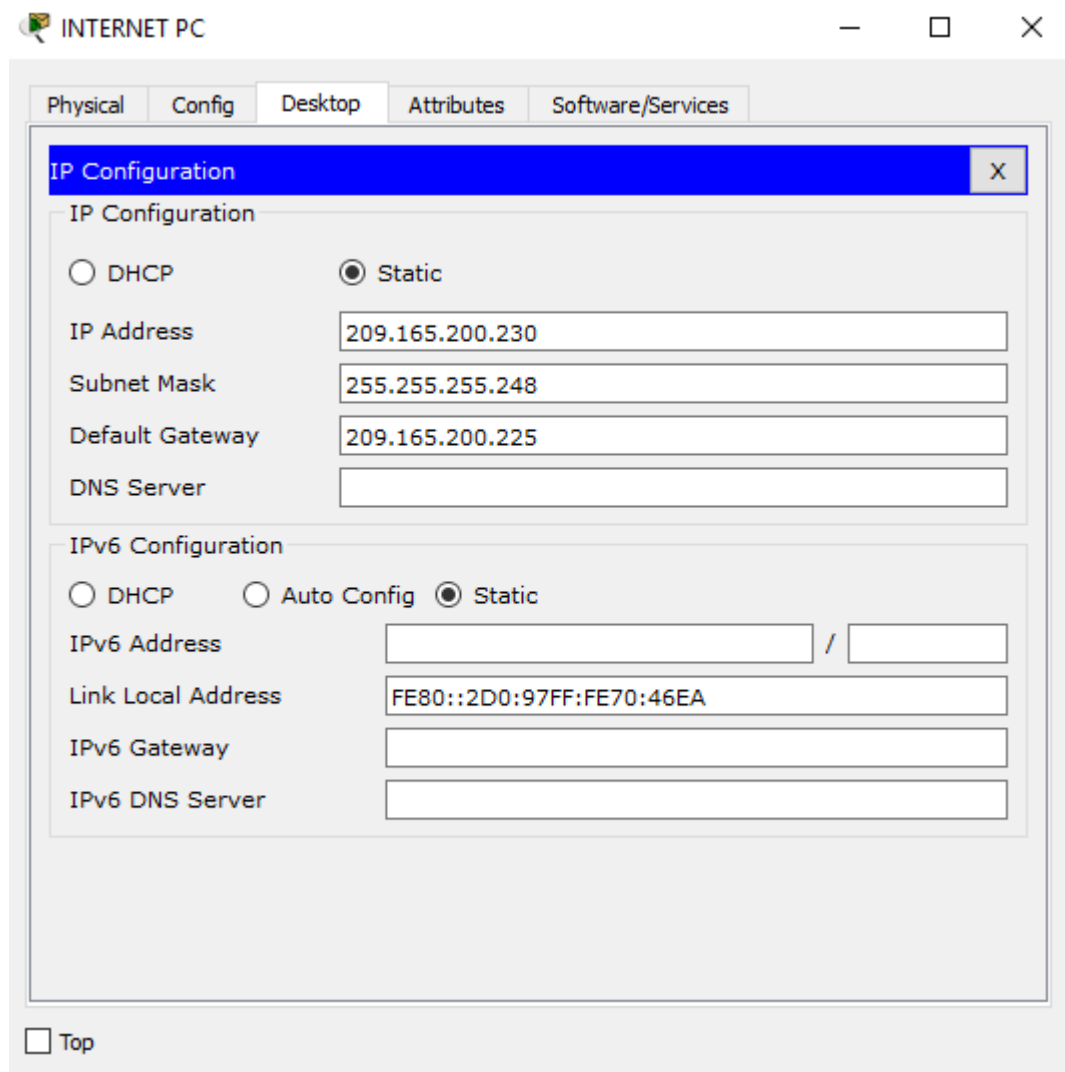


Figura 8

Tareas de configuración para R1 incluyendo: Disable DNS lookup, Nombre, Interface S0/0/0, Default route.

## Configurando R1.

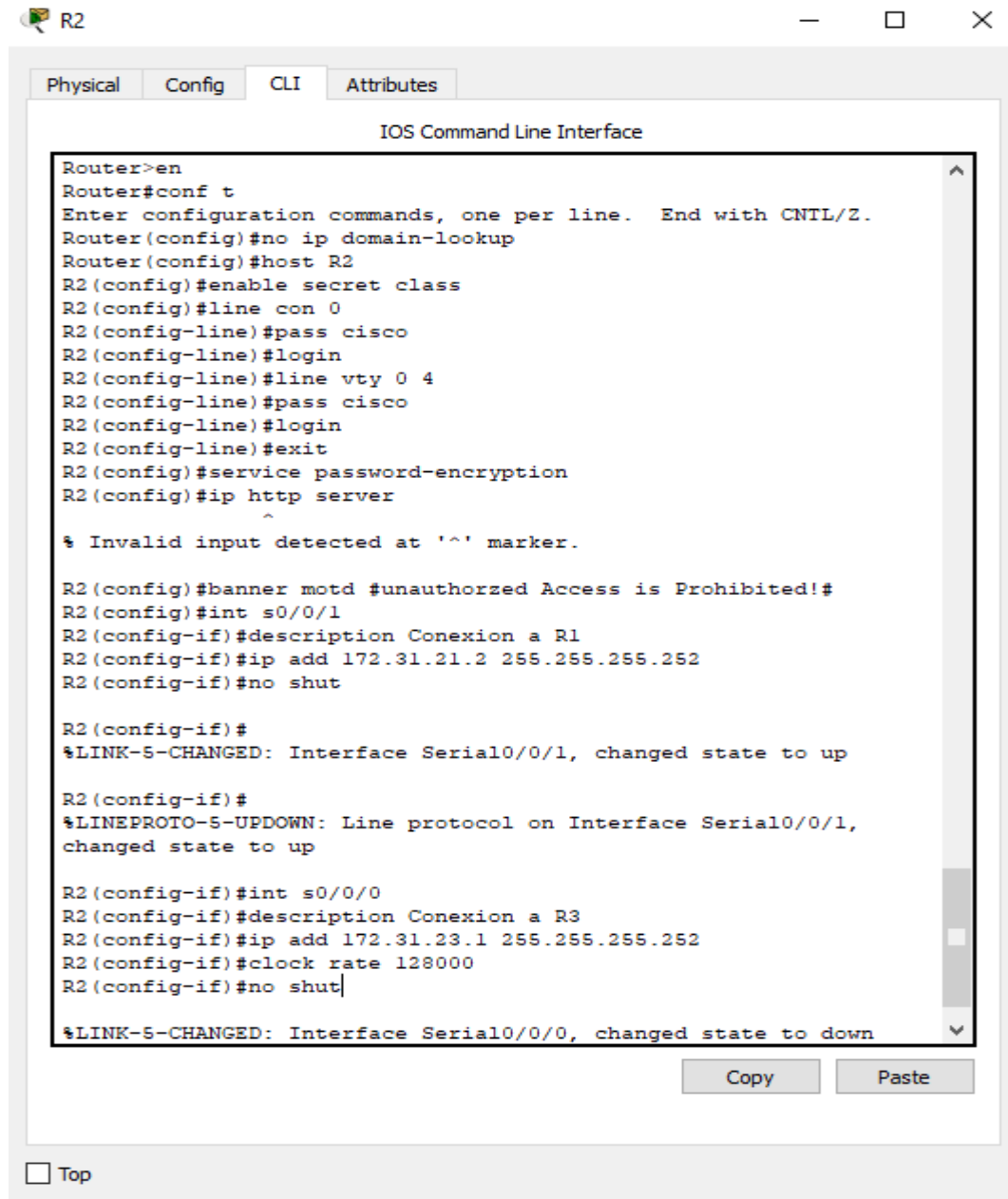
```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#host R1
R1(config)#enable secret class
R1(config)#line con 0
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#line vty 0 4
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#service password-encryption
R1(config)#int s0/0/0
R1(config-if)#description conexion a R2
R1(config-if)#ip add 172.31.21.1 255.255.255.252
R1(config-if)#clock rate 128000
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial10/0/0, changed state to down
R1(config-if)#exit
R1(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0
%Default route without gateway, if not a point-to-point
interface, may impact performance
R1(config)#
```

Figura 9

Tareas de configuración para R2 incluyendo: Disable DNS lookup, Nombre, Interface S0/0/0, Interface S0/0/1, Interface G0/0 (Internet Simulado), Default route.

## Configurando R2.



The screenshot shows a Cisco IOS CLI window titled "R2" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following sequence of commands and responses:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#host R2
R2(config)#enable secret class
R2(config)#line con 0
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#line vty 0 4
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password-encryption
R2(config)#ip http server
^
% Invalid input detected at '^' marker.

R2(config)#banner motd #unauthorized Access is Prohibited!#
R2(config)#int s0/0/1
R2(config-if)#description Conexion a R1
R2(config-if)#ip add 172.31.21.2 255.255.255.252
R2(config-if)#no shut

R2(config-if)#
%LINK-5-CHANGED: Interface Serial10/0/1, changed state to up

R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial10/0/1,
changed state to up

R2(config-if)#int s0/0/0
R2(config-if)#description Conexion a R3
R2(config-if)#ip add 172.31.23.1 255.255.255.252
R2(config-if)#clock rate 128000
R2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial10/0/0, changed state to down
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" button with a checkbox.

Figura 10

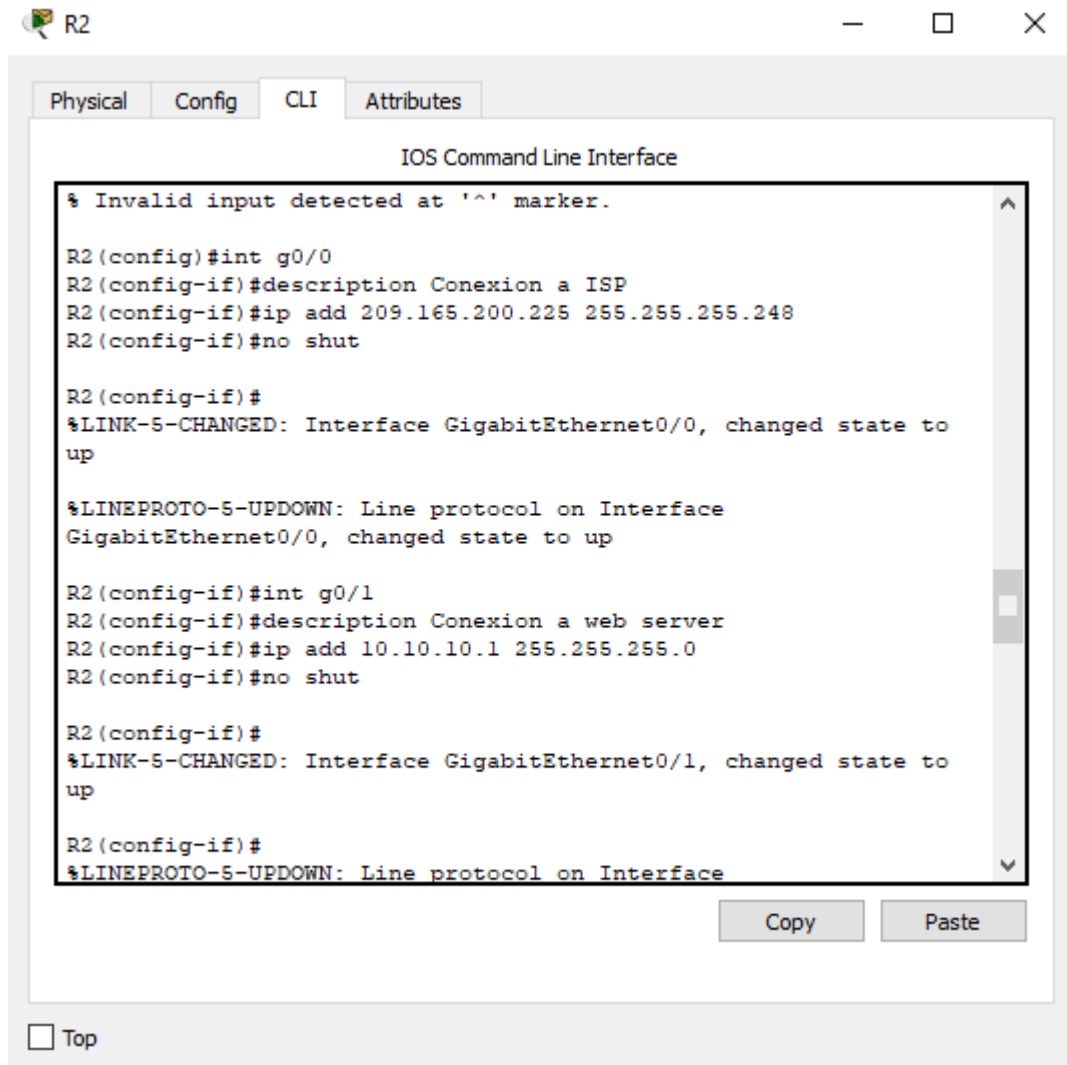


Figura 11

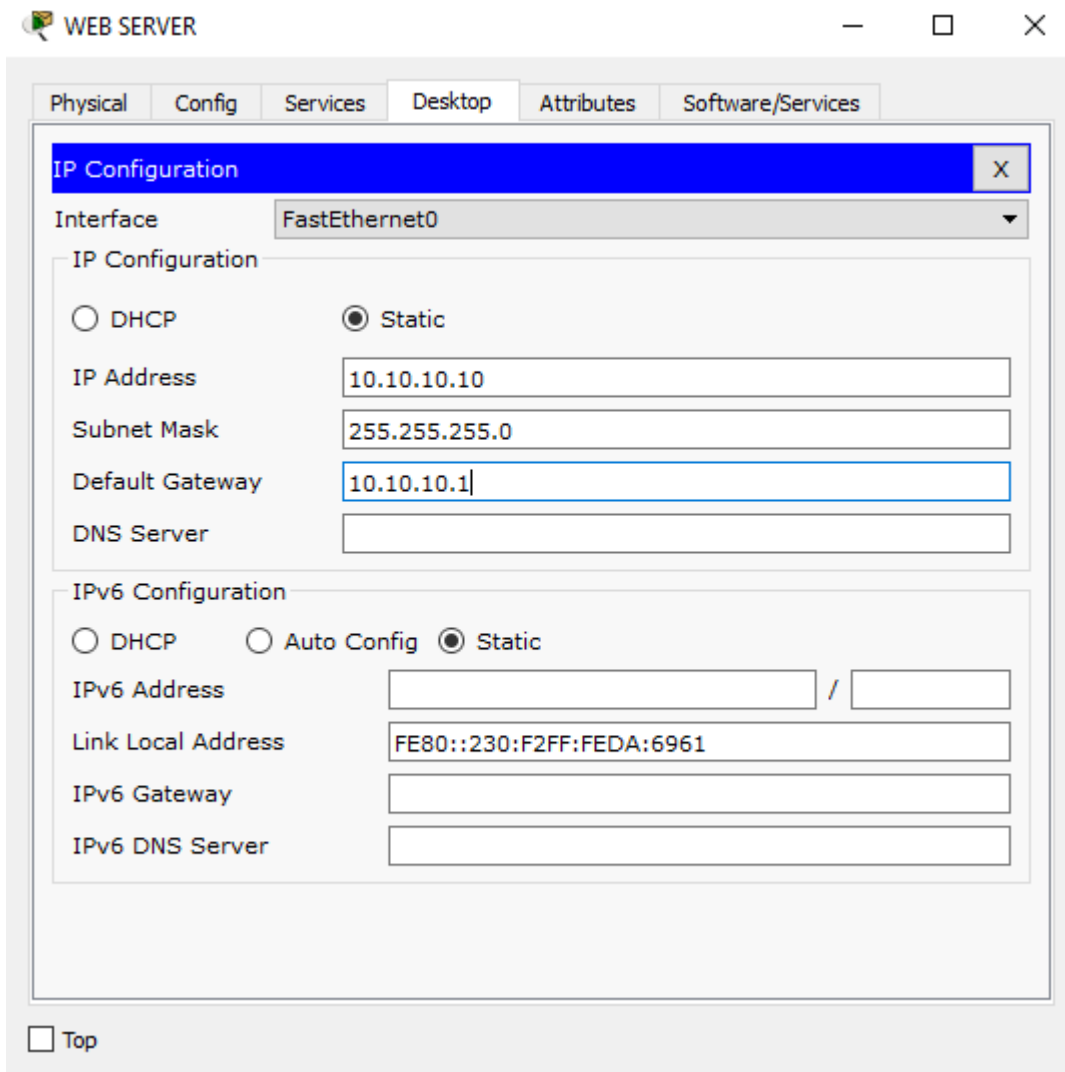
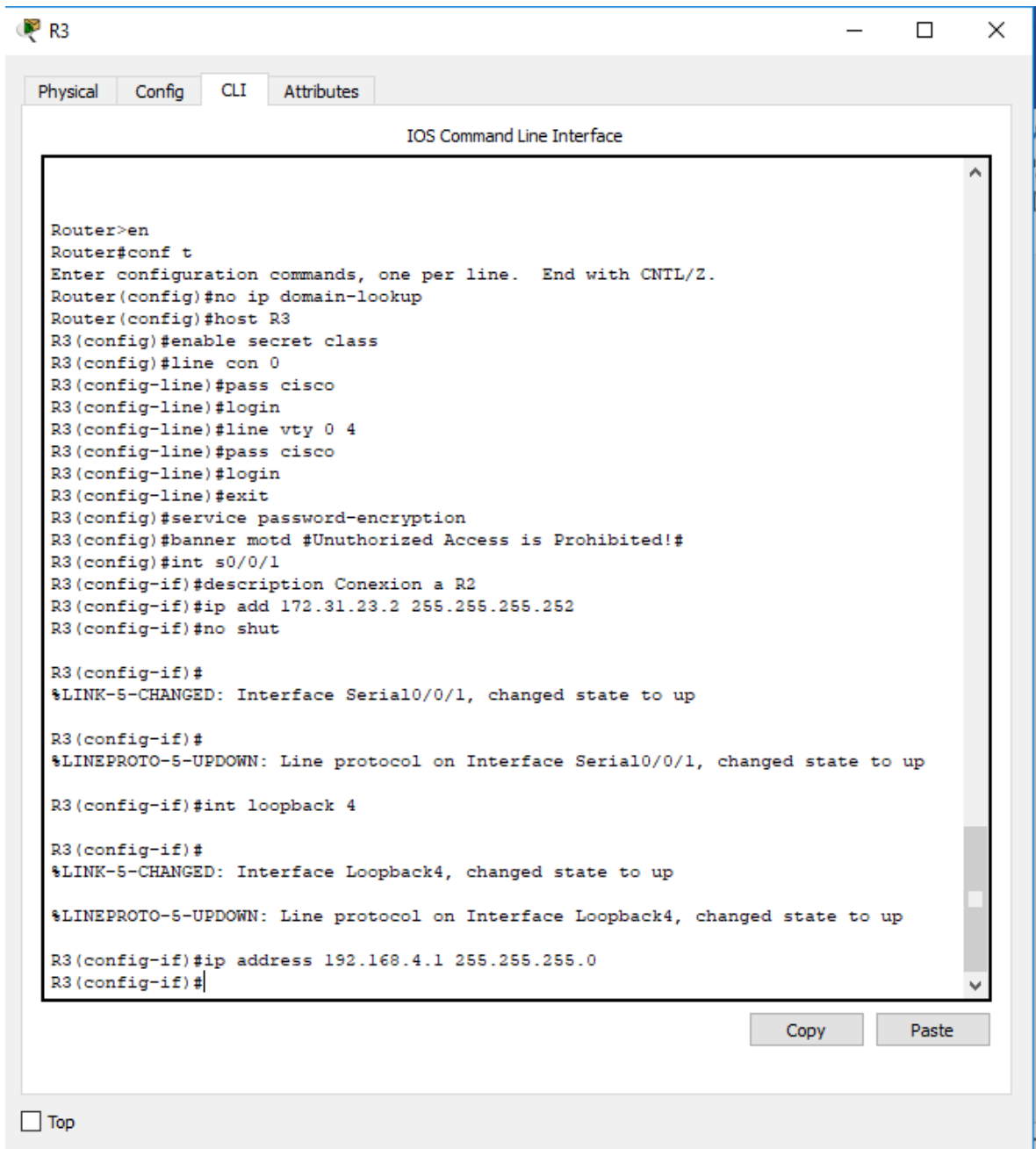


