

**DIPLOMADO DE PROFUNDIZACIÓN CISCO - DISEÑO E IMPLEMENTACIÓN
DE SOLUCIONES INTEGRADAS LAN/WAN**

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA

INGENIERIA DE SISTEMAS

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PRUEBA DE HABILIDADES PRÁCTICAS CCNA

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Resumen

En este trabajo el objetivo es demostrar las habilidades prácticas adquiridas durante el transcurso del diplomado de profundización CCNA y a través de la cual se demuestran los niveles de comprensión y solución de problemas relacionados con diversos aspectos de configuración de redes Cisco. En la configuración de switches y routers, empleando configuraciones de topologías más utilizadas.

Introducción

La Universidad Nacional Abierta y a Distancia UNAD y CISCO Networking Academy mediante el diplomado Diseño e implementación de soluciones integradas LAN –WAN nos ayuda a reforzar conocimiento para crear redes LAN simples, realizar configuraciones básicas de routers y switches, implementar esquemas de direccionamiento IP, configurar routers y switches, resolver problemas de RIPv1, de RIPv2, de OSPF, de LAN virtuales y de routing entre VLAN en redes IPv4 e IPv6. Por medio de la prueba de habilidades prácticas y la herramienta de simulación Packet Tracer, desarrollada por CISCO para diseñar e implementar una red vamos a poner en práctica los temas vistos durante el desarrollo del curso de acuerdo a los protocolos y estándares vistos en cada actividad

Objetivos

Objetivo General

Resolver la prueba de habilidades propuesta en el diplomado diseño e implementación de soluciones integradas LAN / WAN, aplicando los conocimientos adquiridos en el transcurso del desarrollo de los módulos vistos en el curso.

Objetivos Específicos

- Configurar el direccionamiento IP
- Configurar el protocolo de enrutamiento OSPFv2
- Verificar información de OSPF
- Configurar VLANs, puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches
- deshabilitar DNS lookup
- Asignar direcciones IP a los Switches
- Implementar DHCP y NAT para IPv4
- Reservar direcciones IP
- Configurar NAT en un router
- Configurar listas de acceso de tipo estándar
- Verificar procesos de comunicación y redireccionamiento de tráfico en los routers

Evaluación – Prueba de habilidades prácticas CCNA

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

Recursos necesarios:

- Cisco Packet Tracer Student v7.1.1
- 3 Routers
- 2 Switches
- 3 PCs

Topología de red:

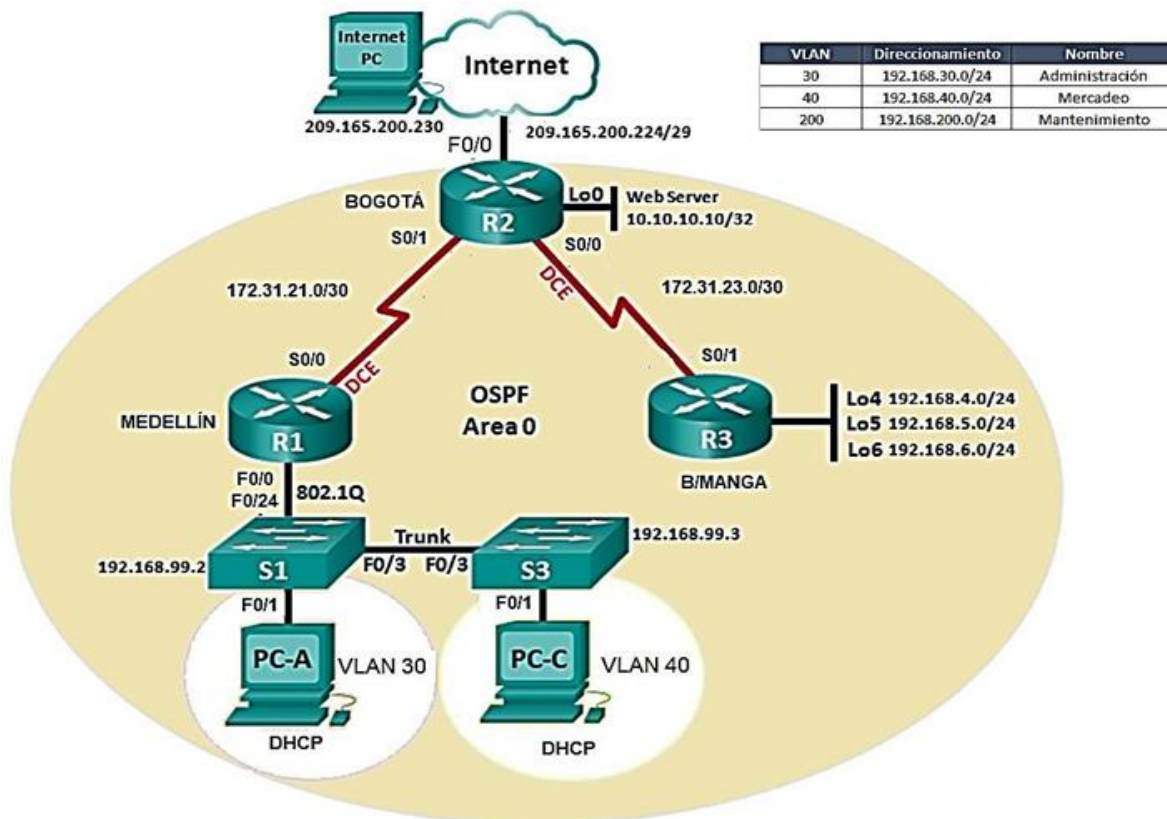


Ilustración 1 Topología de red.

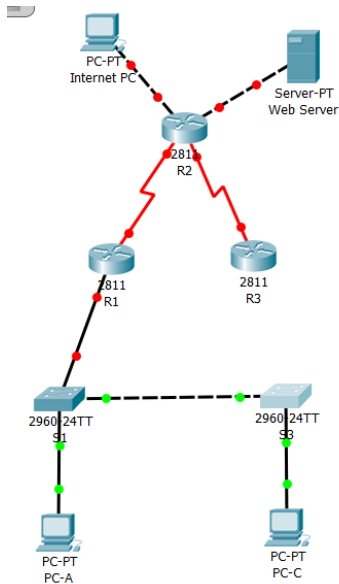


Ilustración 2. Configuración del direccionamiento IP acorde con la topología de red.

1.1 Inicializar dispositivos

Se debe borrar las configuraciones de inicio y luego reiniciar los dispositivos, también borrar el startup-config en todos los Switches y las bases de datos de las VLANS.

```

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 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
Initializing memory for ECC
..
C2800 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

program load complete, entry point: 0x8000f000, size: 0xc940
program load complete, entry point: 0x8000f000, size: 0xc940

program load complete, entry point: 0x8000f000, size: 0x3ed1338
Self decompressing the image :
*****

```

Ilustración 3. Borrado de configuraciones y reinicio de router R1.

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
Be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending
email to
export@cisco.com.
cisco 2811 (MPC860) processor (revision 0x200) with 60416K/5120K
bytes of memory
Processor board ID JAD05190MTZ (4292891495)
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
239K bytes of non-volatile configuration memory.
62720K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 2800 Software (C2800NM-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 06:21 by pt_rel_team

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/
no]:
```

Ilustración 4. Borrado de configuraciones y reinicio de router R2.

R3

Physical Config CLI Attributes

IOS Command Line Interface

```
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 12.1(3r)T2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.
Initializing memory for ECC
..
C2800 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

program load complete, entry point: 0x8000f000, size: 0xc940
program load complete, entry point: 0x8000f000, size: 0xc940

program load complete, entry point: 0x8000f000, size: 0x3ed1338
Self decompressing the image :
#####
```

Ilustración 5. Borrado de configuraciones y reinicio de router R3.

```
Switch#
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: 0060.2F36.5518
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.

Boot Sector Filesystem (bs:) installed, fsid: 3
Parameter Block Filesystem (pb:) installed, fsid: 4

Loading "flash:/c2960-lanbase-mz.122-25.FX.bin"...
*****
```

Ilustración 6. Borrado de configuraciones y reinicio de switch S1.

