Desarrollo e Implementación De Red Estructurada En Simulador Cisco Packet Tracer

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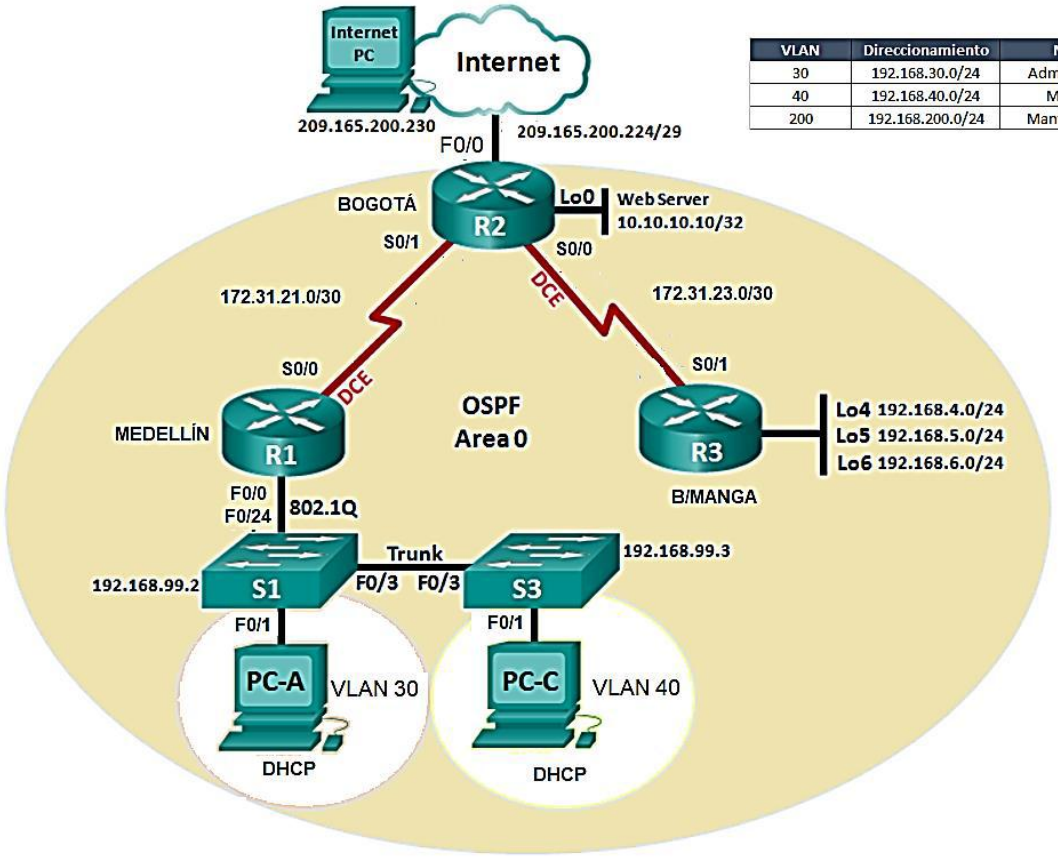
Introducción

En la presente actividad se desarrolla y analiza las temáticas de cisco CCNA1 y CCNA2 enfocadas en la identificación y solución de un problema planteado y relacionado con el enrutamiento mediante comandos del ios. Conoceremos los diferentes protocolos de routing, la implementación y configuración básica de OSPF, se analizaran y desarrollaran las instrucciones necesarias para utilizar las ACL estándar y extendidas en un router Cisco, implementaremos cada una de las funciones de DHCPv4 y se analizara la implementación de NAT con el fin de usar de forma más eficaz las direcciones IPv4, lo anterior se ejecuta utilizando la información contenida en la prueba de habilidades prácticas de la plataforma de Cisco Networking Academy, desarrollando un componente practico con la ayuda del software Packet Tracer.

Desarrollo e Implementación De Red Estructurada En Simulador Cisco Packet Tracer

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

Topología de red

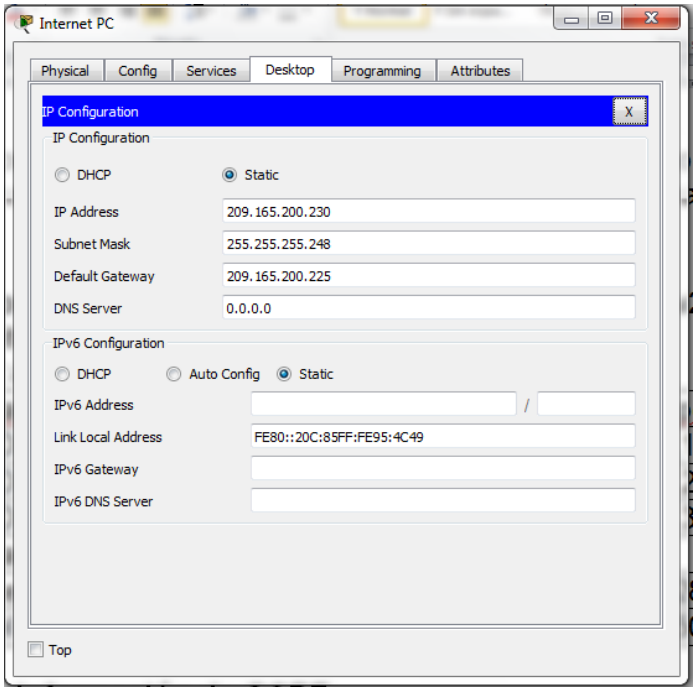


VLAN	Direccionamiento	Nombre
30	192.168.30.0/24	Administración
40	192.168.40.0/24	Mercadeo
200	192.168.200.0/24	Mantenimiento

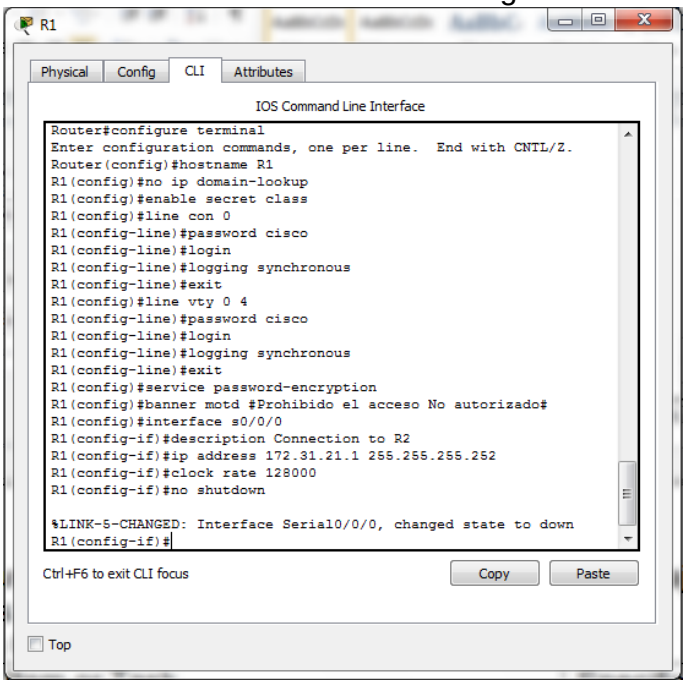
Nota: En los router R1 y R2 no se utiliza las interfaces F0/0, en cambio se utiliza G0/0 y el web server se configura con un equipo conectado a G0/1

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

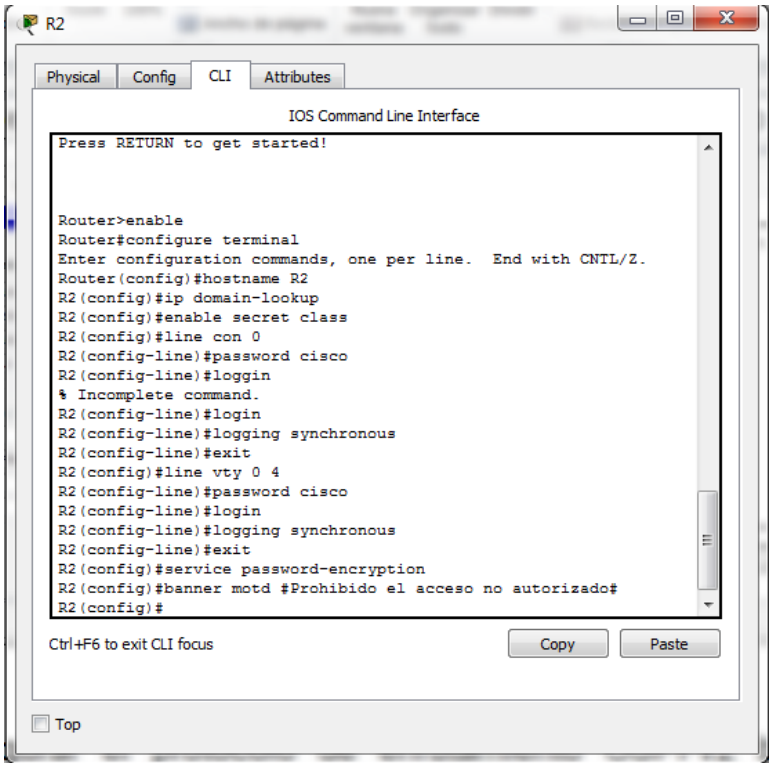
Configuracion de Internet Pc

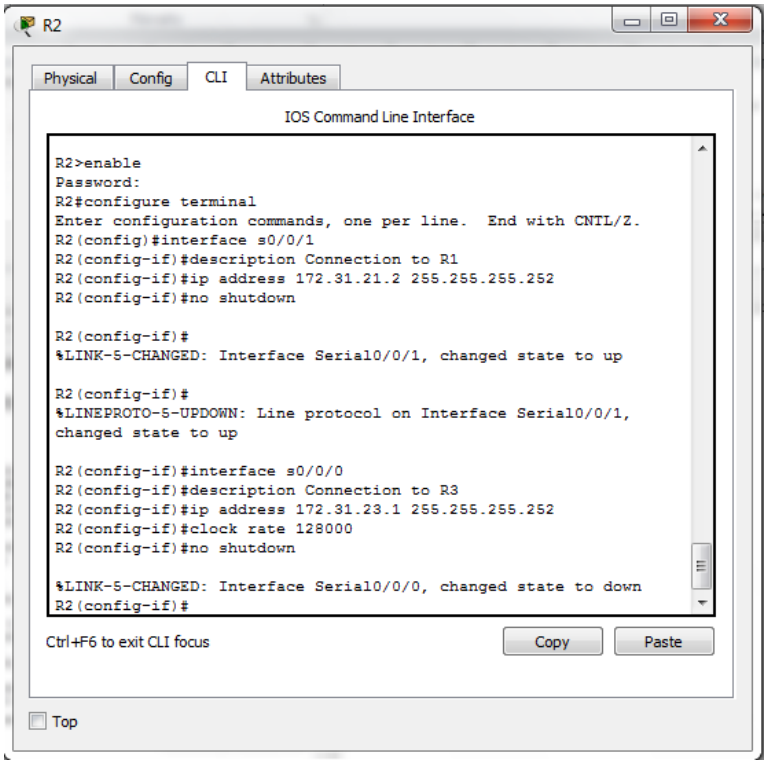


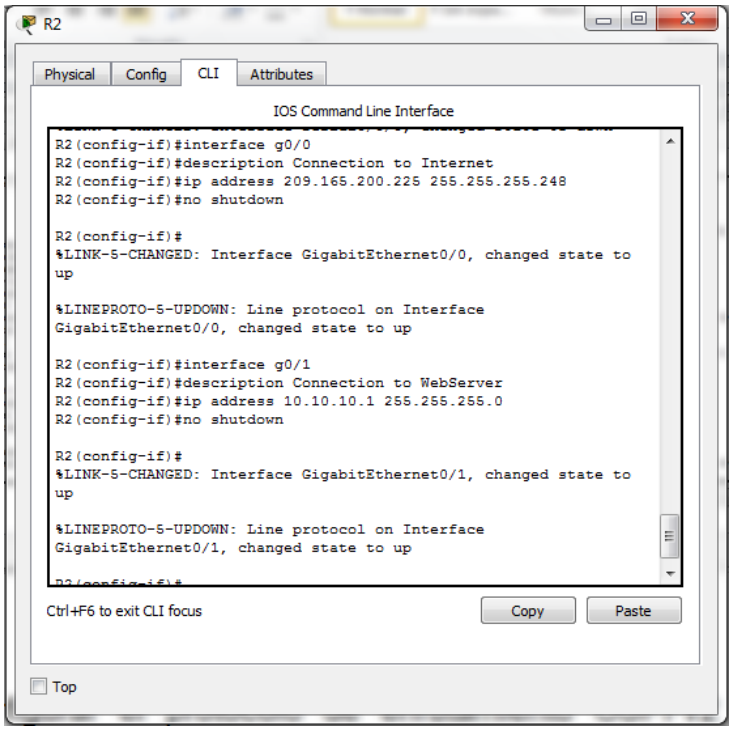
Configuracion de Router 1 – La G0/0 se configura mas adelante



