

EVALUACIÓN FINAL
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
INGENIERÍA ELECTRÓNICA
DIPLOMADO CISCO CCNP
YOPAL-CASANARE

2019

EVALUACIÓN PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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Diplomado de Profundización cisco CCNP prueba de
Habilidades prácticas

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2019

NOTA DE ACEPTACION

Presidente del jurado

Jurado

Yopal 17 de julio de 2019

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GLOSARIO

Certificación CISCO: La certificación Cisco es un plan de capacitación en tecnología de redes informáticas que la empresa Cisco ofrece. Se divide en tres niveles, de menor a mayor complejidad: Cisco Certified Network Associate, Cisco Certified Network Professional y Cisco Certified Internetwork Expert, más conocidas por sus siglas: CCNA, CCNP y CCIE.

CISCO PACKET TRACER: Es un programa de simulación de redes que permite a los estudiantes experimentar con el comportamiento de la red y resolver preguntas del tipo ¿qué pasaría si...?

Networking: Es una red de computadoras, también llamada red de ordenadores, red de comunicaciones de datos o red informática conjunto de equipos informáticos y software reconnectedos entre sí por medio de dispositivos físicos que envían y reciben impulsos eléctricos, ondas electromagnéticas o cualquier otro medio para el transporte de datos, con la finalidad de compartir información, recursos y ofrecer servicios.

Switch: Es un dispositivo de propósito especial diseñado para resolver problemas de rendimiento en la red, debido a anchos de banda pequeños y embottellamientos. El switch puede agregar mayor ancho de banda, acelerar la salida de paquetes, reducir tiempo de espera y bajar el costo por puerto.

Router: Los routers se utilizan para conectar varias redes. Por ejemplo, puede utilizar un router para conectar sus computadoras en red a internet y, de esta forma, compartir una conexión de internet entre varios usuarios. El router actuará como distribuidor, seleccionando la mejor ruta de desplazamiento de la información para que la reciba rápidamente.

RESUMEN

El presente trabajo hace parte del Diplomado de profundización CISCO, en el que se presentan tres escenarios para ser desarrollados. Con este análisis de la información, podemos identificar nuestras debilidades y habilidades que a lo largo del diplomado adquirimos. Se hace por ende necesario que se apliquen los conceptos que se adquirieron en módulos pasados de CISCO, como son, Principios de enrutamiento, VLAN, seguridad, protocolos avanzados entre otros.

En este trabajo hice uso del programa CISCO PACKET TRACER como herramienta de simulación de los escenarios, ya que me parece la mejor herramienta para desarrollar el trabajo.

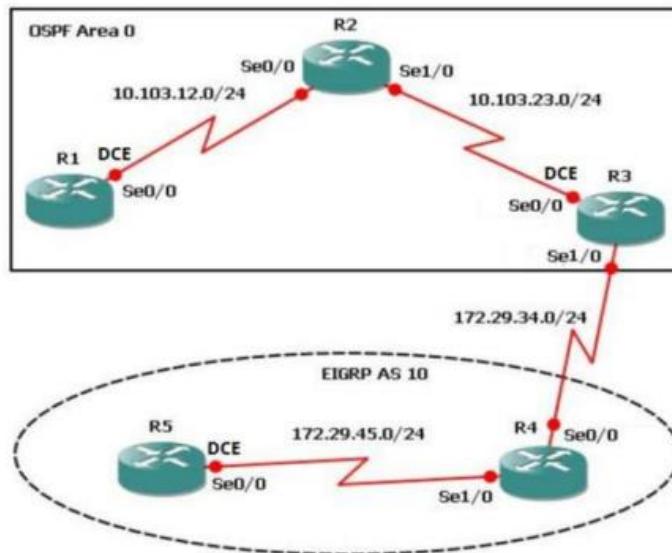
Palabras Clave: Redes, Cisco, VLAN, CCNP

INTRODUCCIÓN

Se aplicó las configuraciones que la guía de actividades exige para la solución de la actividad. Mediante la configuración de SWITCHES y ROUTERS Cisco se pudo analizar el comportamiento de los aparatos enviando comandos descritos en cada escenario. Fue importante un análisis concienzudo para que los temas vistos a lo largo del curso quedaran claros.

ESCENARIO 1

Ilustración 1. Escenario 1



1. Aplique las configuraciones iniciales y los protocolos de enrutamiento para los routers R1, R2, R3, R4 y R5 según el diagrama. No asigne passwords en los routers. Configurar las interfaces con las direcciones que se muestran en la topología de red.

Configuración de interfaces para cada Router:

Router 1 – R1

```
Router> en  
Router#conf t  
Router(config)# Hostname R1  
R1(config)# end
```

```
R1# conf t  
R1(config)# int s0/0/0  
R1(config-if)#ip address 10.103.12.1 255.255.255.0  
R1(config-if)#clock rate 64000  
R1(config-if)#no shutdown  
R1(config-if)#exit  
R1(config)#+
```

Router 2 - R2:

```
Router>en  
Router#conf  
Router(config)#hostname R2  
R2(config)#end  
R2#conf t  
R2(config)#int s0/0/0  
R2(config-if)#ip address 10.103.12.2 255.255.255.0  
R2(config-if)#no shutdown  
R2(config-if)#exit  
R2(config)#int s0/0/1  
R2(config-if)#ip address 10.103.23.1 255.255.255.0  
R2(config-if)#clock rate 64000  
R2(config-if)#no shutodwn  
R2(config-if)#exit  
R2(config)#end
```

Router 3 - R3

```
Router>en
Router#conf t
Router(config)#hostname R3
R3(config)#end
R3#conf t
R3(config)#int s0/0/0
R3(config-if)#ip address 10.103.23.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#int s0/0/1
R3(config-if)#ip address 172.29.34.1 255.255.255.0
R3(config-if)#clock rate 64000
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#+
```

Router 4 – R4

```
Router>en
Router#conf t
Router(config)#hostname R4
R4(config)#end
R4#conf t
R4(config)#int s0/0/0
R4(config-if)#ip address 172.29.34.2 255.255.255.0
```

```
R4(config-if)#no shutdown  
R4(config-if)#exit  
R4(config)#int s0/0/1  
R4(config-if)#ip address 172.29.45.1 255.255.255.0  
R4(config-if)#clock rate 64000  
R4(config-if)#no shutdown  
R4(config-if)#exit  
R4(config)#+
```

Router 5 – R5

```
Router>en  
Router#conf t  
Router(config)#hostname R5  
R5(config)#end  
R5#conf t  
R5(config)#int s0/0/0  
R5(config-if)#ip address 172.29.45.2 255.255.255.0  
R5(config-if)#no shutdown  
R5(config-if)#exit  
R5(config)#+
```

- 2. Cree cuatro nuevas interfaces de Loopback en R1 utilizando la asignación de direcciones 10.1.0.0/22 y configure esas interfaces para participar en el área 0 de OSPF.**

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#int Lo1
%LINK-5-CHANGED: Interface Loopback1, changed state to up
R1(config-if)#ip address 10.1.0.1 255.255.252.0
R1(config-if)#exit
R1(config)#int Lo2
%LINK-5-CHANGED: Interface Loopback2, changed state to up
R1(config-if)#ip address 10.1.0.2 255.255.252.0
% 10.1.0.0 overlaps with Loopback1
R1(config-if)#exit
R1(config)#int Lo3
%LINK-5-CHANGED: Interface Loopback3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3, changed state
to up
R1(config-if)#ip address 10.1.0.3 255.255.252.0
% 10.1.0.0 overlaps with Loopback1
R1(config-if)#exit
R1(config)#int Lo4
R1(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state
to up
```