```
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#
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: 0010.113B.987D
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
```

Ilustración 7. Borrado de configuraciones y reinicio de switch S3.

1.2 Establecer la configuración básica del dispositivo

Configurar la PC de Internet:

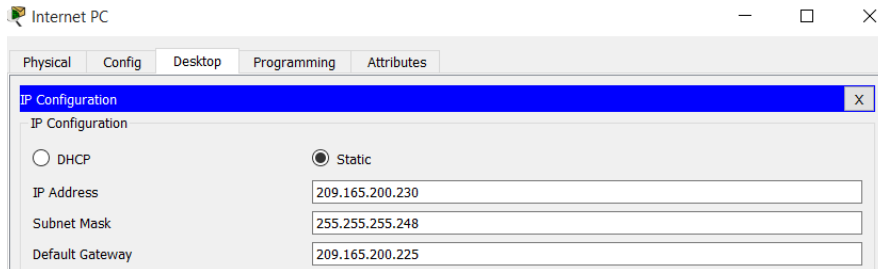


Ilustración 8. Configuración básica Internet PC.

Configurar R1:

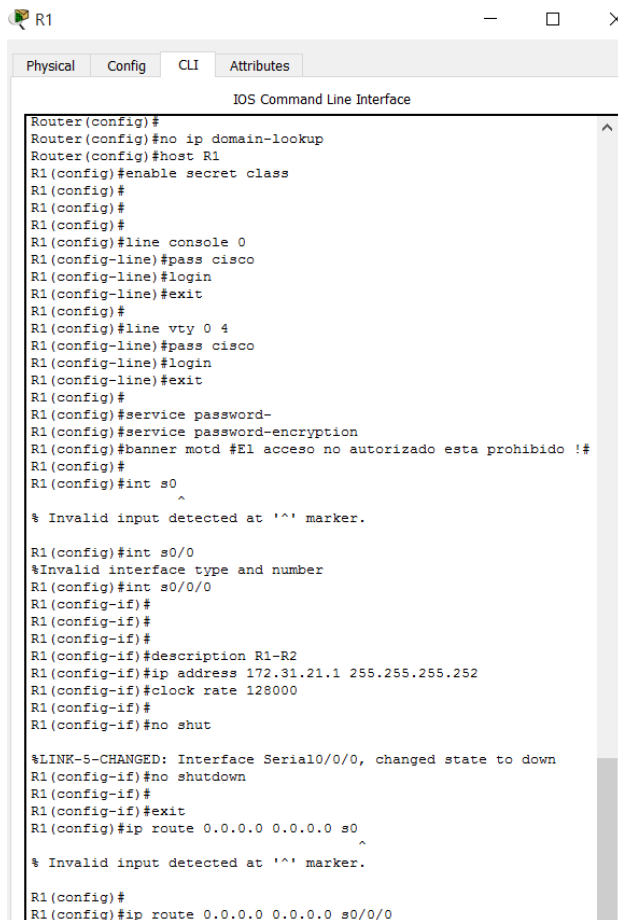
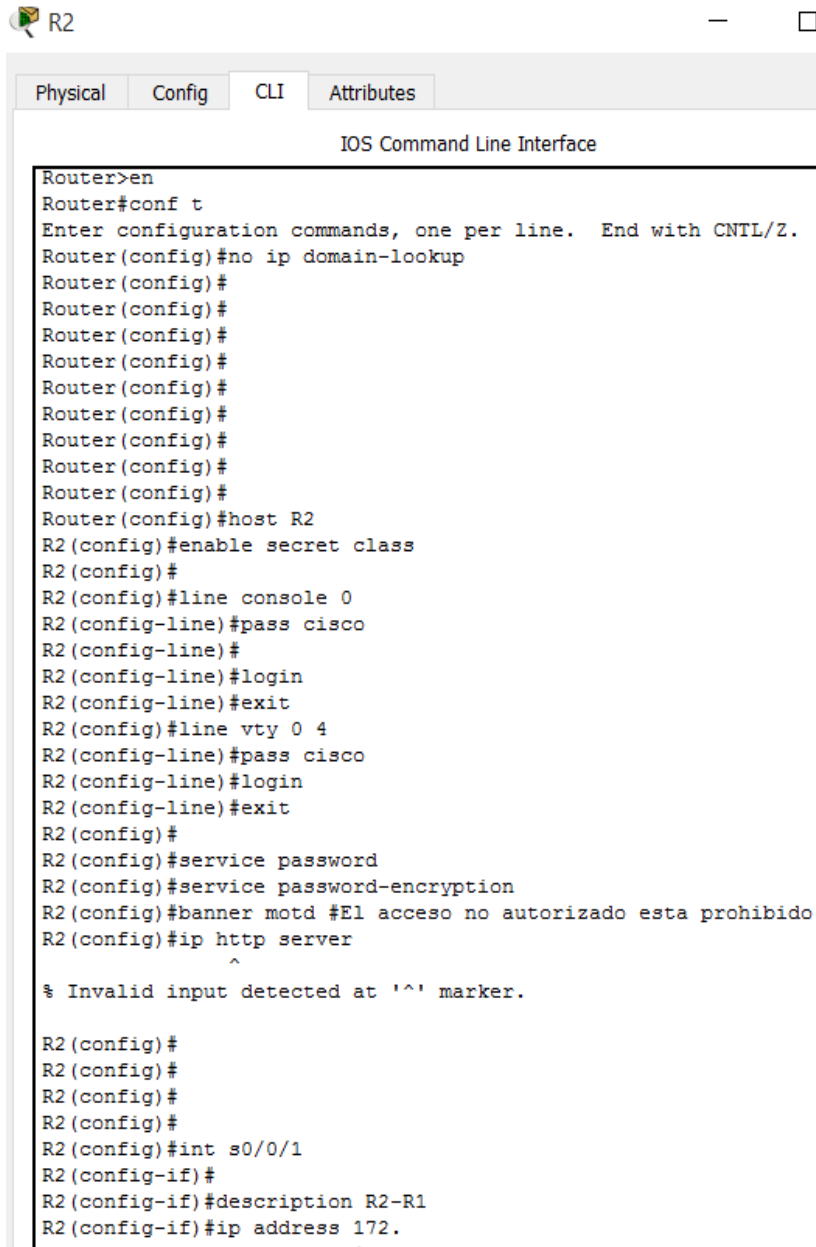


Ilustración 9. Configuración básica para R1.

Configurar 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 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)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#host R2
R2(config)#enable secret class
R2(config)#
R2(config)#line console 0
R2(config-line)#pass cisco
R2(config-line)#
R2(config-line)#login
R2(config-line)#exit
R2(config)#line vty 0 4
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#
R2(config)#service password
R2(config)#service password-encryption
R2(config)#banner motd #El acceso no autorizado esta prohibido!
R2(config)#ip http server
      ^
% Invalid input detected at '^' marker.

R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#int s0/0/1
R2(config-if)#
R2(config-if)#description R2-R1
R2(config-if)#ip address 172.
```

Ilustración 10. Configuración básica para R2.

```
R2
R2 (config-if)#int s0/0/0
R2 (config-if)#
R2 (config-if)#descrip
R2 (config-if)#description R2-R3
R2 (config-if)#ip address 172.31.23.1 255.255.255.252
R2 (config-if)#clock rate 128000
This command applies only to DCE interfaces
R2 (config-if)#
R2 (config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R2 (config-if)#int f0/0
R2 (config-if)#descri
R2 (config-if)#description R2-Internet
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#ip address 209.165.200.225 255.255.255.248
R2 (config-if)#
R2 (config-if)#no shut
R2 (config-if)#no shutdown

R2 (config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#int f0/1
R2 (config-if)#
R2 (config-if)#descrip
R2 (config-if)#description R2-Web Server
R2 (config-if)#
R2 (config-if)#
R2 (config-if)#ip address 10.10.10.1 255.255.255.0
R2 (config-if)#no shutd
R2 (config-if)#no shutdown

R2 (config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
```

Ilustración 11. Continuación configuración básica para R2.

Configurar Web Server:

Web Server

Physical Config Services Desktop Programming Attributes

IP Configuration

DHCP Static

IP Address: 10.10.10.10

Subnet Mask: 255.255.255.0

Default Gateway: 10.10.10.1

Ilustración 12. Configuración básica Web Server. Configurar R3.


```
Router(config)#
Router(config)#host R3
R3(config)#
R3(config)#enable secret class
R3(config)#line console 0
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#line vty 0 4
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#service passw
R3(config)#service password-encryption
R3(config)#banner motd #El acceso no autorizado esta prohibido!#
R3(config)#int s0/0/
      ^
% Invalid input detected at '^' marker.

R3(config)#
R3(config)#int s0/0/1
R3(config-if)#descrip|
R3(config-if)#description R3-R2
R3(config-if)#ip address 172.31.23.2 255.255.255.252
R3(config-if)#
R3(config-if)#no shut

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

R3(config-if)#int lo4

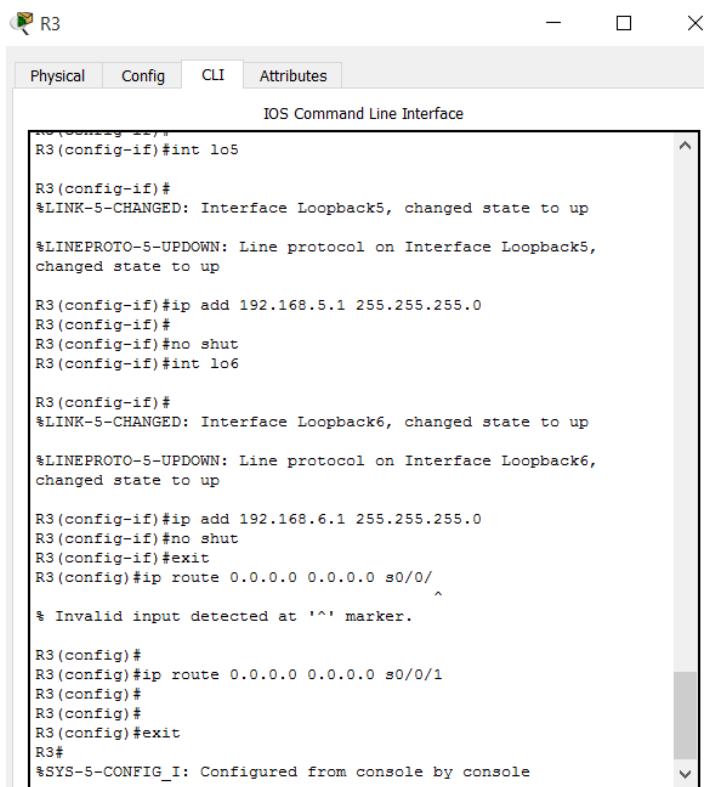
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up

R3(config-if)#
R3(config-if)#
R3(config-if)#
R3(config-if)#
R3(config-if)#int lo 4
R3(config-if)#ip add 192.168.4.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#
R3(config-if)#
R3(config-if)#int lo5
```

Ilustración 13. Configuración básica R3.

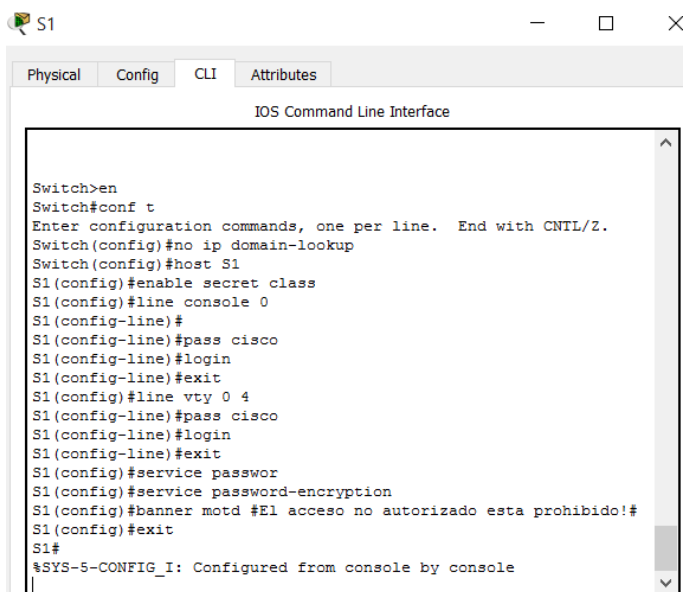


The screenshot shows a window titled 'R3' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
R3(config-if)#int lo5
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5,
changed state to up
R3(config-if)#ip add 192.168.5.1 255.255.255.0
R3(config-if)#
R3(config-if)#no shut
R3(config-if)#int lo6
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6,
changed state to up
R3(config-if)#ip add 192.168.6.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#ip route 0.0.0.0 0.0.0.0 s0/0/
^
% Invalid input detected at '^' marker.
R3(config)#
R3(config)#ip route 0.0.0.0 0.0.0.0 s0/0/1
R3(config)#
R3(config)#
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 14. Continuación configuración básica R3.

Configurar S1.

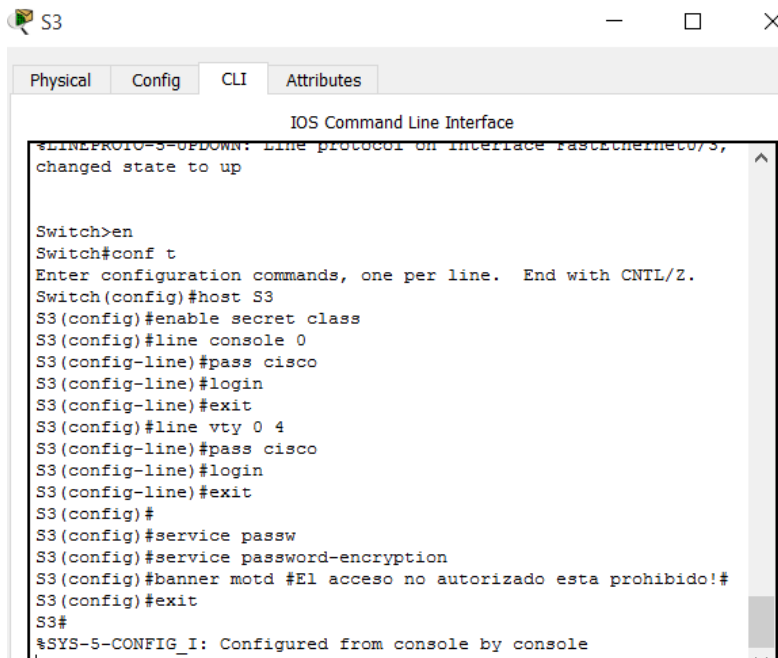


The screenshot shows a window titled 'S1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
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 console 0
S1(config-line)#
S1(config-line)#pass cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#line vty 0 4
S1(config-line)#pass cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password
S1(config)#service password-encryption
S1(config)#banner motd #El acceso no autorizado esta prohibido!#
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 15. Configuración básica S1.