Figura 12

Tareas de configuración para R3 incluyendo: Disable DNS lookup, Nombre, Interface Loopback 4, Interface Loopback 5, Interface Loopback 6, Default route.

## Configurando R3.



The screenshot shows a window titled "R3" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following sequence of commands and responses:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#host R3
R3(config)#enable secret class
R3(config)#line con 0
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#line vty 0 4
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#service password-encryption
R3(config)#banner motd #Unauthorized Access is Prohibited!#
R3(config)#int s0/0/1
R3(config-if)#description Conexion a R2
R3(config-if)#ip add 172.31.23.2 255.255.255.252
R3(config-if)#no shut

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

R3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

R3(config-if)#int loopback 4

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up

R3(config-if)#ip address 192.168.4.1 255.255.255.0
R3(config-if)#
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" button with a checkbox.

Figura 13

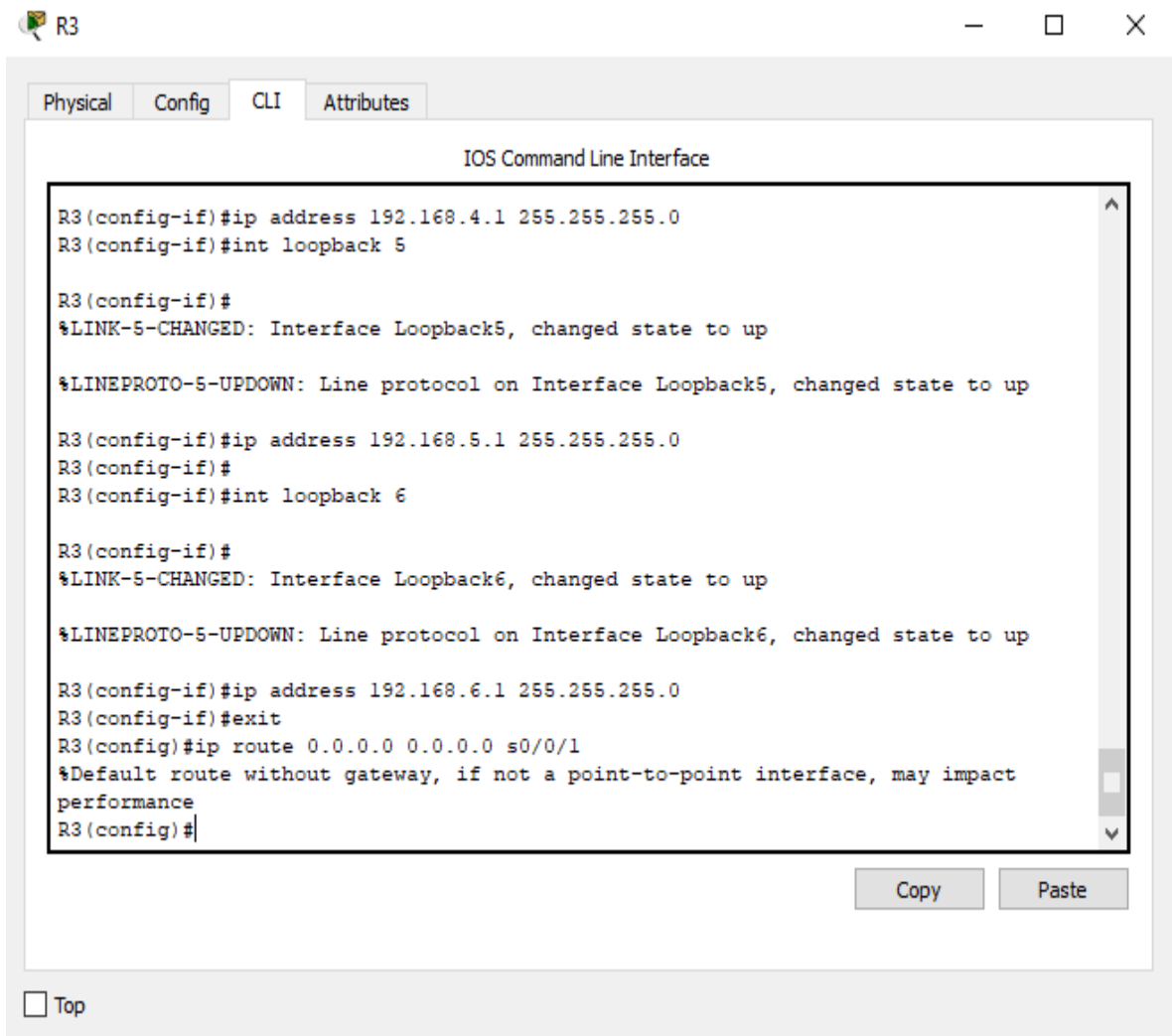
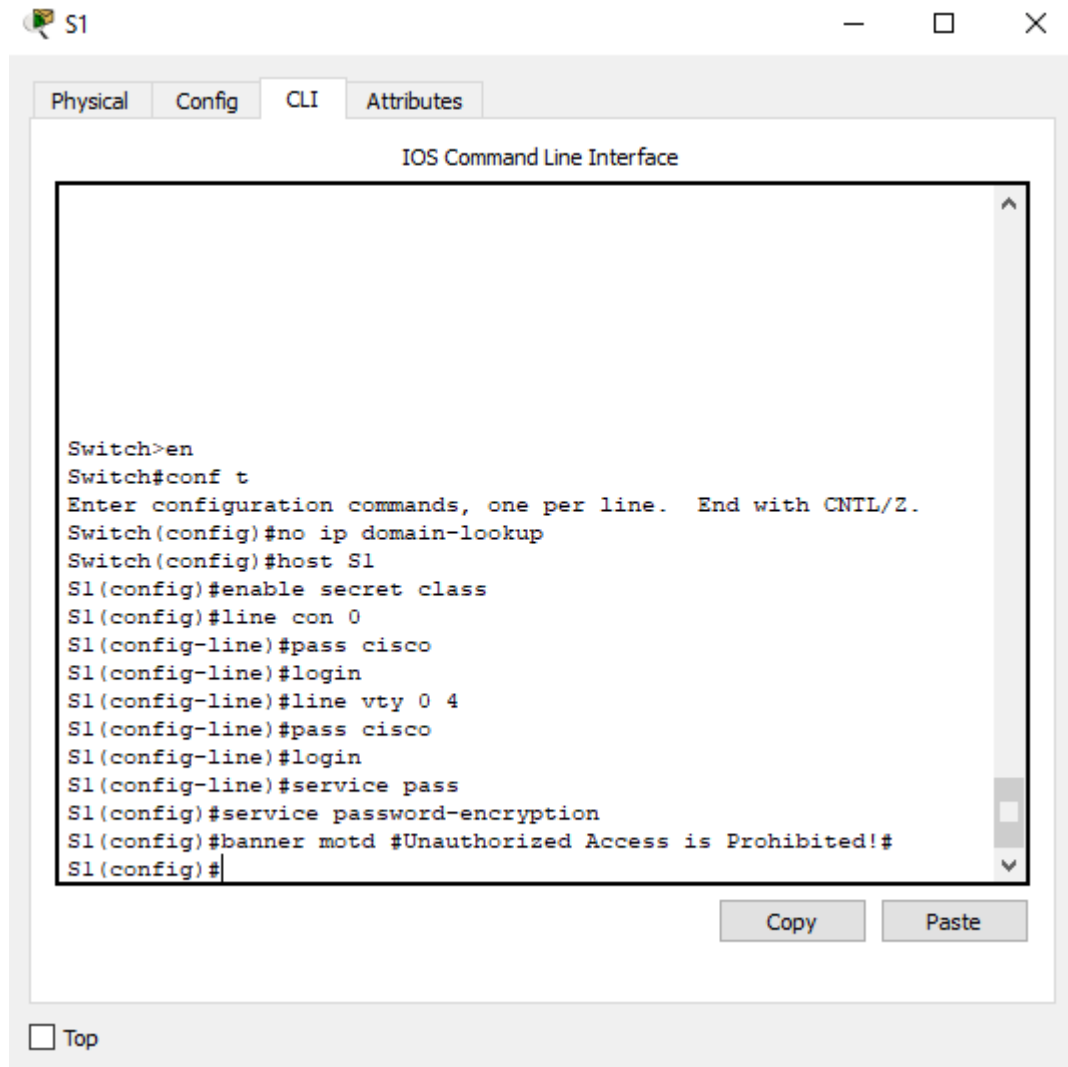


Figura 14

Tareas de configuración para S1 incluyendo: Disable DNS lookup, Nombre.



## Configurando S1.



The screenshot shows a window titled 'S1' with a tabbed interface. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal text is as follows:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#no ip domain-lookup
Switch(config)#host S1
S1(config)#enable secret class
S1(config)#line con 0
S1(config-line)#pass cisco
S1(config-line)#login
S1(config-line)#line vty 0 4
S1(config-line)#pass cisco
S1(config-line)#login
S1(config-line)#service pass
S1(config)#service password-encryption
S1(config)#banner motd #Unauthorized Access is Prohibited!#
S1(config)#
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a 'Top' button with a checkbox.

Figura 15

Tareas de configuración para S3 incluyendo: Disable DNS lookup, Nombre.

## Configurando S3.

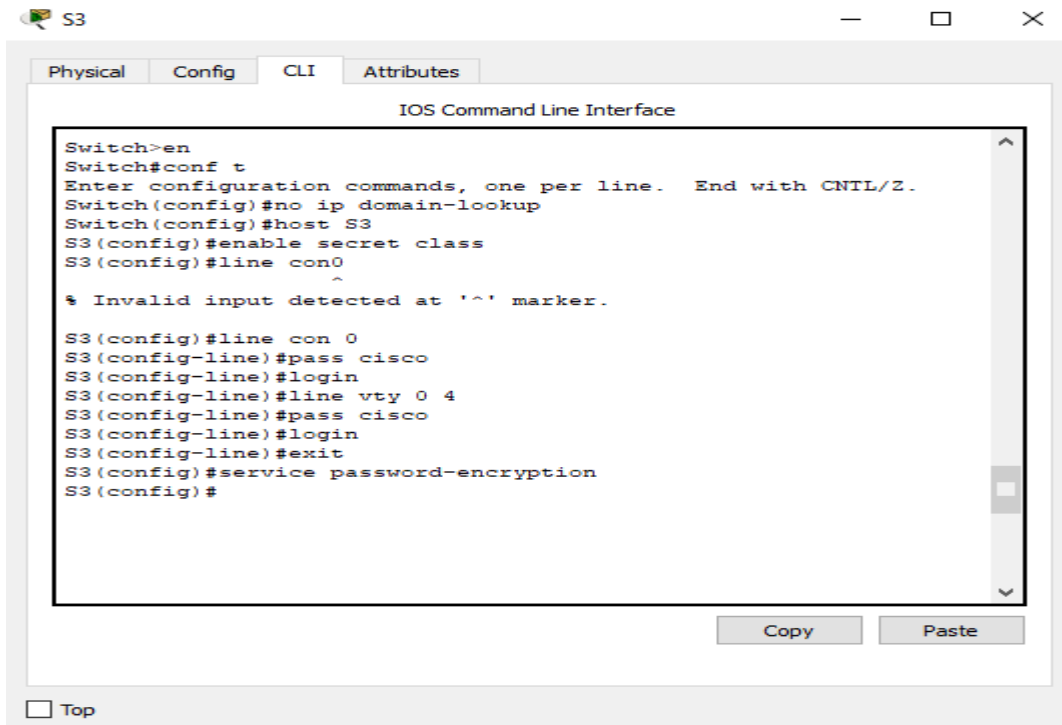


Figura 17

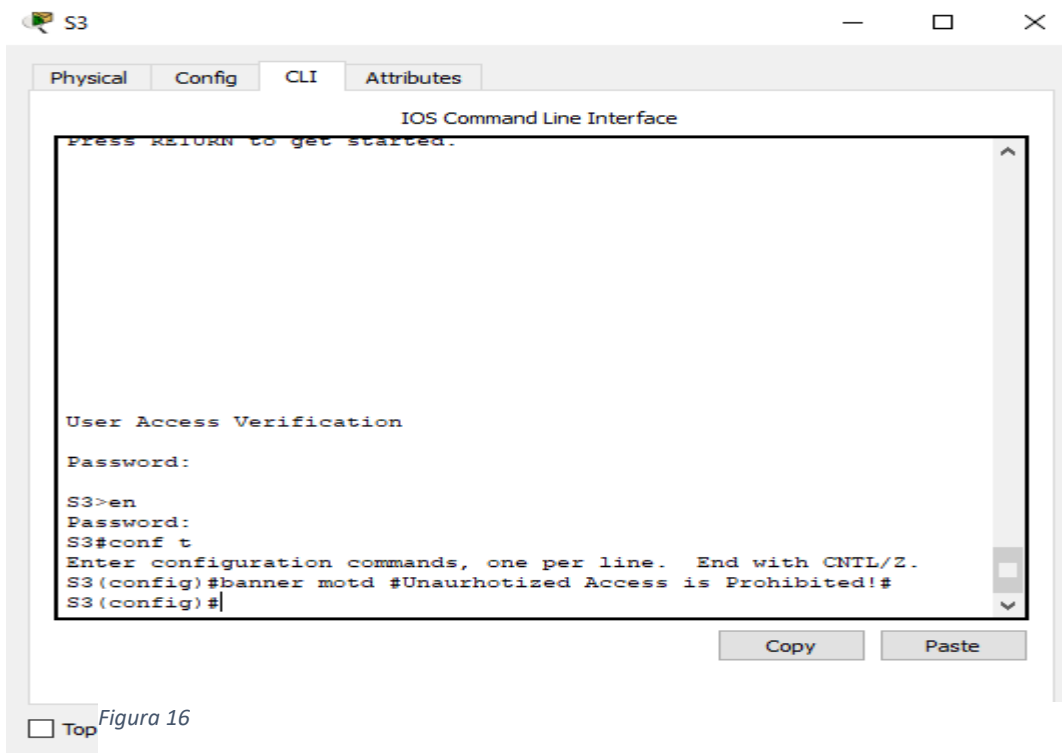


Figura 16

## Verificación de la Conectividad de la Red

Se usa el comando ping para probar la conectividad entre dispositivos de red.