```
R1(config-if)#ip address 10.1.0.4 255.255.252.0
% 10.1.0.0 overlaps with Loopback1
R1(config-router)#exit
R1(config)#end
R1# %SYS-5-CONFIG_I: Configured from console by console
```

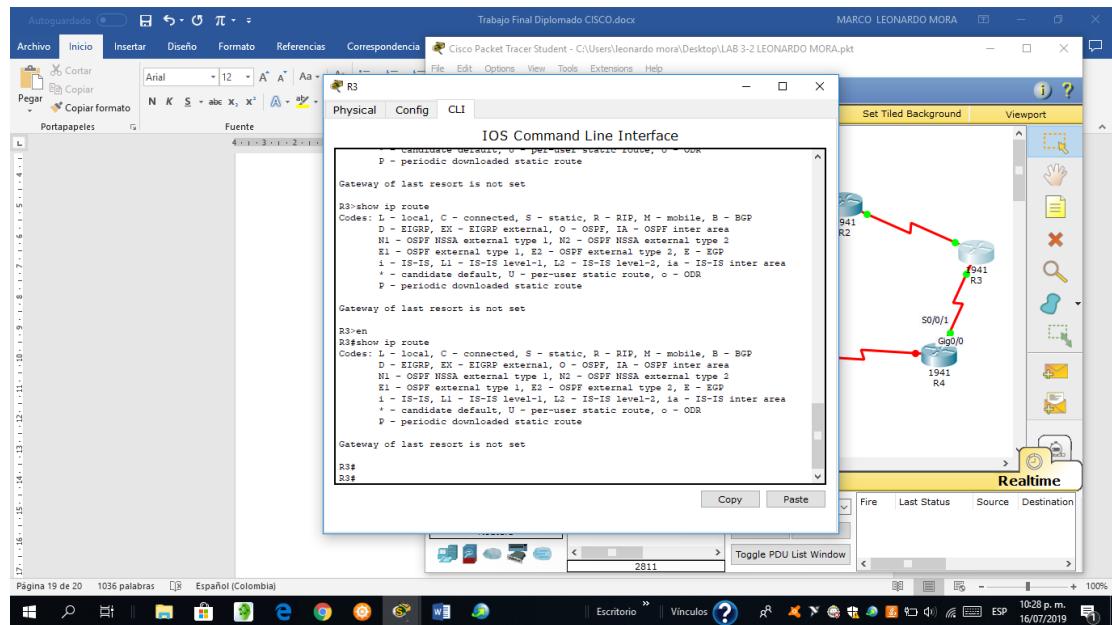
3. Cree cuatro nuevas interfaces de Loopback en R5 utilizando la asignación de direcciones 172.5.0.0/22 y configure esas interfaces para participar en el Sistema Autónomo EIGRP 10.

```
R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#int Lo1
R5(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state
to up
R5(config-if)#ip address 172.5.0.1 255.255.252.0
R5(config-if)#exit
R5(config)#int Lo2
R5(config-if)#
%LINK-5-CHANGED: Interface Loopback2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state
to up
R5(config-if)#ip address 172.5.0.2 255.255.252.0
% 172.5.0.0 overlaps with Loopback1
R5(config-if)#exit
R5(config)#int Lo3
```

```
R5(config-if)#
%LINK-5-CHANGED: Interface Loopback3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3, changed state
to up
R5(config-if)#ip address 172.5.0.3 255.255.252.0
% 172.5.0.0 overlaps with Loopback1
R5(config-if)#exit
R5(config)#int Lo4
R5(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state
to up
R5(config-if)#ip address 172.5.0.4 255.255.252.0
% 172.5.0.0 overlaps with Loopback1
R5(config-if)#exit
R5(config)#router eigrp 10
R5(config-router)#no auto-summary
R5(config-router)#network 172.5.0.0 0.0.3.255
R5(config-router)#exit
R5(config)#end
R5#
%SYS-5-CONFIG_I: Configured from console by console
```

4. Analice la tabla de enrutamiento de R3 y verifique que R3 está aprendiendo las nuevas interfaces de Loopback mediante el comando **show ip route**.

Ilustración 2. Comando show IP route en R3



5. Configure R3 para redistribuir las rutas EIGRP en OSPF usando el costo de 50000 y luego redistribuya las rutas OSPF en EIGRP usando un ancho de banda T1 y 20,000 microsegundos de retardo.

R3>en

R3#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R3(config)#router eigrp 10

R3(config-router)#redistribute ospf 1 metric 10000 100 255 1 1500

R3(config-router)#network 172.5.0.0 0.0.3.255

R3(config-router)#auto-summary

R3(config-router)#exit

R3(config)#router ospf 1

```

R3(config-router)#log-adjacency-changes
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#network 10.1.0.0 0.0.3.255 area 0
R3(config-router)#exit
R3(config)#

```

6. Verifique en R1 y R5 que las rutas del sistema autónomo opuesto existen en su tabla de enrutamiento mediante el comando **show ip route**.

Ilustración 3. Comando show IP route en R5

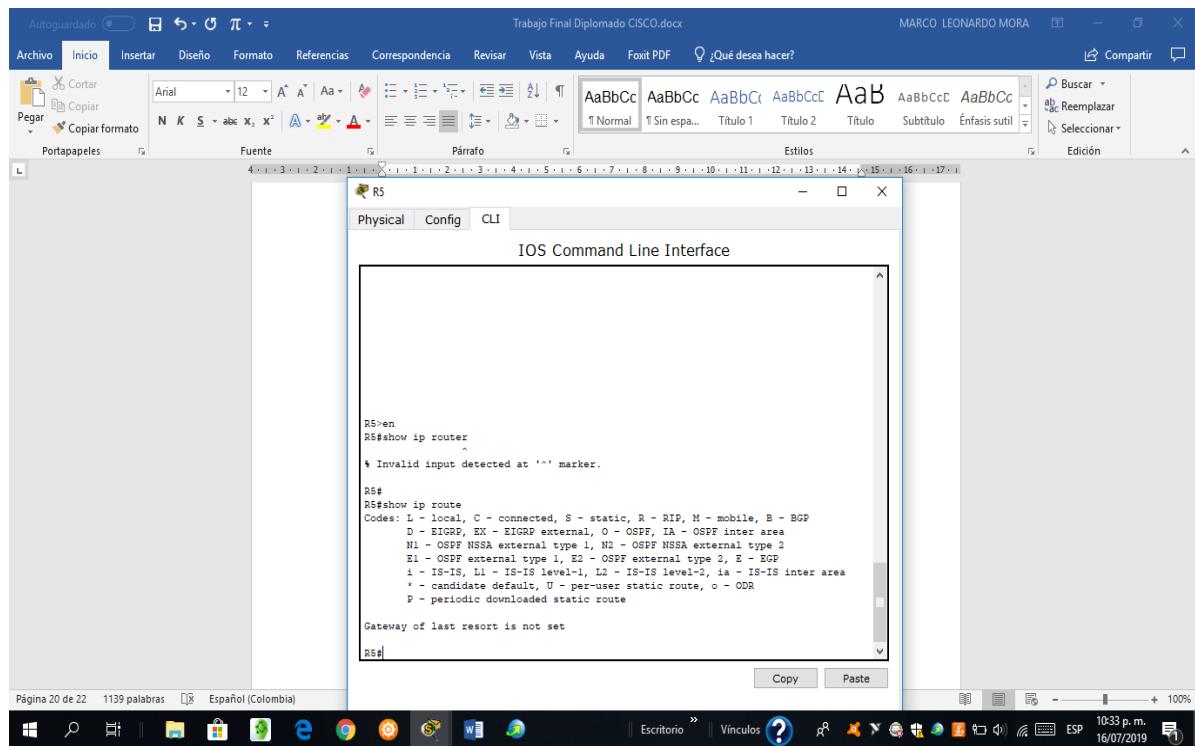


Ilustración 4. Comando show IP en R1

```

*%Dual-0-CHG: IPv6-EIGRP 1: Neighbor FE80::2 (Serial0/1/0) is down: holding time expired
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
*DUAL-0-CHG: IPv6-EIGRP 1: Neighbor FE80::2 (Serial0/1/0) is up: new adjacency

