

Prueba de habilidades prácticas CCNA

Andrea Magdalena Castillo Preciado

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA

(UNAD)

Ciencias Básicas, Tecnología e Ingeniería

Ingeniería de Telecomunicaciones

Sogamoso (Boyacá)

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Diplomado De Profundizacion CISCO

Tutor:

Ing. Giovanni Alberto Bracho

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Después de un largo y duro camino de varios años, por fin llegué al final de mi meta, un camino lleno de mucho aprendizaje intelectual, profesional y personal, el haber llegado al final tiene un gran valor personal en mi vida y es por eso que me gustaría agradecer a las personas que me ayudaron a hacer posible este sueño.

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INTRODUCCIÓN

El mundo de las redes y sus diferentes áreas en la actualidad son de gran importancia, ya que estas están implicadas no solo en grandes empresas si no el diario vivir de las personas.

Es por esto que se ve la necesidad de ingenieros, que se involucren en las redes, que tengan la capacidad de analizarlas, de crearlas, de manejarlas y darles solución cuando lo sea necesario.

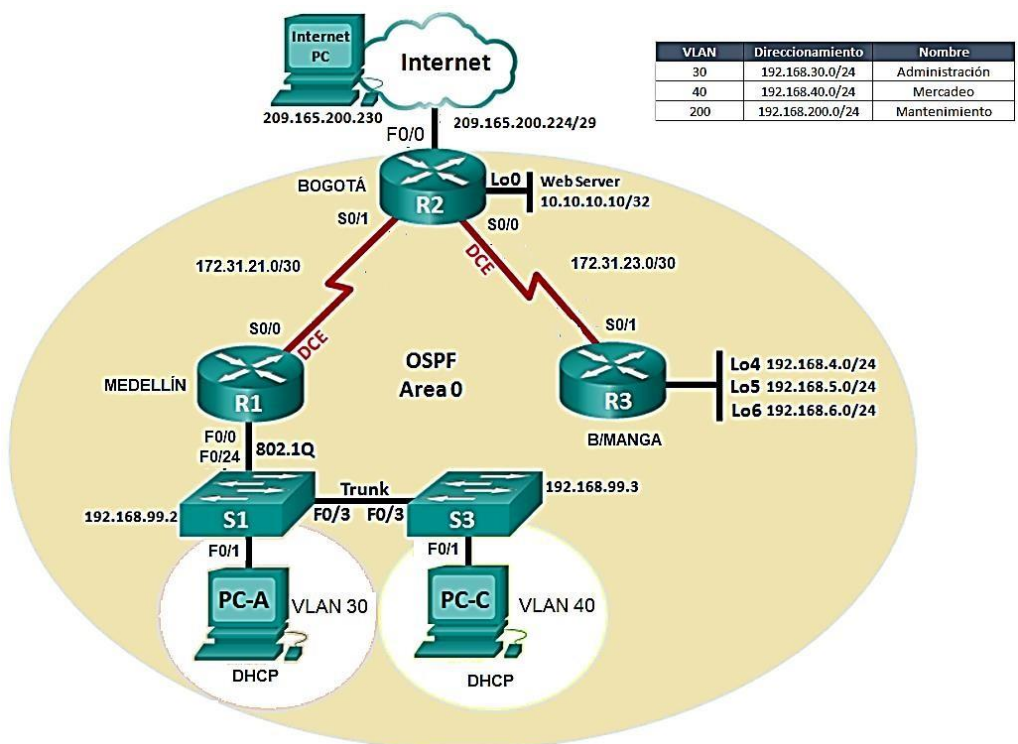
Este trabajo es realizado con el fin de implementar los conocimientos adquiridos en el desarrollo del Diplomado, conocer nuestras destrezas y dificultades, además de ser capaces de implementar una red con lineamientos que nos sugieren desde cero, de la misma que forma como si un cliente lo sugiriera.