### Ping desde R1 a R2, S0/0/0

```
R1#ping 172.31.21.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.21.2, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4
ms
R1#
```

Figura 18

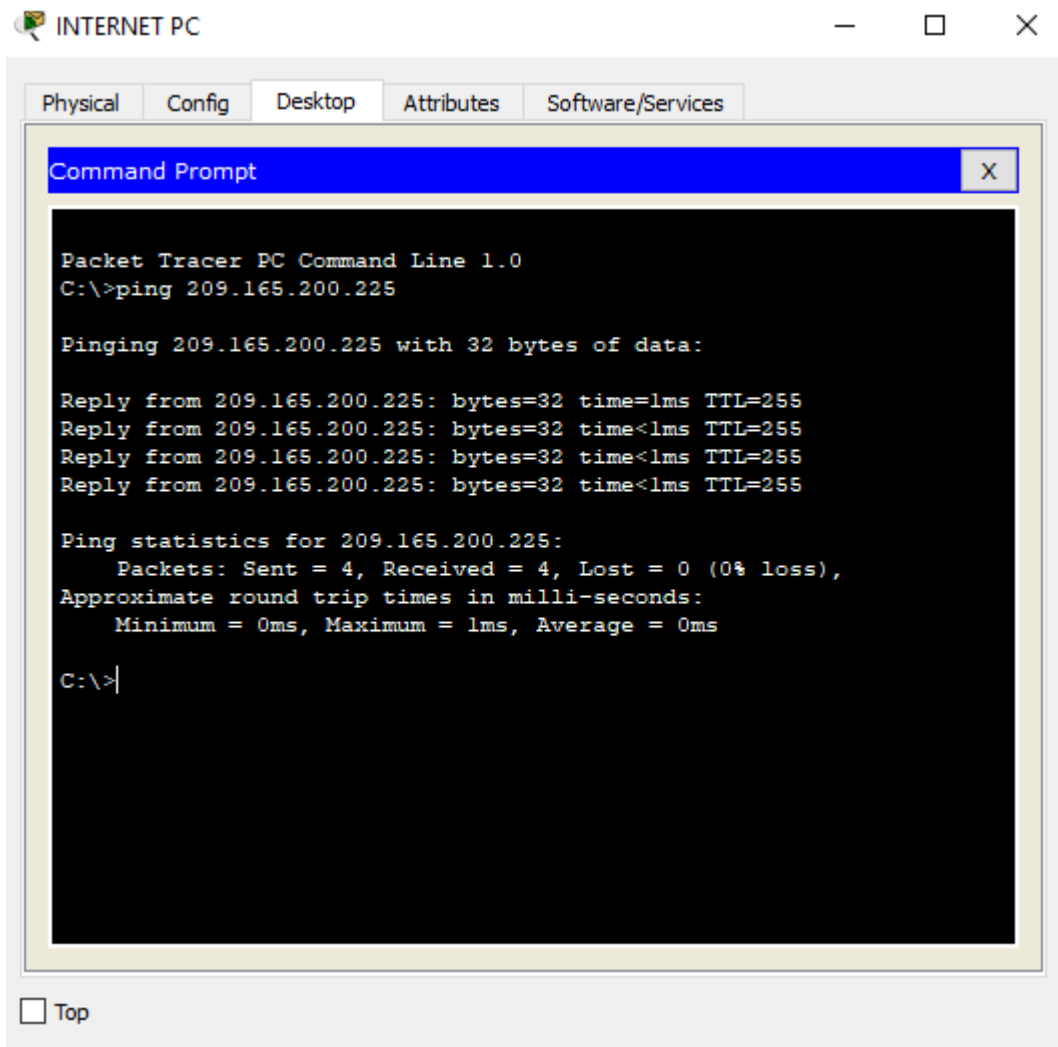
### Ping desde R3 a R2, S0/0/1

```
R3#ping 172.31.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.23.2, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
2/6/19 ms
R3#
```

Figura 19

## Ping desde Internet PC a Puerta de Enlace Predeterminada



The image shows a screenshot of a Packet Tracer PC Command Line window. The window title is "INTERNET PC" and it has standard window controls (minimize, maximize, close). The window contains a "Command Prompt" window with the following text:

```
Packet Tracer PC Command Line 1.0
C:\>ping 209.165.200.225

Pinging 209.165.200.225 with 32 bytes of data:

Reply from 209.165.200.225: bytes=32 time=1ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255

Ping statistics for 209.165.200.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

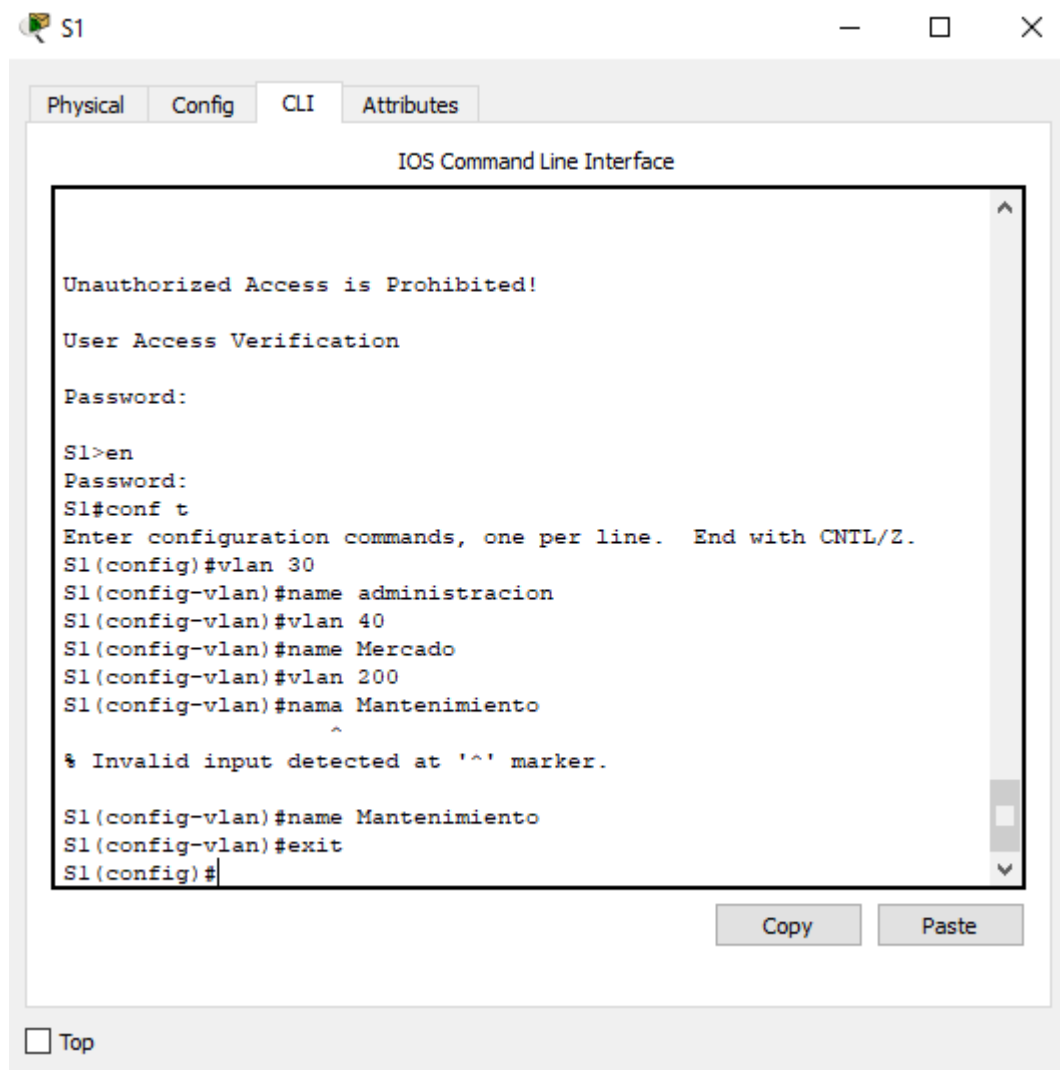
At the bottom left of the window, there is a "Top" button with a square icon.

Figura 20

## Configuración de Switch Security, VLANs e Inter VLAN Routing

Tareas de configuración para S1 incluyendo: Crear la base de datos VLAN, asignar la dirección IP de administración, asignar la puerta de enlace predeterminada, forzar la conexión troncal en la interfaz F0/3, forzar la conexión troncal en la interfaz F0/24, configurar todos los demás puertos como puertos de acceso, asignar F0/1 a la VLAN 30, apagar todos los puertos no utilizados.

### Configurando S1.



```
Unauthorized Access is Prohibited!  
User Access Verification  
Password:  
S1>en  
Password:  
S1#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
S1(config)#vlan 30  
S1(config-vlan)#name administracion  
S1(config-vlan)#vlan 40  
S1(config-vlan)#name Mercado  
S1(config-vlan)#vlan 200  
S1(config-vlan)#nama Mantenimiento  
^  
% Invalid input detected at '^' marker.  
S1(config-vlan)#name Mantenimiento  
S1(config-vlan)#exit  
S1(config)#
```

Figura 21

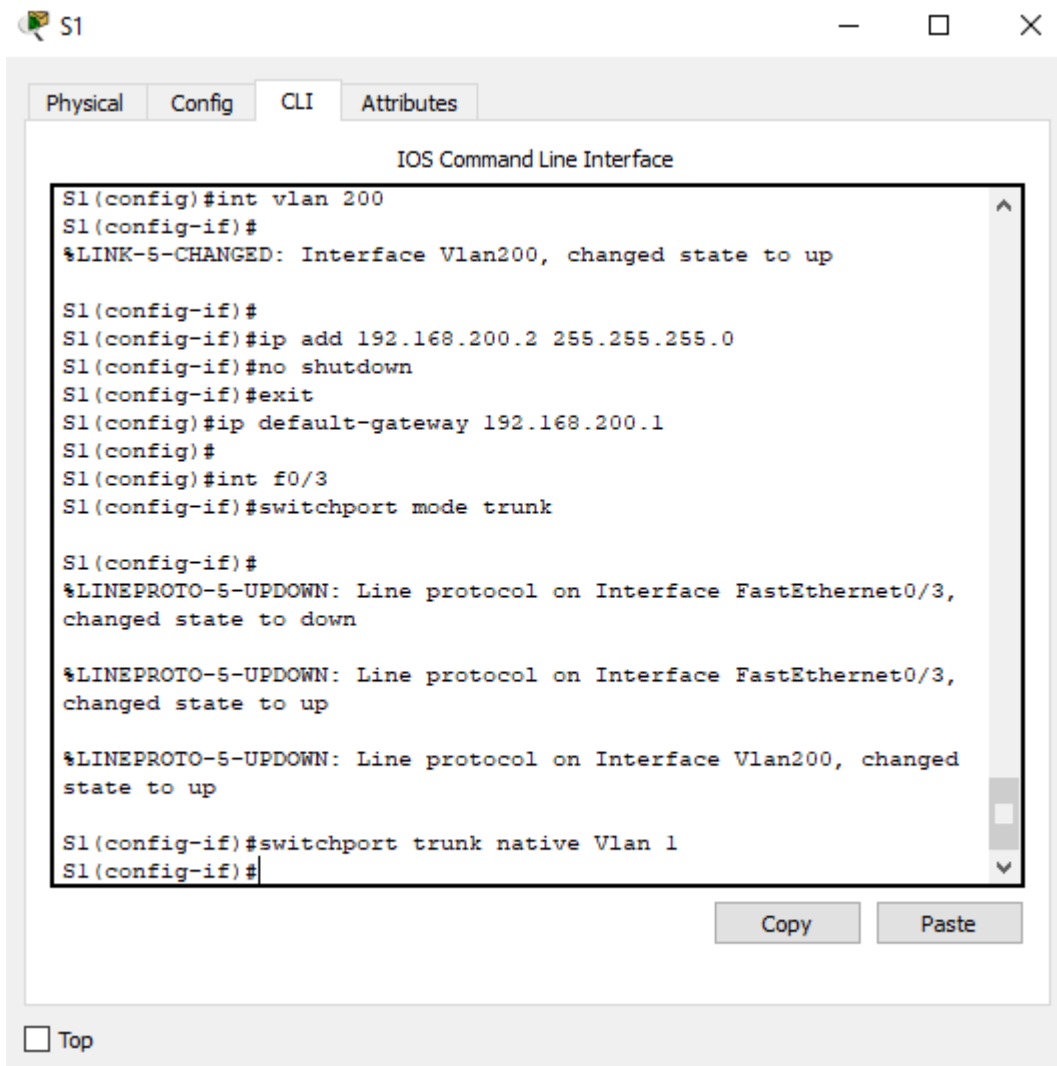


Figura 22

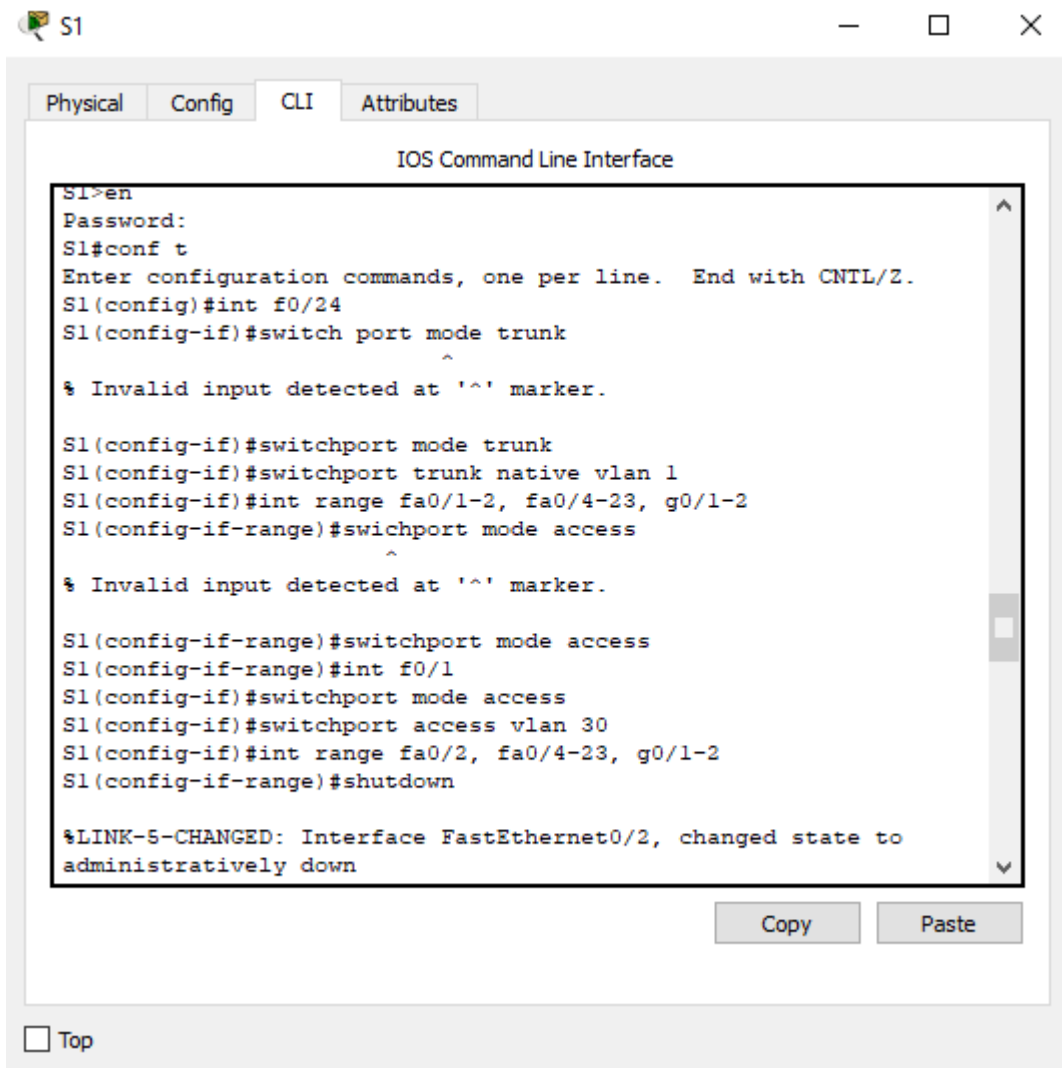


Figura 23

Tareas de configuración para S3 incluyendo: Crear la base de datos VLAN, asignar la dirección IP, asignar la puerta de enlace predeterminada, forzar la conexión troncal en la interfaz F0/3, configurar todos los demás puertos como puertos de acceso, asignar F0/1 a la VLAN 40, apagar todos los puertos no utilizados.

## Configurando S3.



The screenshot shows a window titled "S3" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface" with the following commands and output:

```
S3>en
Password:
S3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)#vlan 30
S3(config-vlan)#name administracion
S3(config-vlan)#vlan 40
S3(config-vlan)#name Mercadeo
S3(config-vlan)#vlan 200
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed
state to up

S3(config-if)#ip add 192.168.200.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.200.1
S3(config)#
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
S3(config-if-range)#
S3(config-if-range)#int f0/1
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 40
S3(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S3(config-if-range)#shut

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to
```

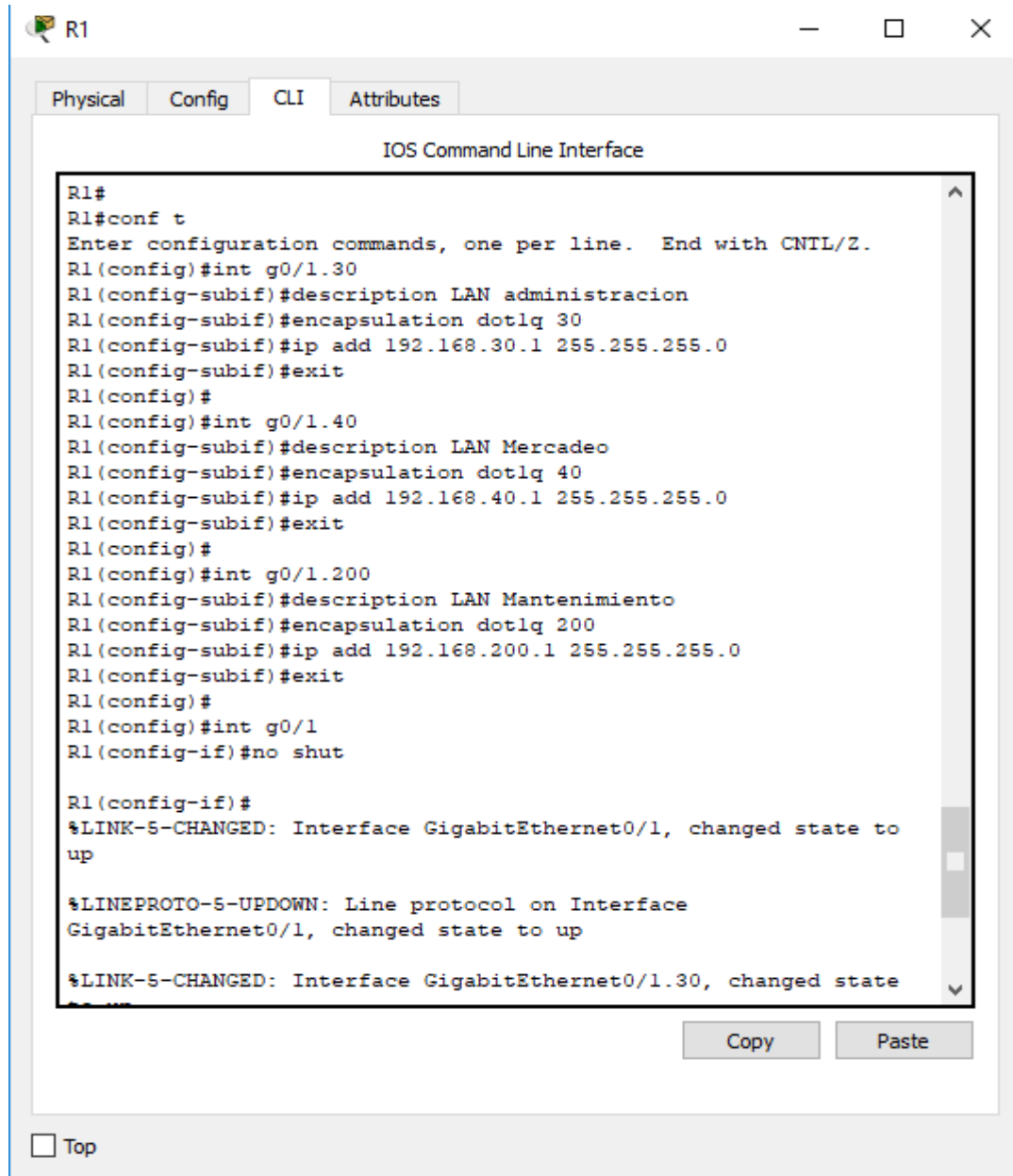
At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" button with a checkbox.

Figura 24



Tareas de configuración para R1 incluyendo: Configurar la subinterfaz 802.1Q .31 en G0/0, configurar la subinterfaz 802.1Q .33 en G0/0, configurar la subinterfaz 802.1Q .99 en G0/0, activar la interfaz G0/0.

## Configurando R1.



The screenshot shows a window titled "R1" with a tabbed interface. The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following commands and their results:

```
R1#  
R1#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R1(config)#int g0/1.30  
R1(config-subif)#description LAN administracion  
R1(config-subif)#encapsulation dot1q 30  
R1(config-subif)#ip add 192.168.30.1 255.255.255.0  
R1(config-subif)#exit  
R1(config)#  
R1(config)#int g0/1.40  
R1(config-subif)#description LAN Mercadeo  
R1(config-subif)#encapsulation dot1q 40  
R1(config-subif)#ip add 192.168.40.1 255.255.255.0  
R1(config-subif)#exit  
R1(config)#  
R1(config)#int g0/1.200  
R1(config-subif)#description LAN Mantenimiento  
R1(config-subif)#encapsulation dot1q 200  
R1(config-subif)#ip add 192.168.200.1 255.255.255.0  
R1(config-subif)#exit  
R1(config)#  
R1(config)#int g0/1  
R1(config-if)#no shut  
  
R1(config-if)#  
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to  
up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface  
GigabitEthernet0/1, changed state to up  
  
%LINK-5-CHANGED: Interface GigabitEthernet0/1.30, changed state
```

At the bottom of the CLI window, there are "Copy" and "Paste" buttons. Below the CLI window, there is a "Top" button.

Figura 25

## Verificar la conectividad de la red

Se usa el comando ping para probar la conectividad entre los swiches y R1.

### Ping desde S1 a R1 dirección VLAN 200

```
S1#ping 192.168.200.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.200.1, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0
ms

S1#ping 192.168.200.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.200.1, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1
ms

S1#
```

Figura 26

### Ping desde S3 a R1, direccion VALN 200

```
S3#ping 192.168.200.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.200.1, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/1/3
ms

S3#ping 192.168.200.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.200.1, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/4
ms
```

Figura 27

### Pin desde S1 a R1, Dirección VLAN 30

```
S1#ping 192.168.30.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/4
ms

S1#
```

Figura 28

### Ping desde S3 a R1, direccion VLAN 40

```
S3#ping 192.168.40.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.1, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
0/2/11 ms

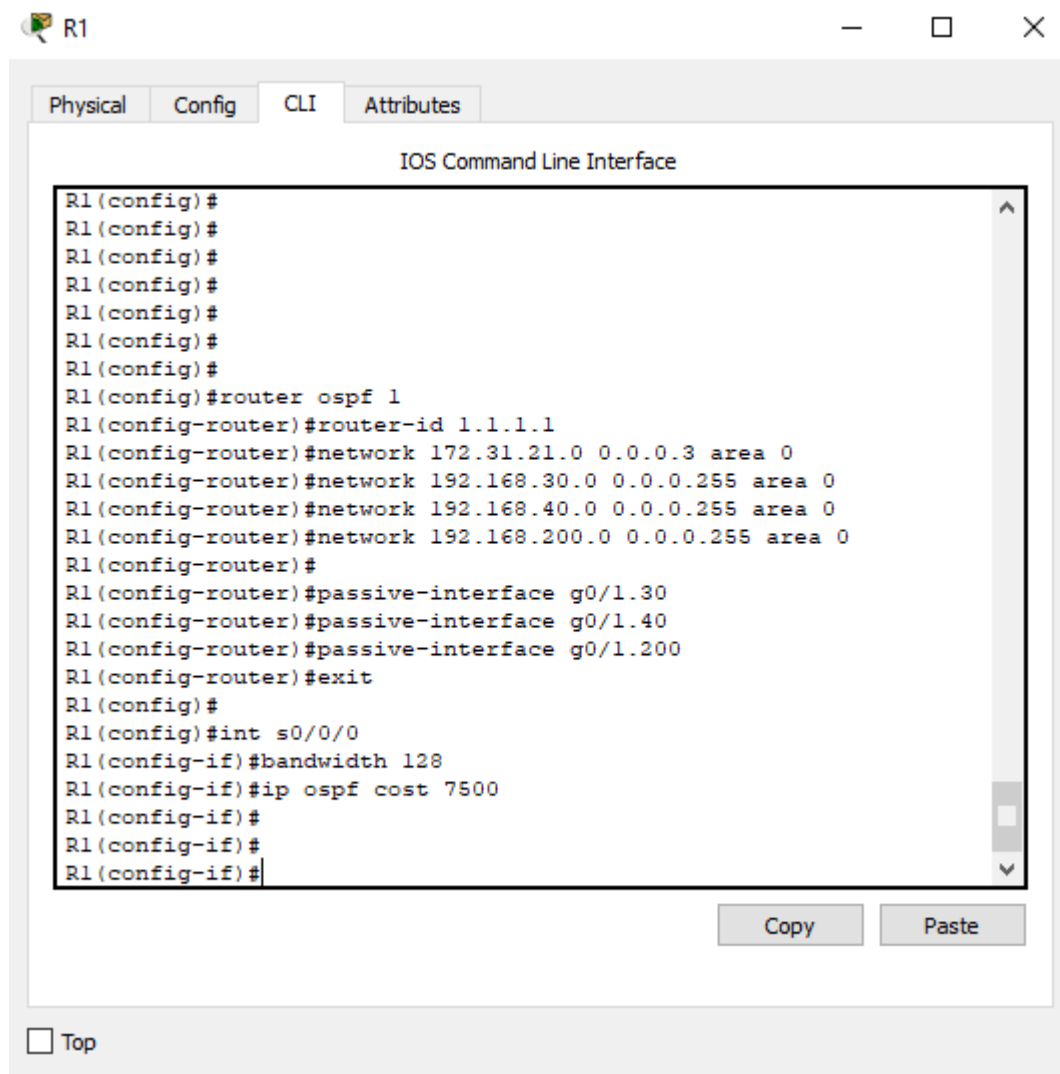
S3#
```

Figura 29

## Configurar el Protocolo de Enrutamiento Dinámico OSPFv2

Tareas de configuración para R1 incluyendo: ID de proceso OSPF, ID de enrutador, anunciar redes conectadas directamente, establecer todas las interfaces LAN como pasivas, cambiar el ancho de banda de referencia de costo predeterminado para admitir cálculos de interfaz Gigabit, establecer el ancho de banda de la interfaz en serie, ajustar el costo métrico de S0/0/0.

### Configurando OSPFv2 en R1.



The screenshot shows a terminal window titled "R1" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following configuration commands:

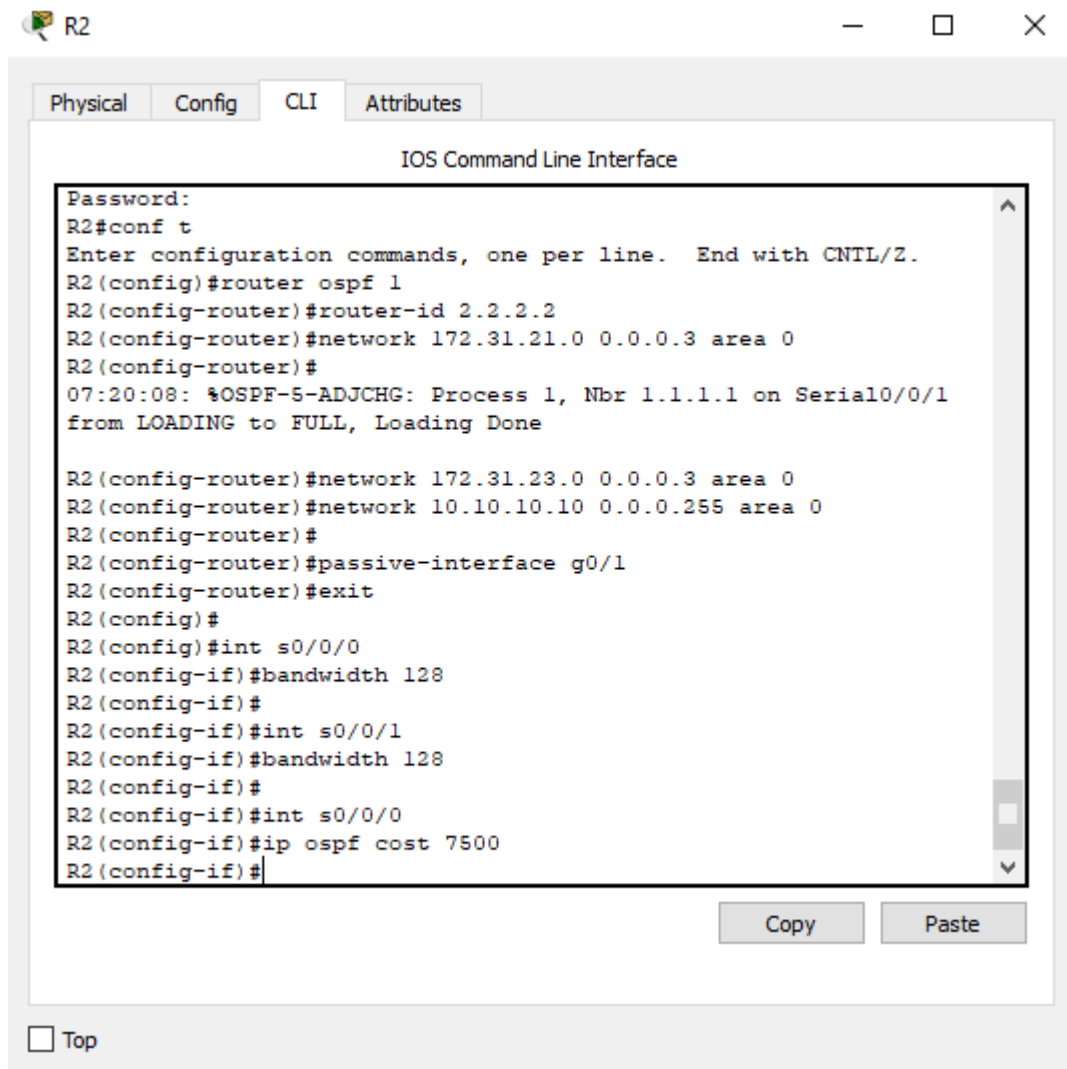
```
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 172.31.21.0 0.0.0.3 area 0
R1(config-router)#network 192.168.30.0 0.0.0.255 area 0
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#network 192.168.200.0 0.0.0.255 area 0
R1(config-router)#
R1(config-router)#passive-interface g0/1.30
R1(config-router)#passive-interface g0/1.40
R1(config-router)#passive-interface g0/1.200
R1(config-router)#exit
R1(config)#
R1(config)#int s0/0/0
R1(config-if)#bandwidth 128
R1(config-if)#ip ospf cost 7500
R1(config-if)#
R1(config-if)#
R1(config-if)#
```

At the bottom of the terminal window, there are "Copy" and "Paste" buttons. Below the terminal window, there is a "Top" button with a checkbox.

Figura 30

Tareas de configuración para R2 incluyendo: ID de proceso OSPF, ID de enrutador, anunciar redes conectadas directamente, configurar la interfaz LAN (Loopback) como pasiva, establecer todas las interfaces LAN como pasivas, cambiar el ancho de banda de referencia de costo predeterminado para admitir cálculos de interfaz Gigabit, establecer el ancho de banda en todas las interfaces seriales, ajustar el costo métrico de S0/0/0.

## Configurando OSPFv2 en R2.



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 172.31.21.0 0.0.0.3 area 0
R2(config-router)#
07:20:08: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1
from LOADING to FULL, Loading Done
R2(config-router)#network 172.31.23.0 0.0.0.3 area 0
R2(config-router)#network 10.10.10.10 0.0.0.255 area 0
R2(config-router)#
R2(config-router)#passive-interface g0/1
R2(config-router)#exit
R2(config)#
R2(config)#int s0/0/0
R2(config-if)#bandwidth 128
R2(config-if)#
R2(config-if)#int s0/0/1
R2(config-if)#bandwidth 128
R2(config-if)#
R2(config-if)#int s0/0/0
R2(config-if)#ip ospf cost 7500
R2(config-if)#
```