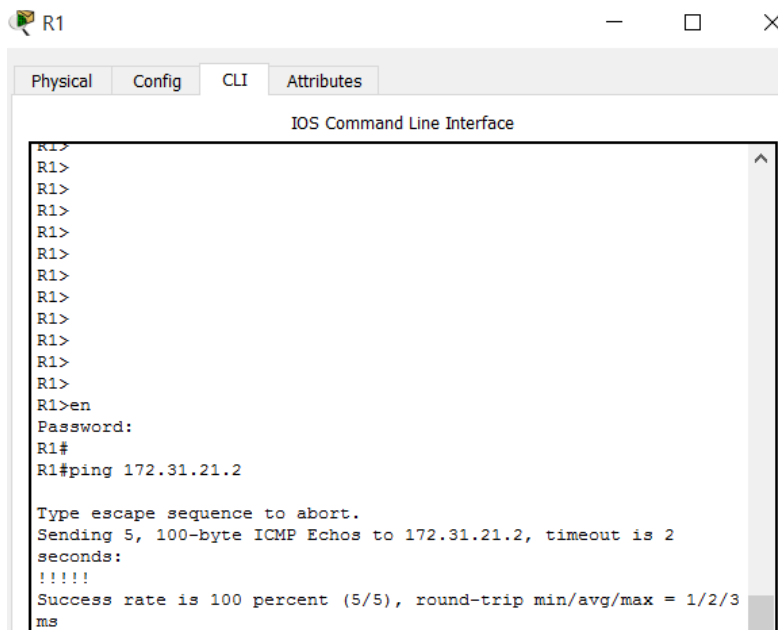
Configurar S3.



```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#host S3
S3(config)#enable secret class
S3(config)#line console 0
S3(config-line)#pass cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#line vty 0 4
S3(config-line)#pass cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#
S3(config)#service passw
S3(config)#service password-encryption
S3(config)#banner motd #El acceso no autorizado esta prohibido!#
S3(config)#exit
S3#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 16. Configuración básica S3.

Con el comando ping se prueba la conectividad entre dispositivos de red:



```
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>
R1>en
Password:
R1#
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 = 1/2/3
ms
```

Ilustración 17. Ping R1-R2

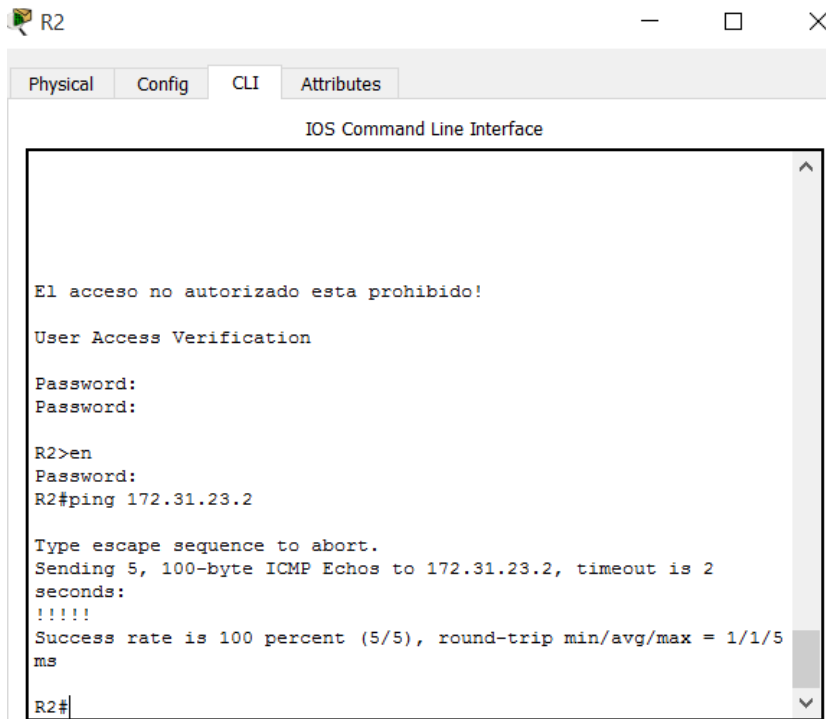


Ilustración 18. Ping R2-R3

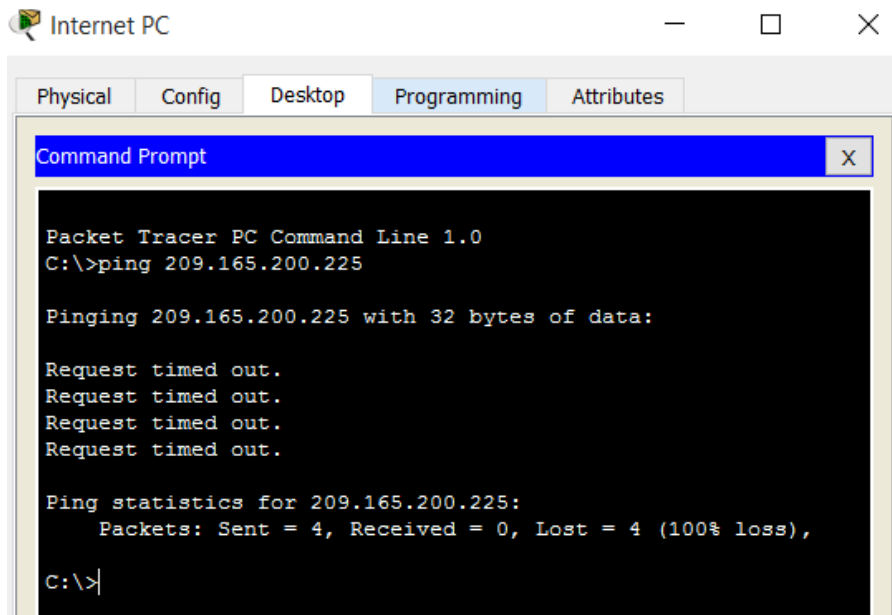


Ilustración 19. Ping Internet PC-Default Gateway

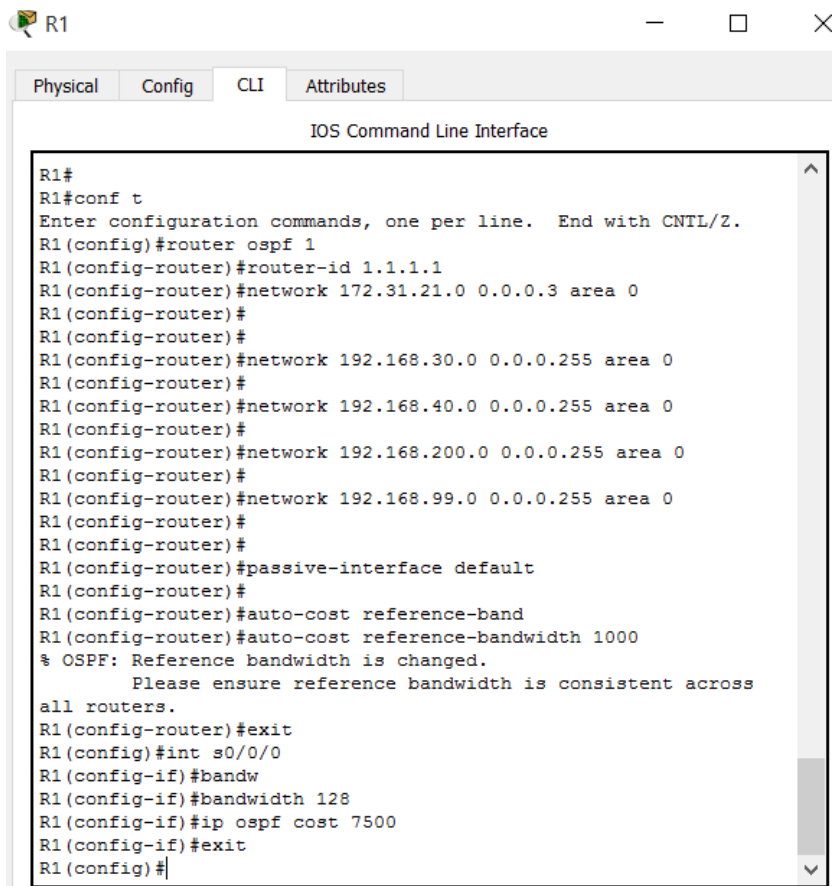
2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

OSPFv2 area 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

Tabla 1. Configuración OSPV area 0

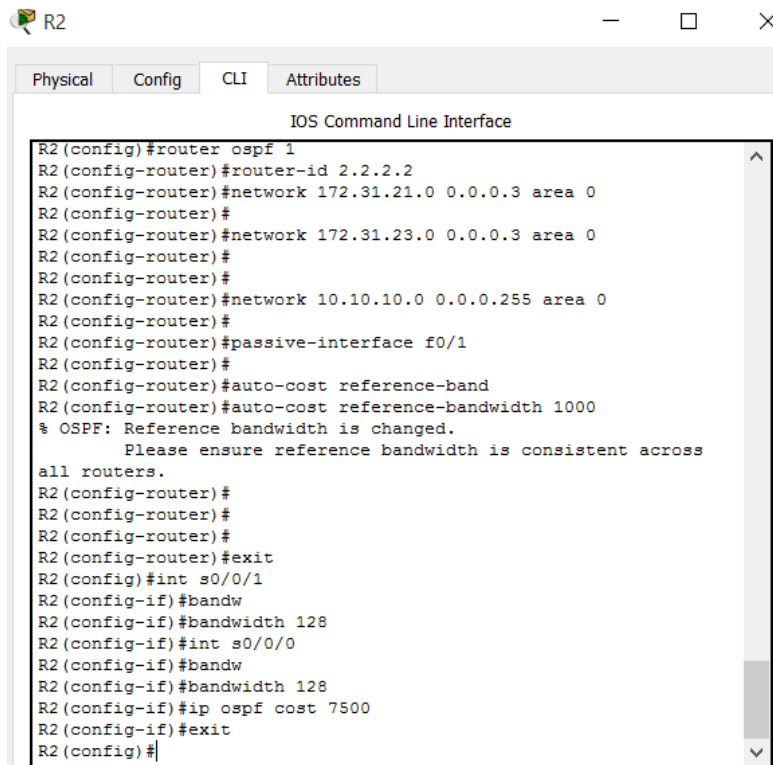
Configurar OSPFv2 en R1:



```
R1#
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
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)#
R1(config-router)#
R1(config-router)#network 192.168.30.0 0.0.0.255 area 0
R1(config-router)#
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#
R1(config-router)#network 192.168.200.0 0.0.0.255 area 0
R1(config-router)#
R1(config-router)#network 192.168.99.0 0.0.0.255 area 0
R1(config-router)#
R1(config-router)#
R1(config-router)#passive-interface default
R1(config-router)#
R1(config-router)#auto-cost reference-band
R1(config-router)#auto-cost reference-bandwidth 1000
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R1(config-router)#exit
R1(config)#int s0/0/0
R1(config-if)#bandw
R1(config-if)#bandwidth 128
R1(config-if)#ip ospf cost 7500
R1(config-if)#exit
R1(config)#
```

Ilustración 20. Configurar OSPFv2 en R1.

Configurar OSPFv2 en R2:



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
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)#
R2 (config-router)#network 172.31.23.0 0.0.0.3 area 0
R2 (config-router)#
R2 (config-router)#
R2 (config-router)#network 10.10.10.0 0.0.0.255 area 0
R2 (config-router)#
R2 (config-router)#passive-interface f0/1
R2 (config-router)#
R2 (config-router)#auto-cost reference-bandwidth
R2 (config-router)#auto-cost reference-bandwidth 1000
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R2 (config-router)#
R2 (config-router)#
R2 (config-router)#
R2 (config-router)#exit
R2 (config)#int s0/0/1
R2 (config-if)#bandw
R2 (config-if)#bandwidth 128
R2 (config-if)#int s0/0/0
R2 (config-if)#bandw
R2 (config-if)#bandwidth 128
R2 (config-if)#ip ospf cost 7500
R2 (config-if)#exit
R2 (config)#
```

Ilustración 21. Configurar OSPFv2 en R2.