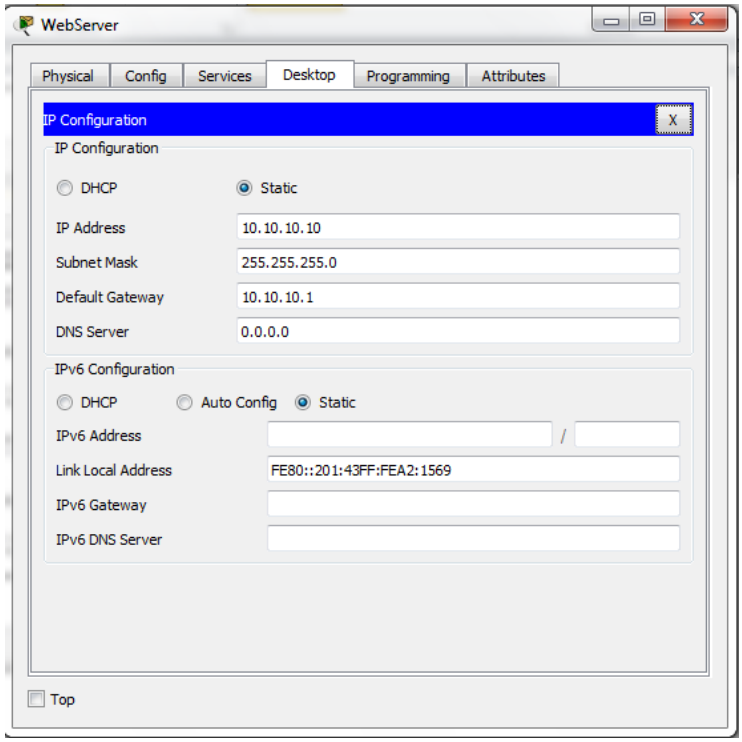
Configuracion de Router 2



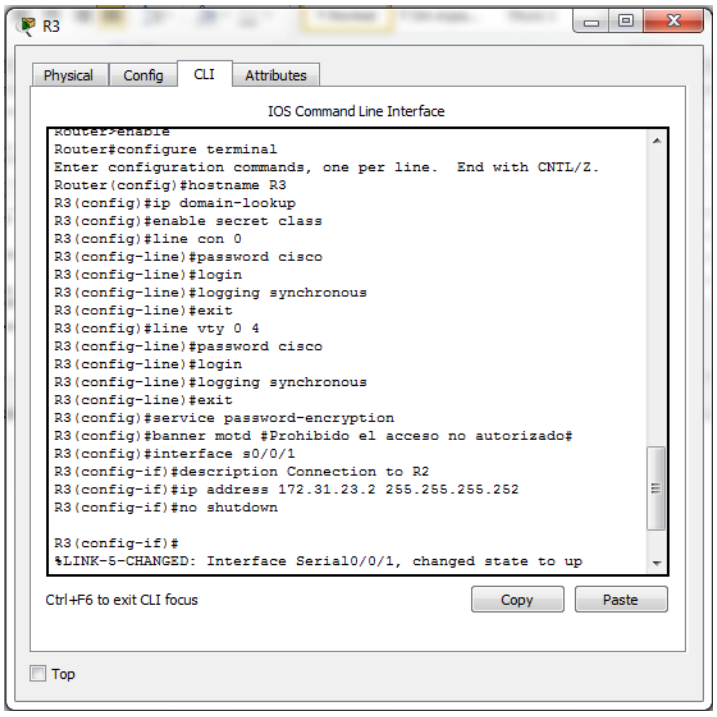


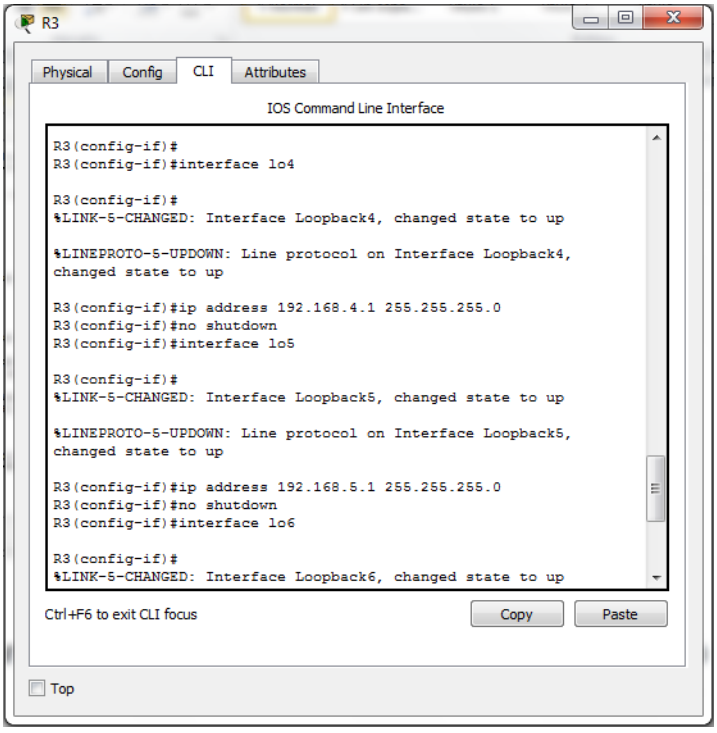


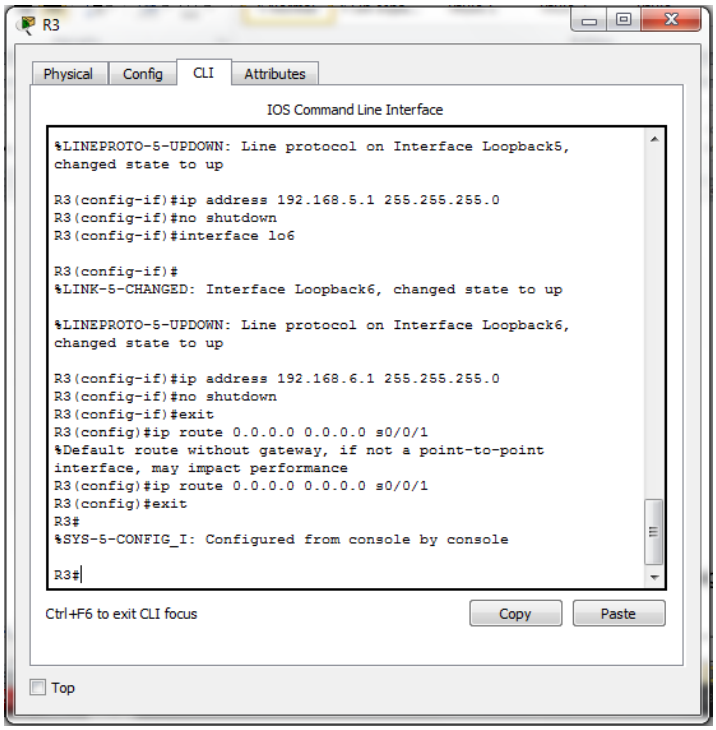
Configuracion de Servidor Web



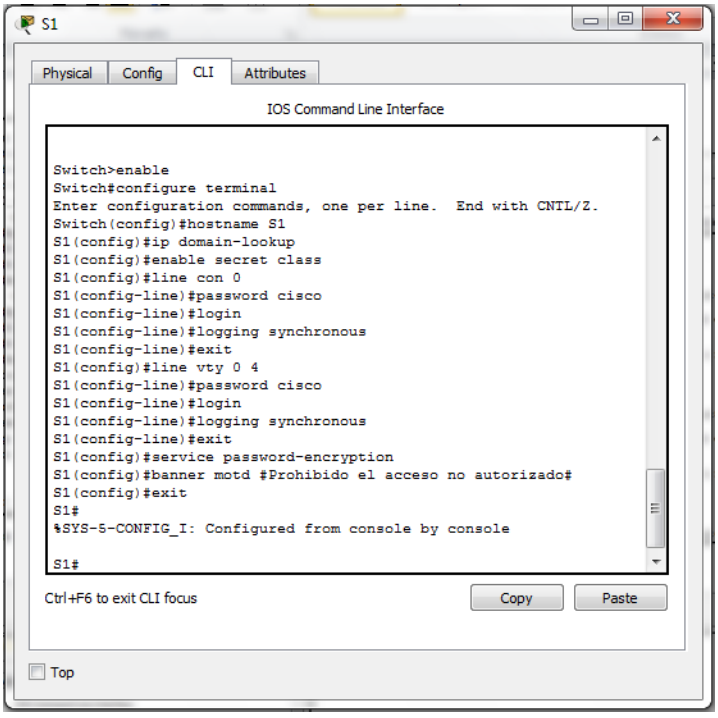
Configuracion de Router 3



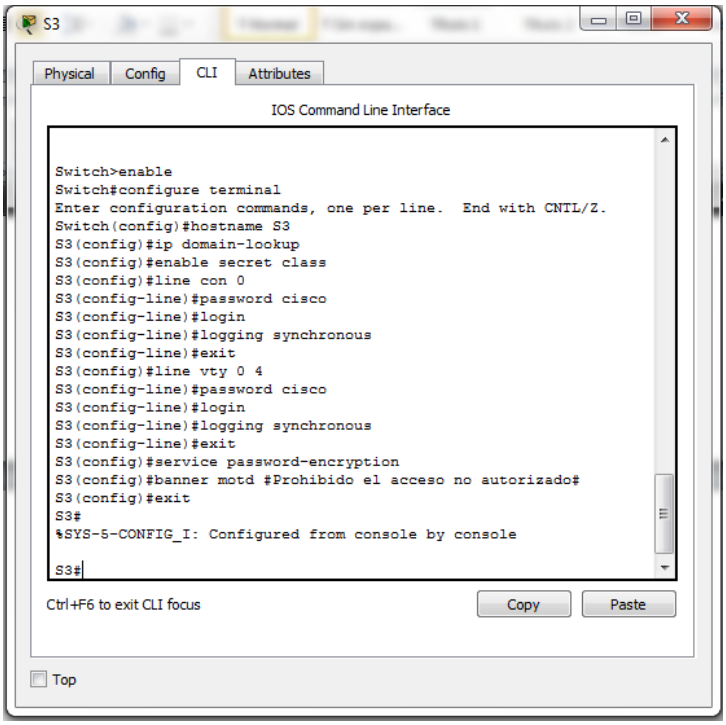




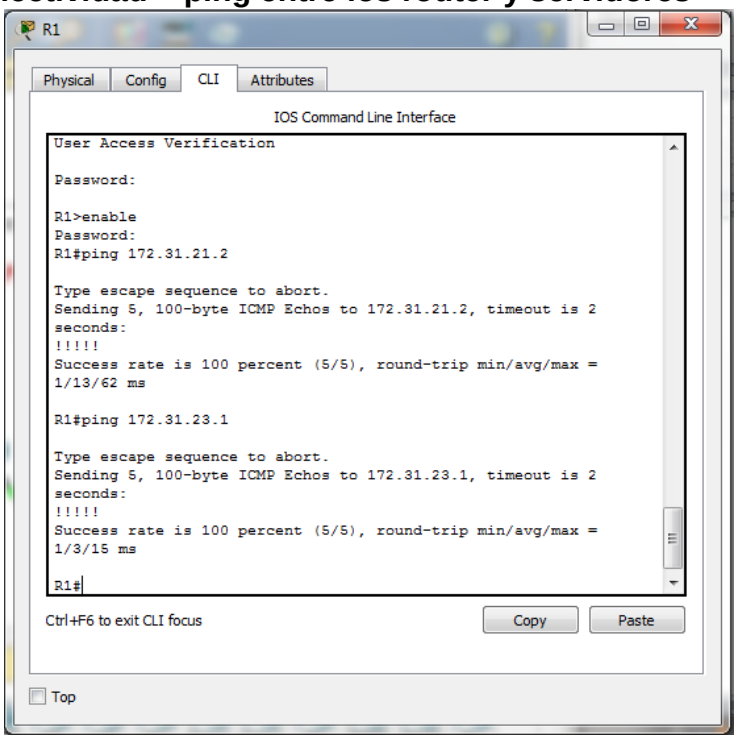
Configuracion de Switch 1

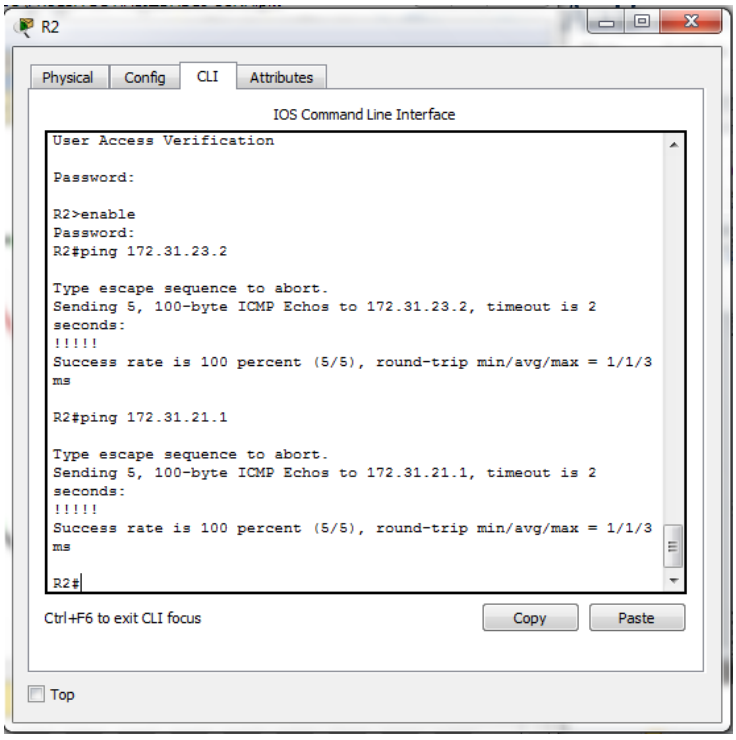


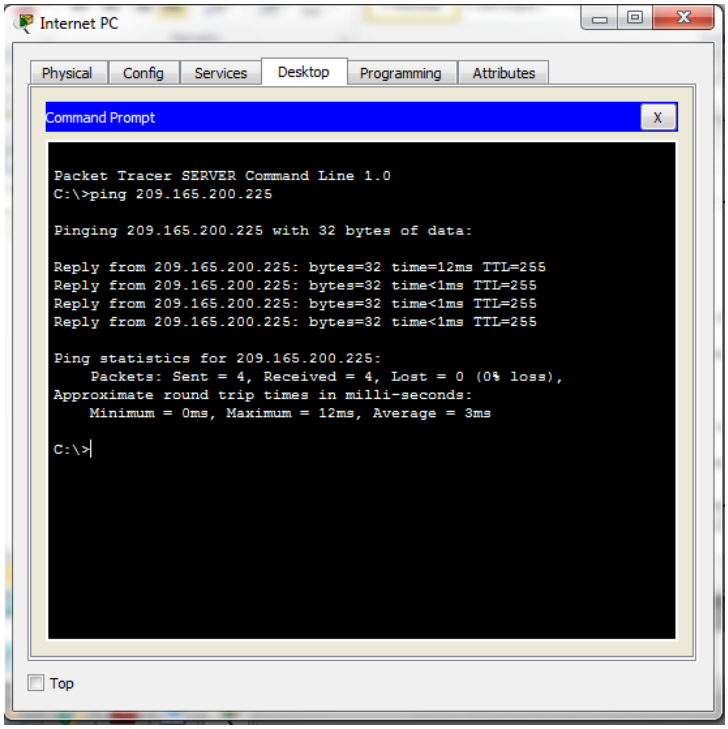
Configuracion de Switch 3

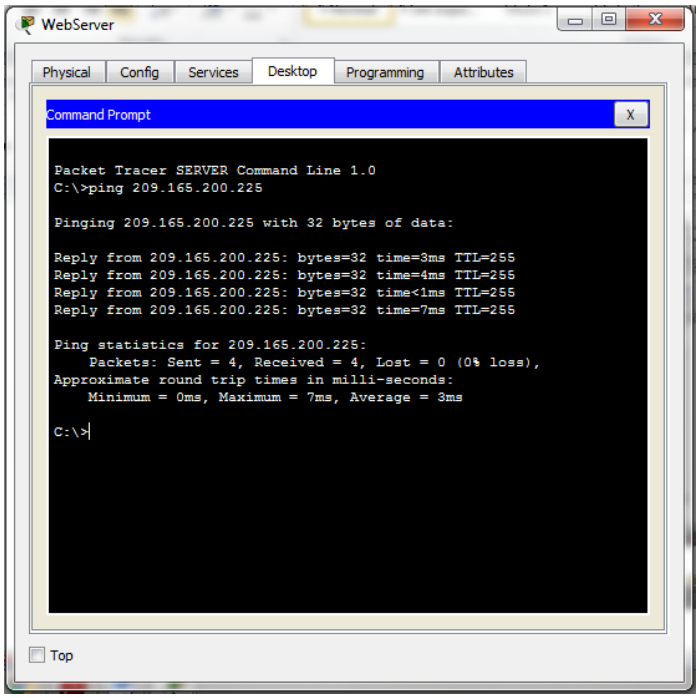


Verificar la conectividad – ping entre los router y servidores




R2
Physical
Config
CLI
Attributes
IOS Command Line Interface
User Access Verification
Password:
R2>enable
Password:
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 = 1/1/3 ms
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 = 1/1/3 ms
R2#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

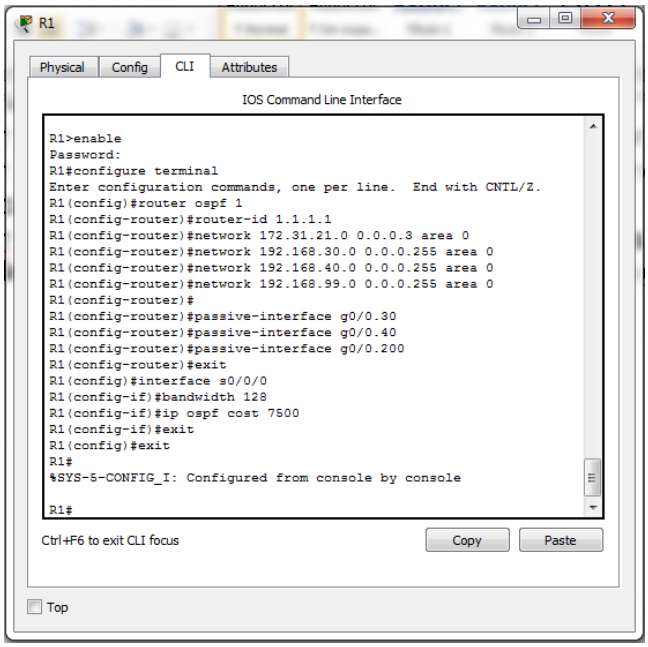

Internet PC
Physical
Config
Services
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer SERVER Command Line 1.0
C:\>ping 209.165.200.225