R1#en
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set
R1#

```

ma autónomo opuesto comando show ip route.

ESCENARIO 2

Ilustración 5. Escenario 2

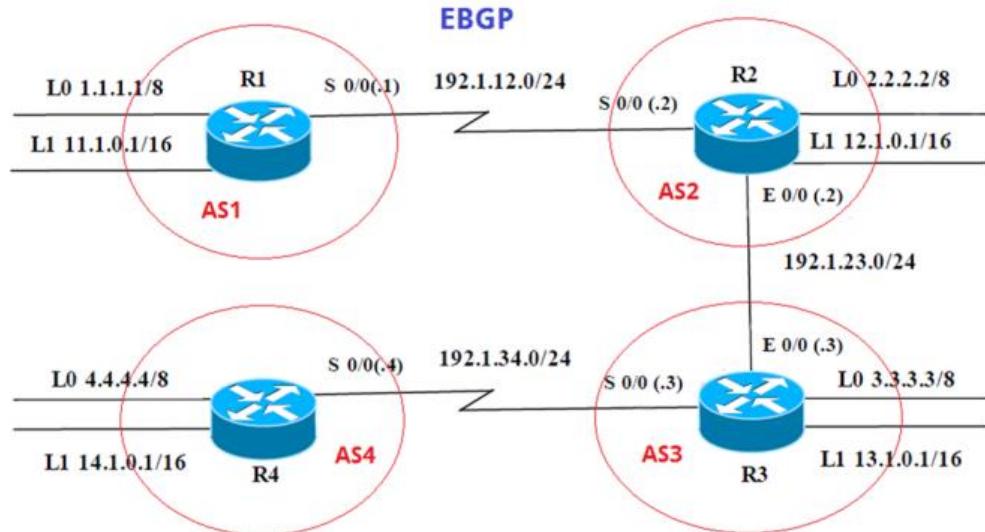


Tabla 1. Direccionamiento de Routers

	Interfaz	Dirección IP	Máscara
R1	Loopback 0	1.1.1.1	255.0.0.0
	Loopback 1	11.1.0.1	255.255.0.0
	S 0/0	192.1.12.1	255.255.255.0
R2	Loopback 0	2.2.2.2	255.0.0.0
	Loopback 1	12.1.0.1	255.255.0.0
	S 0/0	192.1.12.2	255.255.255.0
	E 0/0	192.1.23.2	255.255.255.0
R3	Loopback 0	3.3.3.3	255.0.0.0
	Loopback 1	13.1.0.1	255.255.0.0
	E 0/0	192.1.23.3	255.255.255.0
	S 0/0	192.1.34.3	255.255.255.0
R4	Loopback 0	4.4.4.4	255.0.0.0
	Loopback 1	14.1.0.1	255.255.0.0
	S 0/0	192.1.34.4	255.255.255.0

- Configure una relación de vecino BGP entre R1 y R2. R1 debe estar en AS1 y R2 debe estar en AS2. Anuncie las direcciones de Loopback en BGP. Codifique los ID para los routers BGP como 11.11.11.11 para R1 y como 22.22.22.22 para R2. Presente el paso a con los comandos utilizados y la salida del comando show ip route.

R1

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname R1

R1(config)#end

R1#

%SYS-5-CONFIG_I: Configured from console by console

R1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```
R1(config)#int s0/0/0
R1(config-if)#ip address 192.1.12.1 255.255.255.0
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#int Lo0
R1(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state
to up
R1(config-if)#ip address 1.1.1.1 255.0.0.0
R1(config-if)#exit
R1(config)#int Lo1
R1(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state
to up
R1(config-if)#ip address 11.1.0.1 255.255.0.0
R1(config-if)#exit
R1(config)#

```

R2

```
Router>en
```

```
Router#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#hostname R2
```

```
R2(config)#end
```

```
R2#  
%SYS-5-CONFIG_I: Configured from console by console  
R2#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#int Lo0  
R2(config-if)#  
%LINK-5-CHANGED: Interface Loopback0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state  
to up  
R2(config-if)#ip address 2.2.2.2 255.0.0.0  
R2(config-if)#exit  
R2(config)#int Lo1  
R2(config-if)#  
%LINK-5-CHANGED: Interface Loopback1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state  
to up  
R2(config-if)#ip address 12.1.0.1 255.255.0.0  
R2(config-if)#exit  
R2(config)#int s0/0/0  
R2(config-if)#ip address 192.1.12.2 255.255.255.0  
R2(config-if)#no shutdown  
R2(config-if)#  
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up  
R2(config-if)#exit  
R2(config)#int e  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state  
to up  
R2(config)#int f0/0
```

```
R2(config-if)#ip address 192.1.23.2 255.255.255.0  
R2(config-if)#exit  
R2(config)#end  
R2#
```

R3

```
Router>en  
Router#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#hostname R3  
R3(config)#exit  
R3#  
%SYS-5-CONFIG_I: Configured from console by console  
R3#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#int Lo0  
R3(config-if)#  
%LINK-5-CHANGED: Interface Loopback0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state  
to up  
R3(config-if)#ip address 3.3.3.3 255.0.0.0  
R3(config-if)#exit  
R3(config)#int Lo1  
R3(config-if)#  
%LINK-5-CHANGED: Interface Loopback1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state  
to up  
R3(config-if)#ip address 13.1.0.1 255.255.0.0
```

```
R3(config-if)#exit
R3(config)#int f0/0
R3(config-if)#ip address 192.1.23.3 255.255.255.0
R3(config-if)#exit
R3(config)#int s0/0/0
R3(config-if)#ip address 192.1.34.3 255.255.255.0
R3(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R3(config-if)#exit
R3(config)#+
```

R4

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R4
R4(config)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#int Lo0
R4(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state
to up
```

```
R4(config-if)#ip address 4.4.4.4 255.0.0.0
R4(config-if)#exit
R4(config)#int Lo1
R4(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state
to up
R4(config-if)#ip address 14.1.0.1 255.255.0.0
R4(config-if)#exit
R4(config)#int s0/0/0
R4(config-if)#ip address 192.1.34.4 255.255.255.0
R4(config-if)#clock rate 64000
R4(config-if)#no shutdown
R4(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R4(config-if)#exit
R4(config)#end
R4#
```

Configuración vecino BGP para R1 y R2

R1

```
R1#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R1(config)#router bgp 100
```

```
R1(config-router)#network 192.1.12.1 mask 255.255.255.0
```

```
R1(config-router)#neighbor 192.1.12.2 remote-as 200
```

```
R1(config-router)#+
```

R2:

R2>en

R2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R2(config)#router bgp 200

R2(config-router)#network 192.1.12.2 mask 255.255.255.0

R2(config-router)#neighbor 192.1.12.1 remote-as 100

R2(config-router)#%BGP-5-ADJCHANGE: neighbor 192.1.12.1 Up

Ilustración 6. Relación BGP establecida

The screenshot shows the Cisco IOS CLI interface. At the top, there are three tabs: Physical, Config, and CLI. The CLI tab is selected. Below the tabs, the title "IOS Command Line Interface" is displayed. The main window contains the following command history and output:

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
R1#
*DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::2 (Serial0/1/0) is up: new
adjacency
R1#
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
*DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::2 (Serial0/1/0) is down: interface
down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
R1#
*DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::2 (Serial0/1/0) is up: new
adjacency
R1#ping 192.1.12.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.1.12.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons.

Ilustración 7. Relación BGP en R2

```
%DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::3 (Serial0/1/0) is down: holding time expired

%DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::1 (Serial0/1/1) is down: holding time expired

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

R2#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
%DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::1 (Serial0/1/1) is up: new adjacency

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

R2#
%DUAL-5-NBRCHANGE: IPv6-EIGRP 1: Neighbor FE80::3 (Serial0/1/0) is up: new adjacency