Configurar OSPFv2 en R3.:

Con la calculadora IP online se encuentra la Wildcard



DIRECCION IP
192 . 168 . 4 . 0

MASCARA DE SUBRED
255.255.252.0 (decimal) | 22 (bits) | ff.ff.fc.00 (hexadecimal)

RESULTADOS PARA 192.168.4.0
RED: 192.168.4.0 / 22
BROADCAST: 192.168.7.255
WILDCARD: 0.0.3.255
RANGO DE HOSTS: 192.168.4.1 - 192.168.7.254
TIPO: IP Pública - Clase B

Ilustración 22. Calculadora IP - Wildcard

The screenshot shows the configuration of OSPFv2 on router R3. The configuration includes enabling OSPF, setting the router ID to 3.3.3.3, and defining two areas: Area 0 with networks 172.31.23.0/24 and 192.168.0/24, and Area 0.3.255 with network 192.168.4.0/24. Several interfaces (lo4, lo5, lo6) are configured as passive. The reference bandwidth is set to 1000. Finally, the configuration is applied to interface Serial0/0/1 with a bandwidth of 128.

```
R3(config)#router ospf 1
R3(config-router)#
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)#network 192.168.
01:27:44: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1
from LOADING to FULL, Loading Done

R3(config-router)#network 192.168.4.0 0.0.3.255 area 0
R3(config-router)#passiv
R3(config-router)#passive-interface lo4
R3(config-router)#
R3(config-router)#passive-interface lo5
R3(config-router)#
R3(config-router)#passive-interface lo
% Incomplete command.
R3(config-router)#
R3(config-router)#
R3(config-router)#passive-interface lo6
R3(config-router)#
R3(config-router)#auto-cost referen
R3(config-router)#auto-cost reference-bandwidth 1000
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R3(config-router)#exit
R3(config)#int s0/0/1
R3(config-if)#band
R3(config-if)#bandwidth 128
R3(config-if)#exit
R3(config)#
```

Ilustración 23. Configurar OSPFv2 en R3.

2.1 Verificar información de OSPF

2.1.1 Visualizar tablas de enrutamiento y routers conectados por OSPFv2

The screenshot shows the output of the 'show ip ospf neighbor' command on router R1. It displays a table with columns for Neighbor ID, Pri, State, Dead Time, and Address. The output shows a single neighbor with ID 2.2.2.2, priority 0, state FULL/-, and address 172.31.21.2 on interface Serial0/0/0.

```
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#shor ip ospf neig
^
% Invalid input detected at '^' marker.

R1#
R1#
R1#shor ip ospf neig
R1#show ip ospf neig

Neighbor ID    Pri   State           Dead Time   Address
Interface
2.2.2.2        0    FULL/ -         00:00:31   172.31.21.2
Serial0/0/0
R1#
R1#
```

Ilustración 24. Tablas de enrutamiento R1 conectado por OSPFv2.

01:28:50: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/0 from LOADING to FULL, Loading Done

01:58:49: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1 from LOADING to FULL, Loading Done

El acceso no autorizado esta prohibido!

User Access Verification

Password:

R2>en

Password:

R2#show ip ospf neig

Neighbor ID	Pri	State	Dead Time	Address
Interface				
3.3.3.3	0	FULL/ -	00:00:37	172.31.23.2
Serial0/0/0				
1.1.1.1	0	FULL/ -	00:00:34	172.31.21.1
Serial0/0/1				

R2#

Ilustración 25. Tablas de enrutamiento R2 conectado por OSPFv2.

Press RETURN to get started.

El acceso no autorizado esta prohibido!

User Access Verification

Password:

R3>en

Password:

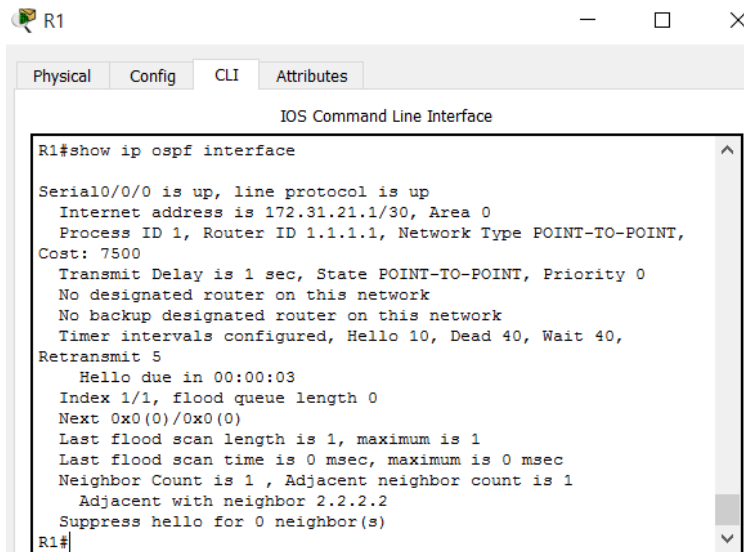
R3#show ip ospf neig

Neighbor ID	Pri	State	Dead Time	Address
Interface				
2.2.2.2	0	FULL/ -	00:00:37	172.31.23.1
Serial0/0/1				

R3#

Ilustración 26. Tablas de enrutamiento R3 conectado por OSPFv2.

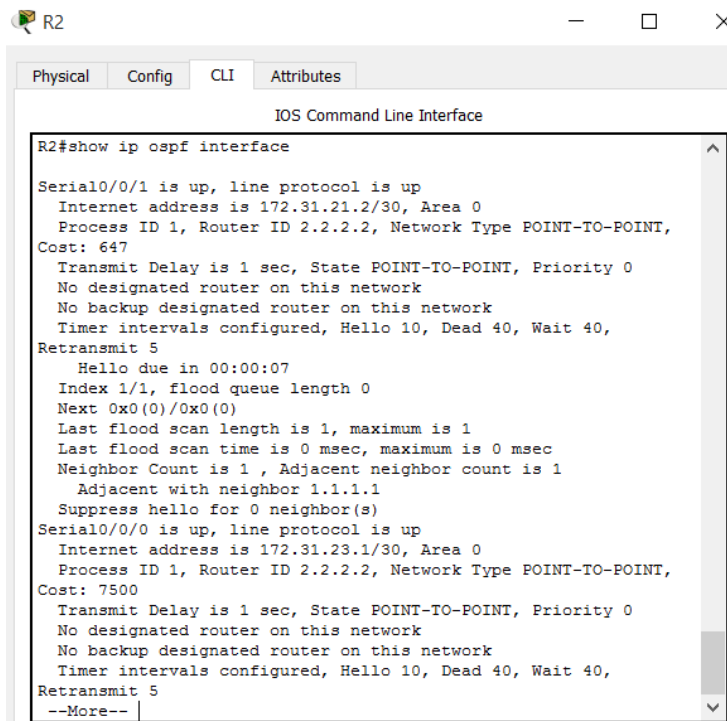
2.1.2 Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface.



The screenshot shows a terminal window for router R1. The CLI prompt is 'R1#'. The command entered is 'show ip ospf interface'. The output displays the configuration for Serial0/0/0, including its IP address (172.31.21.1/30), Area 0, Process ID 1, Router ID 1.1.1.1, Network Type POINT-TO-POINT, and a Cost of 7500. It also shows timer intervals (Hello 10, Dead 40, Wait 40, Retransmit 5) and neighbor information (Neighbor Count is 1, Adjacent neighbor count is 1, Adjacent with neighbor 2.2.2.2).

```
R1#show ip ospf interface
Serial0/0/0 is up, line protocol is up
 Internet address is 172.31.21.1/30, Area 0
 Process ID 1, Router ID 1.1.1.1, 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
 Hello due in 00:00:03
 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 1 , Adjacent neighbor count is 1
 Adjacent with neighbor 2.2.2.2
 Suppress hello for 0 neighbor(s)
R1#
```

Ilustración 27. Lista resumida de interfaces por OSPF R1.



The screenshot shows a terminal window for router R2. The CLI prompt is 'R2#'. The command entered is 'show ip ospf interface'. The output displays the configuration for two interfaces: Serial0/0/1 and Serial0/0/0. Serial0/0/1 has IP address 172.31.21.2/30, Area 0, Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, and a Cost of 647. Serial0/0/0 has IP address 172.31.23.1/30, Area 0, Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, and a Cost of 7500. Both interfaces show timer intervals and neighbor information.

```
R2#show ip ospf interface
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: 647
 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 00:00:07
 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 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
--More--
```

Ilustración 28. Lista resumida de interfaces por OSPF R2.

```

R3
Physical Config CLI Attributes
IOS Command Line Interface
Password:
R3>en
Password:
R3#show ip ospf interface

Serial0/0/1 is up, line protocol is up
  Internet address is 172.31.23.2/30, Area 0
  Process ID 1, Router ID 3.3.3.3, Network Type POINT-TO-POINT,
  Cost: 647
  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 00:00:07
  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 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 2.2.2.2
  Suppress hello for 0 neighbor(s)
Loopback4 is up, line protocol is up
  Internet address is 192.168.4.1/24, Area 0
  Process ID 1, Router ID 3.3.3.3, Network Type LOOPBACK, Cost: 0
  Loopback interface is treated as a stub Host
Loopback5 is up, line protocol is up
  Internet address is 192.168.5.1/24, Area 0
--More--

```

Ilustración 29. Lista resumida de interfaces por OSPF R3.

2.1.3 Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, y passive interfaces configuradas en cada router

```

R1
Physical Config CLI Attributes
IOS Command Line Interface
Suppress hello for 0 neighbor(s)
R1#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 1.1.1.1
  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
    192.168.30.0 0.0.0.255 area 0
    192.168.40.0 0.0.0.255 area 0
    192.168.200.0 0.0.0.255 area 0
    192.168.99.0 0.0.0.255 area 0
  Passive Interface(s):
    Vlan1
    FastEthernet0/0
    FastEthernet0/1
    Serial0/0/1
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:09:46
    2.2.2.2          110          00:17:56
--More--

```

Ilustración 30. Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, y passive interfaces configuradas en R1.