1. Descripción del escenario propuesto para la prueba de habilidades

1.1 Escenario

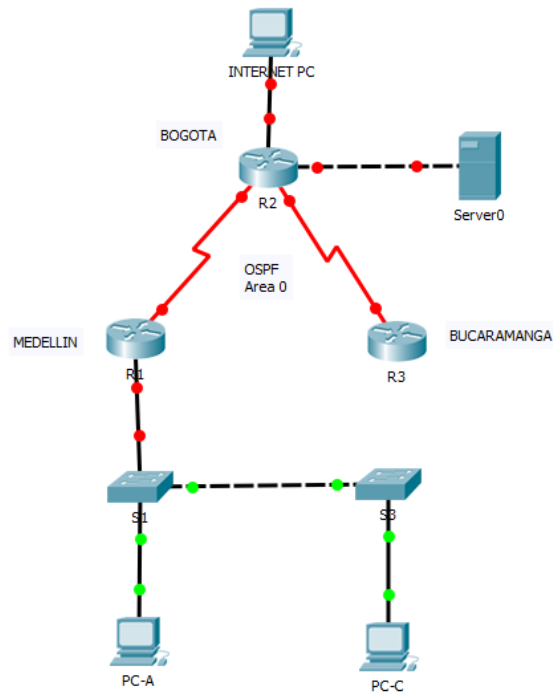
Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos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

1.2 Topología de red



2. DESARROLLO PRACTICA

2.1 Topología



2.2 Configuramiento de direccionamiento IP

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

DISPOSITIVO		DIRECCION IP	MASCARA	GATEWAY
	Internet PC	209.165.200.230	255.255.255.248	209.165.200.225
R1	S0/0/0 DCE	172.31.21.1	255.255.255.252	
R2	G0/0	209.165.200.225	255.255.255.248	
	S0/0/0 DCE	172.31.23.1	255.255.255.252	
	S0/0/1	172.31.21.2	255.255.255.252	
	Lo0 (G0/1)	10.10.10.1	255.255.255.0	
Web server		10.10.10.10	255.255.255.0	10.10.10.1

R3	Serial0/0/1	172.31.23.2	255.255.255.252	
	Lo4	192.168.4.1	255.255.255.0	
	Lo5	192.168.5.1	255.255.255.0	
	Lo6	192.168.6.1	255.255.255.0	
S1		192.168.99.2	255.255.255.0	192.168.99.1
S3		192.168.99.3	255.255.255.0	192.168.99.1

2.3 Configuración OSPF

2.3.1 Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

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

2.3.2 Verificar información de OSPF

2.3.2.1 Visualizar tablas de enrutamiento y routers conectados por OSPFv2

R1	<pre>R1#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/ - 00:00:38 172.31.21.2 Serial0/0/0</pre>
R2	<pre>R2#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 3.3.3.3 0 FULL/ - 00:00:36 172.31.23.2 Serial0/0/0 1.1.1.1 0 FULL/ - 00:00:31 172.31.21.1 Serial0/0/1</pre>
R3	<pre>R3#sh ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 2.2.2.2 0 FULL/ - 00:00:38 172.31.23.1 Serial0/0/1</pre>

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

<p>R1</p>	<pre> R1#sh ip ospf interface GigabitEthernet0/0.30 is up, line protocol is up Internet address is 192.168.30.1/24, Area 0 Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1 Transmit Delay is 1 sec, State DR, Priority 1 Designated Router (ID) 1.1.1.1, Interface address 192.168.30.1 No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 No Hellos (Passive interface) Index 1/1, flood queue length 0 Next 0x0(0)/0x0(0) Last flood scan length is 1, maximum is 1 Last flood scan time is 0 msec, maximum is 0 msec Neighbor Count is 0, Adjacent neighbor count is 0 Suppress hello for 0 neighbor(s) GigabitEthernet0/0.40 is up, line protocol is up Internet address is 192.168.40.1/24, Area 0 Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1 Transmit Delay is 1 sec, State DR, Priority 1 Designated Router (ID) 1.1.1.1, Interface address 192.168.40.1 No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 No Hellos (Passive interface) Index 2/2, flood queue length 0 Next 0x0(0)/0x0(0) Last flood scan length is 1, maximum is 1 Last flood scan time is 0 msec, maximum is 0 msec Neighbor Count is 0, Adjacent neighbor count is 0 Suppress hello for 0 neighbor(s) GigabitEthernet0/0.200 is up, line protocol is up Internet address is 192.168.200.1/24, Area 0 Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1 Transmit Delay is 1 sec, State DR, Priority 1 Designated Router (ID) 1.1.1.1, Interface address 192.168.200.1 No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 No Hellos (Passive interface) Index 3/3, flood queue length 0 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 00:00:07 Index 4/4, 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) </pre>