R2#ping 192.1.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.1.12.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R2#
```

Copy Paste

Codificación de los ID para los routers BGP:

R1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#router bgp 100

R1(config-router)#bgp router-id 11.11.11.11 25

R1(config-router)#%BGP-5-ADJCHANGE: neighbor 192.1.12.2 Up

R2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R2(config)#router bgp 200

```
R2(config-router)#bgp router-id 22.22.22.22  
R2(config-router)#  
%BGP-5-ADJCHANGE: neighbor 192.1.12.1 Up
```

2. Configure una relación de vecino BGP entre R2 y R3. R2 ya debería estar configurado en AS2 y R3 debería estar en AS3. Anuncie las direcciones de Loopback de R3 en BGP. Codifique el ID del router R3 como 33.33.33.33. Presente el paso a con los comandos utilizados y la salida del comando show ip route.

R2

```
R2#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#router bgp 200  
R2(config-router)#network 192.1.12.2 mask 255.255.255.0  
R2(config-router)#neighbor 192.1.12.3 remote-as 300  
R2(config-router)#+
```

R3

```
R3#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#router bgp 300  
R3(config-router)#network 192.1.12.3 mask 255.255.255.0  
R3(config-router)#neighbor 192.1.12.2 remote-as 200  
R3(config-router)#+  
Se codifica el ID para el router R3
```

```
R3#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#router bgp 300  
R3(config-router)#bgp router-id 33.33.33.33  
R3(config-router)#exit  
R3(config)#end  
R3#  
%SYS-5-CONFIG_I: Configured from console by console  
R3#show ip bgp  
BGP table version is 1, local router ID is 33.33.33.33
```

3. Configure una relación de vecino BGP entre R3 y R4. R3 ya debería estar configurado en AS3 y R4 debería estar en AS4. Anuncie las direcciones Loopback de R4 en BGP. Codifique el ID del router R4 como 44.44.44.44. Establezca las relaciones de vecino con base en las direcciones de Loopback 0. Cree rutas estáticas para alcanzar la Loopback 0 del otro router. No anuncie la Loopback 0 en BGP. Anuncie la red Loopback de R4 en BGP. Presente el paso como los comandos utilizados y salida del comando show ip route

R3:

```
R3#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#router bgp 300  
R3(config-router)#network 3.3.3.3 mask 255.0.0.0  
R3(config-router)#neighbor 4.4.4.4 remote-as 400  
R3(config-router)#exit  
R3(config)#end  
R3#  
%SYS-5-CONFIG_I: Configured from console by console
```

R4

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.

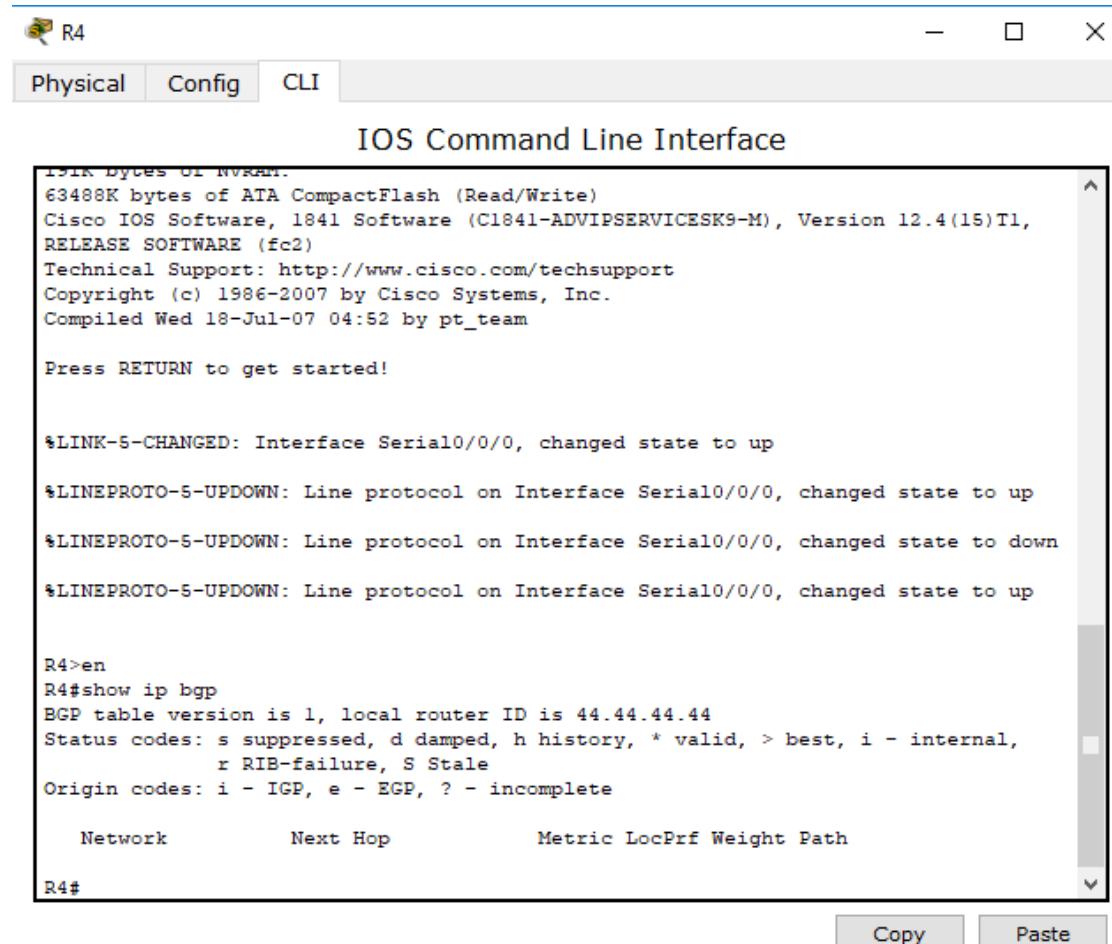
R4(config)#router bgp 400
R4(config-router)#network 4.4.4.4 mask 255.0.0.0
R4(config-router)#neighbor 3.3.3.3 remote-as 300
R4(config-router)#exit
R4(config)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console
```

Se codifica el ID para el router R4:

```
R4#conf t
Enter configuration commands, one per line. End with CNTL/Z.

R4(config)#router bgp 400 28
R4(config-router)#bgp router-id 44.44.44.44
R4(config-router)#exit
R4(config)#end
R4#
```

Ilustración 8. Configuración BGP R4



R4 Physical Config CLI

IOS Command Line Interface

```
151K bytes of NVRAM.  
63488K bytes of ATA CompactFlash (Read/Write)  
Cisco IOS Software, 1841 Software (C1841-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 04:52 by pt_team  
  
Press RETURN to get started!  
  
*LINK-5-CHANGED: Interface Serial0/0/0, changed state to up  
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up  
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down  
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up  
  
R4>en  
R4#show ip bgp  
BGP table version is 1, local router ID is 44.44.44.44  
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,  
r RIB-failure, S Stale  
Origin codes: i - IGP, e - EGP, ? - incomplete  
  
Network          Next Hop           Metric LocPrf Weight Path  
R4#
```

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Ilustración 9. Creación de la ruta estática R3