The screenshot shows the CLI of router R2. The command 'show ip protocols' has been executed, displaying the following configuration details:

```
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):
    FastEthernet0/1
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:10:53
    2.2.2.2          110          00:19:03
    3.3.3.3          110          00:18:08
  Distance: (default is 110)

R2#
```

Ilustración 31. Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, y passive interfaces configuradas en R2.

The screenshot shows the CLI of router R3. The command 'show ip protocols' has been executed, displaying the following configuration details:

```
R3#
R3#
R3#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 3.3.3.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.23.0 0.0.0.3 area 0
    192.168.4.0 0.0.3.255 area 0
  Passive Interface(s):
    Loopback4
    Loopback5
    Loopback6
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:11:46
    2.2.2.2          110          00:19:56
    3.3.3.3          110          00:19:00
  Distance: (default is 110)

R3#
```

Ilustración 32. Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, y passive interfaces configuradas en R3.

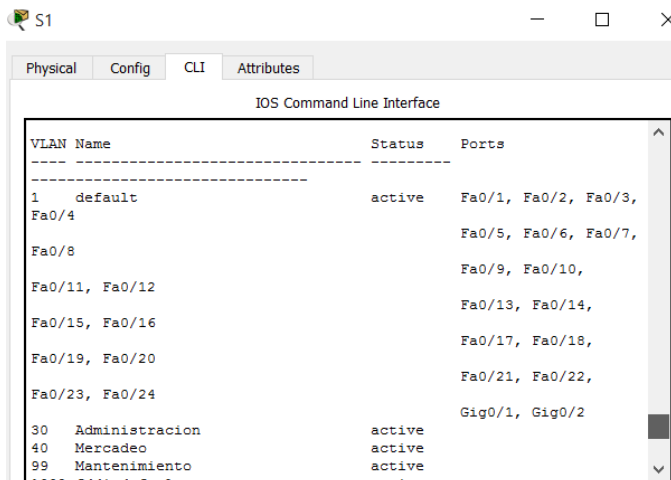
3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, InterVLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.

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.

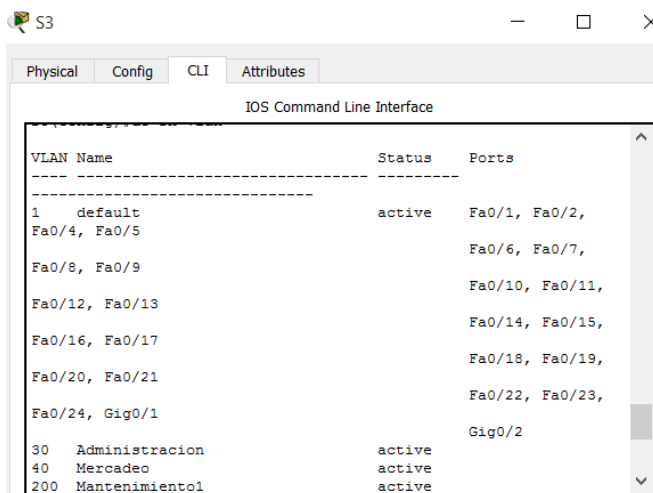
Configurar S1 y S3:



The screenshot shows the CLI interface for switch S1. The 'CLI' tab is selected, and the 'IOS Command Line Interface' window displays the following VLAN configuration:

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24
30 Administracion	active	Gig0/1, Gig0/2
40 Mercadeo	active	
99 Mantenimiento	active	

Ilustración 33. Crear VLANs S1

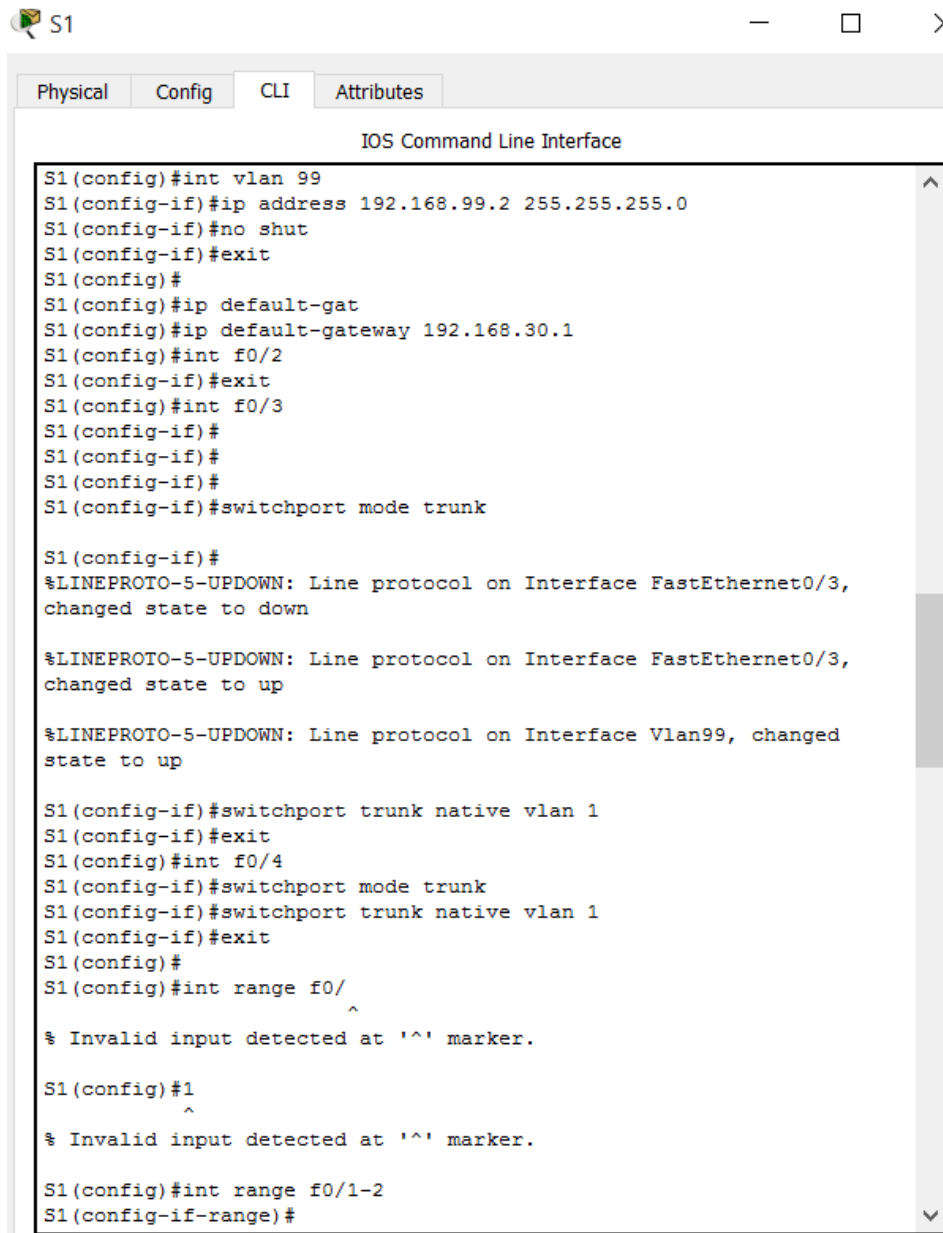


The screenshot shows the CLI interface for switch S3. The 'CLI' tab is selected, and the 'IOS Command Line Interface' window displays the following VLAN configuration:

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24, Gig0/1
30 Administracion	active	Gig0/2
40 Mercadeo	active	
200 Mantenimiento1	active	

Ilustración 34. Crear VLANs S3

Asignar la dirección IPv4 de Capa 3 a la VLAN de Administración. Asignar el cdefault-gateway, asignar F0/1 a la VLAN 30, asignar F0/1 a la VLAN 40 utilizar VLAN 1 como la VLAN nativa, configurar los otros puertos como puertos de acceso, Apagar todos los puertos no utilizados.



```
S1
Physical Config CLI Attributes
IOS Command Line Interface
S1(config)#int vlan 99
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
S1(config)#
S1(config)#ip default-gat
S1(config)#ip default-gateway 192.168.30.1
S1(config)#int f0/2
S1(config-if)#exit
S1(config)#int f0/3
S1(config-if)#
S1(config-if)#
S1(config-if)#
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed
state to up

S1(config-if)#switchport trunk native vlan 1
S1(config-if)#exit
S1(config)#int f0/4
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#exit
S1(config)#
S1(config)#int range f0/
^
% Invalid input detected at '^' marker.

S1(config)#1
^
% Invalid input detected at '^' marker.

S1(config)#int range f0/1-2
S1(config-if-range)#
```

Ilustración 35. Configuración VLANs S1.

```
S3 (CLI)
S3(config)#int vlan 99
S3(config-if)#s
% Ambiguous command: "s"
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#no shutdown
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.40.1
^
% Invalid input detected at '^' marker.

S3(config)#
S3(config)#ip default-gat
S3(config)#ip default-gateway 192.168.40.1
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#int range f0/1-2, f0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
S3(config-if-range)#shut

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

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to
administratively down

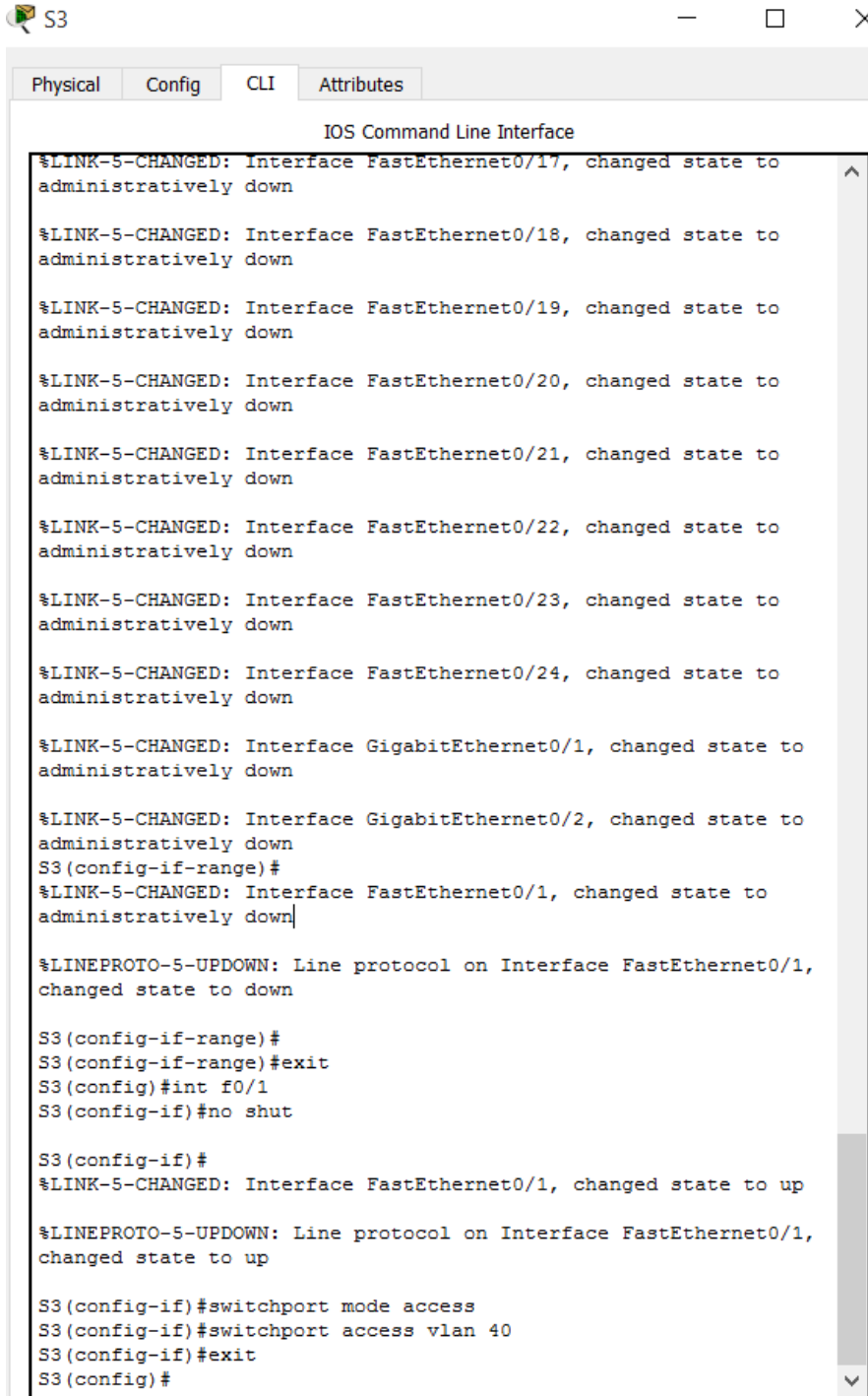
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to
administratively down
```