Copy Paste

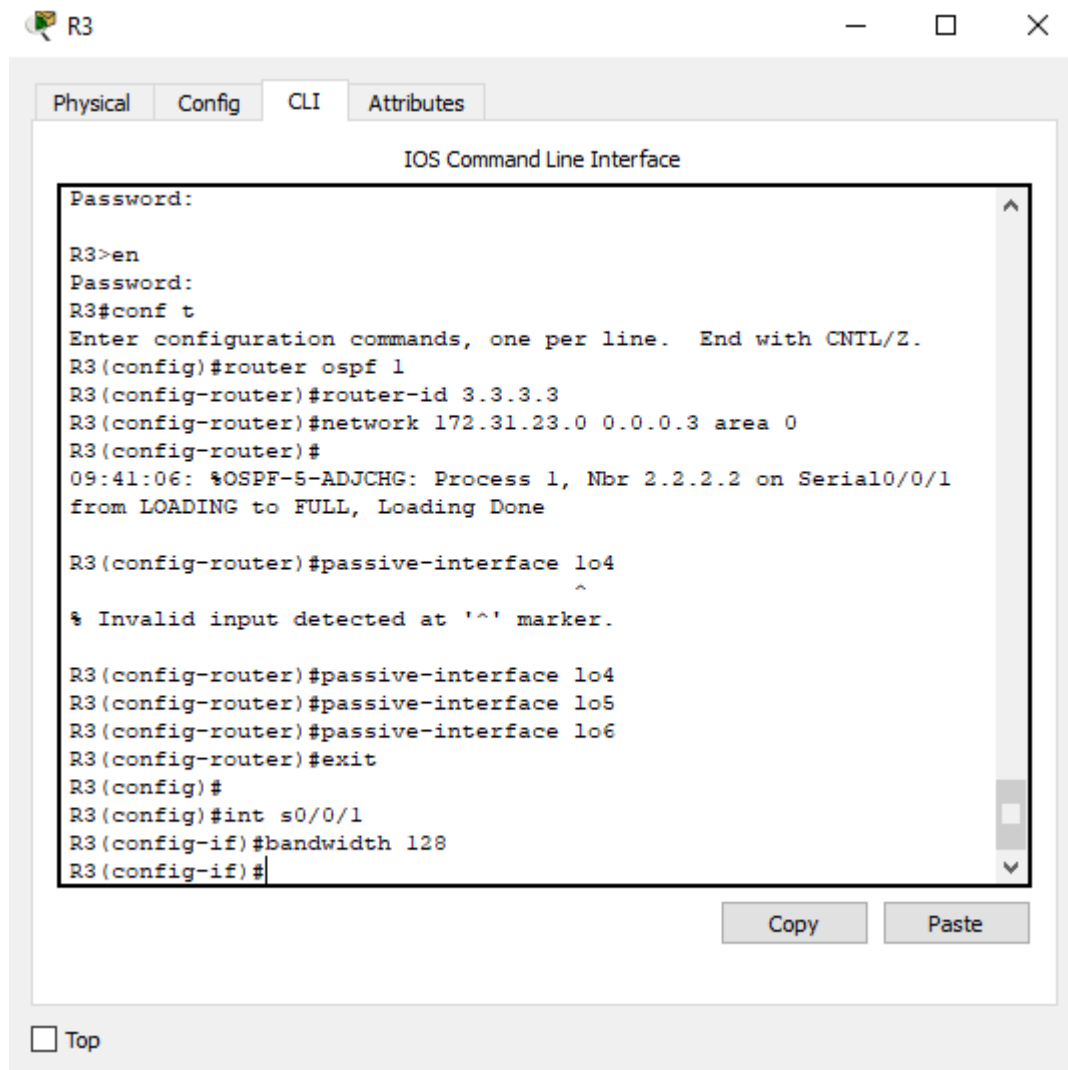
Top

Figura 31

Tareas de configuración para R3 incluyendo: ID de proceso OSPF, ID de enrutador, anunciar redes conectadas directamente, configurar la interfaz LAN (Loopback) como pasiva, establecer todas las interfaces LAN (loopback) como pasivas, cambiar el ancho de banda de referencia de costo predeterminado para

admitir cálculos de interfaz Gigabit, establecer el ancho de banda en la interface serial.

## Configurando OSPFv2 en R3.



The screenshot shows a terminal window titled "R3" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows the following sequence of commands and responses:

```
Password:
R3>en
Password:
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 172.31.23.0 0.0.0.3 area 0
R3(config-router)#
09:41:06: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1
from LOADING to FULL, Loading Done

R3(config-router)#passive-interface lo4
^
% Invalid input detected at '^' marker.

R3(config-router)#passive-interface lo4
R3(config-router)#passive-interface lo5
R3(config-router)#passive-interface lo6
R3(config-router)#exit
R3(config)#
R3(config)#int s0/0/1
R3(config-if)#bandwidth 128
R3(config-if)#
```

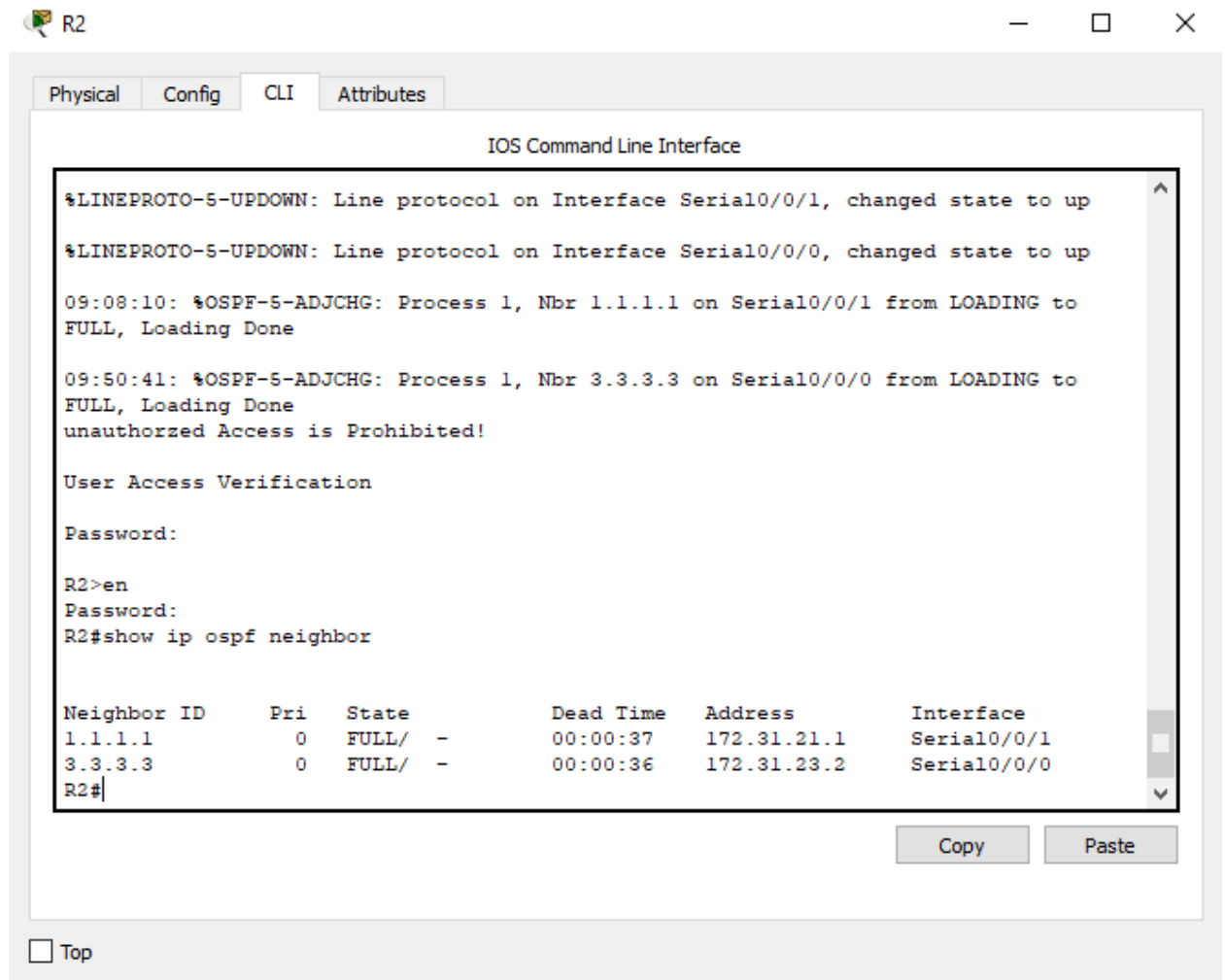
At the bottom of the terminal window, there are "Copy" and "Paste" buttons, and a "Top" button with a checkbox.

Figura 32

## Verificación de la información de OSPF

En siguiente es un ejemplo de la verificación en el router R2

## Routers conectados por OSPFv2



The screenshot shows the CLI of router R2. The interface displays several system messages indicating that OSPFv2 neighbors have reached the FULL state. The output of the `show ip ospf neighbor` command is as follows:

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	0	FULL/ -	00:00:37	172.31.21.1	Serial0/0/1
3.3.3.3	0	FULL/ -	00:00:36	172.31.23.2	Serial0/0/0

The CLI also shows a password prompt and the command `show ip ospf neighbor` being entered. The interface has tabs for Physical, Config, CLI, and Attributes. A 'Top' button is visible at the bottom left, and 'Copy' and 'Paste' buttons are at the bottom right.

Figura 33

## Resumen de las interfaces OSPF que incluye una columna para el Costo de cada Interfaz

```
R2#show ip ospf interface

GigabitEthernet0/1 is up, line protocol is up
Internet address is 10.10.10.1/24, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State WAITING, Priority 1
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  No Hellos (Passive interface)
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/1 is up, line protocol is up
Internet address is 172.31.21.2/30, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 781
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  Hello due in 00:00:02
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
  Adjacent with neighbor 1.1.1.1
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.23.1/30, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 7500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
```

Figura 34



## OSPF Process ID, Router ID, Address summarizations, Routing Networks, y passive interfaces configuradas en un Router

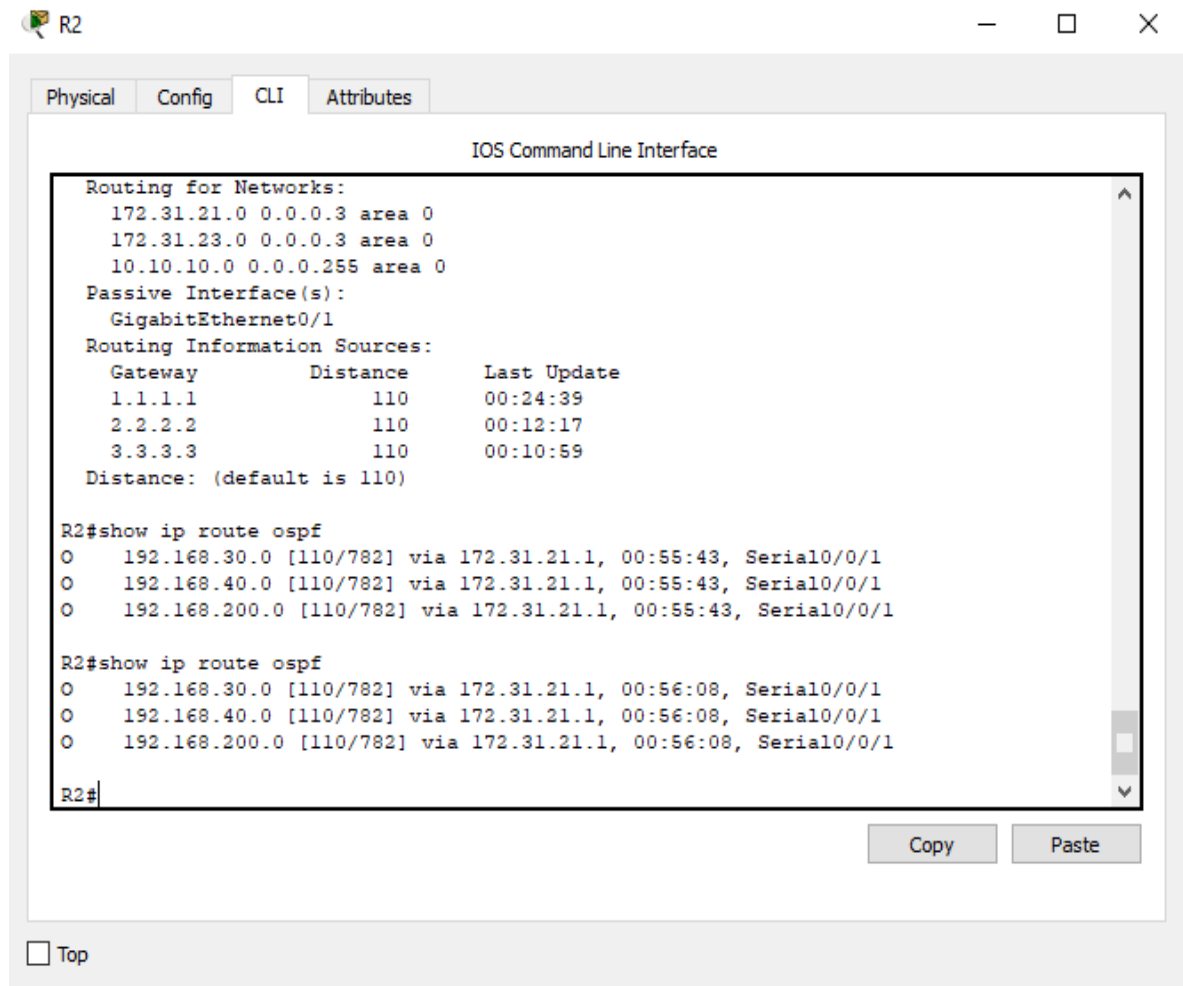


The screenshot shows a Cisco IOS Command Line Interface (CLI) window for router R2. The window has tabs for Physical, Config, CLI, and Attributes. The CLI shows the output of the command 'show ip protocols'. The output indicates that OSPF process 1 is running with Router ID 2.2.2.2. It lists three networks in area 0: 172.31.21.0/24, 172.31.23.0/24, and 10.10.10.0/24. It also shows that GigabitEthernet0/1 is configured as a passive interface. The Routing Information Sources table shows three sources: 1.1.1.1, 2.2.2.2, and 3.3.3.3, all with a distance of 110. The window includes a 'Copy' button and a 'Paste' button at the bottom right, and a 'Top' button at the bottom left.

```
R2#  
R2#  
R2#show ip protocols  
  
Routing Protocol is "ospf 1"  
  Outgoing update filter list for all interfaces is not set  
  Incoming update filter list for all interfaces is not set  
  Router ID 2.2.2.2  
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa  
  Maximum path: 4  
  Routing for Networks:  
    172.31.21.0 0.0.0.3 area 0  
    172.31.23.0 0.0.0.3 area 0  
    10.10.10.0 0.0.0.255 area 0  
  Passive Interface(s):  
    GigabitEthernet0/1  
  Routing Information Sources:  
    Gateway         Distance      Last Update  
    1.1.1.1           110          00:24:39  
    2.2.2.2           110          00:12:17  
    3.3.3.3           110          00:10:59  
  Distance: (default is 110)  
  
R2#
```

Figura 35

## Mostrar solo las rutas OSPF



IOS Command Line Interface

```
Routing for Networks:
 172.31.21.0 0.0.0.3 area 0
 172.31.23.0 0.0.0.3 area 0
 10.10.10.0 0.0.0.255 area 0
Passive Interface(s):
 GigabitEthernet0/1
Routing Information Sources:
 Gateway          Distance      Last Update
 1.1.1.1           110          00:24:39
 2.2.2.2           110          00:12:17
 3.3.3.3           110          00:10:59
Distance: (default is 110)

R2#show ip route ospf
O   192.168.30.0 [110/782] via 172.31.21.1, 00:55:43, Serial0/0/1
O   192.168.40.0 [110/782] via 172.31.21.1, 00:55:43, Serial0/0/1
O   192.168.200.0 [110/782] via 172.31.21.1, 00:55:43, Serial0/0/1

R2#show ip route ospf
O   192.168.30.0 [110/782] via 172.31.21.1, 00:56:08, Serial0/0/1
O   192.168.40.0 [110/782] via 172.31.21.1, 00:56:08, Serial0/0/1
O   192.168.200.0 [110/782] via 172.31.21.1, 00:56:08, Serial0/0/1

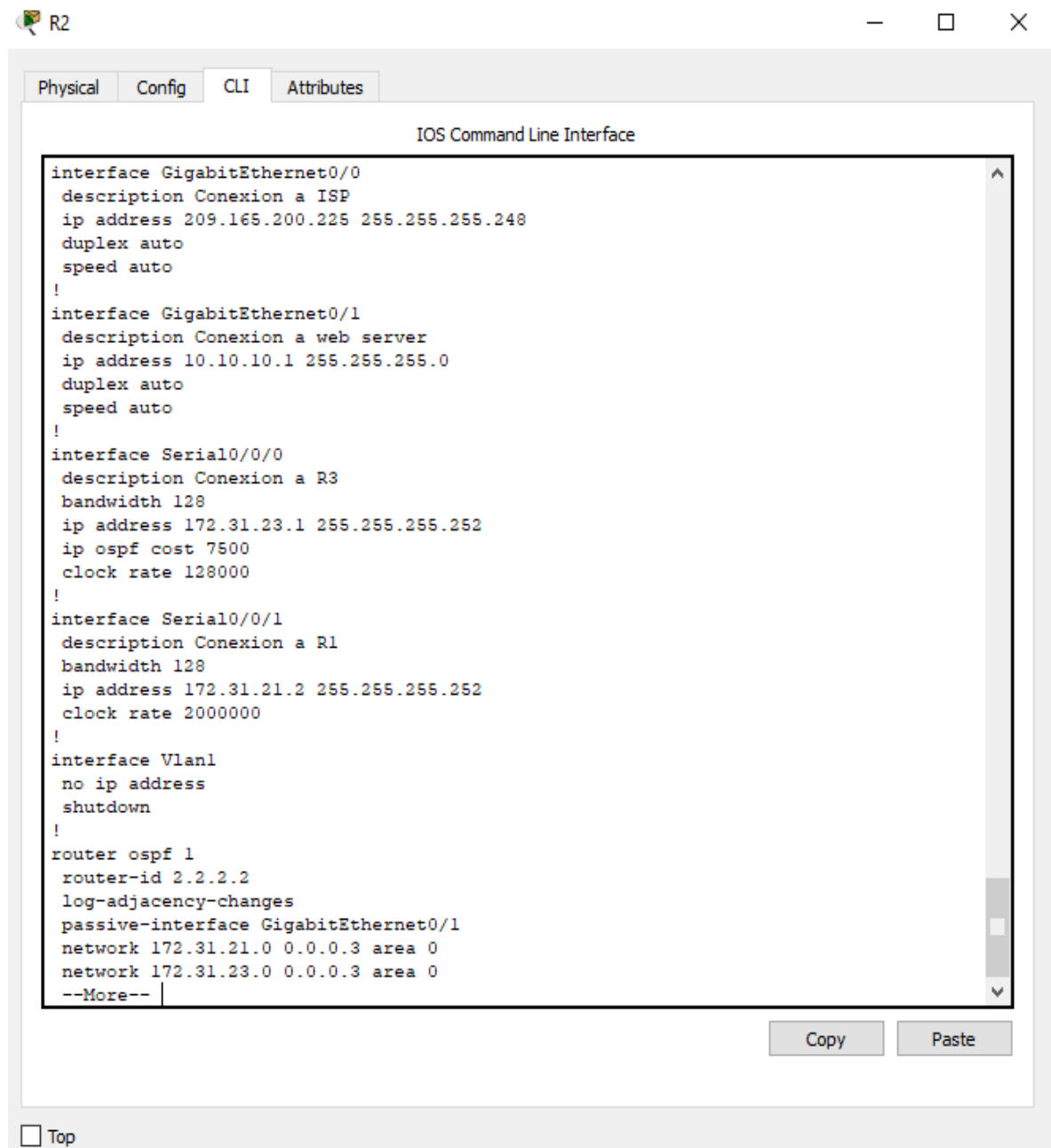
R2#
```