Pinging 209.165.200.225 with 32 bytes of data:
Reply from 209.165.200.225: bytes=32 time=12ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Ping statistics for 209.165.200.225:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 12ms, Average = 3ms
C:\>
Top

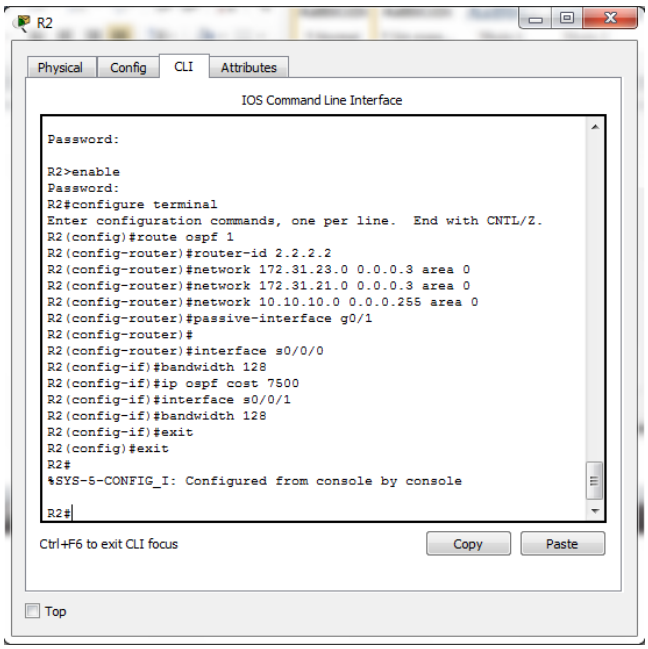

WebServer
Physical
Config
Services
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer SERVER Command Line 1.0
C:\>ping 209.165.200.225
Pinging 209.165.200.225 with 32 bytes of data:
Reply from 209.165.200.225: bytes=32 time=3ms TTL=255
Reply from 209.165.200.225: bytes=32 time=4ms TTL=255
Reply from 209.165.200.225: bytes=32 time<1ms TTL=255
Reply from 209.165.200.225: bytes=32 time=7ms TTL=255
Ping statistics for 209.165.200.225:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 7ms, Average = 3ms
C:\>
Top

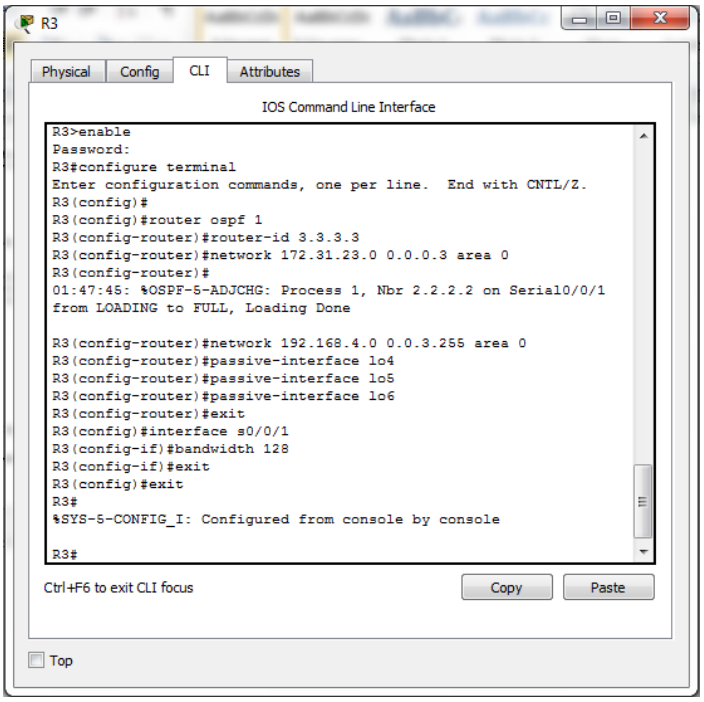
2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

OSPFv2 área 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	2.2.2.2
Router ID R3	3.3.3.3
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	128 Kb/s
Ajustar el costo en la métrica de s0/0 a	7500

