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RESUMEN

Internet es la red más extensa que existe, la cual proporciona los servicios que permiten conectarnos, comunicarnos desde cualquier parte del mundo, desarrollar y facilitar el trabajo, las relaciones business-to-business, el comercio electrónico e intereses personales, etc., pero también existen redes de todo tamaño que pueden ir desde redes simples, compuestas mínimo por dos PC, hasta redes que conectan millones de dispositivos.

La infraestructura de red es la plataforma que da soporte a la red, puede variar ampliamente en términos de tamaño, cantidad de usuarios, y cantidad y tipo de servicios y la plataforma de routing y switching es la base de toda infraestructura en entornos de red de Cisco. Adicionalmente, las redes deben ser confiables, tolerantes a fallas, escalables, deben proporcionar calidad de servicio y garantizar la seguridad de la información y de los recursos en ellas.

Por lo anterior, se plantea dos escenarios para la construcción y funcionamiento de cada una de la red, en la que se pone a prueba las habilidades y conocimiento adquirido en el Diplomado de Profundización Cisco (implementación de soluciones integradas lan / wan).

ABSTRACT

The Internet is the most extensive network that exists, which provides the services that allow us to connect, communicate from anywhere in the world, develop and facilitate work, business-to-business relationships, electronic commerce and personal interests, etc., but There are also networks of all sizes that can range from simple networks, composed of minimum for two PCs, to networks that connect millions of devices.

The network infrastructure is the platform that supports the network, it can vary in terms of size, number of users, amount and type of services and the routing and switching platform is the basis of the entire infrastructure in Cisco network environments In addition, networks must be reliable, fault tolerant, scalable, must provide quality of service and ensure the security of information and resources in them.

Therefore, two situations arise for the construction and operation of each of the network, in which the skills and knowledge acquired in the Cisco Deepening Diploma (implementation of integrated lan / wan solutions) are tested.

INTRODUCCIÓN

En un mundo globalizado, donde la tencológia avanza a pasos agingatados, donde el uso de la internet permite extender y potenciar nuestra capacidad de comunicarnos sin límites, donde se producen las interacciones sociales, comerciales, políticas y personales que cambia en forma continua, por ende, se dede estar al día con la evolución de esta red global.

Por lo tanto, los desarrolladores, programadores usan el internet como punto de inicio para sus esfuerzos, creando nuevos productos y servicios diseñados específicamente para aprovechar las funcionalidades de la red, en la medida que estos impulsen los límites de lo posible, las funcionaliades de las redes interconectadas que crean la Internet jugarán un papel cada vez más grande en el éxito de los proyectos.

Como también, como futuros profesionales, al realizar el Diplomado de Profundización CCNA, le permitirá explorar el material que presenta las bases para explorar los servicios, las tecnologías y los problemas que enfrentaran en el diseño y construcción de una red moderna y acorde a las necesidades de los clientes.

OBJETIVOS

GENERAL:

Identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del Diplomado de Profundización CCNA, poniendo a prueba los niveles de comprensión y solción de dos problemas relacionados con diversos aspectos de Networking.

ESPECÍFICOS:

- Aplicar los conocimientos adquiridos durante del diplomado y desarrollar prueba de habilidades.
- Desarrollar dos (2) escenarios propuestos, acompañado de los respectivos procesos de documentación de la solución.
- Registrar en docuemento los correspondientes al registro de la configuración de cada uno de los dispositivos, la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

DESARROLLO DE LOS DOS ESCENARIOS

1. ESCENARIO 1

Una empresa posee sucursales distribuidas en las ciudades de Bogotá, Medellín y Cali 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.