Ilustración 36. Configuración VLANs S3.



The screenshot shows a window titled "S3" with a tabbed interface. The active tab is "CLI", and the window title is "IOS Command Line Interface". The main content area displays a series of system messages and configuration commands. The messages indicate that interfaces FastEthernet0/17 through 0/24 and GigabitEthernet0/1 and 0/2 have been administratively shut down. The configuration sequence includes exiting the interface range, entering interface FastEthernet0/1, and performing the following commands: `int f0/1`, `no shut`, `switchport mode access`, `switchport access vlan 40`, and `exit`. The final status shows FastEthernet0/1 is now administratively up and the line protocol is up.

```
IOS Command Line Interface
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to
administratively down
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to
administratively down
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to
administratively down
S3(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to
administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to down
S3(config-if-range)#
S3(config-if-range)#exit
S3(config)#int f0/1
S3(config-if)#no shut
S3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 40
S3(config-if)#exit
S3(config)#
```

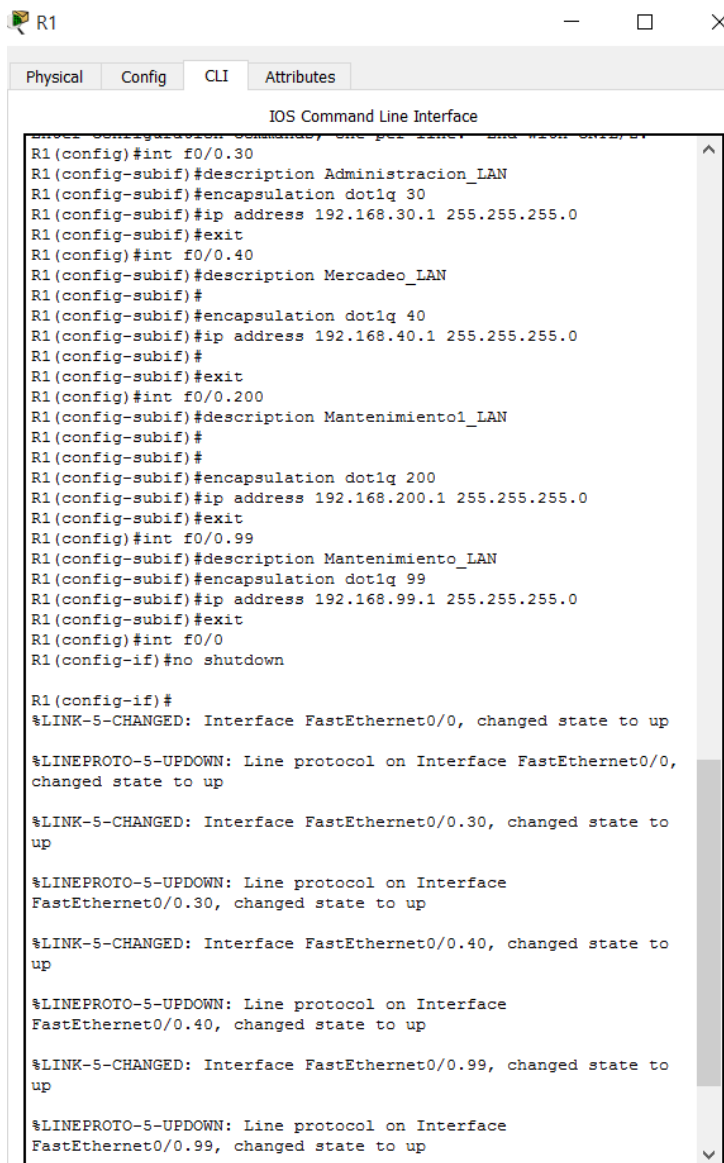
Ilustración 37. Continuación configuración VLANs S3.

```
S3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#no ip domain-lookup
S3(config)#
S3(config)#
```

Ilustración 38. Deshabilitar DNS lookup en S3

Configura R1:

Configurar 802.1Q interface 30, 49, 99, 200 en F0/0, activar interface F0/0.



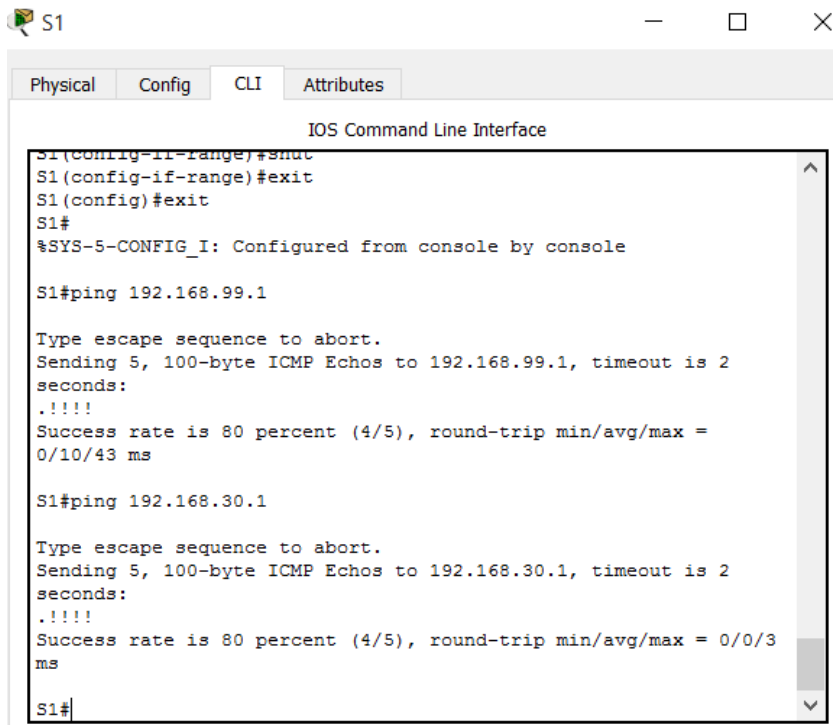
The screenshot shows the CLI of a router named R1. The configuration is as follows:

```
R1(config)#int f0/0.30
R1(config-subif)#description Administracion_LAN
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
R1(config-subif)#exit
R1(config)#int f0/0.40
R1(config-subif)#description Mercadeo_LAN
R1(config-subif)#
R1(config-subif)#encapsulation dot1q 40
R1(config-subif)#ip address 192.168.40.1 255.255.255.0
R1(config-subif)#
R1(config-subif)#exit
R1(config)#int f0/0.200
R1(config-subif)#description Mantenimiento1_LAN
R1(config-subif)#
R1(config-subif)#
R1(config-subif)#encapsulation dot1q 200
R1(config-subif)#ip address 192.168.200.1 255.255.255.0
R1(config-subif)#exit
R1(config)#int f0/0.99
R1(config-subif)#description Mantenimiento_LAN
R1(config-subif)#encapsulation dot1q 99
R1(config-subif)#ip address 192.168.99.1 255.255.255.0
R1(config-subif)#exit
R1(config)#int f0/0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to
up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0.30, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.40, changed state to
up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0.40, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.99, changed state to
up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0.99, changed state to up
```

Ilustración 39. Configuración 802.1Q en R1.

Con el comando ping se prueba la conectividad entre dispositivos de red:



```
S1
Physical Config CLI Attributes
IOS Command Line Interface
S1(config-if-range)#shut
S1(config-if-range)#exit
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#ping 192.168.99.1

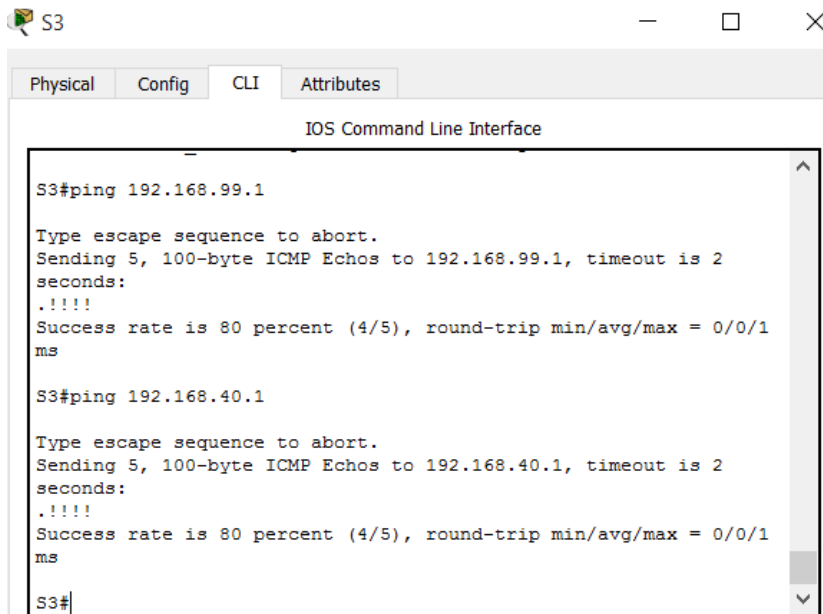
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.99.1, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max =
0/10/43 ms

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 80 percent (4/5), round-trip min/avg/max = 0/0/3
ms

S1#
```

Ilustración 40. Ping S1 con R1 VLAN 99 y R1 VLAN 30.



```
S3
Physical Config CLI Attributes
IOS Command Line Interface

S3#ping 192.168.99.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.99.1, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/1
ms

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 80 percent (4/5), round-trip min/avg/max = 0/0/1
ms

S3#
```

Ilustración 41. Ping S3 con R1 VLAN 99 y R1 VLAN 40.