<p>R2</p>	<pre> R2#sh ip ospf interface GigabitEthernet0/1 is up, line protocol is up Internet address is 10.10.10.1/24, Area 0 Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1 Transmit Delay is 1 sec, State DR, Priority 1 Designated Router (ID) 2.2.2.2, Interface address 10.10.10.1 No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 No Hellos (Passive interface) Index 1/1, flood queue length 0 Next 0x0(0)/0x0(0) Last flood scan length is 1, maximum is 1 Last flood scan time is 0 msec, maximum is 0 msec Neighbor Count is 0, Adjacent neighbor count is 0 Suppress hello for 0 neighbor(s) Serial0/0/0 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 Hello due in 00:00:03 Index 2/2, flood queue length 0 Next 0x0(0)/0x0(0) Last flood scan length is 1, maximum is 1 Last flood scan time is 0 msec, maximum is 0 msec Neighbor Count is 1, Adjacent neighbor count is 1 Adjacent with neighbor 3.3.3.3 Suppress hello for 0 neighbor(s) Serial0/0/1 is up, line protocol is up Internet address is 172.31.21.2/30, Area 0 Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 781 Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0 No designated router on this network No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 Hello due in 00:00:03 Index 3/3, 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) </pre>
<p>R3</p>	<pre> R3#sh ip ospf interface 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: 1 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 Process ID 1, Router ID 3.3.3.3, Network Type LOOPBACK, Cost: 1 Loopback interface is treated as a stub Host Loopback6 is up, line protocol is up Internet address is 192.168.6.1/24, Area 0 Process ID 1, Router ID 3.3.3.3, Network Type LOOPBACK, Cost: 1 Loopback interface is treated as a stub Host 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: 781 Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0 No designated router on this network No backup designated router on this network Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5 Hello due in 00:00:07 Index 4/4, 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) </pre>

2.3.2.3 Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

<p>R1</p>	<pre> R1# sh 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 Passive Interface(s): Vlan1 GigabitEthernet0/0 GigabitEthernet0/1 Serial0/0/1 GigabitEthernet0/0.30 GigabitEthernet0/0.40 GigabitEthernet0/0.200 Routing Information Sources: Gateway Distance Last Update 1.1.1.1 110 00:28:23 2.2.2.2 110 00:28:23 3.3.3.3 110 00:28:23 Distance: (default is 110) </pre>
<p>R2</p>	<pre> R2# sh 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: 10.10.10.0 0.0.0.255 area 0 172.31.21.0 0.0.0.3 area 0 172.31.23.0 0.0.0.3 area 0 Passive Interface(s): GigabitEthernet0/1 Routing Information Sources: Gateway Distance Last Update 1.1.1.1 110 00:00:13 2.2.2.2 110 00:00:14 3.3.3.3 110 00:00:14 Distance: (default is 110) </pre>

R3	<pre> R3# sh 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 0.0.0.255 area 0 192.168.5.0 0.0.0.255 area 0 192.168.6.0 0.0.0.255 area 0 Passive Interface(s): Loopback4 Loopback5 Loopback6 Routing Information Sources: Gateway Distance Last Update 1.1.1.1 110 00:01:14 2.2.2.2 110 00:01:16 3.3.3.3 110 00:01:15 Distance: (default is 110) </pre>
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2.4 Configuración VLANS