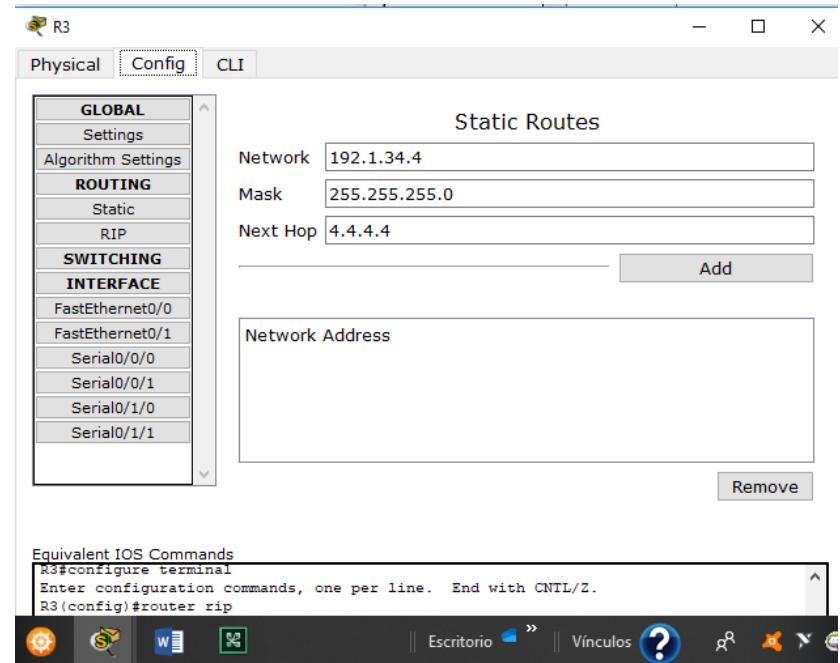


Ilustración 10. Creación de la ruta estática en R4

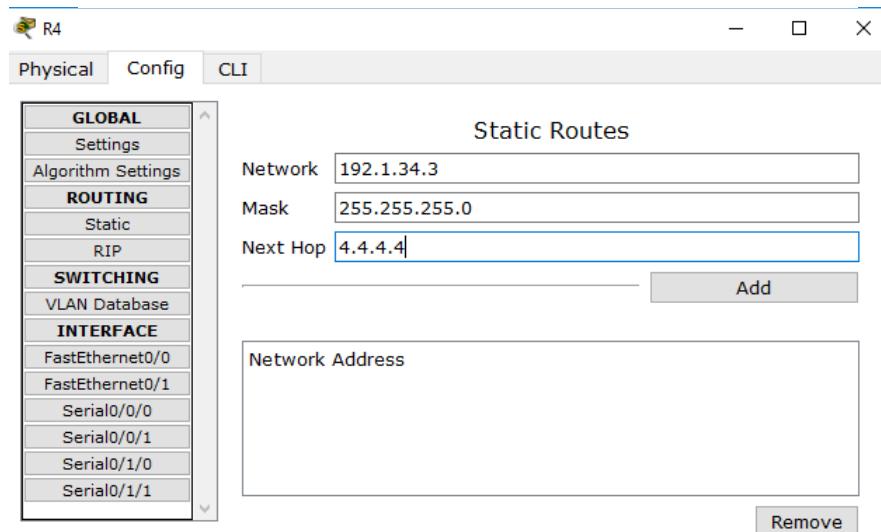


Ilustración 11. Funcionamiento de conexión establecida en R3

```
R3(vlan)#
R3(vlan)#exit
APPLY completed.
Exiting...
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#
R3(config-router)#exit
R3(config)#
R3(config)#ip route 192.1.34.4 255.255.255.0 4.4.4.4
%Inconsistent address and mask
R3(config)#
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
end
Translating "end"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

R3#ping 192.1.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.1.34.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/9/45 ms

R3#
```

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Ilustración 12. Funcionamiento de conexión establecida en R4

```
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#ip route 192.1.34.3 255.255.255.0 4.4.4.4
%Inconsistent address and mask
R4(config)#end
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#ping 192.1.34.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.1.34.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/4/15 ms

R4#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

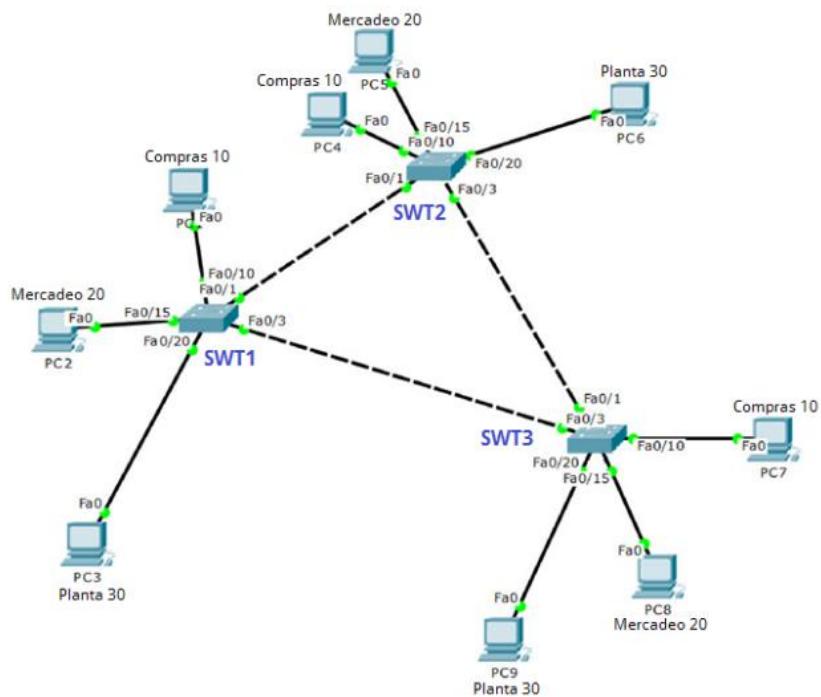
C        4.0.0.0/8 is directly connected, Loopback0
        14.0.0.0/16 is subnetted, 1 subnets
C          14.1.0.0 is directly connected, Loopback1
C        192.1.34.0/24 is directly connected, Serial0/0/0

R4#
```

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ESCENARIO 3

Ilustración 13. Escenario 3



SWT1

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#VTP domain CCNP

Changing VTP domain name from NULL to CCNP

Switch(config)#vtp mode client

Setting device to VTP CLIENT mode.

Switch(config)#vtp password cisco

Setting device VLAN database password to cisco

SWT2:

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#hostname SWT2

SWT2(config)#end

SWT2#

%SYS-5-CONFIG_I: Configured from console by console

SWT2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT2(config)#vtp mode server

Device mode already VTP SERVER.

SWT2(config)#vtp domain CCNP

Domain name already set to CCNP.

SWT2(config)#vtp password cisco

Setting device VLAN database password to cisco

SWT2(config)#

SWT3:

Switch>en

Switch#conf

Configuring from terminal, memory, or network? terminal

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#hostname SWT3

```
SWT3(config)#end
SWT3#
%SYS-5-CONFIG_I: Configured from console by console
SWT3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SWT3(config)#VTP domain CCNP
Changing VTP domain name from NULL to CCNP
SWT3(config)#vtp mode client
Setting device to VTP CLIENT mode.
SWT3(config)#vtp password cisco
Setting device VLAN database password to cisco
SWT3(config)#

```

B. Configurar DTP (Dynamic Trunking Protocol)

1. Configure un enlace troncal (“trunk”) dinámico entre SWT1 y SWT2. Debido a que el modo por defecto es dynamic auto, solo un lado del enlace debe configurarse como dynamic desirable

SWT1:

```
SWT1>en
SWT1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SWT1(config)#int fa0/1
SWT1(config-if)#switchport mode dynamic desirable SWT1
(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/1, changed state to up

```

```

SWT1(config-if)#exit
SWT1(config)#end
SWT1#
%SYS-5-CONFIG_I: Configured from console by console

```

2. Verifique el enlace “trunk” entre SWT1 y SWT2 usando el comando show interfaces trunk.

Ilustración 14. Comando show interfaces trunk SWT1

```

SWT1#show vtp status
VTP Version : 2
Configuration Revision : 8
Maximum VLANs supported locally : 255
Number of existing VLANs : 9
VTP Operating Mode : Client
VTP Domain Name : CCNP
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0x49 0x92 0xDE 0x9F 0xC7 0xAE 0x93 0x8A
Configuration last modified by 0.0.0.0 at 3-1-93 00:26:01
SWT1#show interfaces trunk
Port      Mode      Encapsulation  Status      Native vlan
Fa0/1    desirable   n-802.1q     trunking    1
Fa0/3    on          802.1q      trunking    1

Port      Vlans allowed on trunk
Fa0/1    1-1005
Fa0/3    1-1005

Port      Vlans allowed and active in management domain
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99
SWT1#