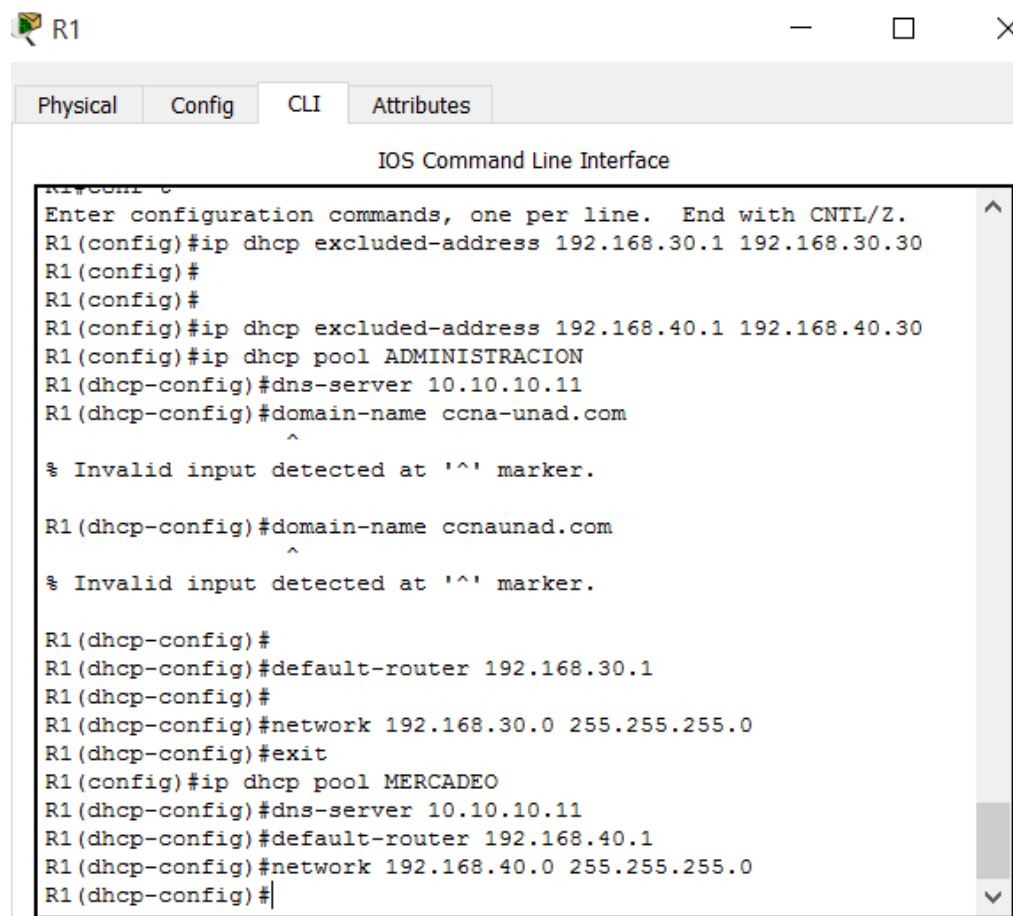
7. Implementar DHCP y NAT para IPv4

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 en R1:

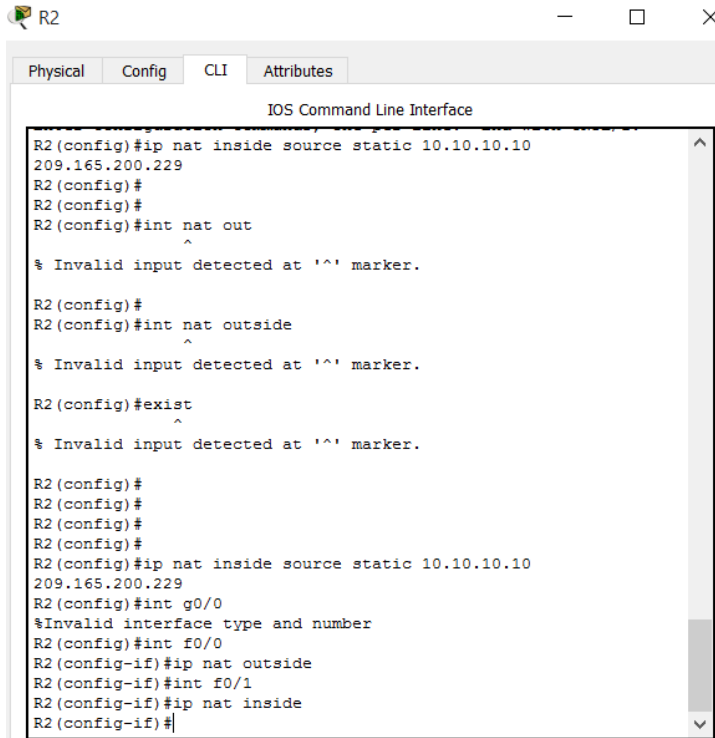
Reservar las primeras 30 direcciones IP en la VLAN 30 y VLAN 40 para configuraciones estáticas y configurar DHCP para la VLAN 30 y VLAN 40.



```
R1
Physical Config CLI Attributes
IOS Command Line Interface
R1#
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)#
R1(config)#
R1(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
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)#domain-name ccnaunad.com
^
% Invalid input detected at '^' marker.
R1(dhcp-config)#
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#
R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#exit
R1(config)#ip dhcp pool MERCADEO
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#default-router 192.168.40.1
R1(dhcp-config)#network 192.168.40.0 255.255.255.0
R1(dhcp-config)#
```

Ilustración 42. Configurar DHCP en R1.

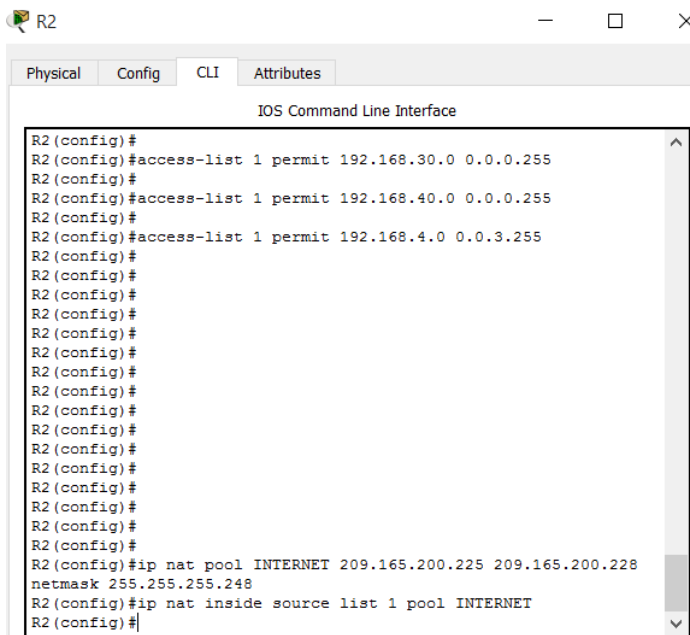
10. Configurar NAT en R2 para permitir que los host puedan salir a internet.



The screenshot shows the R2 CLI interface with the following commands and output:

```
R2(config)#ip nat inside source static 10.10.10.10
209.165.200.229
R2(config)#
R2(config)#
R2(config)#int nat out
^
% Invalid input detected at '^' marker.
R2(config)#
R2(config)#int nat outside
^
% Invalid input detected at '^' marker.
R2(config)#exist
^
% Invalid input detected at '^' marker.
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#ip nat inside source static 10.10.10.10
209.165.200.229
R2(config)#int g0/0
%Invalid interface type and number
R2(config)#int f0/0
R2(config-if)#ip nat outside
R2(config-if)#int f0/1
R2(config-if)#ip nat inside
R2(config-if)#
```

Ilustración 43. Configurar NAT en R2.

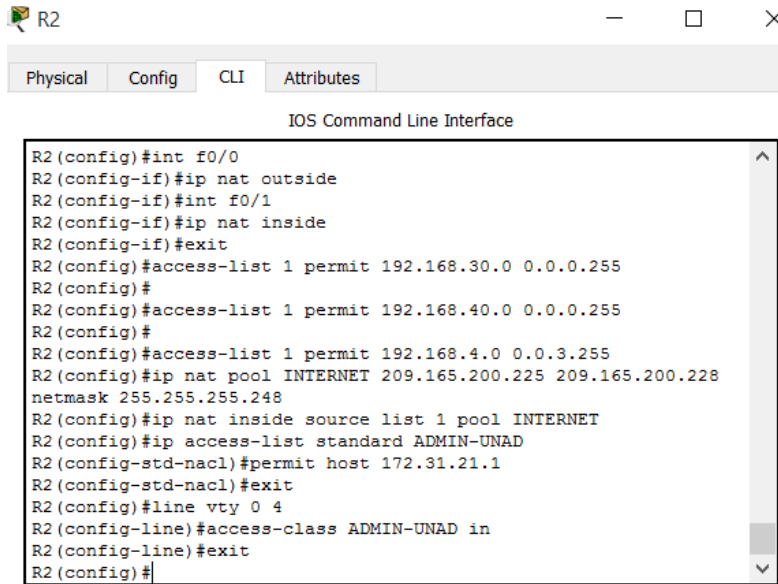


The screenshot shows the R2 CLI interface with the following commands and output:

```
R2(config)#
R2(config)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#
R2(config)#access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)#
R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228
netmask 255.255.255.248
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#
```

Ilustración 44. Continuación configurar NAT en R2.

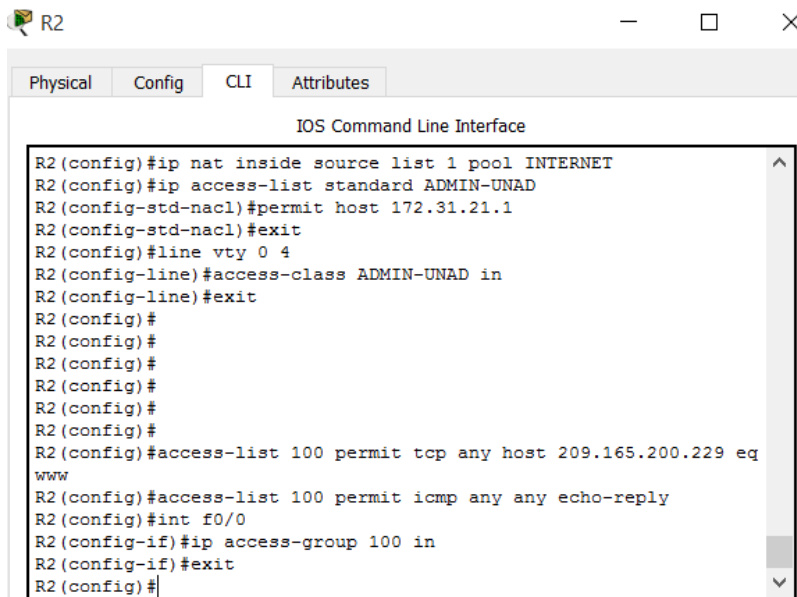
11. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
R2(config)#int f0/0
R2(config-if)#ip nat outside
R2(config-if)#int f0/1
R2(config-if)#ip nat inside
R2(config-if)#exit
R2(config)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#
R2(config)#access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)#
R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228
netmask 255.255.255.248
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#ip access-list standard ADMIN-UNAD
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#line vty 0 4
R2(config-line)#access-class ADMIN-UNAD in
R2(config-line)#exit
R2(config)#
```

Ilustración 45. Configurar el acceso a las líneas VTY en 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.



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#ip access-list standard ADMIN-UNAD
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#line vty 0 4
R2(config-line)#access-class ADMIN-UNAD in
R2(config-line)#exit
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#access-list 100 permit tcp any host 209.165.200.229 eq
www
R2(config)#access-list 100 permit icmp any any echo-reply
R2(config)#int f0/0
R2(config-if)#ip access-group 100 in
R2(config-if)#exit
R2(config)#
```

Ilustración 46. Configuración ACL extendida en R2.