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

VLAN	DIRECCIONAMIENTO	NOMBRE
30	192.168.30.0/24	Administración
40	192.168.40.0/24	Mercádeo
200	192.168.200.0/24	Mantenimiento

R1	<pre> interface GigabitEthernet0/0.30 description ADMINISTRACION LAN encapsulation dot1Q 30 ip address 192.168.30.1 255.255.255.0 ! interface GigabitEthernet0/0.40 description MERCADEO LAN encapsulation dot1Q 40 ip address 192.168.40.1 255.255.255.0 ! interface GigabitEthernet0/0.200 description MANTENIMIENTO LAN encapsulation dot1Q 200 ip address 192.168.200.1 255.255.255.0 </pre>
----	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

SW1

```

S1
Physical Config CLI Attributes
IOS Cor
interface Vlan200
  mac-address 0060.7044.7c01
  ip address 192.168.99.2 255.255.255.0
  !
ip default-gateway 192.168.99.1
!

S1#sh vlan brief

VLAN Name                Status    Ports
-----
1    default                active    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, Gig0/1, Gig0/2
30   ADMINISTRACION         active    Fa0/1
40   MERCADEO               active
200  MANTENIMIENTO           active
1002 fddi-default           active
1003 token-ring-default   active
1004 fddinet-default      active
1005 trnet-default        active

S1#sh interfaces trunk

Port      Mode      Encapsulation  Status      Native vlan
Fa0/3     on        802.1q         trunking    1
Fa0/24    on        802.1q         trunking    1

Port      Vlans allowed on trunk
Fa0/3     1-1005
Fa0/24    1-1005

Port      Vlans allowed and active in management domain
Fa0/3     1,30,40,200
Fa0/24    1,30,40,200

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/3     1,30,40,200
Fa0/24    1,30,40,200

:
interface FastEthernet0/1
  switchport access vlan 30
  switchport mode access
  !

```

SW3

```

S3
Physical Config CLI Attributes
IOS Command Line Interfa
interface Vlan200
  mac-address 00d0.ff69.7e01
  ip address 192.168.99.3 255.255.255.0
  !
ip default-gateway 192.168.99.1
!

```

```

S3#sh vlan brief
VLAN Name                Status    Ports
-----
1    default                active    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, Gig0/2

30   ADMINISTRACION         active
40   MERCADEO               active    Fa0/1
200  MANTENIMIENTO          active

S3# sh int trunk
Port      Mode          Encapsulation  Status      Native vlan
Fa0/3     on            802.1q         trunking    1

Port      Vlans allowed on trunk
Fa0/3     1-1005

Port      Vlans allowed and active in management domain
Fa0/3     1,30,40,200

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/3     1,30,40,200

interface FastEthernet0/1
 switchport access vlan 40
 switchport mode access

```

2.4.2 En el Switch 3 deshabilitar DNS lookup

```

S3
Physical Config CLI Attributes
no ip domain-lookup

```

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

```

S1
Physical Config CLI Attributes
IOS Cor

interface Vlan200
 mac-address 0060.7044.7c01
 ip address 192.168.99.2 255.255.255.0
 !
 ip default-gateway 192.168.99.1
 !

```

```

S3
Physical Config CLI Attributes
IOS Command Line Interface
interface Vlan200
  mac-address 00d0.ff69.7e01
  ip address 192.168.99.3 255.255.255.0
  !
  ip default-gateway 192.168.99.1
  !