```

3. Entre SWT1 y SWT3 configure un enlace “trunk” estático utilizando el comando switchport mode trunk en la interfaz f0/3 de SWT1

SWT1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT1(config)#int fa0/3

SWT1(config-if)#switchport mode trunk

SWT1(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

SWT1(config-if)#exit

SWT1(config)#end

SWT1#

%SYS-5-CONFIG_I: Configured from console by console

4. Verifique el enlace “trunk” con el comando show interfaces trunk en SWT1

Ilustración 15. Comando show interfaces trunk en SWT1

The screenshot shows the CLI interface for switch SWT1. The title bar says "SWT1". Below it, there are three tabs: "Physical", "Config", and "CLI", with "CLI" being the active tab. The main window displays the output of the "show interfaces trunk" command. The output is as follows:

```
IOS Command Line Interface
SWT1#show interfaces trunk
Port      Mode       Encapsulation  Status      Native vlan
Fa0/1    desirable   n-802.1q        trunking    1
Fa0/3    on          802.1q         trunking    1

Port      Vlans allowed on trunk
Fa0/1    1-1005
Fa0/3    1-1005

Port      Vlans allowed and active in management domain
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99
SWT1#
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons.

5. Configure un enlace “trunk” permanente entre SWT2 y SWT3

SWT2>en

SWT2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT2(config)#int fa0/3

SWT2(config-if)#switchport mode trunk

SWT2(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

SWT2(config-if)#exit

SWT2(config)#end

SWT2#

%SYS-5-CONFIG_I: Configured from console by console

Ilustración 16. Enlace trunk en SWT2

The screenshot shows the CLI interface for a Cisco router named SWT2. The window title is "SWT2". The tabs at the top are "Physical", "Config" (which is selected), and "CLI". The main area is titled "IOS Command Line Interface". The command entered was "show interfaces trunk". The output displays the configuration of FastEthernet0/3 as a trunk port, including its allowed VLANs and active management domain VLANs. The interface is configured with native VLAN 1 and 802.1Q encapsulation.

```
SWT2>en
SWT2#show interfaces trunk
Port      Mode      Encapsulation  Status      Native vlan
Fa0/1    auto      n-802.1q       trunking    1
Fa0/3    on        802.1q        trunking    1

Port      Vlans allowed on trunk
Fa0/1    1-1005
Fa0/3    1-1005

Port      Vlans allowed and active in management domain
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99
SWT2#
```

C. Agregar VLANs y asignar puertos 1. En SWT1 agreue la VLAN 10. En SWT2 agreue las VLANS Compras (10), Mercadeo (20), Planta (30) y Admon (99)

SWT2:

```
SWT2>en
SWT2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SWT2(config)#vlan 10
SWT2(config-vlan)#name VLAN_Compras
SWT2(config-vlan)#exit
SWT2(config)#vlan 20
SWT2(config-vlan)#name VLAN_Mercadeo
SWT2(config-vlan)#exit
SWT2(config)#vlan 30
SWT2(config-vlan)#name VLAN_Planta
SWT2(config-vlan)#exit
SWT2(config)#vlan 99
SWT2(config-vlan)#name VLAN_Admon
SWT2(config-vlan)#exit
SWT2(config)#end
SWT2#
%SYS-5-CONFIG_I: Configured from console by console
```

SWT1:

SWT1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT1(config)#int fa0/10

SWT1(config-if)#sw access vlan 10

SWT1(config-if)#exit

SWT1(config)#end

SWT1#

%SYS-5-CONFIG_I: Configured from console by console

3. Verifique que las VLANs han sido agregadas correctamente.

Ilustración 17. Verificación de VLSN

The screenshot shows the Cisco IOS Command Line Interface (CLI) window titled "IOS Command Line Interface". The window has tabs for "Physical", "Config", and "CLI", with "CLI" selected. The command entered is "show vlan". The output displays information about VLANs, including their names, status, and associated ports. It also shows detailed statistics for each VLAN.

```
Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30,99
Fa0/3    1,10,20,30,99
SWT1#
SWT1#show vlan

VLAN Name          Status    Ports
---- --
1    default        active    Fa0/2, Fa0/4, Fa0/5, Fa0/6
                           Fa0/7, Fa0/8, Fa0/9, Fa0/11
                           Fa0/12, Fa0/13, Fa0/14, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/21
                           Fa0/22, Fa0/23, Fa0/24, Gig0/1
                           Gig0/2
10   VLAN_Compras  active    Fa0/10
20   VLAN_Mercadeo active    Fa0/15
30   VLAN_Planta   active    Fa0/20
99   VLAN_Admon   active
1002 fddi-default  act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default act/unsup
1005 trnet-default  act/unsup

VLAN Type      SAID      MTU      Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- --      --      --      --      --      --      --      --      --      --
1  enet      100001    1500      -       -       -       -       0       0
10  enet     100010    1500      -       -       -       -       0       0
--More-- |
```

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4. Asocie los puertos a las VLAN y configure las direcciones IP de acuerdo con la siguiente tabla.

Tabla 2. Direcciones IP

Interfaz	VLAN	Direcciones IP de los PCs
F0/10	VLAN 10	190.108.10.X / 24
F0/15	VLAN 20	190.108.20.X /24
F0/20	VLAN 30	190.108.30.X /24

X = número de cada PC particular

SWT1:

SWT1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT1(config)#int fa0/10

SWT1(config-if)#switchport mode Access

SWT1(config-if)#switchport access vlan 10

SWT1(config-if)#exit

SWT1(config)#int fa0/15

SWT1(config-if)# exit

SWT1#

%SYS-5-CONFIG_I: Configured from console by console

SWT1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT1(config)#int fa0/15

SWT1(config-if)#switchport mode access

SWT1(config-if)#switchport access vlan 20

SWT1(config-if)#exit

SWT1(config)#int fa0/20

SWT1(config-if)#switchport mode Access

SWT1(config-if)#switchport access vlan 30

```
SWT1(config-if)#exit  
SWT1(config)#end  
SWT1#  
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 18. IP configuration PC3