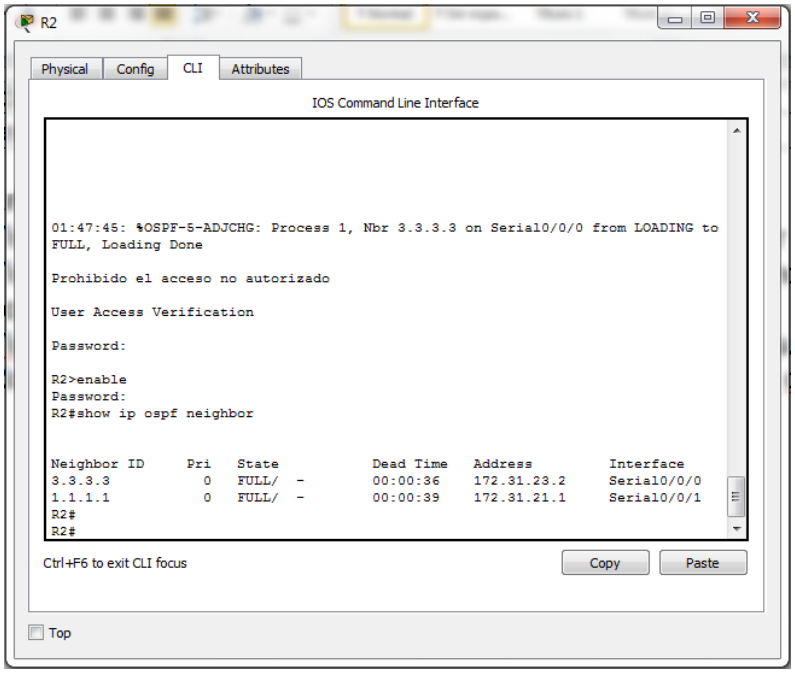


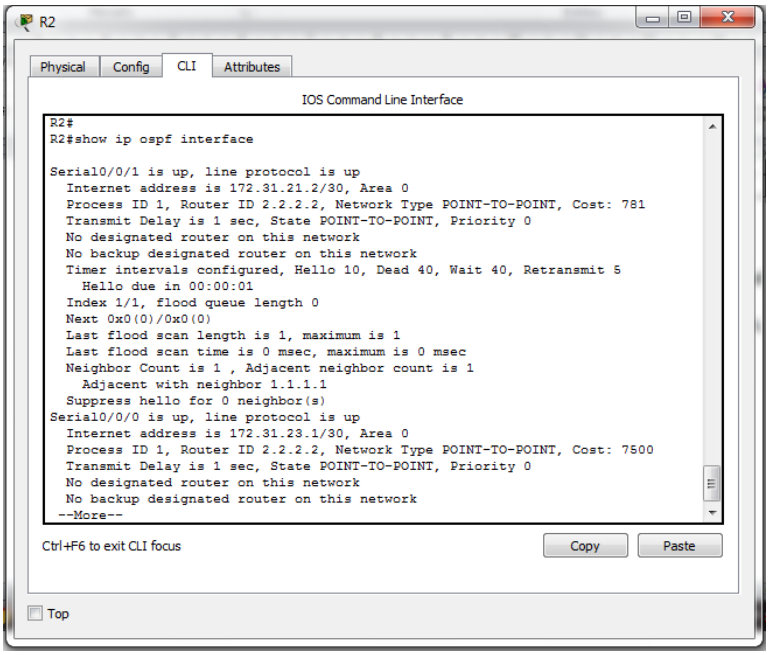


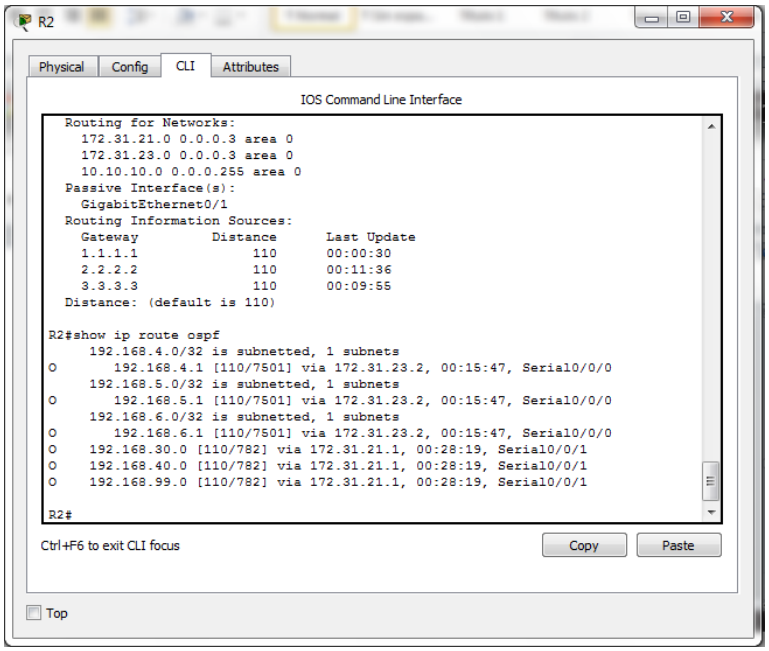


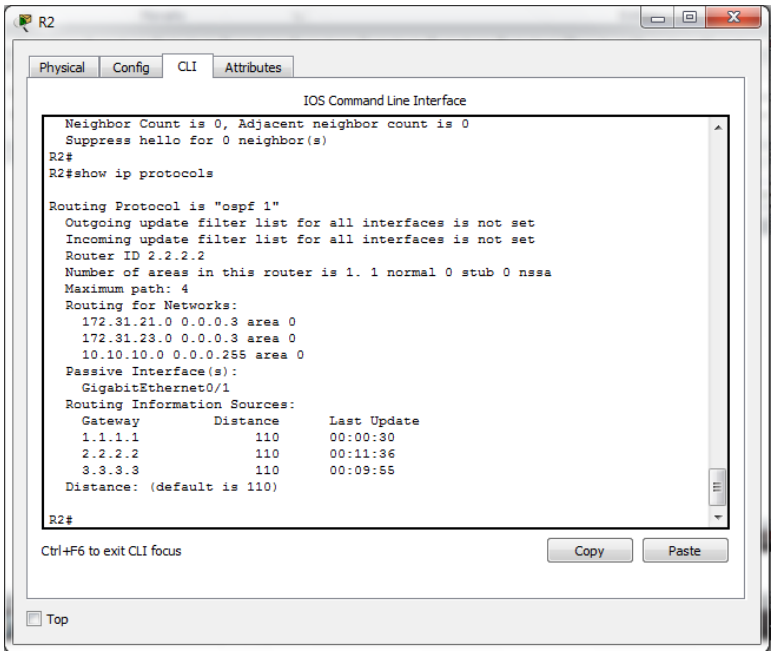
Verificar información de OSPF

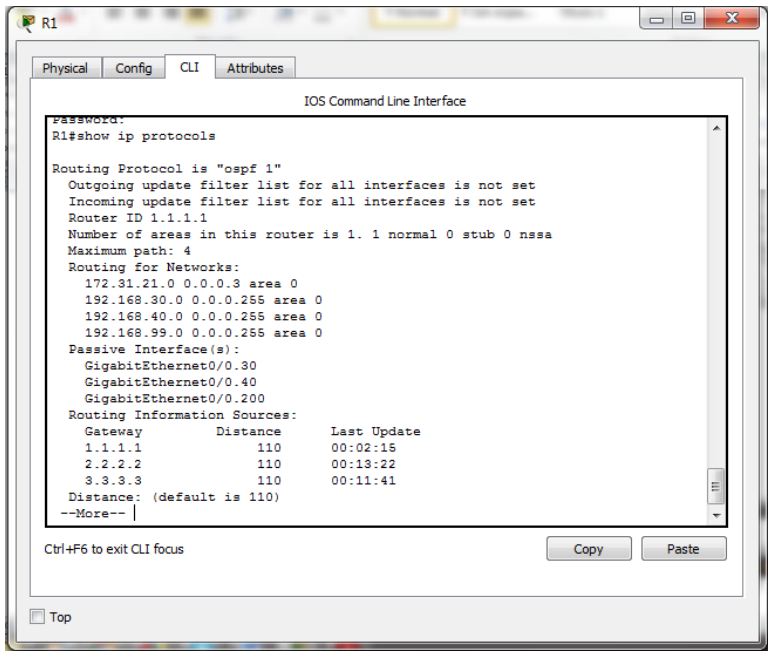
- Visualizar tablas de enrutamiento y routers conectados por OSPFv2
- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

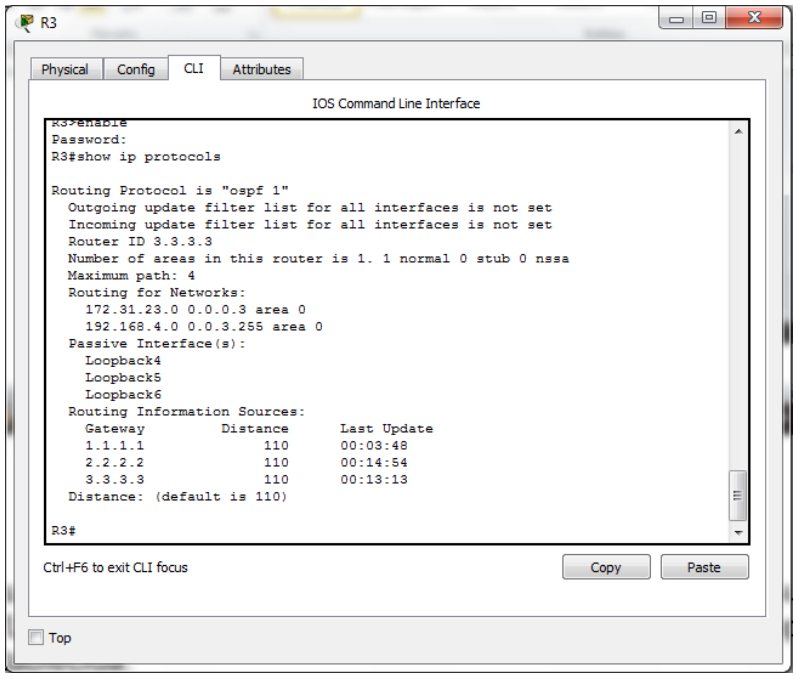



R2
Physical
Config
CLI
Attributes
IOS Command Line Interface
R2#
R2#show ip ospf interface
Serial0/0/1 is up, line protocol is up
Internet address is 172.31.21.2/30, Area 0
Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 781
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 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 00:00:01
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
--More--
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


R2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Routing for Networks:
172.31.21.0 0.0.0.3 area 0
172.31.23.0 0.0.0.3 area 0
10.10.10.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/1
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:00:30
2.2.2.2 110 00:11:36
3.3.3.3 110 00:09:55
Distance: (default is 110)
R2#show ip route ospf
192.168.4.0/32 is subnetted, 1 subnets
O 192.168.4.1 [110/7501] via 172.31.23.2, 00:15:47, Serial0/0/0
192.168.5.0/32 is subnetted, 1 subnets
O 192.168.5.1 [110/7501] via 172.31.23.2, 00:15:47, Serial0/0/0
192.168.6.0/32 is subnetted, 1 subnets
O 192.168.6.1 [110/7501] via 172.31.23.2, 00:15:47, Serial0/0/0
O 192.168.30.0 [110/782] via 172.31.21.1, 00:28:19, Serial0/0/1
O 192.168.40.0 [110/782] via 172.31.21.1, 00:28:19, Serial0/0/1
O 192.168.99.0 [110/782] via 172.31.21.1, 00:28:19, Serial0/0/1
R2#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


R2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
R2#
R2#show ip protocols
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 2.2.2.2
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.31.21.0 0.0.0.3 area 0
172.31.23.0 0.0.0.3 area 0
10.10.10.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/1
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:00:30
2.2.2.2 110 00:11:36
3.3.3.3 110 00:09:55
Distance: (default is 110)
R2#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

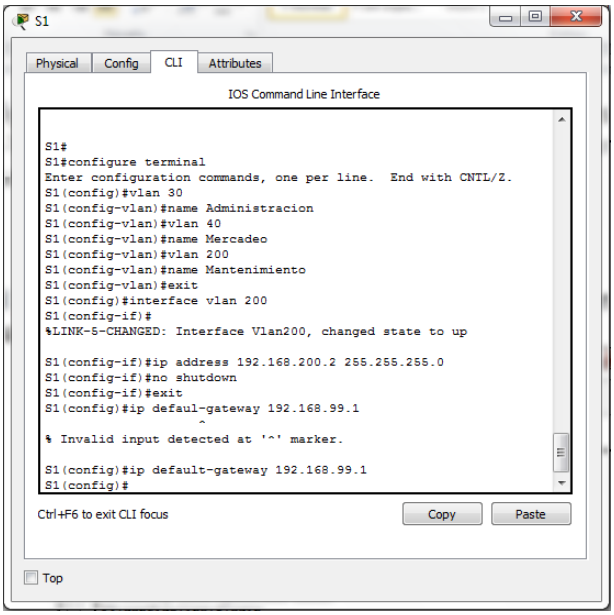

R1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Password:
R1#show ip protocols
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 1.1.1.1
Number of areas in this router is 1. 1 normal 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
192.168.99.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/0.30
GigabitEthernet0/0.40
GigabitEthernet0/0.200
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:02:15
2.2.2.2 110 00:13:22
3.3.3.3 110 00:11:41
Distance: (default is 110)
--More--
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

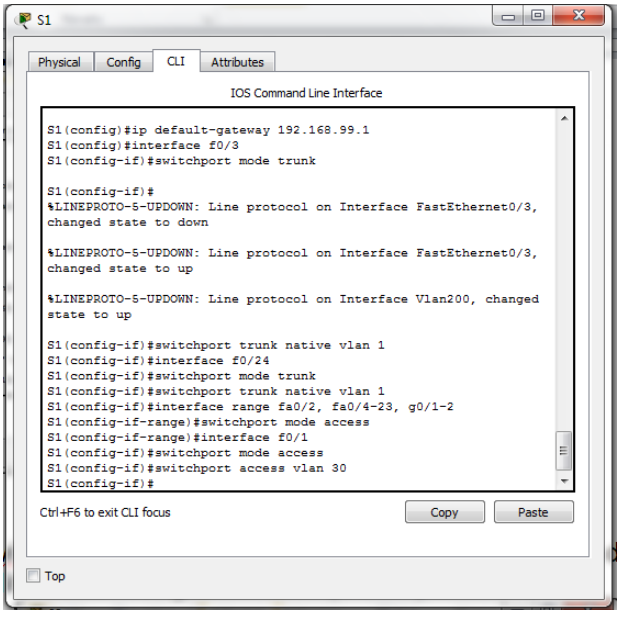

R3
Physical
Config
CLI
Attributes
IOS Command Line Interface
R3>enable
Password:
R3#show ip protocols
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 3.3.3.3
Number of areas in this router is 1. 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 00:03:48
2.2.2.2 110 00:14:54
3.3.3.3 110 00:13:13
Distance: (default is 110)
R3#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

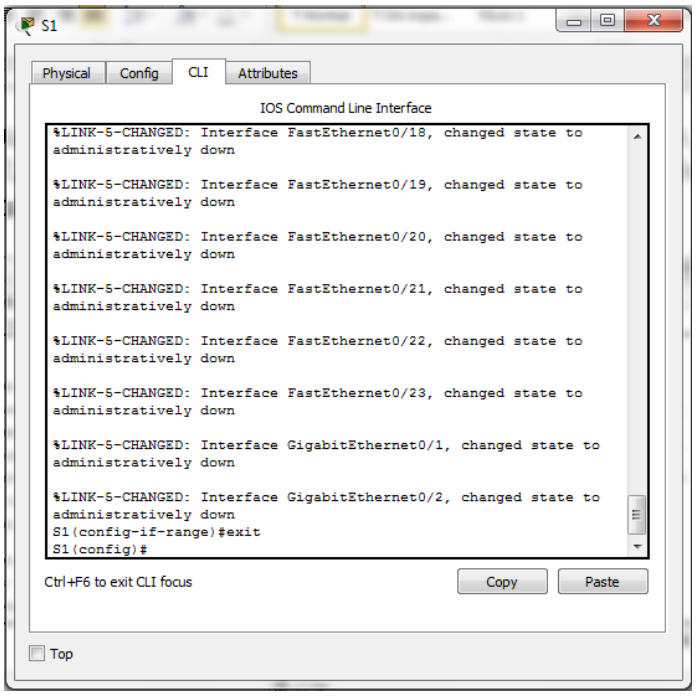
3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.