1.1. Topología de la Red

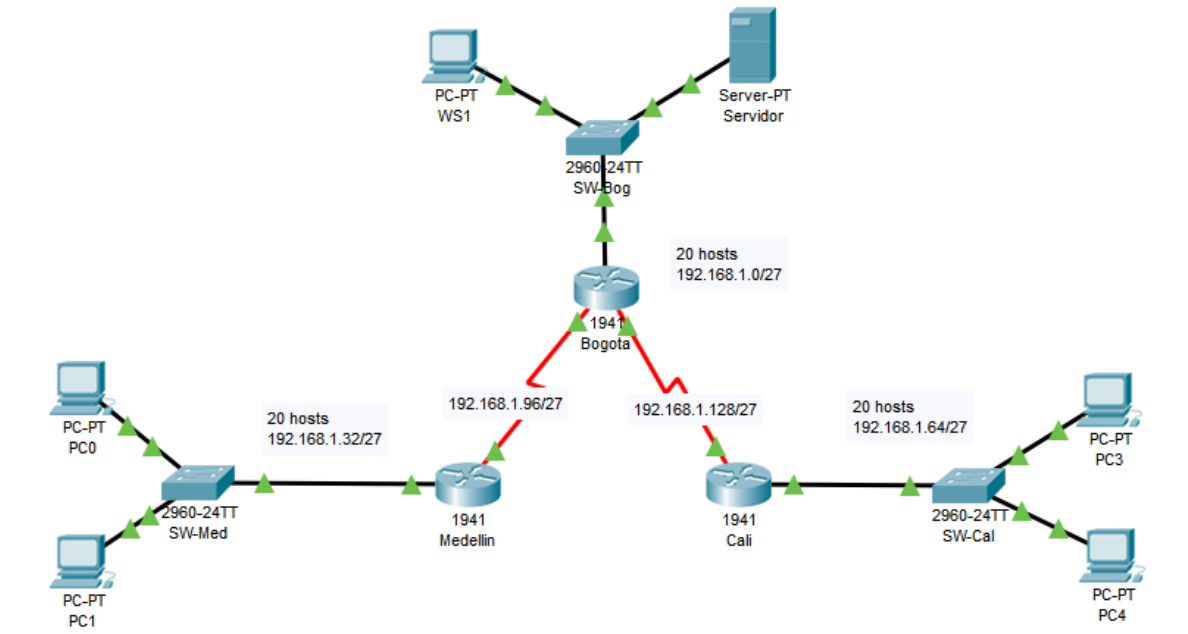

Figura 1. Modelo Topología de Red Escenario 1

1.2. Configuración de equipos.

Realizar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc).

Configuracion Router – Bogota

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname BOGOTA
BOGOTA(config)#no ip domain-lookup
BOGOTA(config)#service password-encryption
BOGOTA(config)#enable secret class
BOGOTA(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso restringido.#

BOGOTA(config)#line console 0
BOGOTA(config-line)#password cisco
BOGOTA(config-line)#login
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#line vty 0 15
BOGOTA(config-line)#password cisco
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#login
BOGOTA(config-line)#exit
BOGOTA(config)#end
BOGOTA#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
BOGOTA#
```

Configuracion Router – Medellin

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname MEDELLIN
MEDELLIN(config)#no ip domain-lookup
MEDELLIN(config)#service password-encryption
MEDELLIN(config)#enable secret class
MEDELLIN(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Acceso restringido.#
```

```
MEDELLIN(config)#line console 0
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#login
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#line vty 0 15
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#login
MEDELLIN(config-line)#end
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
MEDELLIN#
```

Configuracion Router – Cali

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname CALI
CALI(config)#no ip domain-lookup
CALI(config)#service password-encryption
CALI(config)#enable secret class
CALI(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Acceso restringido.#

CALI(config)#line console 0
CALI(config-line)#password cisco
CALI(config-line)#login
CALI(config-line)#logging synchronous
CALI(config-line)#line vty 0 15
CALI(config-line)#password cisco
CALI(config-line)#logging synchronous
CALI(config-line)#login
CALI(config-line)#end
CALI#
%SYS-5-CONFIG_I: Configured from console by console