Copy Paste

Top

Figura 36

## Sección OSPF de la configuración en ejecución



The screenshot shows a window titled "R2" with a tabbed interface. The "CLI" tab is active, displaying the "IOS Command Line Interface" configuration. The configuration includes settings for several interfaces and an OSPF router configuration. The configuration text is as follows:

```
interface GigabitEthernet0/0
description Conexion a ISP
ip address 209.165.200.225 255.255.255.248
duplex auto
speed auto
!
interface GigabitEthernet0/1
description Conexion a web server
ip address 10.10.10.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/0/0
description Conexion a R3
bandwidth 128
ip address 172.31.23.1 255.255.255.252
ip ospf cost 7500
clock rate 128000
!
interface Serial0/0/1
description Conexion a R1
bandwidth 128
ip address 172.31.21.2 255.255.255.252
clock rate 2000000
!
interface Vlan1
no ip address
shutdown
!
router ospf 1
router-id 2.2.2.2
log-adjacency-changes
passive-interface GigabitEthernet0/1
network 172.31.21.0 0.0.0.3 area 0
network 172.31.23.0 0.0.0.3 area 0
--More--
```

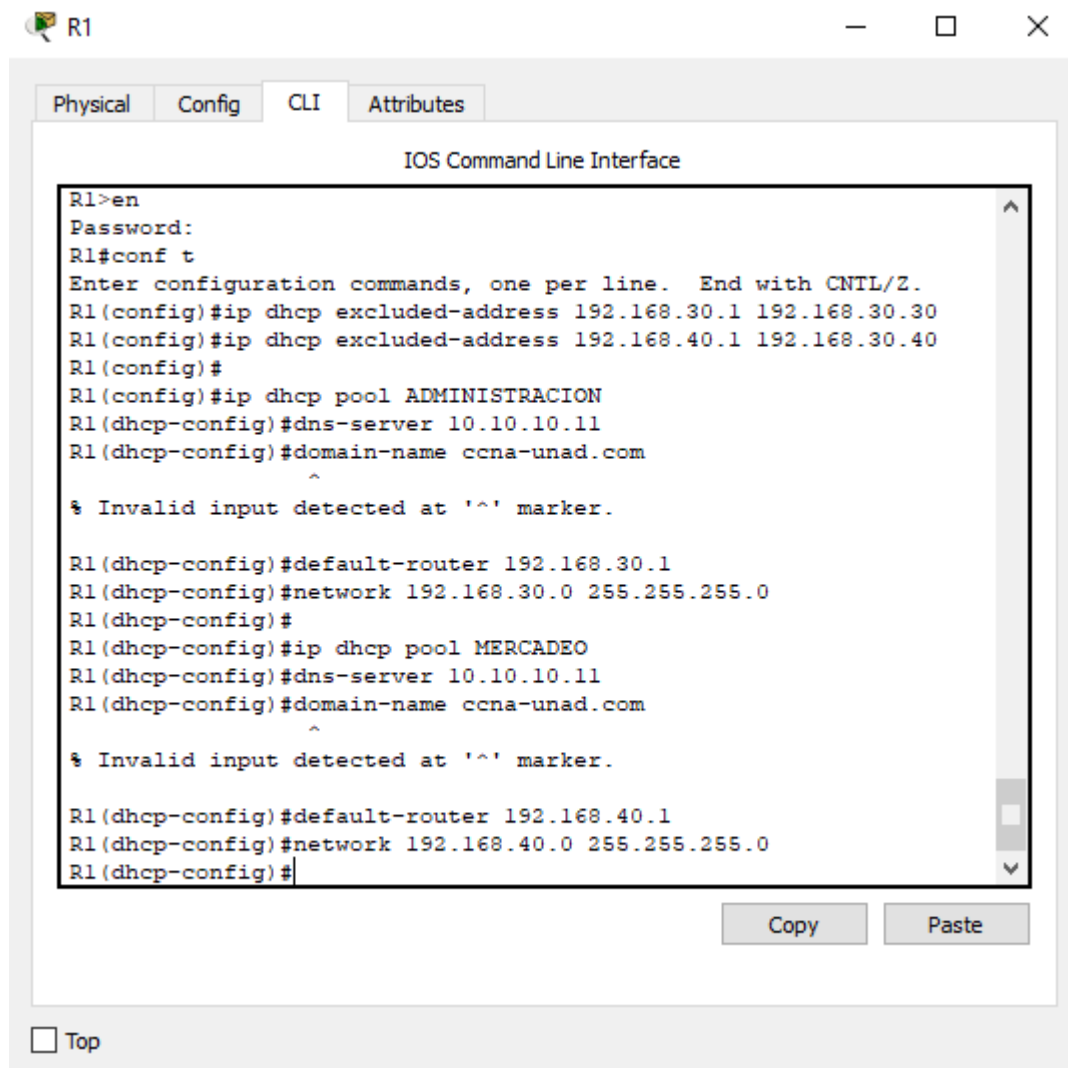
At the bottom of the CLI window, there are "Copy" and "Paste" buttons. Below the window, there is a "Top" button.

Figura 37

## Implementación DHCP y NAT para IPv4

Tareas de configuración para R1 incluyendo: Reservar las primeras 30 direcciones IP en la VLAN 30 para configuraciones estáticas, reservar las primeras 30 direcciones IP en la VLAN 40 para configuraciones estáticas, crear una agrupación DHCP para la VLAN 30, crear una agrupación DHCP para la VLAN 40.

### Configurando R1 como el servidor DHCP para las VLAN 30 y 40.

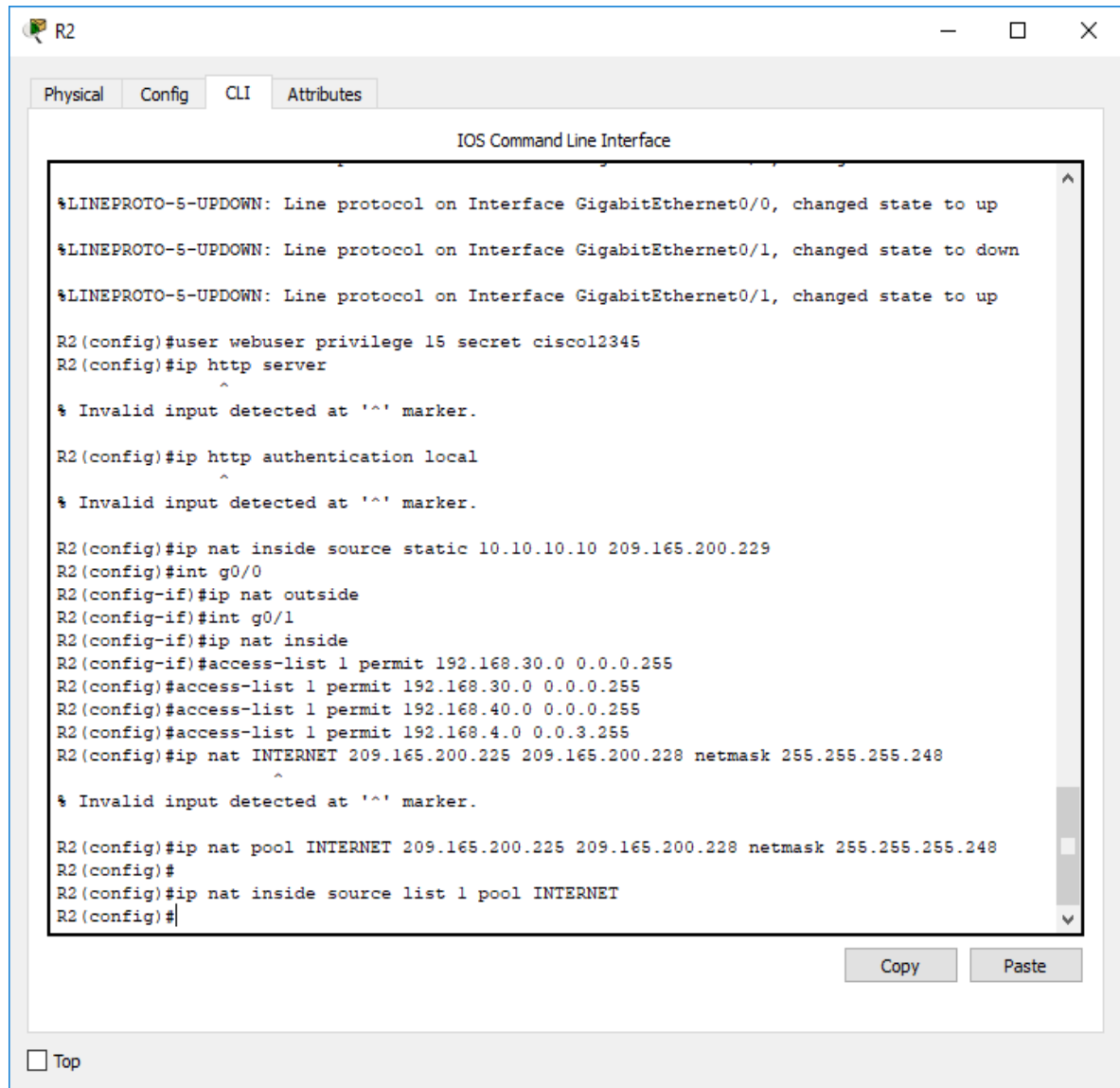


```
R1>en
Password:
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
R1(config)#ip dhcp excluded-address 192.168.40.1 192.168.30.40
R1(config)#
R1(config)#ip dhcp pool ADMINISTRACION
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#
R1(dhcp-config)#ip dhcp pool MERCADEO
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.
R1(dhcp-config)#default-router 192.168.40.1
R1(dhcp-config)#network 192.168.40.0 255.255.255.0
R1(dhcp-config)#
```

Figura 38

Tareas de configuración para R2 incluyendo: Crear una base de datos local con 1 cuenta de usuario, habilitar el servicio de servidor HTTP, configurar el servidor HTTP para usar la base de datos local para la autenticación, crear una NAT estática para el servidor web, asignar la interfaz interna y externa para la NAT estática, configurar la NAT dinámica dentro de la ACL privada, definir el grupo de direcciones IP públicas utilizables, definir la traducción dinámica de NAT.

## Configurando NAT Estático y Dinámico en R2.



```
R2
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

R2(config)#user webuser privilege 15 secret cisco12345
R2(config)#ip http server
^
% Invalid input detected at '^' marker.

R2(config)#ip http authentication local
^
% Invalid input detected at '^' marker.

R2(config)#ip nat inside source static 10.10.10.10 209.165.200.229
R2(config)#int g0/0
R2(config-if)#ip nat outside
R2(config-if)#int g0/1
R2(config-if)#ip nat inside
R2(config-if)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#ip nat INTERNET 209.165.200.225 209.165.200.228 netmask 255.255.255.248
^
% Invalid input detected at '^' marker.

R2(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228 netmask 255.255.255.248
R2(config)#
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#
```