```

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

SW1	<pre> S1#sh int i down FastEthernet0/2 is administratively down, line protocol is down (disabled) FastEthernet0/4 is administratively down, line protocol is down (disabled) FastEthernet0/5 is administratively down, line protocol is down (disabled) FastEthernet0/6 is administratively down, line protocol is down (disabled) FastEthernet0/7 is administratively down, line protocol is down (disabled) FastEthernet0/8 is administratively down, line protocol is down (disabled) FastEthernet0/9 is administratively down, line protocol is down (disabled) FastEthernet0/10 is administratively down, line protocol is down (disabled) FastEthernet0/11 is administratively down, line protocol is down (disabled) FastEthernet0/12 is administratively down, line protocol is down (disabled) FastEthernet0/13 is administratively down, line protocol is down (disabled) FastEthernet0/14 is administratively down, line protocol is down (disabled) FastEthernet0/15 is administratively down, line protocol is down (disabled) FastEthernet0/16 is administratively down, line protocol is down (disabled) FastEthernet0/17 is administratively down, line protocol is down (disabled) FastEthernet0/18 is administratively down, line protocol is down (disabled) FastEthernet0/19 is administratively down, line protocol is down (disabled) FastEthernet0/20 is administratively down, line protocol is down (disabled) FastEthernet0/21 is administratively down, line protocol is down (disabled) FastEthernet0/22 is administratively down, line protocol is down (disabled) FastEthernet0/23 is administratively down, line protocol is down (disabled) GigabitEthernet0/1 is administratively down, line protocol is down (disabled) GigabitEthernet0/2 is administratively down, line protocol is down (disabled) Vlan1 is administratively down, line protocol is down </pre>
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SW3	<pre> S3# sh int i down FastEthernet0/2 is administratively down, line protocol is down (disabled) FastEthernet0/4 is administratively down, line protocol is down (disabled) FastEthernet0/5 is administratively down, line protocol is down (disabled) FastEthernet0/6 is administratively down, line protocol is down (disabled) FastEthernet0/7 is administratively down, line protocol is down (disabled) FastEthernet0/8 is administratively down, line protocol is down (disabled) FastEthernet0/9 is administratively down, line protocol is down (disabled) FastEthernet0/10 is administratively down, line protocol is down (disabled) FastEthernet0/11 is administratively down, line protocol is down (disabled) FastEthernet0/12 is administratively down, line protocol is down (disabled) FastEthernet0/13 is administratively down, line protocol is down (disabled) FastEthernet0/14 is administratively down, line protocol is down (disabled) FastEthernet0/15 is administratively down, line protocol is down (disabled) FastEthernet0/16 is administratively down, line protocol is down (disabled) FastEthernet0/17 is administratively down, line protocol is down (disabled) FastEthernet0/18 is administratively down, line protocol is down (disabled) FastEthernet0/19 is administratively down, line protocol is down (disabled) FastEthernet0/20 is administratively down, line protocol is down (disabled) FastEthernet0/21 is administratively down, line protocol is down (disabled) FastEthernet0/22 is administratively down, line protocol is down (disabled) FastEthernet0/23 is administratively down, line protocol is down (disabled) FastEthernet0/24 is administratively down, line protocol is down (disabled) GigabitEthernet0/1 is administratively down, line protocol is down (disabled) GigabitEthernet0/2 is administratively down, line protocol is down (disabled) Vlan1 is administratively down, line protocol is down </pre>
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2.5 Implement DHCP and NAT for IPv4

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

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

```

hostname R1
!
!
!
enable secret 5 $1$mERr$9cTjUIEqNGurQiFU.ZeCi1
!
!
ip dhcp excluded-address 192.168.30.1 192.168.30.30
ip dhcp excluded-address 192.168.40.1 192.168.40.30
!
ip dhcp pool ADMINISTRACION
network 192.169.30.0 255.255.255.0
default-router 192.168.30.1
dns-server 10.10.10.11
ip dhcp pool MERCADEO
network 192.168.40.0 255.255.255.0
default-router 192.168.40.1
dns-server 10.10.10.11

```

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

```
ip nat inside source static 10.10.10.10 209.165.200.229
ip classless
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/0
```

2.9 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.