   Después de terminar la configuración de las VLANs, no pasaba las pruebas con el comando ping, se verifica y se identifica que se debe cambiar el direccionamiento de la VLAN 200, ya que la dirección que da la topología no corresponde con el direccionamiento de los switch. Al realizar el cambio y corregir esto se realizan las pruebas de comunicación con el comando ping sin contratiempos, en los pantallazos al final se puede ver claramente. Las gráficas resaltadas en rojo indican las correcciones y cambios que se realizan para que funcionen las VLAN.

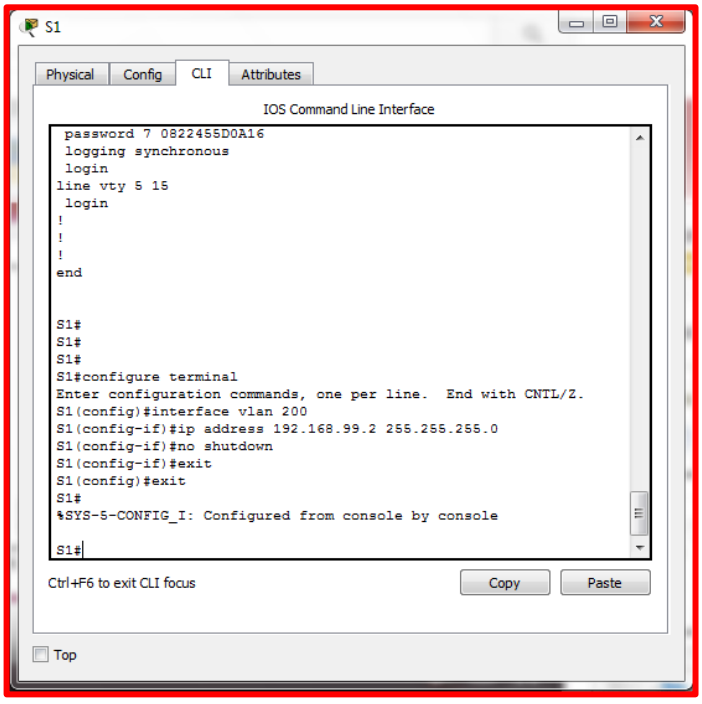
   VLAN 200 – 192.168.200.0/24 es remplazada por 192.168.99.0/24

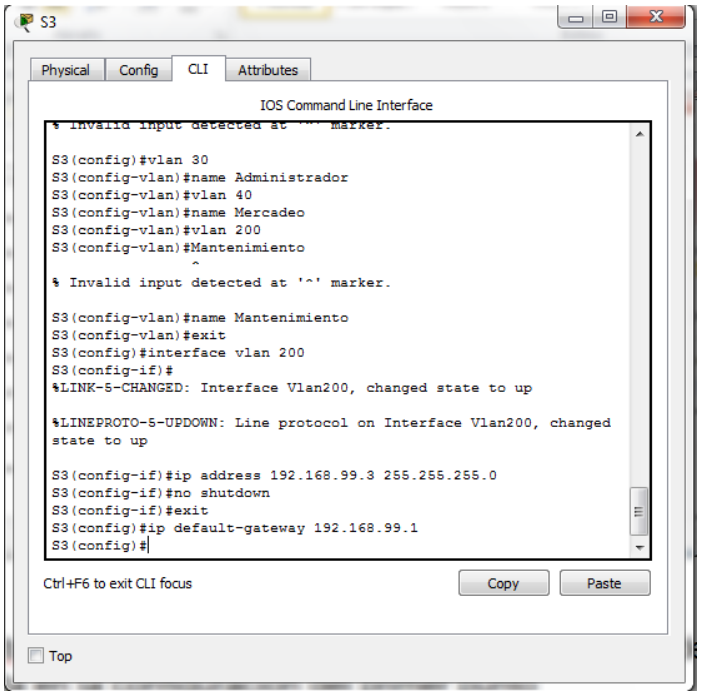


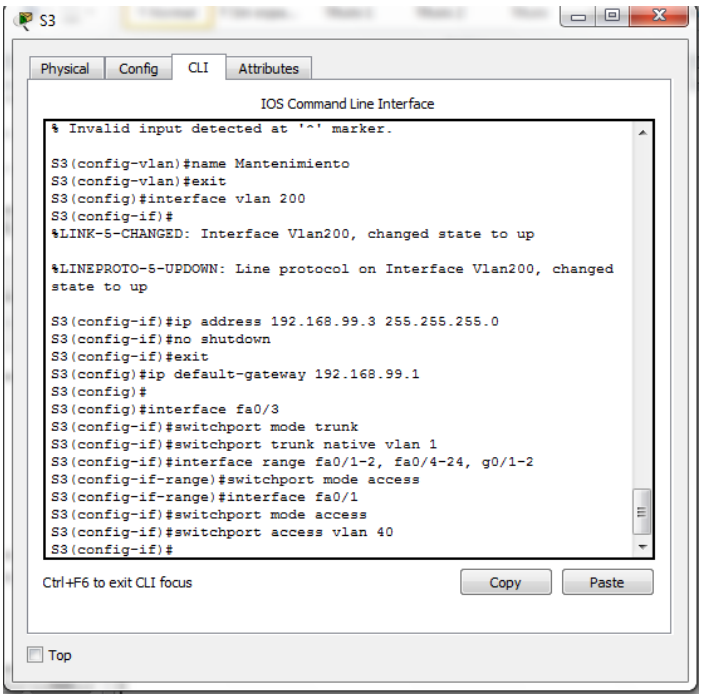


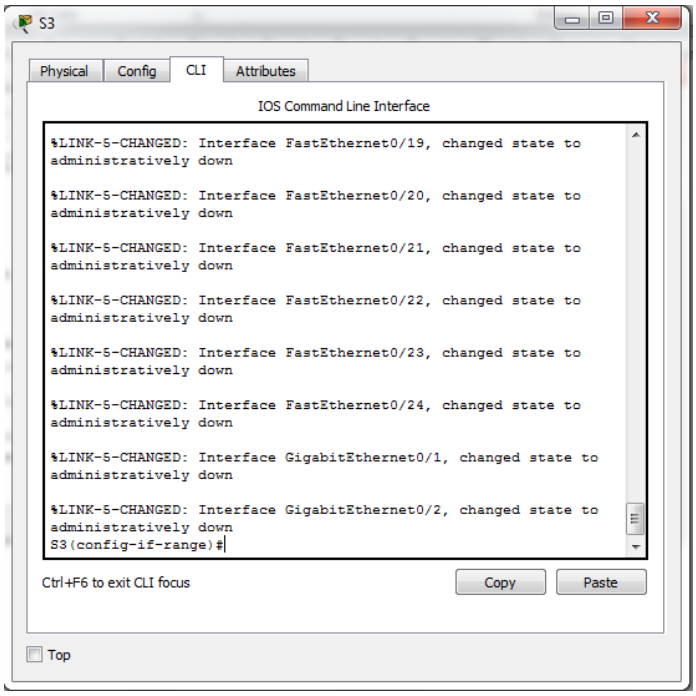


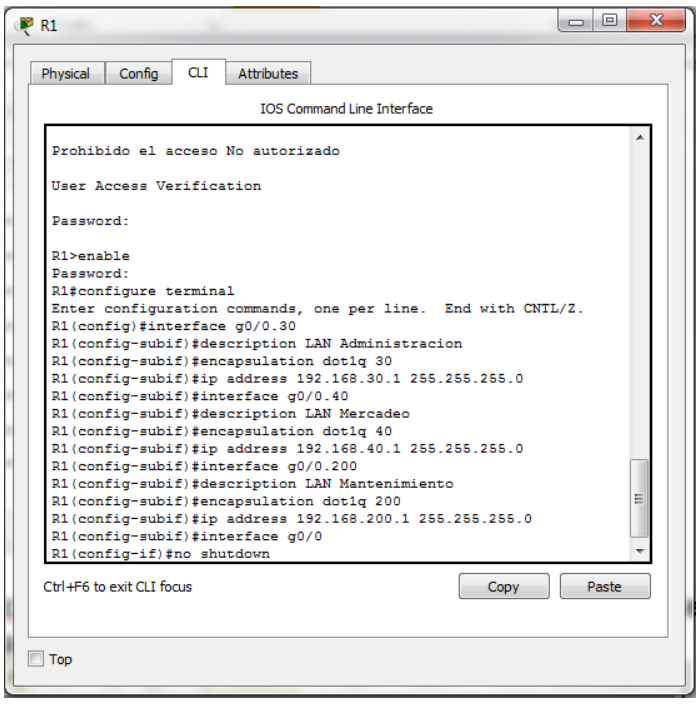
Corrección realizada a la vlan 200

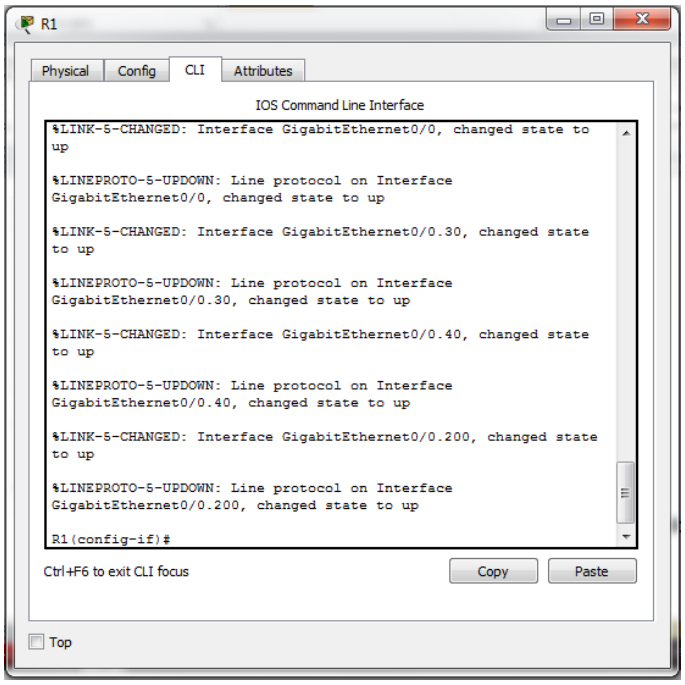



S3
Physical
Config
CLI
Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
S3(config)#vlan 30
S3(config-vlan)#name Administrador
S3(config-vlan)#vlan 40
S3(config-vlan)#name Mercadeo
S3(config-vlan)#vlan 200
S3(config-vlan)#Mantenimiento
^
% Invalid input detected at '^' marker.
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#interface vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#no shutdown
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

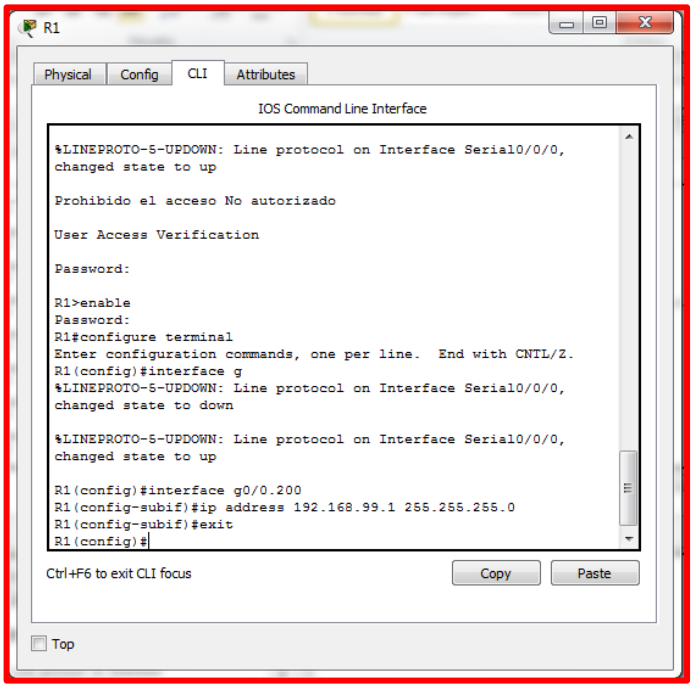

S3
Physical
Config
CLI
Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#interface vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#no shutdown
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#
S3(config)#interface fa0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#interface range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
S3(config-if-range)#interface fa0/1
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 40
S3(config-if)#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