CALI#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
CALI#
```

1.3. Conexión fisica de los equipos.

Realizar la conexión fisica de los equipos con base en la topología de red.

Dipositivos requeridos

3 Routers (cisco 1941)
3 Switch (cisco 2960-24TT)
1 Servidor
5 PCs con Windows 7
Cables Serial y Ethernet

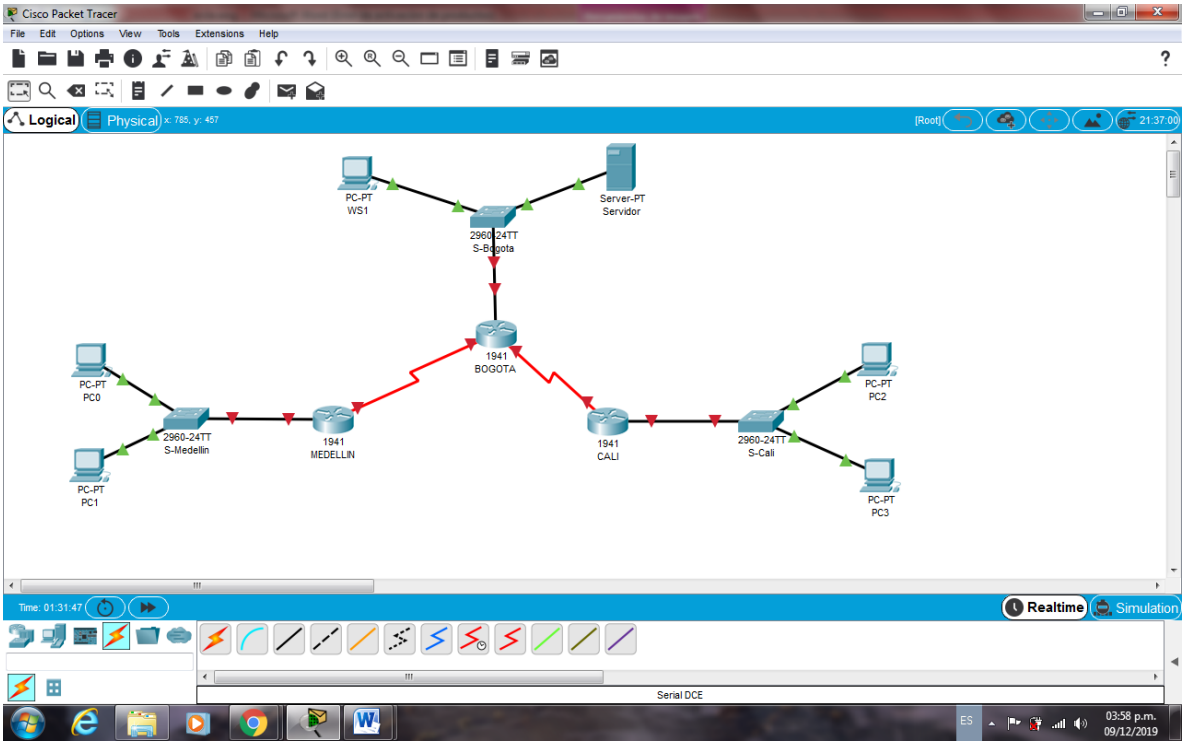

Figura 2. Conexión Física de los equipos con base en la Topología de Red

1.4. Parte 1. Asignación de direcciones IP.

a. Se debe dividir (subnetear) la red creando una segmentación en ocho partes, para permitir crecimiento futuro de la red corporativa.

b. Asignar una dirección IP a la red.

Tabla 1		
Nombre de Subred	**Dirección de Red**	**Máscara de Subred**
Bogota LAN	192.168.1.0	255.255.255.224
Medellín LAN	192.168.1.32	255.255.255.224
Cali LAN	192.168.1.64	255.255.255.224
Bogota Medellín	192.168.1.96	255.255.255.224
Bogota Cali	192.168.1.128	255.255.255.224
Proxima	192.168.1.160	255.255.255.224
Proxima	192.168.1.192	255.255.255.224
Proxima	192.168.1.224	255.255.255.224

1.5. Parte 2. Configuración básica.

a. Completar la siguiente tabla con la configuración básica de los routers, teniendo en cuenta las subredes diseñadas.

Tabla 2			
	R1	R2	R3
Nombre de Host	**MEDELLIN**	**BOGOTA**	**CALI**
Dirección de Ip en interfaz Serial 0/0	192.168.1.99	192.168.1.98	192.168.1.131
Dirección de Ip en interfaz Serial 0/1		192.168.1.130	
Dirección de Ip en interfaz FA 0/0	192.168.1.33	192.168.1.1	192.168.1.65
Protocolo de enrutamiento	**Eigrp**	**Eigrp**	**Eigrp**
Sistema Autónomo	200	200	200
Afirmaciones de red	192.168.1.0	192.168.1.0	192.168.1.0

Configuración Router – Bogotá