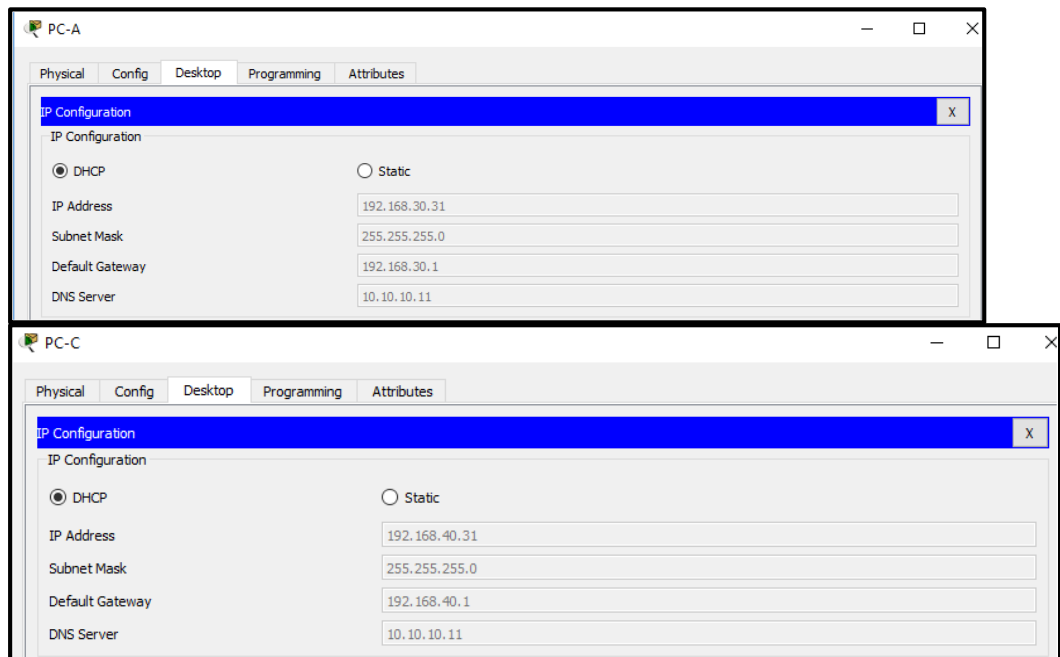
```
access-list 1 permit 192.168.30.0 0.0.0.255
access-list 1 permit 192.168.40.0 0.0.0.255
access-list 1 permit 192.168.200.0 0.0.0.255
```

2.10 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.

```
access-list 120 permit tcp any host 209.165.200.229
!
```

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

3.1 Asignación dhcp en PC-A y PC-B



3.2 Pruebas desde R1:

- Ping desde R1 A interface serial0/0/1.

```
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 =
1/21/102 ms
```

- Ping desde R1 A PC-A y PC-B

```
R1#ping 192.168.30.31

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
0/2/10 ms
```

```
R1#ping 192.168.40.31

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
0/5/26 ms
```

- Ping desde R1 a WEB SERVER

```
R1#ping 10.10.10.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.10, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/3/15 ms
```

- Ping desde R1 a INTERNET

```
R1#ping 209.165.200.225
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.225, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/30/141 ms
```

- Traza hasta el WEB SERVER

```
R1#traceroute 10.10.10.10
Type escape sequence to abort.
Tracing the route to 10.10.10.10

 1  172.31.21.2      0 msec    5 msec    1 msec
 2  10.10.10.10     49 msec   1 msec    0 msec
 3
```

- Traza hasta el R3

```
R1#TRACEROUTE 172.31.23.2
Type escape sequence to abort.
Tracing the route to 172.31.23.2

 1  172.31.21.2      0 msec    0 msec    1 msec
 2  172.31.23.2     4 msec    3 msec    2 msec
 3
```

3.3 Pruebas desde R2:

- Ping desde R2 A PC-A y PC-B

```
R2#ping 192.168.30.31
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/38/185 ms

R2#ping 192.168.40.31
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/7/34 ms
```

- Ping desde R2 a R3

```
R2#ping 172.31.23.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.23.2, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/13/57 ms
```

- Ping desde R2 a R1

```
R2#ping 172.31.21.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.21.1, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2
ms
```

- Ping desde R2 a WEB SERVER

```
R2#ping 10.10.10.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.10, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
0/7/37 ms
```