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

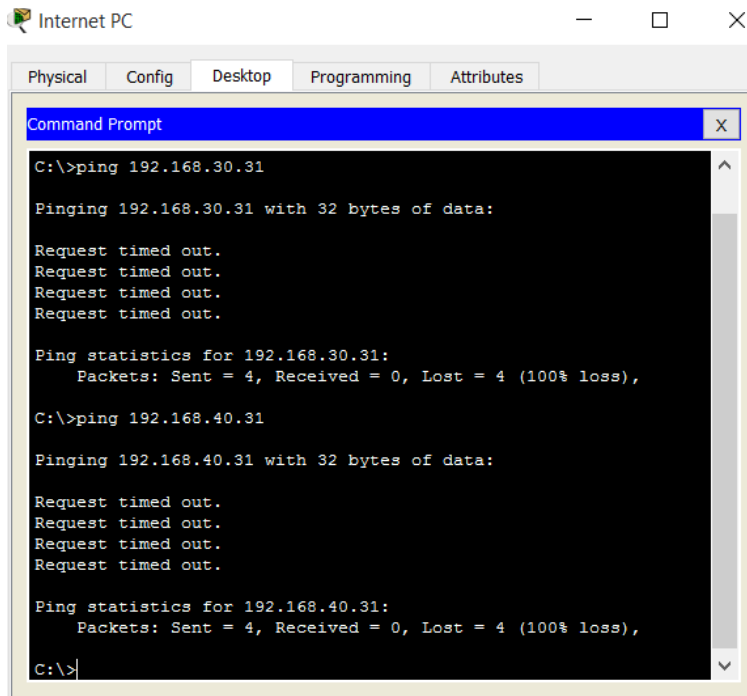


Ilustración 47. Ping PC a PC-A y PC-C.

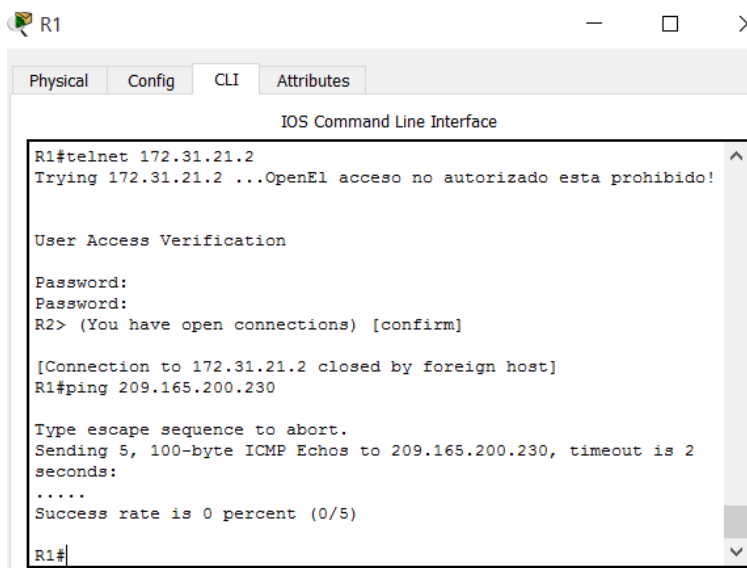


Ilustración 48. Ping R1 a Internet PC.

```
R1
Physical Config CLI
IOS Command Line Interface
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#telnet 172.31.21.2
Trying 172.31.21.2 ...OpenUnauthorized Access is Prohibited!

User Access Verification
Password:
R2>en
Password:
R2#exit

[Connection to 172.31.21.2 closed by foreign host]
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 = 1/4/17 ms

R1#traceroute 192.168.30.31
Type escape sequence to abort.
Tracing the route to 192.168.30.31
 0  192.168.30.31  1 msec  0 msec  0 msec
R1#
```

Ilustración 49. Traceroute entre R1 y PC-A.

```
R1
Physical Config CLI
IOS Command Line Interface
R1#telnet 172.31.21.2
Trying 172.31.21.2 ...OpenUnauthorized Access is Prohibited!

User Access Verification
Password:
R2>en
Password:
R2#exit

[Connection to 172.31.21.2 closed by foreign host]
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 = 1/4/17 ms

R1#traceroute 192.168.30.31
Type escape sequence to abort.
Tracing the route to 192.168.30.31
 0  192.168.30.31  1 msec  0 msec  0 msec
R1#traceroute 192.168.40.31
Type escape sequence to abort.
Tracing the route to 192.168.40.31
 0  192.168.40.31  1 msec  3 msec  3 msec
R1#
```

Ilustración 50. Traceroute entre R1 y PC-C.

```
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#config t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-list 100 permit tcp any host 209.165.200.229 eq www
R2(config)#access-list 100 permit icmp any any echo-reply
R2(config)#int s0/1
R2(config-if)#ip access-group 100 out
R2(config-if)#int s0/0
R2(config-if)#ip access-group 100 out
R2(config-if)#exit
R2(config)#int f0/1
R2(config-if)#ip access-group 100 out
R2(config-if)#exit
R2(config)#int f0/0
R2(config-if)#ip access-group 100 in
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#traceroute 192.168.30.31
Type escape sequence to abort.
Tracing the route to 192.168.30.31

 1  172.31.21.1      1 msec    0 msec    2 msec
 2  192.168.30.31   0 msec    1 msec    1 msec
R2#
```

Ilustración 51. Traceroute entre R2 y PC-A.

```
R2(config)#access-list 100 permit tcp any host 209.165.200.229 eq www
R2(config)#access-list 100 permit icmp any any echo-reply
R2(config)#int s0/1
R2(config-if)#ip access-group 100 out
R2(config-if)#int s0/0
R2(config-if)#ip access-group 100 out
R2(config-if)#exit
R2(config)#int f0/1
R2(config-if)#ip access-group 100 out
R2(config-if)#exit
R2(config)#int f0/0
R2(config-if)#ip access-group 100 in
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#traceroute 192.168.30.31
Type escape sequence to abort.
Tracing the route to 192.168.30.31

 1  172.31.21.1      1 msec    0 msec    2 msec
 2  192.168.30.31   0 msec    1 msec    1 msec
R2#traceroute 192.168.40.31
Type escape sequence to abort.
Tracing the route to 192.168.40.31

 1  172.31.21.1      1 msec    0 msec    0 msec
 2  192.168.40.31   1 msec    1 msec    1 msec
R2#
```

Ilustración 52. Traceroute entre R2 y PC-C.

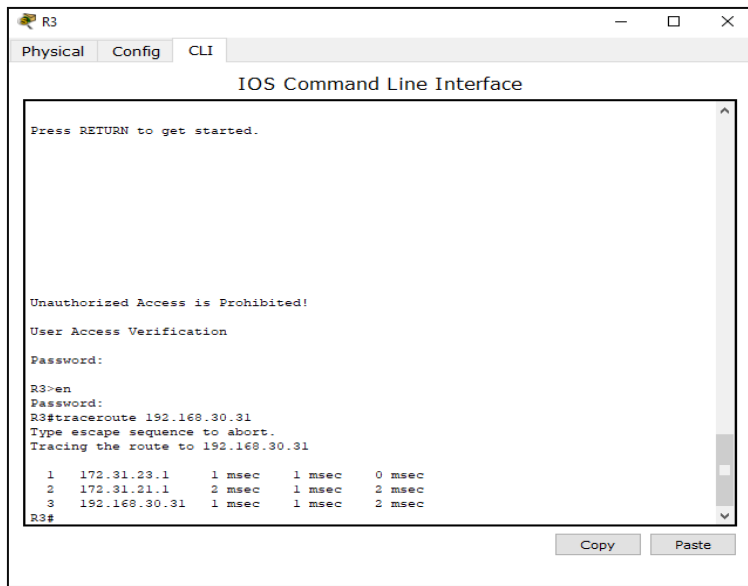


Ilustración 53. Traceroute entre R3 y PC-A.

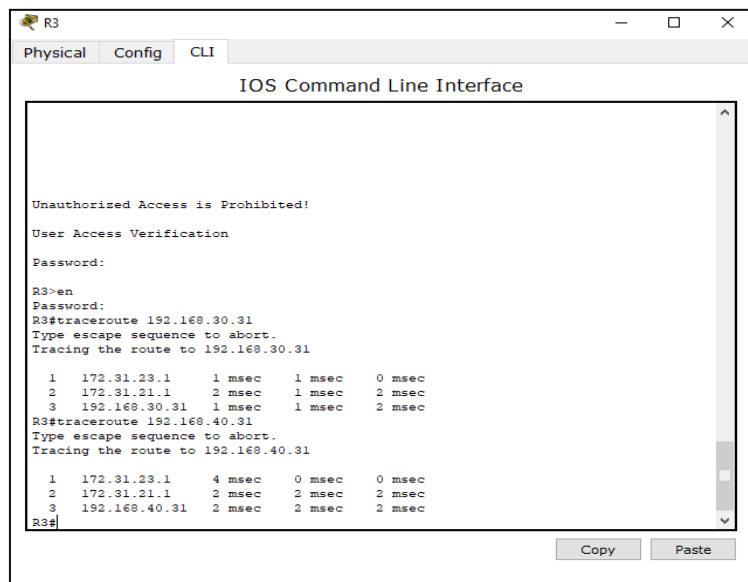


Ilustración 54. Traceroute entre R3 y PC-C.

Conclusiones

En el desarrollo del trabajo se evidencia la importancia que juegan las telecomunicaciones en cualquier entorno y adquirimos conocimientos de redes en cada actividad planteada durante el curso “Network Fundamentals” donde comprendimos los conceptos básicos y el diseño e implementación de subredes y ”Routing Protocols and Concepts” aprendiendo la configuración y solución de problemas de protocolos de enrutamiento obteniendo un crecimiento personal y profesional para así tener mejores oportunidades en el mundo de las telecomunicaciones.

Bibliografía

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<https://static-course-assets.s3.amazonaws.com/RSE503/es/index.html>

Cisco Networking Academy, Switching y routing CCNA: Introducción a redes. Disponible en:

<https://static-course-assets.s3.amazonaws.com/ITN503/es/index.html>

Cisco Networking Academy, Recursos para estudiandes. Disponible en: <https://static-course-assets.s3.amazonaws.com/ITN503/es/index.html>