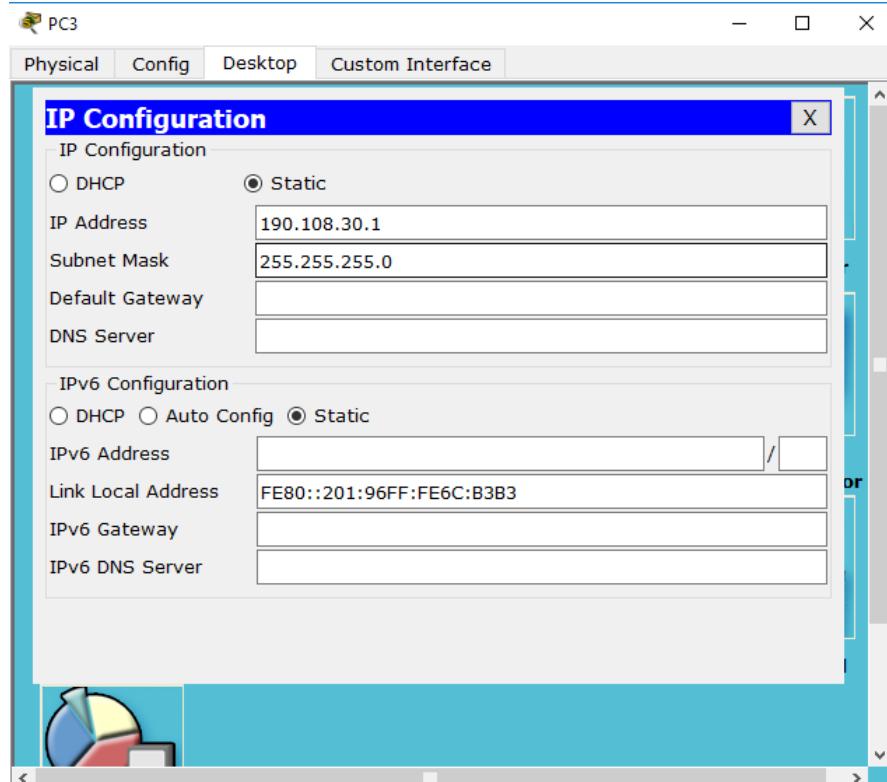


Ilustración 19. IP configuration PC4

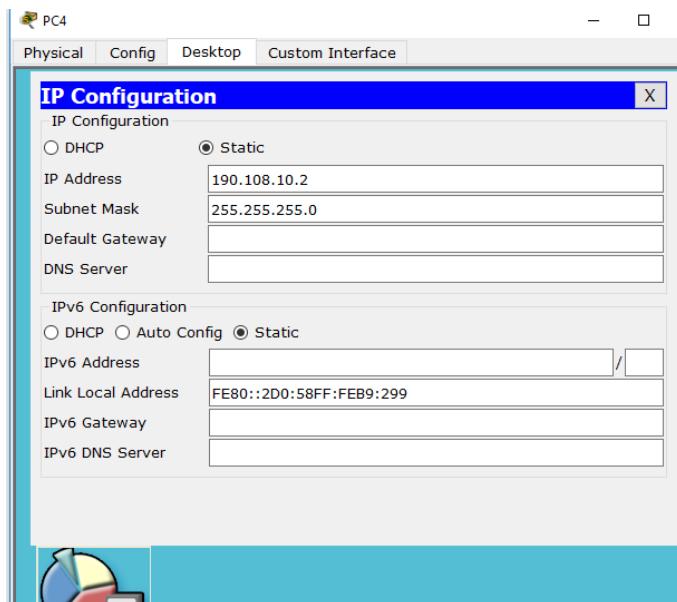
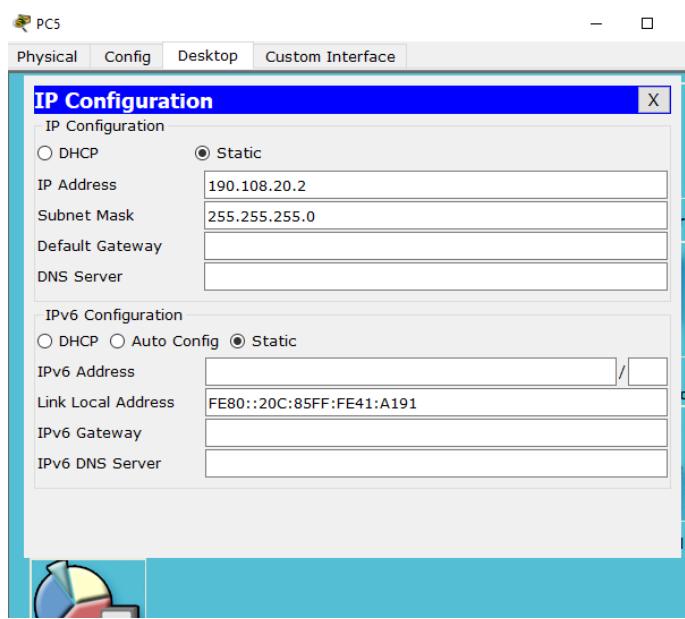


Ilustración 20. IP configuration en PC5



SWT3

```
SWT3>en
SWT3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SWT3(config)#int fa0/10
SWT3(config-if)#switchport mode access
SWT3(config-if)#switchport access vlan 10
SWT3(config-if)#exit
SWT3(config)#int fa0/15
SWT3(config-if)#switchport mode access
SWT3(config-if)#switchport access vlan 20
SWT3(config-if)#exit
SWT3(config)#int fa0/20
SWT3(config-if)#switchport mode access
SWT3(config-if)#switchport access vlan 30
SWT3(config-if)#exit
SWT3(config)#end
SWT3#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 21. IP configuration PC 6

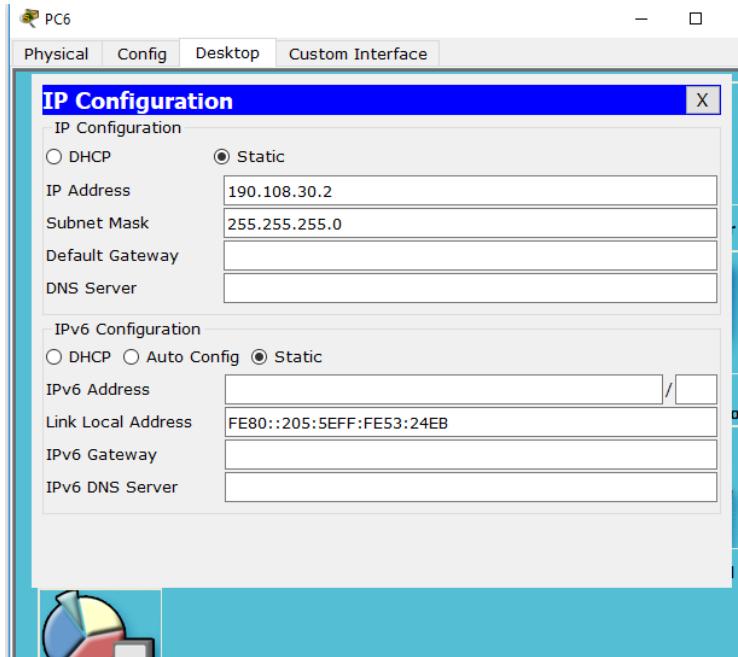


Ilustración 22. IP configuration PC7

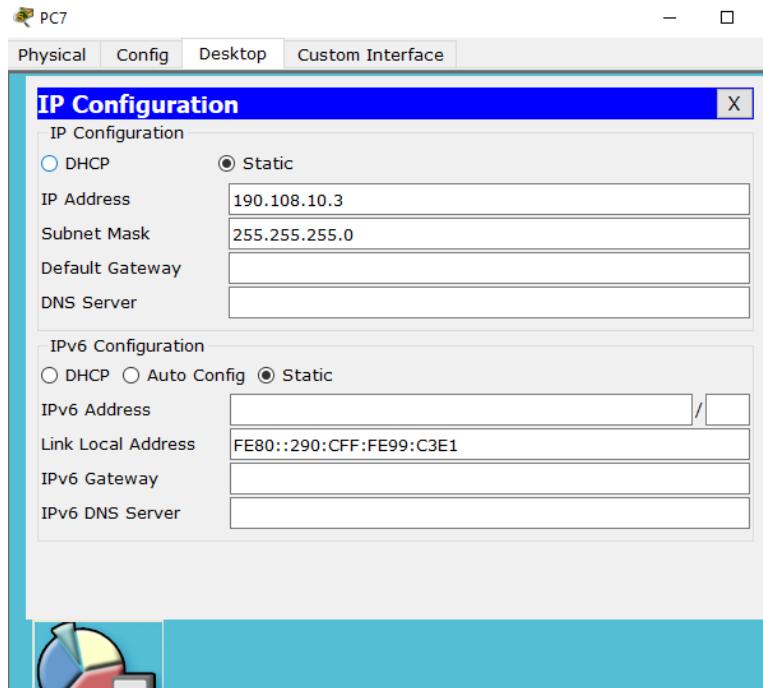
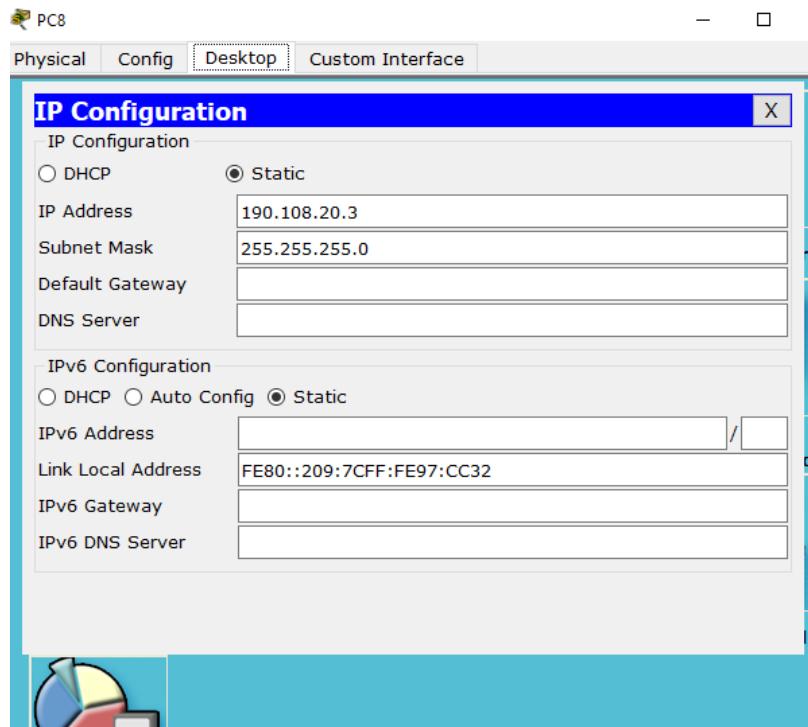


Ilustración 23. IP configuration PC8



4. Configure el puerto F0/10 en modo de acceso para SWT1, SWT2 y SWT3 y asígnelo a la VLAN 10
5. Repita el procedimiento para los puertos F0/15 y F0/20 en SWT1, SWT2 y SWT3. Asigne las VLANs y las direcciones IP de los PCs de acuerdo con la tabla de arriba.

D. Configurar las direcciones IP en los switches

1. En cada uno de los switches asigne una dirección IP al SVI para VLAN 99 de acuerdo con la siguiente tabla de direccionamiento y active la interfaz

Tabla 3. Direccionamiento de Switches

Equipo	Interfaz	Dirección IP	Máscara
SWT1	VLAN 99	190.108.99.1	255.255.255.0
SWT2	VLAN 99	190.108.99.2	255.255.255.0
SWT3	VLAN 99	190.108.99.3	255.255.255.0

SWT1:

SWT1>en

SWT1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

SWT1(config)#int vlan 99

SWT1(config-if)#

%LINK-5-CHANGED: Interface Vlan99, changed state to up

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

SWT1(config-if)#ip address 190.108.99.1 255.255.255.0

SWT1(config-if)#no shutdown

SWT1(config-if)#exit

SWT1(config)#end

SWT1#

%SYS-5-CONFIG_I: Configured from console by console

SWT2:

SWT2>en

SWT2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```
SWT2(config)#int vlan 99
SWT2(config-if)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to
up
SWT2(config-if)#ip address 190.108.99.2 255.255.255.0
SWT2(config-if)#no shutdown
SWT2(config-if)#exit
SWT2(config)#end
SWT2#
%SYS-5-CONFIG_I: Configured from console by console
```