- Ping desde R1 a INTERNET

```
R2#ping 209.165.200.225

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.225, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/7/20 ms
```

- Traza desde R2 A PC-A y PC-B

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

 0  172.31.21.1      9 msec    1 msec    17 msec
 1  192.168.30.31   1 msec    0 msec    0 msec
R2#traceroute 192.168.40.31
Type escape sequence to abort.
Tracing the route to 192.168.40.31

 0  172.31.21.1     11 msec   1 msec    0 msec
 1  192.168.40.31  0 msec    1 msec    1 msec
R2#
```

- Traza desde R2 A WEBSERVER

```
R2#Traceroute 10.10.10.10
Type escape sequence to abort.
Tracing the route to 10.10.10.10

 0  10.10.10.10     114 msec  0 msec    0 msec
 1
```

3.4 Pruebas desde R3:

- Ping desde R3 A PC-A y PC-B

```
R3#ping 192.168.30.31
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
2/15/69 ms

R3#ping 192.168.40.31
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.31, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
2/8/34 ms
```

- Ping desde R3 a R2

```
R3#ping 172.31.23.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.23.1, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/25/117 ms
```

- Ping desde R3 a R1

```
R3#ping 172.31.21.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.21.1, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
2/11/49 ms
```

- Ping desde R3 a WEB SERVER

```
R3#PING 10.10.10.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.10, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/22/107 ms
```

- Ping desde R3 a INTERNET

```
R3#PING 209.165.200.225

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.225, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/9/39 ms
```

- Traza desde R3 A PC-A y PC-B

```
traceroute 192.168.30.31
Type escape sequence to abort.
Tracing the route to 192.168.30.31

 0  192.168.30.31    0 msec  0 msec  0 msec
 1  172.31.23.1     84 msec  1 msec  1 msec
 2  172.31.21.1     1 msec  2 msec  1 msec
 3  192.168.30.31   2 msec  2 msec  2 msec
goal
```

```
R3#traceroute 192.168.40.31
Type escape sequence to abort.
Tracing the route to 192.168.40.31

 0  192.168.40.31   0 msec  0 msec  0 msec
 1  172.31.23.1     37 msec  0 msec  0 msec
 2  172.31.21.1     3 msec  2 msec  3 msec
 3  192.168.40.31   4 msec  6 msec  2 msec
,
```

- Traza desde R3 a INTERNET

```
R3#traceroute 209.165.200.225
Type escape sequence to abort.
Tracing the route to 209.165.200.225