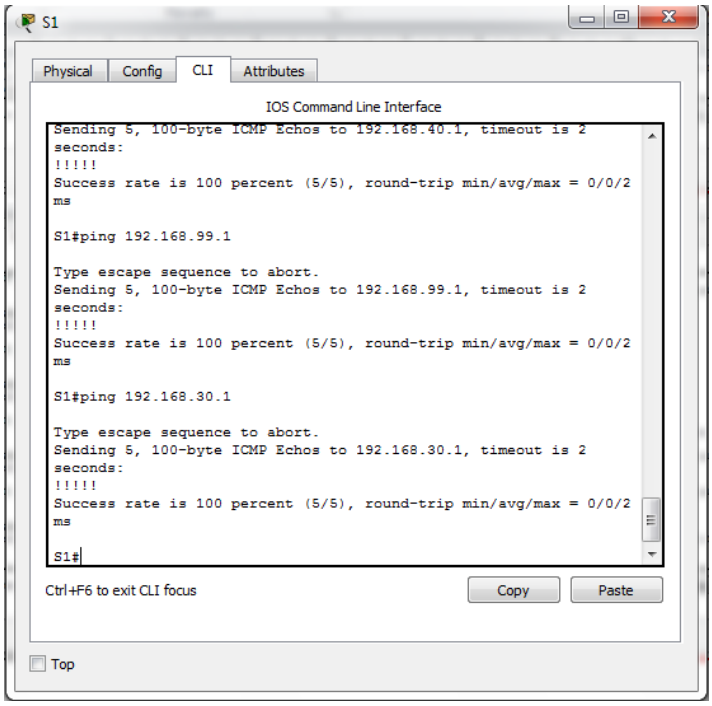

S3
Physical
Config
CLI
Attributes
IOS Command Line Interface
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively 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)#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

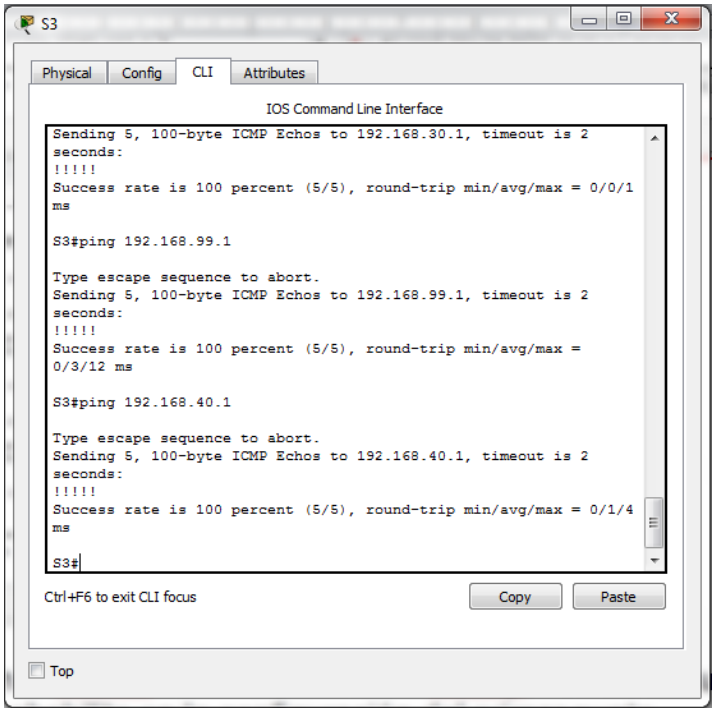

R1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Prohibido el acceso No autorizado
User Access Verification
Password:
R1>enable
Password:
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface g0/0.30
R1(config-subif)#description LAN Administracion
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
R1(config-subif)#interface g0/0.40
R1(config-subif)#description LAN Mercadeo
R1(config-subif)#encapsulation dot1q 40
R1(config-subif)#ip address 192.168.40.1 255.255.255.0
R1(config-subif)#interface g0/0.200
R1(config-subif)#description LAN Mantenimiento
R1(config-subif)#encapsulation dot1q 200
R1(config-subif)#ip address 192.168.200.1 255.255.255.0
R1(config-subif)#interface g0/0
R1(config-if)#no shutdown
Ctrl+F6 to exit CLI focus
Copy
Paste
Top



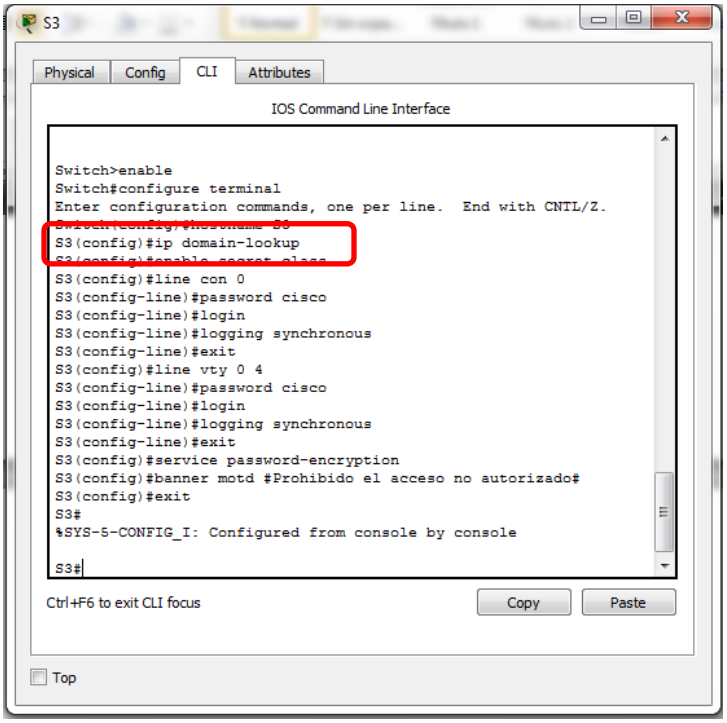
Corrección realizada a la vlan 200




S1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Sending 5, 100-byte ICMP Echos to 192.168.40.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/2 ms
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 100 percent (5/5), round-trip min/avg/max = 0/0/2 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 100 percent (5/5), round-trip min/avg/max = 0/0/2 ms
S1#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


S3
Physical
Config
CLI
Attributes
IOS Command Line Interface
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
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 100 percent (5/5), round-trip min/avg/max = 0/3/12 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 100 percent (5/5), round-trip min/avg/max = 0/1/4 ms
S3#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

4. En el Switch 3 deshabilitar DNS lookup
   Ya se encuentra deshabilitado. Se deshabilita en la configuración del primer punto

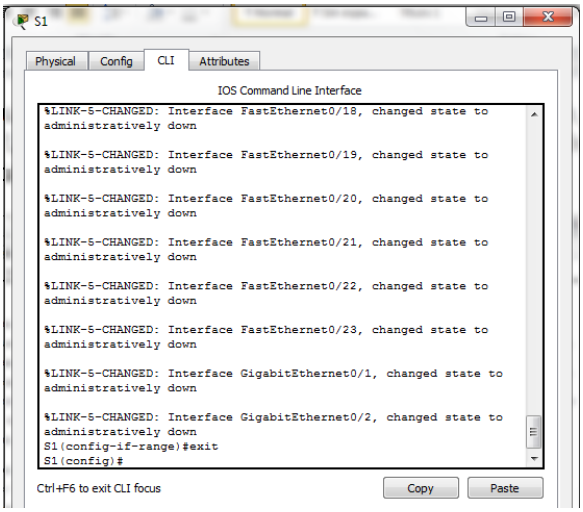


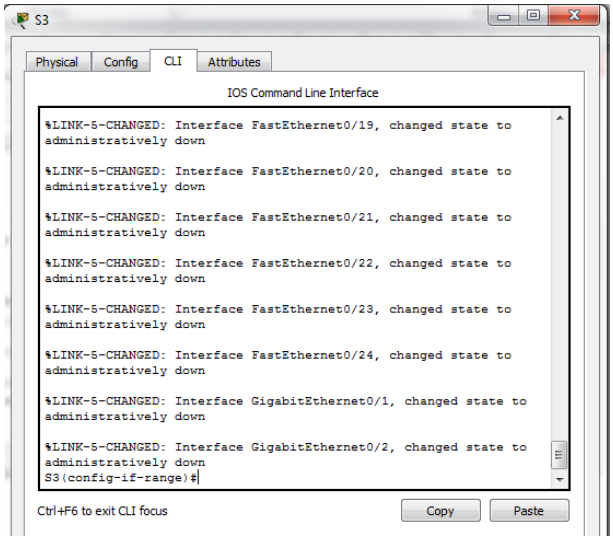
5. Asignar direcciones IP a los Switches acorde a los lineamientos.

   Parámetros ya configurados en los puntos 1 y 3

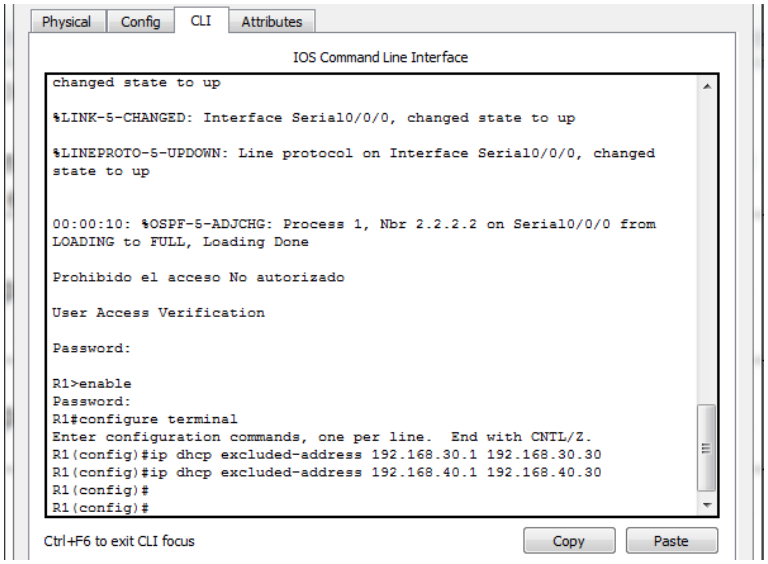
6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

   Parámetros ya configurados en el punto 3

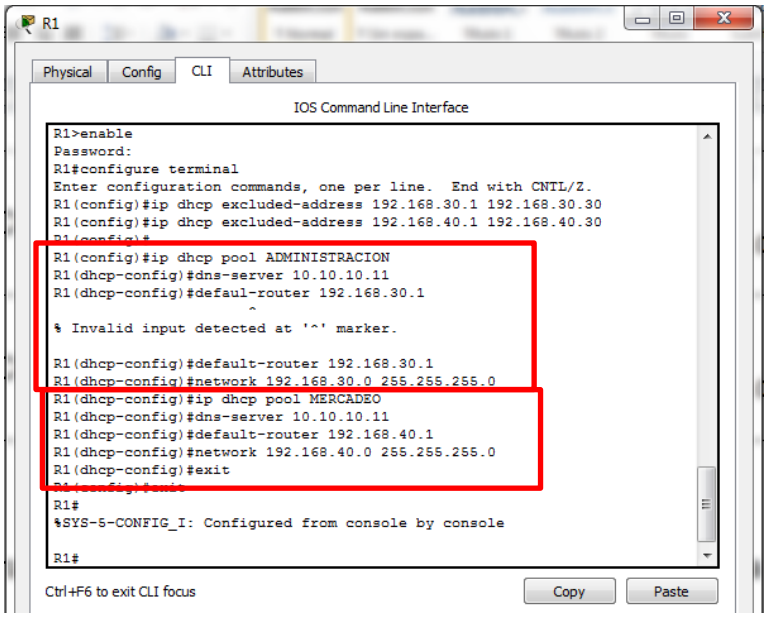




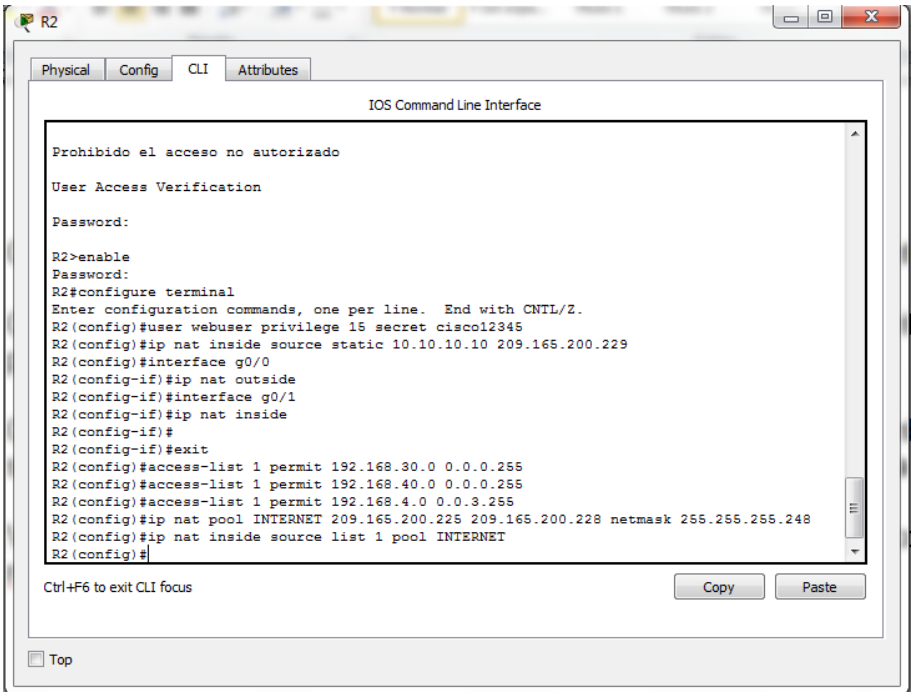
7. Implement DHCP and NAT for IPv4
   - Configurar R1 como servidor DHCP para las VLANs 30 y 40.
   - Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.