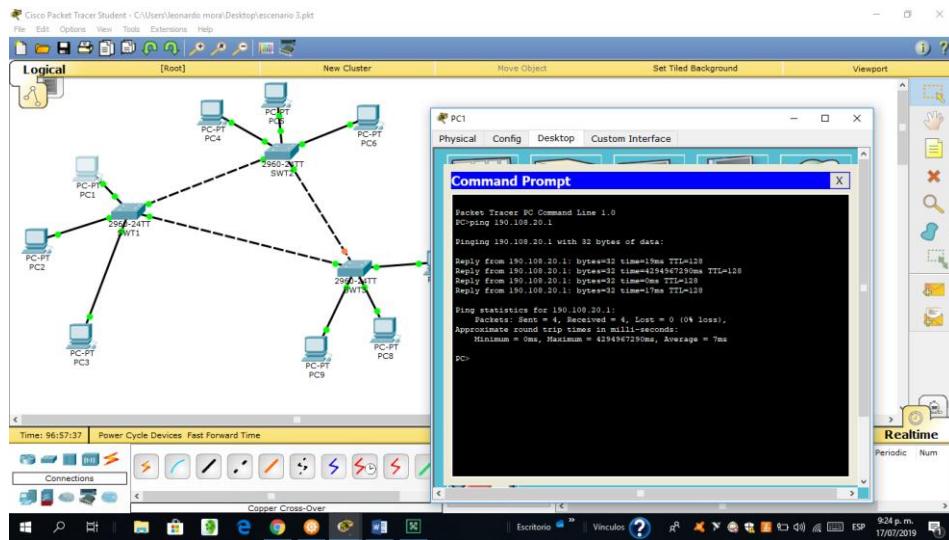
SWT3:

```
SWT3>en
SWT3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SWT3(config)#int vlan 99
SWT3(config-if)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to
up
SWT3(config-if)#ip address 190.108.99.3 255.255.255.0
SWT3(config-if)#no shutdown
SWT3(config-if)#exit
SWT3(config)#end
SWT3# %SYS-5-CONFIG_I: Configured from console by console
```

E. Verificar la conectividad Extremo a Extremo

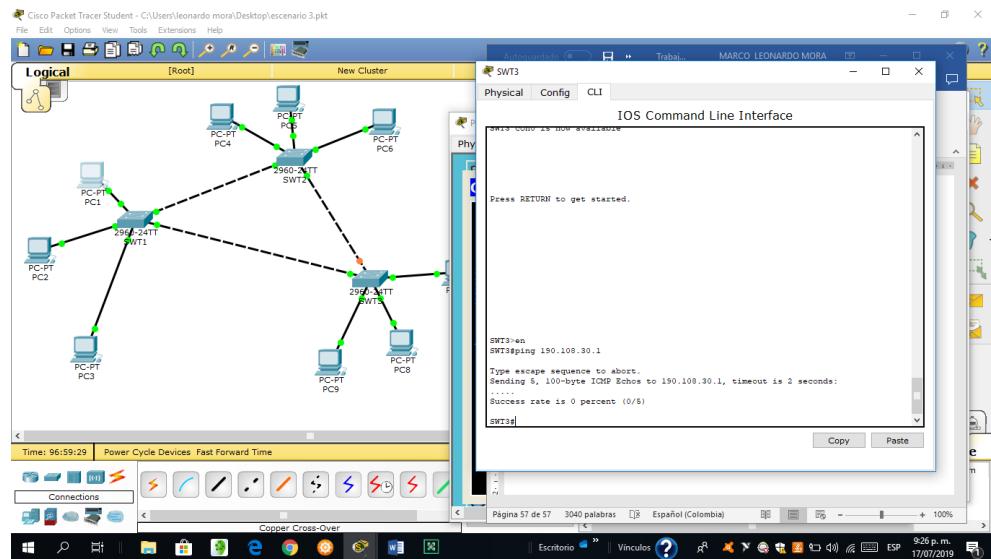
1. Ejecute un Ping desde cada PC a los demás. Explique por qué el ping tuvo o no tuvo éxito.

Ilustración 24. Ping PC1



5. Ejecute un Píng desde cada Switch a cada PC.

Ilustración 25. Ping SWT3



CONCLUSIONES

Se desarrolla la guía de actividades necesaria para optar por el título de Ingeniero Electrónico.

Se desarrollaron los tres escenarios que abarcan los temas de Switches y Routers.

La simulación en Packet Tracer es muy importante para verificar el funcionamiento de la teoría que hemos aprendido.

Se establecieron las conexiones Vecino BGP y se comprueba el funcionamiento de los protocolos.

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