Copy Paste

Top

Figura 39

## Verificando DHCP y NAT estática.

### Verificando que la PC-A haya adquirido la información IP del servidor DHCP

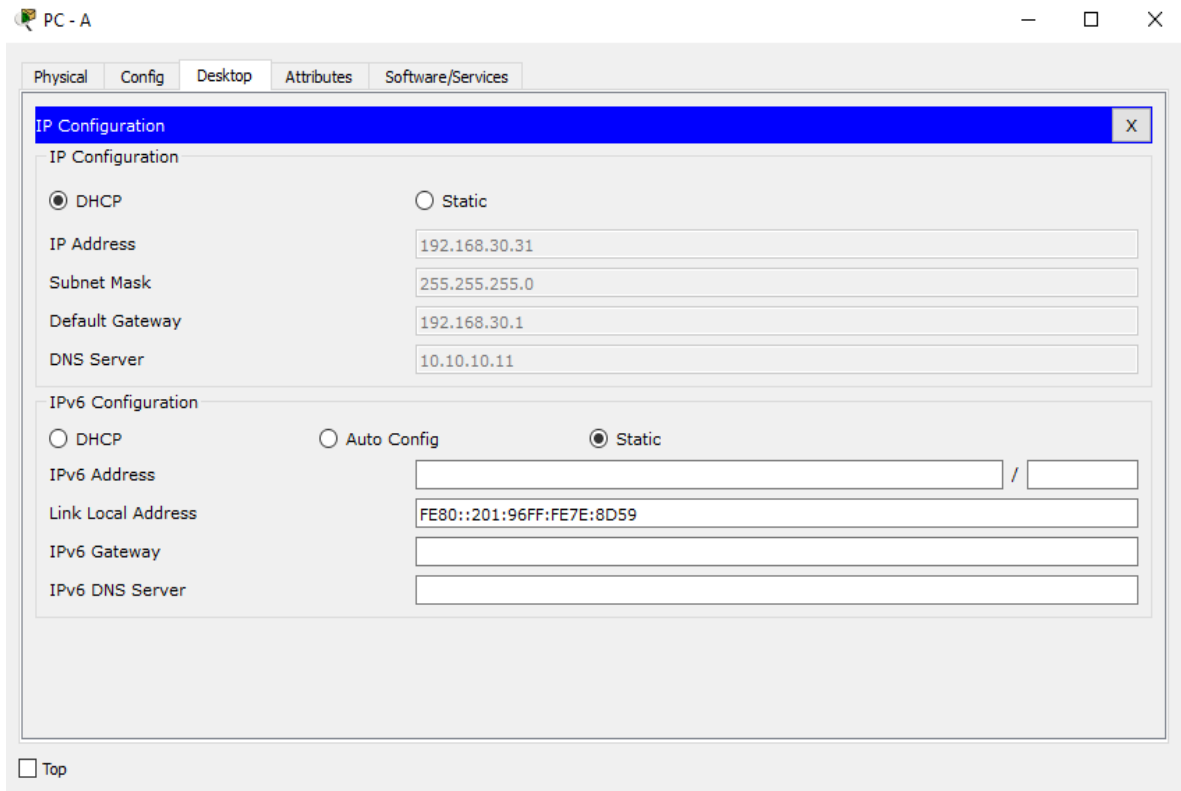


Figura 40

## Verificando que la PC-C haya adquirido la información IP del servidor DHCP

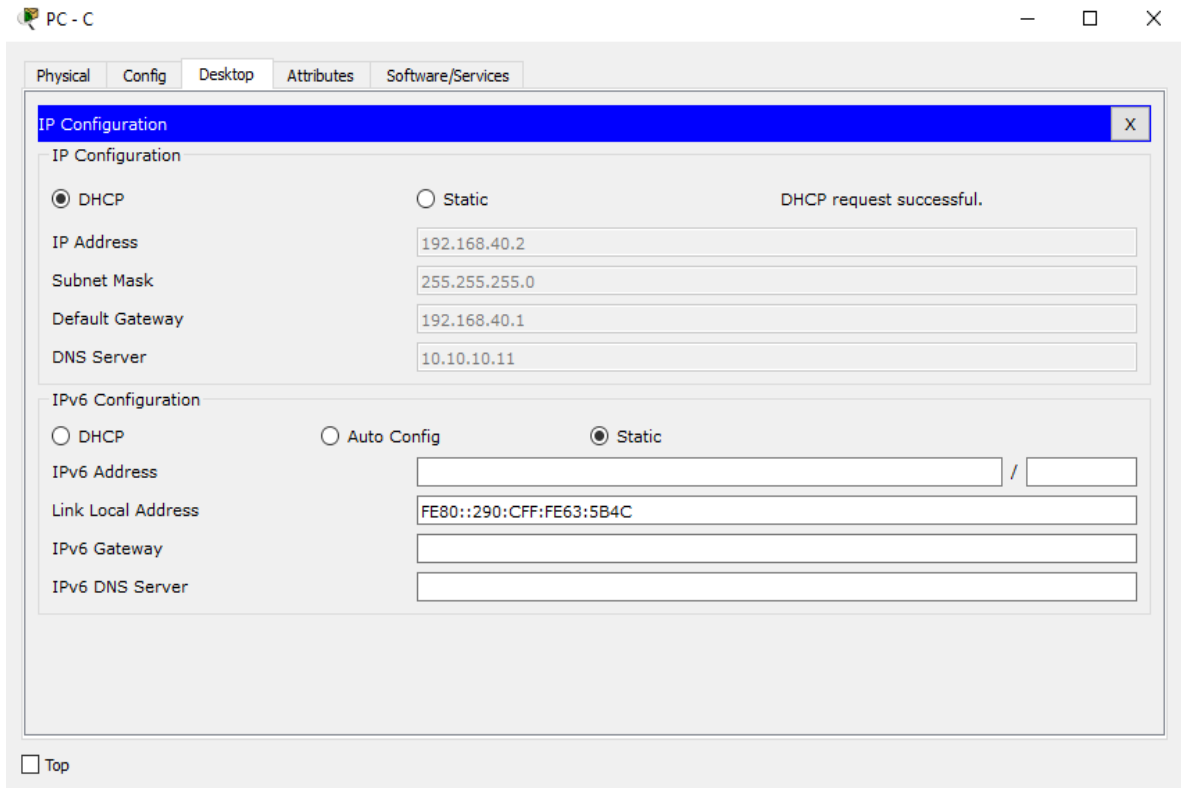


Figura 41

## Verificando que la PC-A pueda hacer ping a la PC-C.

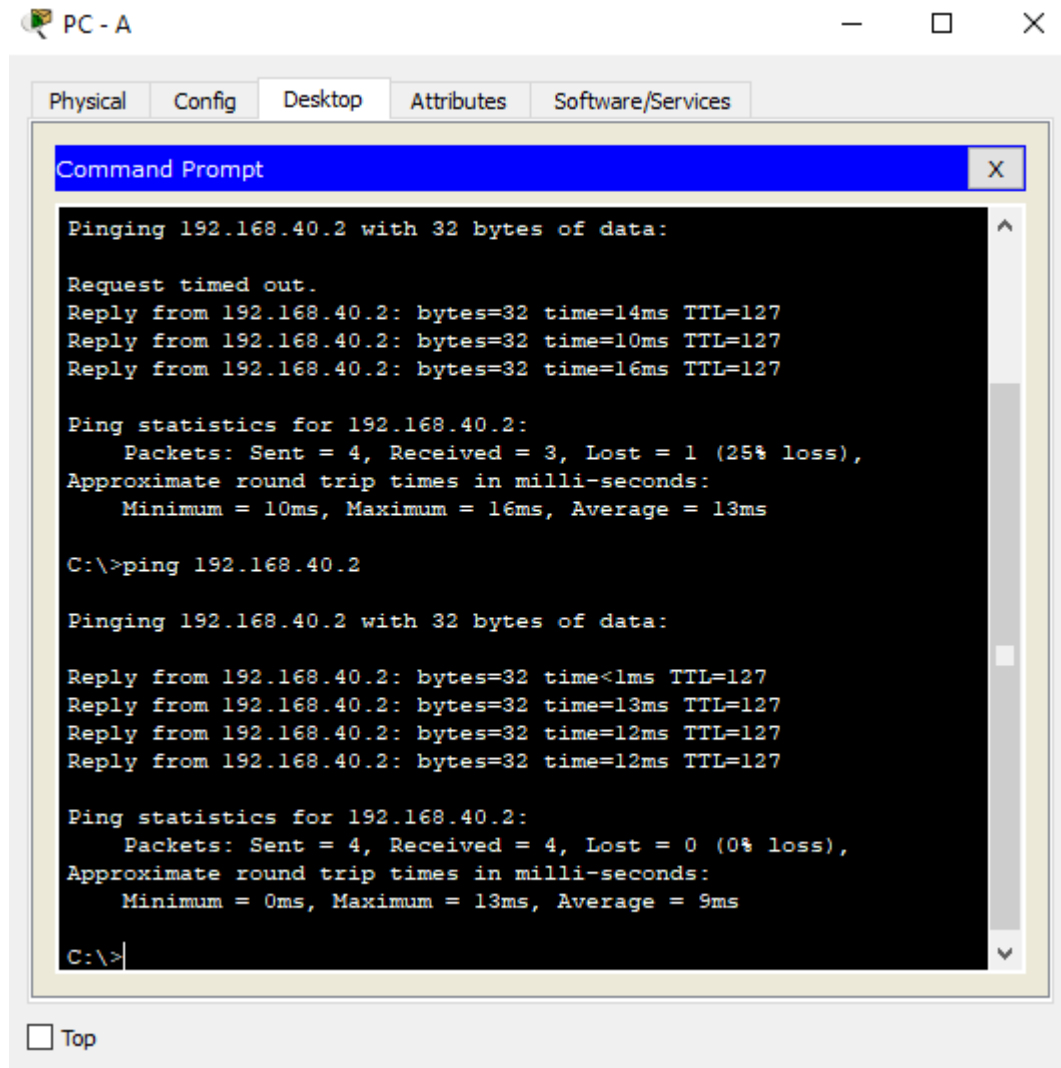
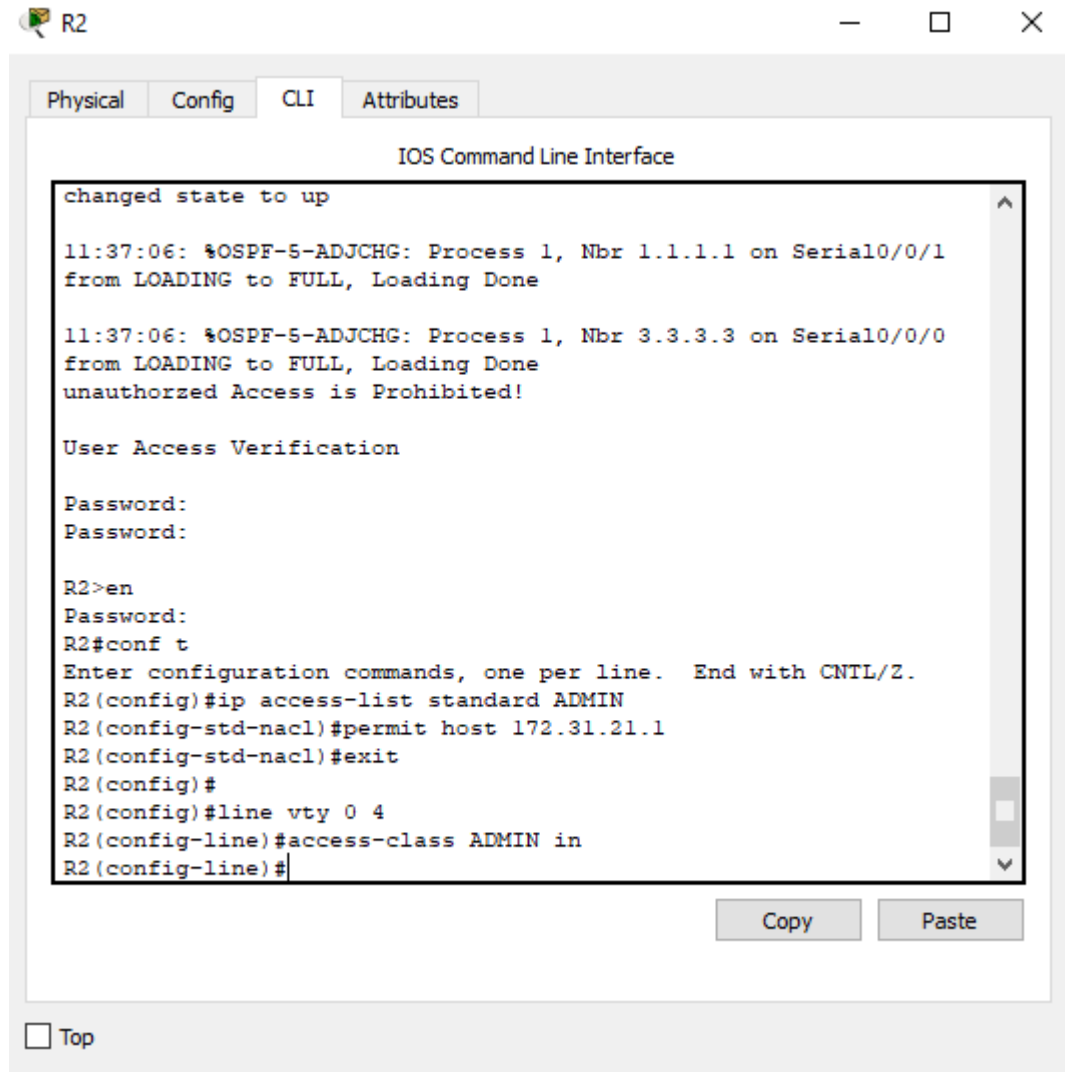


Figura 42



## Configuración y verificando listas de control de acceso (ACL) restringiendo el acceso a las líneas VTY en R2



The screenshot shows the CLI of router R2. The interface has tabs for Physical, Config, CLI, and Attributes. The CLI window displays the following text:

```
changed state to up

11:37:06: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1
from LOADING to FULL, Loading Done

11:37:06: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/0
from LOADING to FULL, Loading Done
unauthorized Access is Prohibited!

User Access Verification

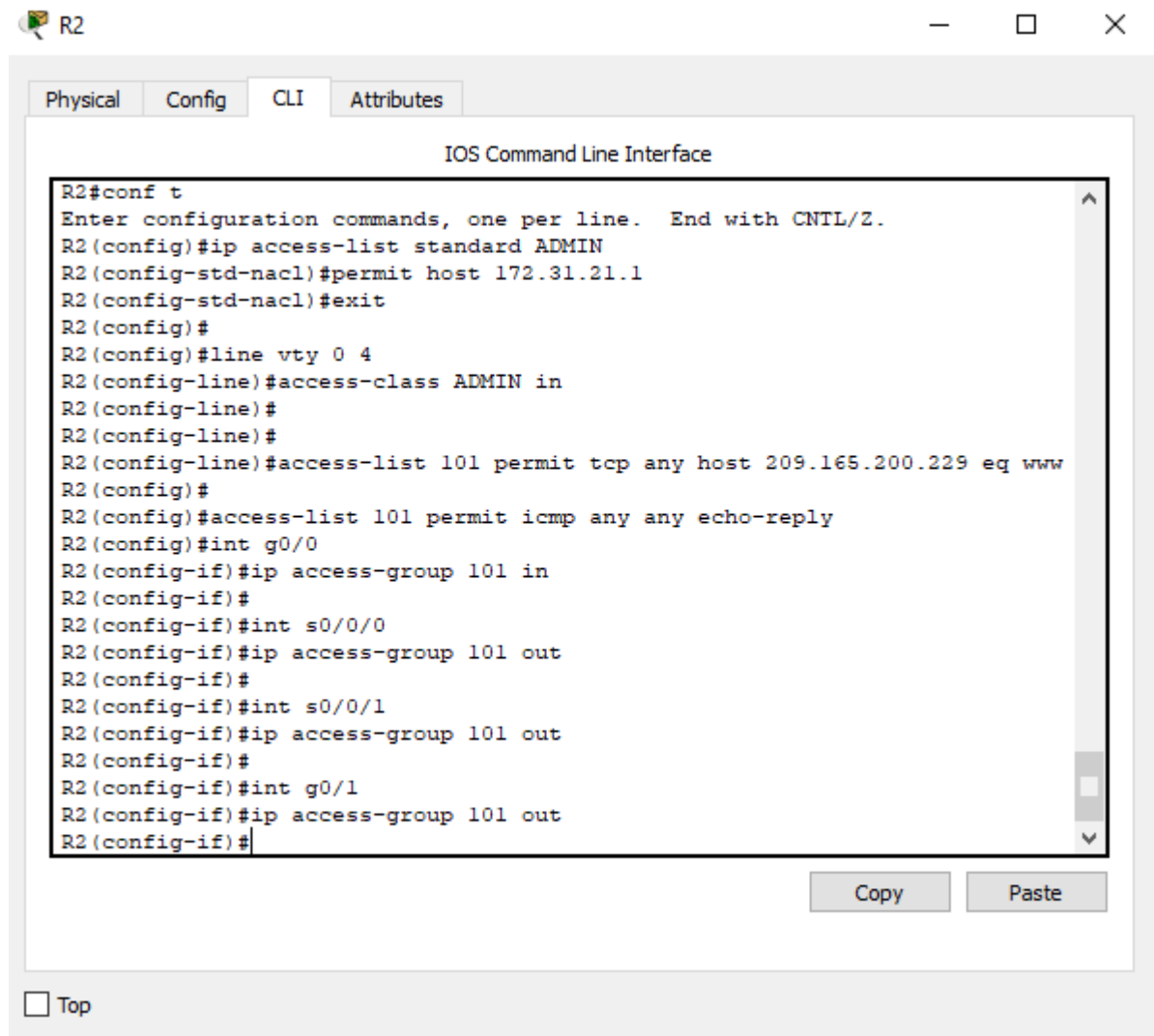
Password:
Password:

R2>en
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip access-list standard ADMIN
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#
R2(config)#line vty 0 4
R2(config-line)#access-class ADMIN in
R2(config-line)#
```

At the bottom of the CLI window, there are 'Copy' and 'Paste' buttons. Below the CLI window, there is a 'Top' button with a checkbox.

Figura 43

## Asegurando la Red del Tráfico de Internet



The screenshot shows a window titled "R2" with a standard Windows-style title bar (minimize, maximize, close). The window contains a tabbed interface with "Physical", "Config", "CLI", and "Attributes" tabs. The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a series of configuration commands being entered into a terminal window. The commands are as follows:

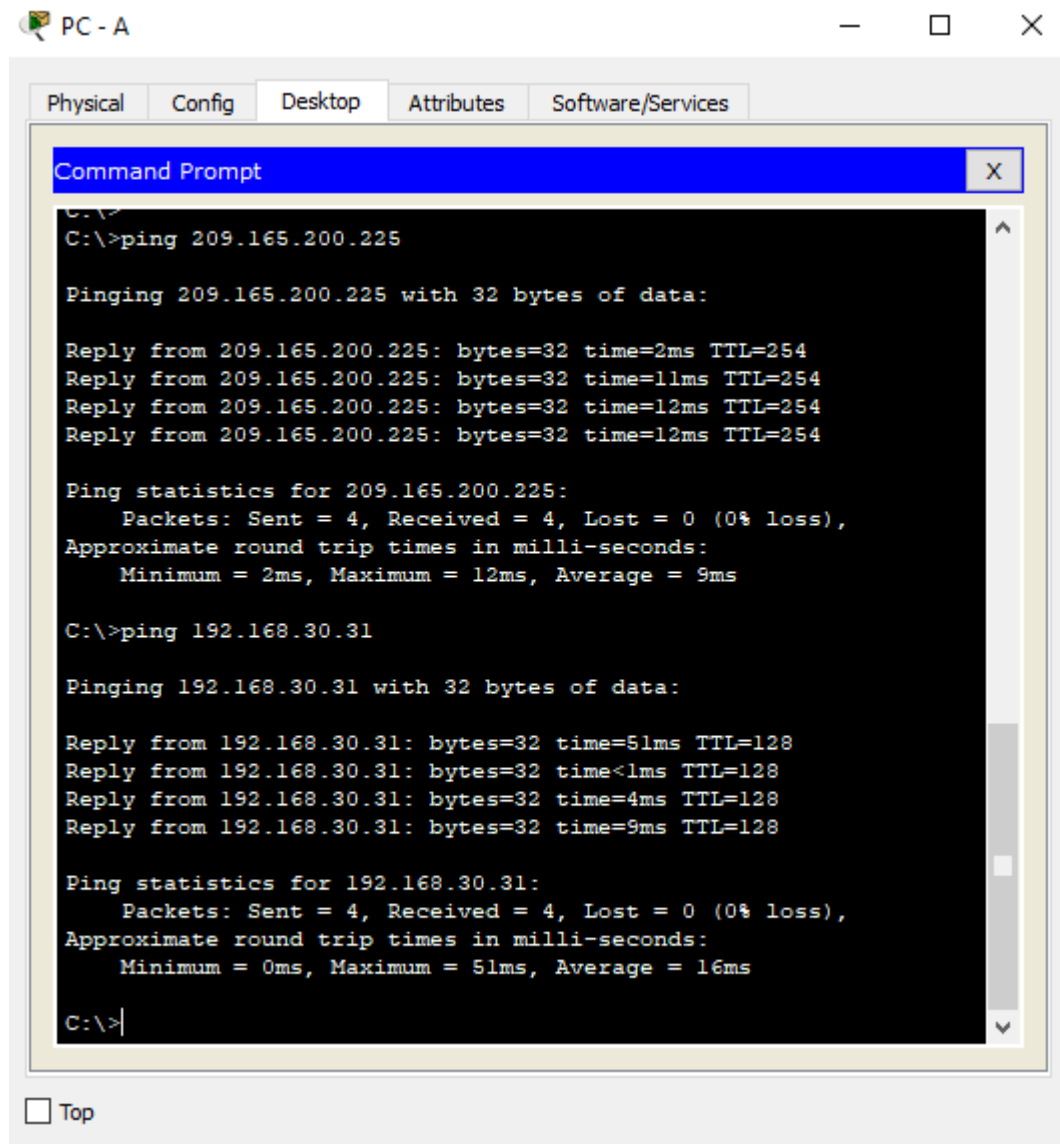
```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip access-list standard ADMIN
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#
R2(config)#line vty 0 4
R2(config-line)#access-class ADMIN in
R2(config-line)#
R2(config-line)#
R2(config-line)#access-list 101 permit tcp any host 209.165.200.229 eq www
R2(config)#
R2(config)#access-list 101 permit icmp any any echo-reply
R2(config)#int g0/0
R2(config-if)#ip access-group 101 in
R2(config-if)#
R2(config-if)#int s0/0/0
R2(config-if)#ip access-group 101 out
R2(config-if)#
R2(config-if)#int s0/0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#
R2(config-if)#int g0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#
```

At the bottom right of the terminal window, there are "Copy" and "Paste" buttons. Below the terminal window, there is a "Top" button with a small square icon to its left.