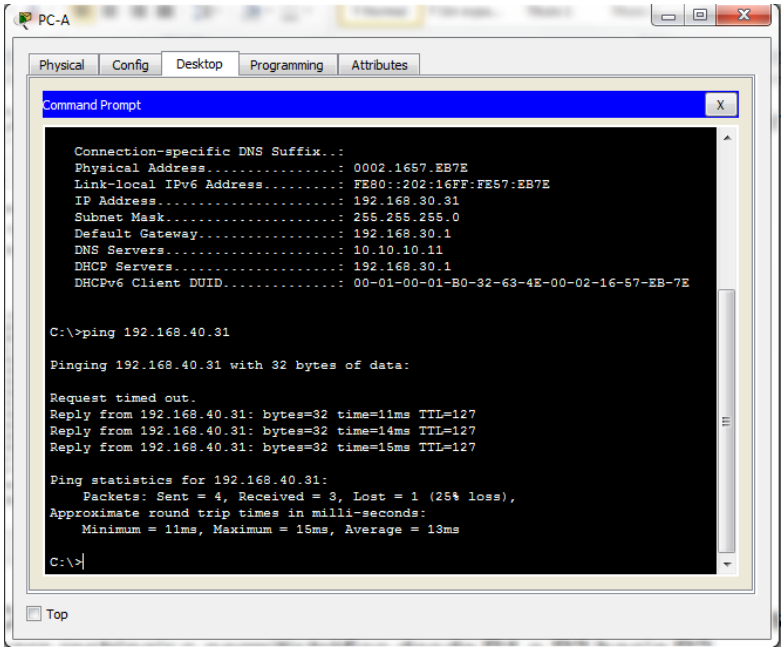


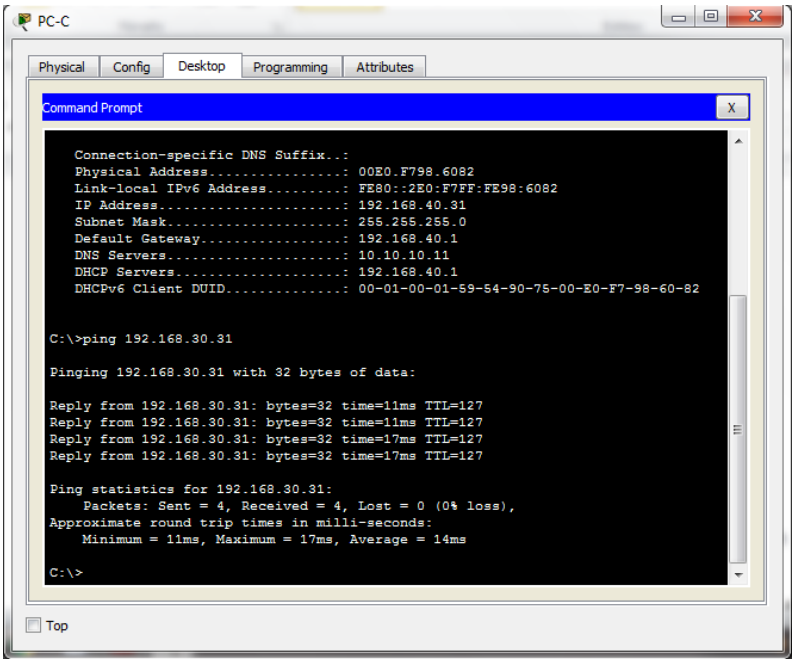
Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer defaul gateway
Configurar DHCP pool para VLAN 40	Name: MERCADEO DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer defaul gateway

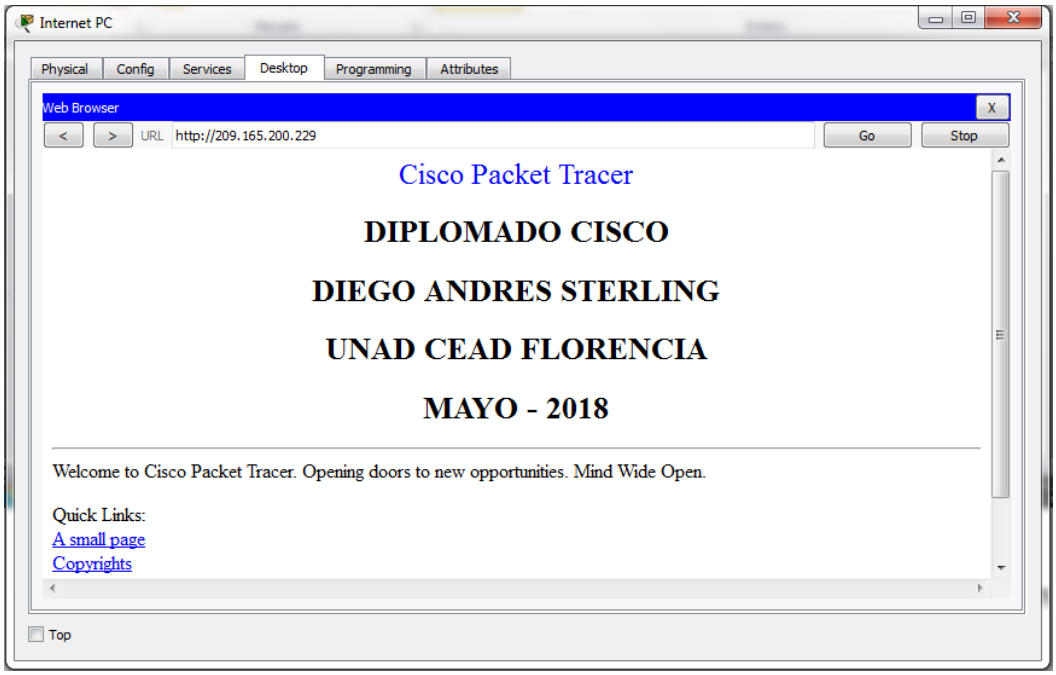


8. Configurar NAT en R2 para permitir que los host puedan salir a internet

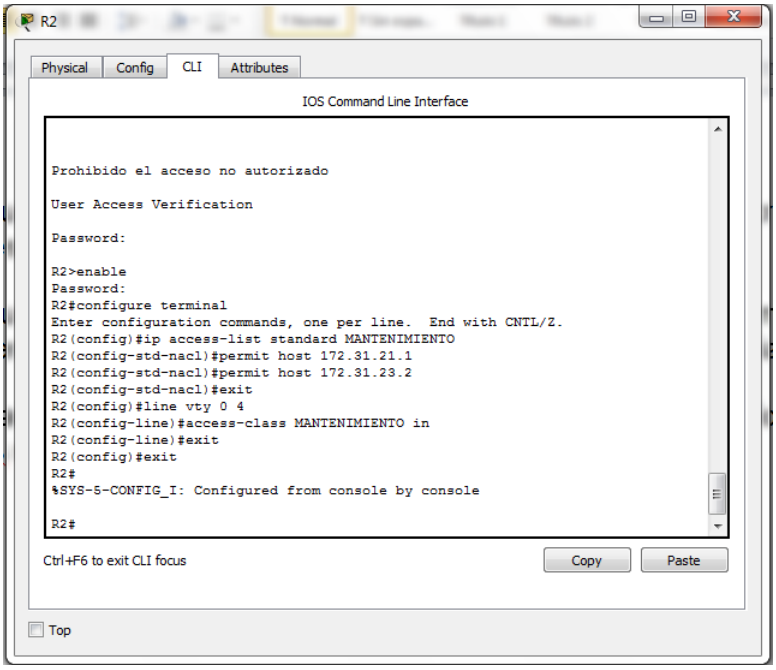




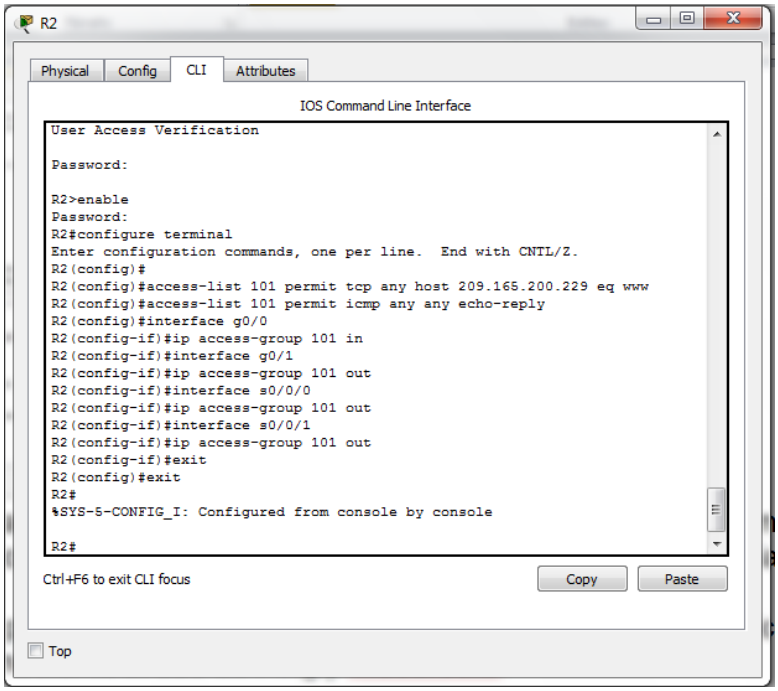

PC-C
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Connection-specific DNS Suffix..:
Physical Address.....: 00E0.F798.6082
Link-local IPv6 Address.....: FE80::2E0:F7FF:FE98:6082
IP Address.....: 192.168.40.31
Subnet Mask.....: 255.255.255.0
Default Gateway.....: 192.168.40.1
DNS Servers.....: 10.10.10.11
DHCP Servers.....: 192.168.40.1
DHCPv6 Client DUID.....: 00-01-00-01-59-54-90-75-00-E0-F7-98-60-82
C:\>ping 192.168.30.31
Pinging 192.168.30.31 with 32 bytes of data:
Reply from 192.168.30.31: bytes=32 time=11ms TTL=127
Reply from 192.168.30.31: bytes=32 time=11ms TTL=127
Reply from 192.168.30.31: bytes=32 time=17ms TTL=127
Reply from 192.168.30.31: bytes=32 time=17ms TTL=127
Ping statistics for 192.168.30.31:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 11ms, Maximum = 17ms, Average = 14ms
C:\>
Top


Internet PC
Physical
Config
Services
Desktop
Programming
Attributes
Web Browser
URL
http://209.165.200.229
Go
Stop
Cisco Packet Tracer
DIPLOMADO CISCO
DIEGO ANDRES STERLING
UNAD CEAD FLORENCIA
MAYO - 2018
Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Top

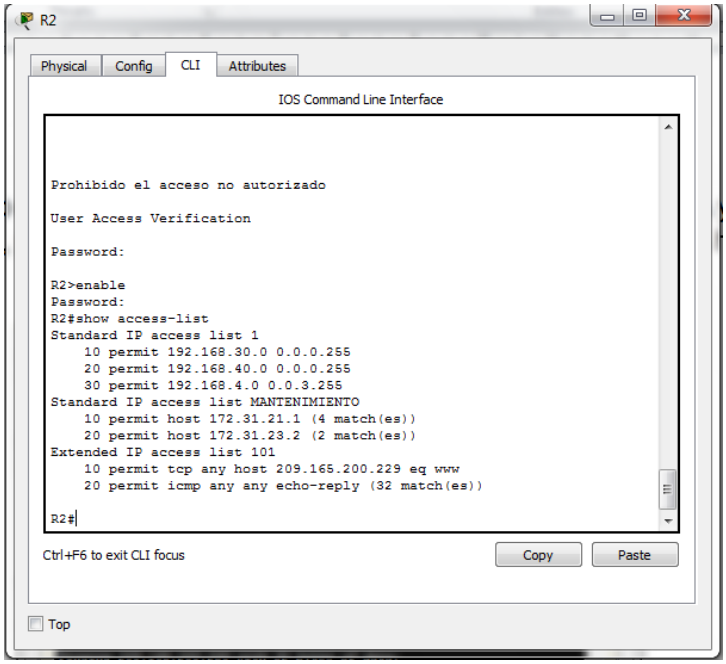
9. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.