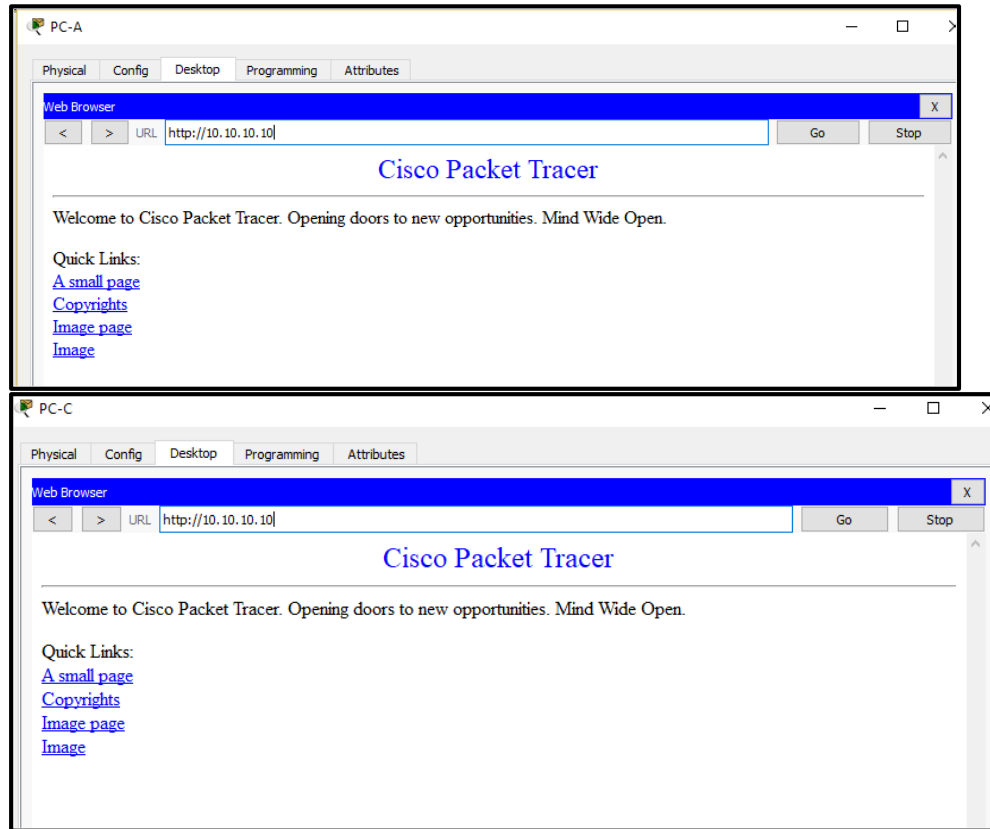
 0  209.165.200.225 0 msec  0 msec  0 msec
 1  172.31.23.1     3 msec  2 msec  1 msec
,
```

- Traza desde R3 a WEBSERVER

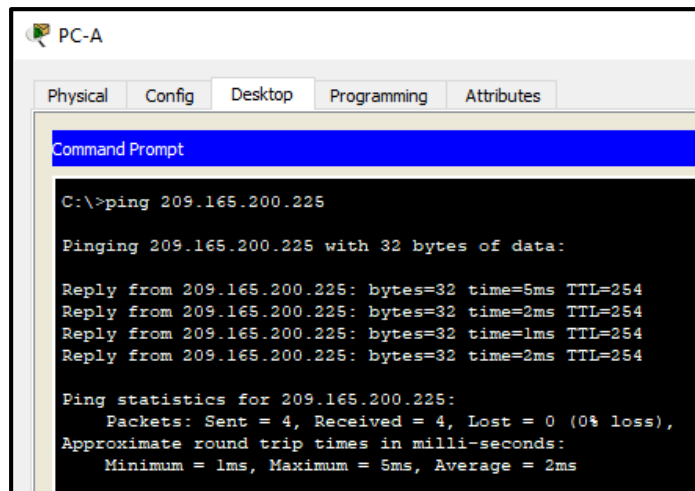
```
R3#traceroute 10.10.10.10
Type escape sequence to abort.
Tracing the route to 10.10.10.10

 0  10.10.10.10     0 msec  0 msec  0 msec
 1  172.31.23.1     12 msec  1 msec  1 msec
 2  10.10.10.10     1 msec  1 msec  0 msec
```


3.5 Acceso desde las PCs a el WEBSERVER



3.6 Alcanzabilidad desde las PCs a INTERNET



The image shows a screenshot of a Packet Tracer PC-C interface. The window title is "PC-C" and it has tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, showing a "Command Prompt" window. The command prompt displays the following text:

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

Pinging 209.165.200.225 with 32 bytes of data:

Reply from 209.165.200.225: bytes=32 time=1ms TTL=254
Reply from 209.165.200.225: bytes=32 time=1ms TTL=254
Reply from 209.165.200.225: bytes=32 time=4ms TTL=254
Reply from 209.165.200.225: bytes=32 time=1ms TTL=254

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

CONCLUSIONES

Con el desarrollo de este trabajo aplicamos las habilidades obtenidas en el Desarrollo del Diplomado y lo cual nos va a servir en nuestra vida profesional Como Ingenieros de Telecomunicaciones.

Además de comprender la gran importancia del adecuado manejo de las redes Tanto en su implementación como en su manejo, desde el punto de vista Operativo, administrativo y empresarial.

Se analizaron a profundidad los diferentes conceptos de switching y routing, para El manejo y troubleshooting en redes.

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