Figura 44

## Verificando que la ACL esté funcionando

### Ping PC-A



```
C:\>ping 209.165.200.225

Pinging 209.165.200.225 with 32 bytes of data:

Reply from 209.165.200.225: bytes=32 time=2ms TTL=254
Reply from 209.165.200.225: bytes=32 time=11ms TTL=254
Reply from 209.165.200.225: bytes=32 time=12ms TTL=254
Reply from 209.165.200.225: bytes=32 time=12ms TTL=254

Ping statistics for 209.165.200.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 12ms, Average = 9ms

C:\>ping 192.168.30.31

Pinging 192.168.30.31 with 32 bytes of data:

Reply from 192.168.30.31: bytes=32 time=51ms TTL=128
Reply from 192.168.30.31: bytes=32 time<1ms TTL=128
Reply from 192.168.30.31: bytes=32 time=4ms TTL=128
Reply from 192.168.30.31: bytes=32 time=9ms TTL=128

Ping statistics for 192.168.30.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 51ms, Average = 16ms

C:\>
```

Figura 45

## Ping PC-C

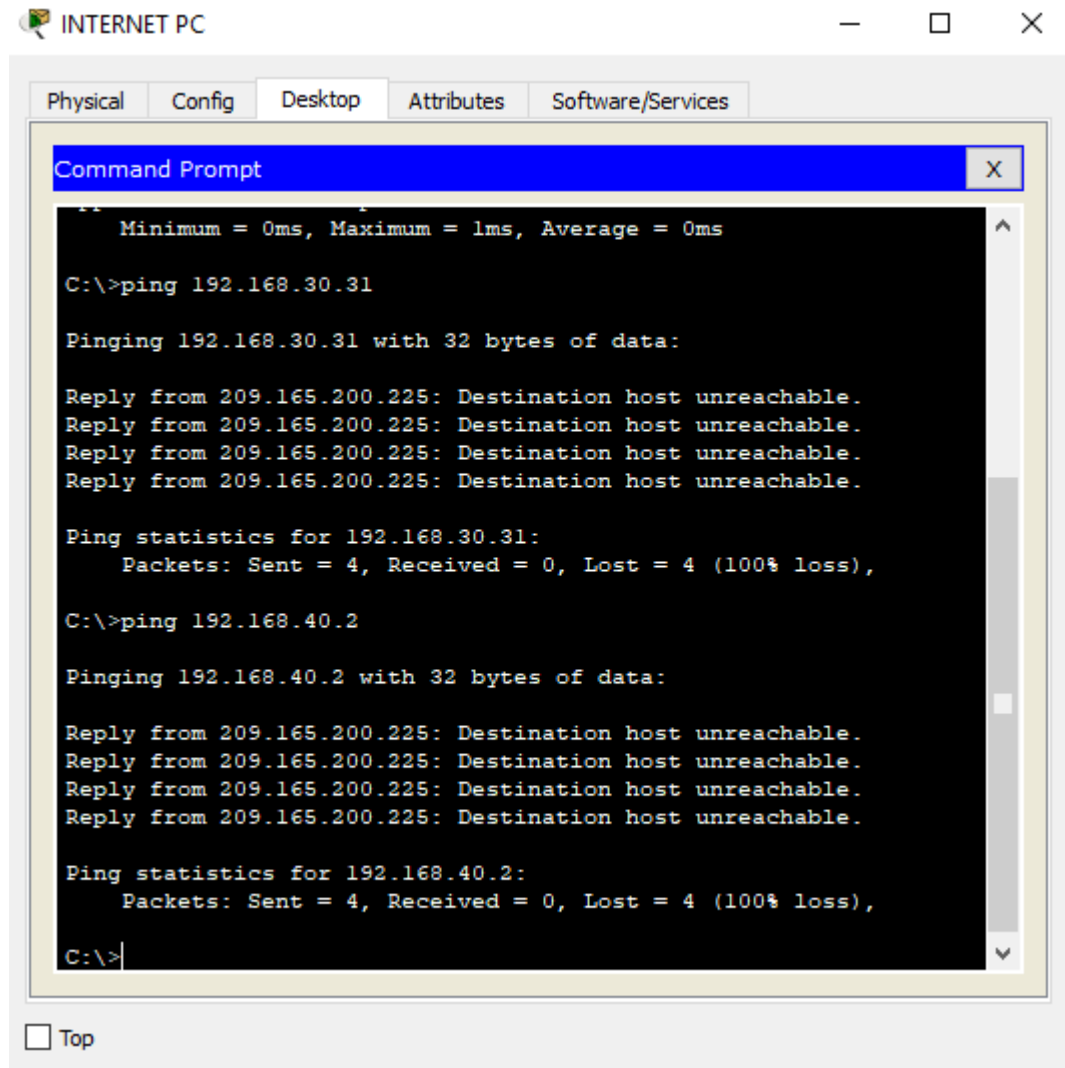
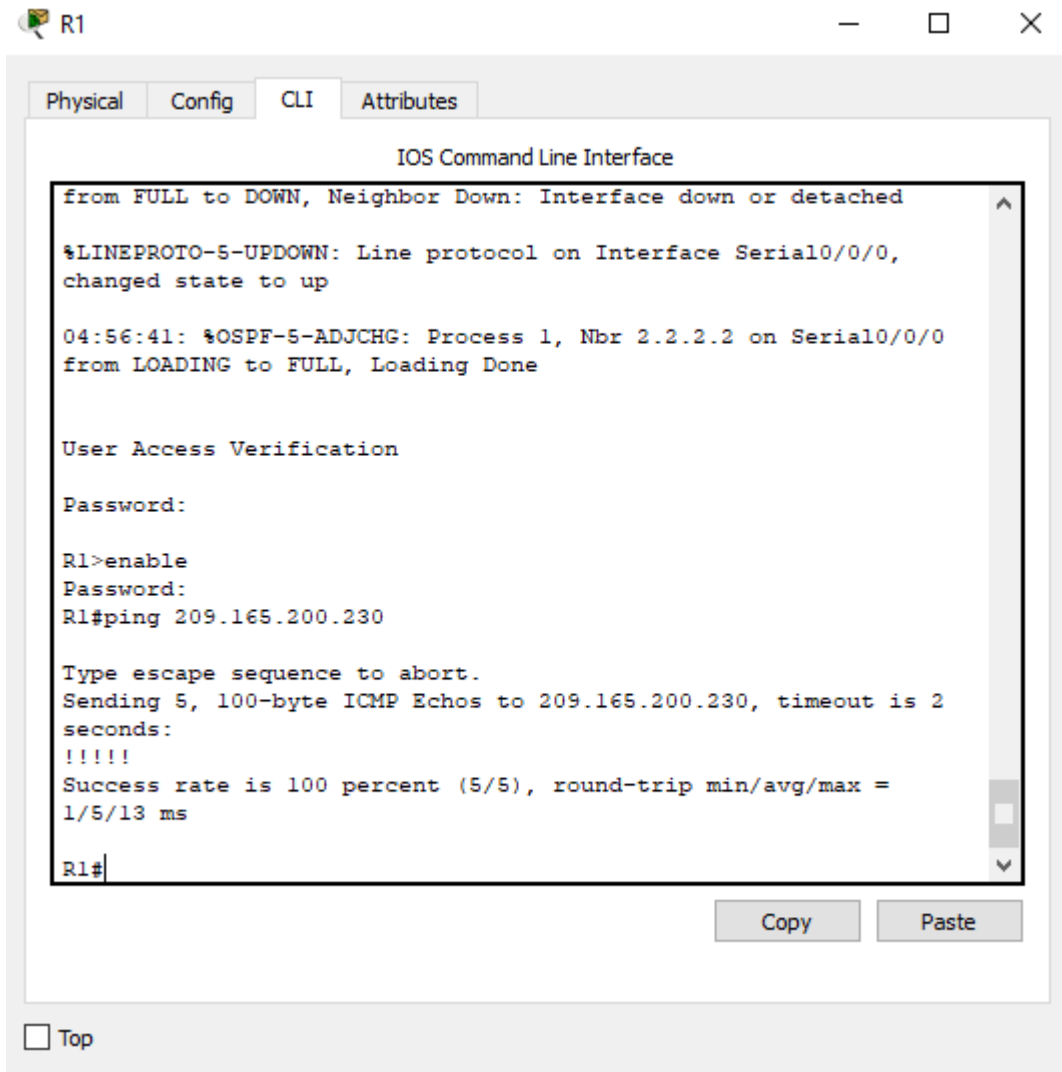


Figura 46

Desde R1, Ping a la Internet PC (Ping debería tener éxito).



The screenshot shows a terminal window titled "R1" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output shows a sequence of events: a log message about a neighbor down, a log message about the line protocol on Serial10/0/0 changing to up, a log message about the OSPF process 1 reaching the FULL state, a "User Access Verification" prompt, a password prompt, the user entering "enable", another password prompt, and the user entering "ping 209.165.200.230". The ping command output shows "Type escape sequence to abort.", "Sending 5, 100-byte ICMP Echos to 209.165.200.230, timeout is 2 seconds:", "!!!!", and "Success rate is 100 percent (5/5), round-trip min/avg/max = 1/5/13 ms". The prompt "R1#" is visible at the bottom of the terminal. There are "Copy" and "Paste" buttons at the bottom right of the terminal area, and a "Top" button at the bottom left of the window.

```
from FULL to DOWN, Neighbor Down: Interface down or detached
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial10/0/0,
changed state to up
04:56:41: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial10/0/0
from LOADING to FULL, Loading Done

User Access Verification

Password:

R1>enable
Password:
R1#ping 209.165.200.230

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.230, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/5/13 ms
R1#
```

Figura 47

## Verificación de la Información de las ACLs

Coincidencias que han recibido las listas de acceso.

```
R2#show access-lists
Standard IP access list 1
 10 permit 192.168.30.0 0.0.0.255
 20 permit 192.168.40.0 0.0.0.255
 30 permit 192.168.4.0 0.0.3.255
Standard IP access list ADMIN
 10 permit host 172.31.21.1
Extended IP access list 101
 10 permit tcp any host 209.165.200.229 eq www
 20 permit icmp any any echo-reply (10 match(es))

R2#
```

Figura 48

## Diagrama de la Topología de Red totalmente Funcional

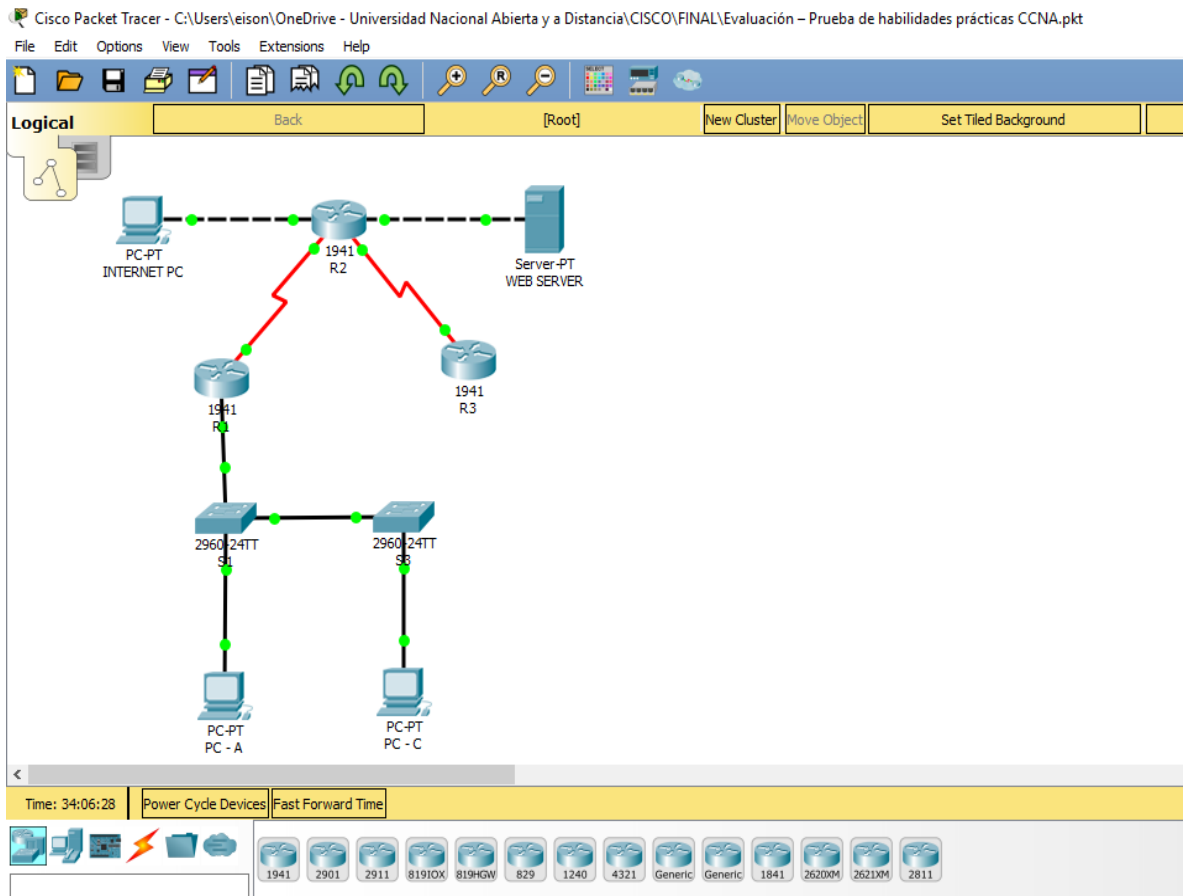


Figura 49

## CONCLUSIONES

Realizando el desarrollo y practica de los principios básicos del routing y swiching de CCNA, la meta fue poder culminar en su totalidad las actividades propuestas por el diplomado y de esta manera entender los conceptos y tecnologías base de la una red.

Podemos indicar que fue de gran ayuda el material de apoyo proporcionado por el diplomado ya que nos ayudó a desarrollar las actitudes necesarias para planificar e implementar redes pequeñas con una variedad de aplicaciones.

Así como se indica en el desarrollo de la prueba de habilidades practicas CCNA, esta actividad practica se centró en el aprendizaje del funcionamiento de los routers y swiches y sus funciones en una red, en esta actividad aprendimos y pusimos en práctica todos los conceptos y conocimientos que obtuvimos a lo largo del curso.



## BIBLIOGRAFIA

CISCO . (2014). Conceptos de routing. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#4.0.1.1>

CISCO. (2014). Configuración y conceptos básicos de switching. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#2.0.1.1>

CISCO. (2014). DHCP. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#10.0.1.1>

CISCO. (2014). Enrutamiento entre VLAN. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#5.0.1.1>

CISCO. (2014). Enrutamiento estatico. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#6.0.1.1>

CISCO. (2014). Introducción a redes comutadas. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#1.0.1.1>

CISCO. (2014). Listas de control . Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#9.0.1.1>

CISCO. (2014). OSPF de área única. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#8.0.1.1>

CISCO. (2014). Routing dinámico. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#7.0.1.1>

CISCO. (2014). VLAN. Obtenido de NETACAD: <https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html#3.0.1.1>