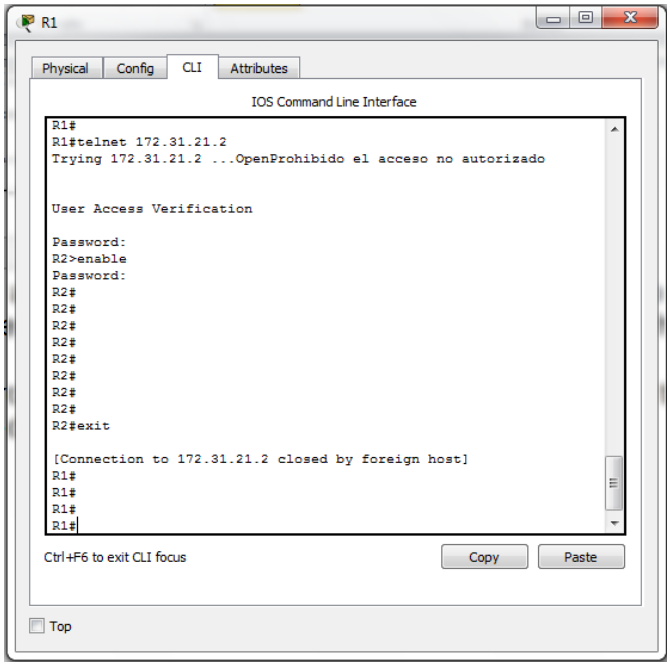
10. Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

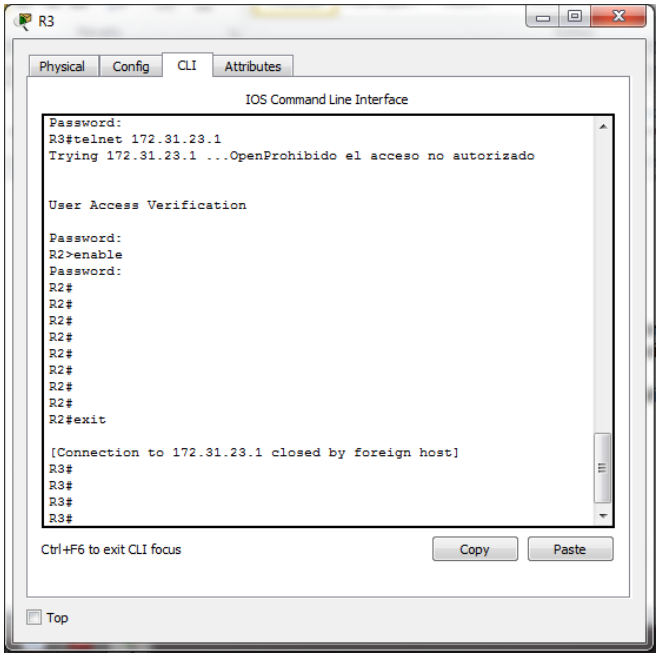


11. Verificar procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

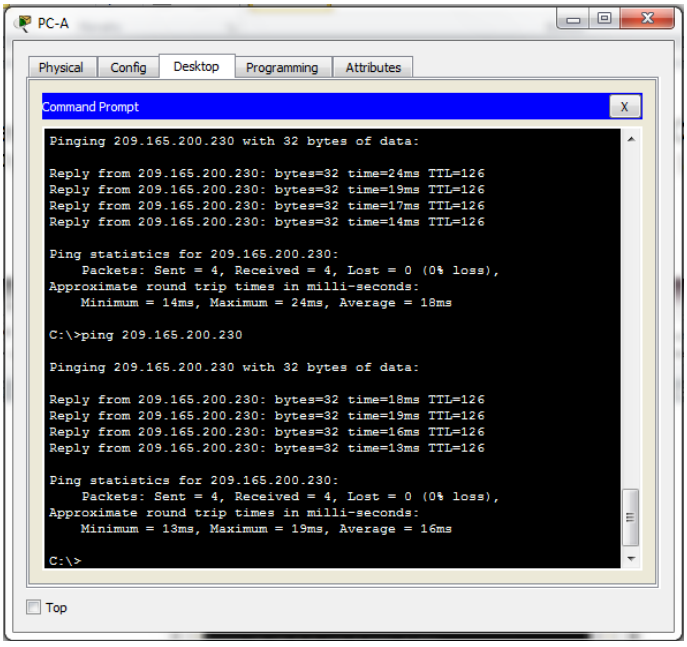


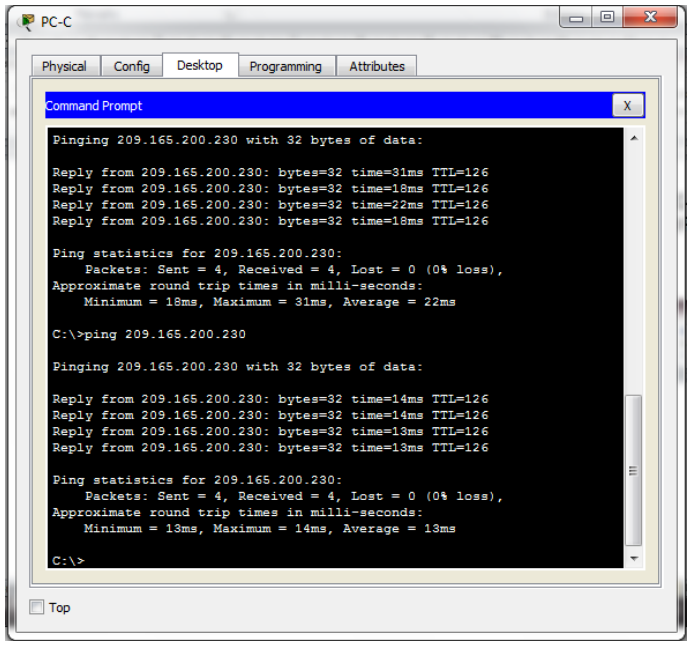
Listas de acceso estándar donde se puede conectar por medio de telnet a R2 desde R1 y R3, pero desde los host no es permitido

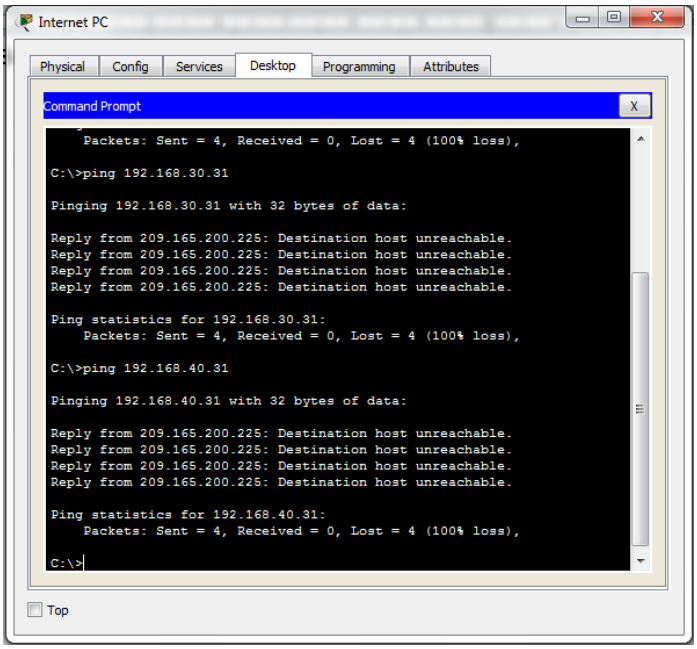


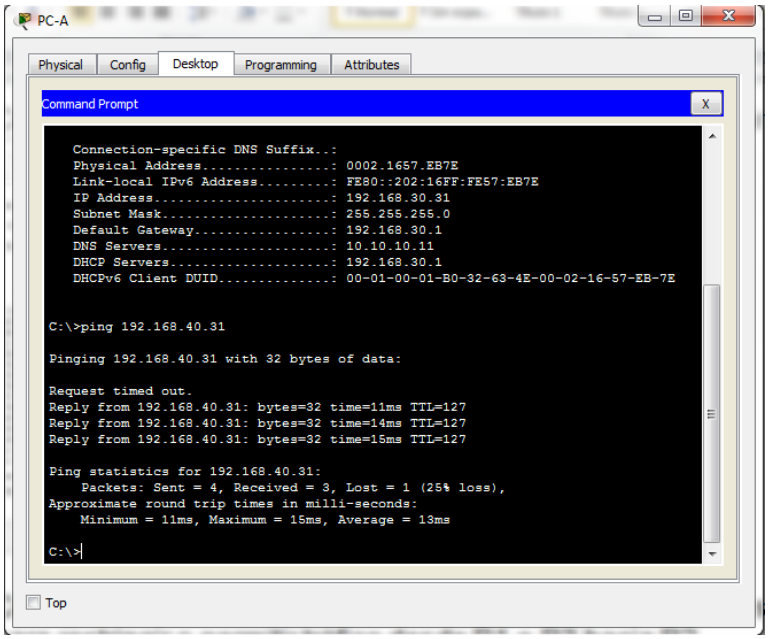


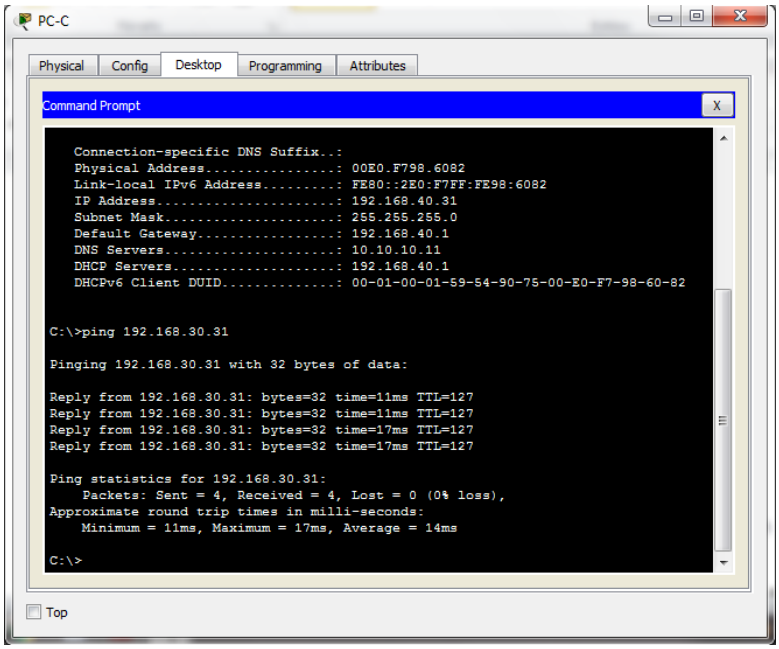
Listas de acceso extendidas, permiten hacer ping desde los host PC-A y PC-C al host Internet PC, pero no permite hacer ping del host Internet PC a los host PC-A y PC-C




PC-C
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Pinging 209.165.200.230 with 32 bytes of data:
Reply from 209.165.200.230: bytes=32 time=31ms TTL=126
Reply from 209.165.200.230: bytes=32 time=18ms TTL=126
Reply from 209.165.200.230: bytes=32 time=22ms TTL=126
Reply from 209.165.200.230: bytes=32 time=18ms TTL=126
Ping statistics for 209.165.200.230:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 18ms, Maximum = 31ms, Average = 22ms
C:\>ping 209.165.200.230
Pinging 209.165.200.230 with 32 bytes of data:
Reply from 209.165.200.230: bytes=32 time=14ms TTL=126
Reply from 209.165.200.230: bytes=32 time=14ms TTL=126
Reply from 209.165.200.230: bytes=32 time=13ms TTL=126
Reply from 209.165.200.230: bytes=32 time=13ms TTL=126
Ping statistics for 209.165.200.230:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 13ms, Maximum = 14ms, Average = 13ms
C:\>
Top


Internet PC
Physical
Config
Services
Desktop
Programming
Attributes
Command Prompt
X
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.30.31
Pinging 192.168.30.31 with 32 bytes of data:
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Ping statistics for 192.168.30.31:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.40.31
Pinging 192.168.40.31 with 32 bytes of data:
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Reply from 209.165.200.225: Destination host unreachable.
Ping statistics for 192.168.40.31:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top





NOTA: No se adjuntan más pantallazos para no extender más el documento y evitar que quede más pesado y a medida que se fue desarrollando la actividad se hacían pruebas, se puede ver en los pantallazos del proceso. De igual manera se anexa el archivo de packet tracer para evidencia y su validación.

La prueba de habilidades cuenta con 13 puntos, durante el proceso se integraron algunos con el fin de darle más orden al documento quedando en total 11 puntos

Conclusiones

- Se logró comprender y utilizar los diferentes protocolos de routing disponibles dependiendo de las necesidades de la red.
- Se conoció y desarrollo la implementación y configuración básica de OSPF de área única.
- Se analizaron y ejecutaron las instrucciones necesarias para utilizar las ACL estándar y extendida en un router Cisco.
- Se identificó cada una de las funciones, la configuración y la aplicación de DHCPv4.
- Se estudió la implementación de NAT combinada sobre la red configurada con direcciones IPv4.

Bibliografía

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