```
BOGOTA#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#ip address 192.168.1.98 255.255.255.224
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#int s0/0/1
BOGOTA(config-if)#ip address 192.168.1.130 255.255.255.224
```

```
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#int g0/0
BOGOTA(config-if)#ip address 192.168.1.1 255.255.255.224
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#router eigrp 200
BOGOTA(config-router)#no auto-summary
BOGOTA(config-router)#do show ip route connected
 C   192.168.1.0/27  is directly connected, GigabitEthernet0/0
 C   192.168.1.96/27  is directly connected, Serial0/0/0
 C   192.168.1.128/27  is directly connected, Serial0/0/1

BOGOTA(config-router)#network 192.168.1.0 0.0.0.31
BOGOTA(config-router)#network 192.168.1.96 0.0.0.31
BOGOTA(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.99 (Serial0/0/0) is
up: new adjacency

BOGOTA(config-router)#network 192.168.1.128 0.0.0.31
BOGOTA(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.131 (Serial0/0/1) is
up: new adjacency

BOGOTA(config-router)#
```

Configuration Router – Medellin

```
MEDELLIN>enable
Password:
MEDELLIN#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
MEDELLIN(config)#interface s0/0/0
MEDELLIN(config-if)#ip address 192.168.1.99 255.255.255.224
MEDELLIN(config-if)#no shutdown
MEDELLIN(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
MEDELLIN(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
MEDELLIN(config-if)#interface g0/0
MEDELLIN(config-if)#ip address 192.168.1.33 255.255.255.224
MEDELLIN(config-if)#no shutdown
MEDELLIN(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
```

MEDELLIN(config-if)#router eigrp 200
MEDELLIN(config-router)#no auto-summary
MEDELLIN(config-router)#do show ip route connected
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
C 192.168.1.96/27 is directly connected, Serial0/0/0

MEDELLIN(config-router)#network 192.168.1.32 0.0.0.31
MEDELLIN(config-router)#network 192.168.1.96 0.0.0.31
Medellin(config-router)#

%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.98 (Serial0/0/0) is up: new adjacency

Configuration Router – Cali

CALI>enable
Password:
CALI#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#interface s0/0/0
CALI(config-if)#ip address 192.168.1.131 255.255.255.224
CALI(config-if)#no shutdown
CALI(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
CALI(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
CALI(config-if)#interface g0/0
CALI(config-if)#ip address 192.168.1.65 255.255.255.224
CALI(config-if)#no shutdown
CALI(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
CALI(config-if)#router eigrp 200
CALI(config-router)#no auto-summary
CALI(config-router)#do show ip route connected
C 192.168.1.64/27 is directly connected, GigabitEthernet0/0
C 192.168.1.128/27 is directly connected, Serial0/0/0
CALI(config-router)#network 192.168.1.64 0.0.0.31
CALI(config-router)#network 192.168.1.128 0.0.0.31Cali(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.130 (Serial0/0/0) is up: new adjacency

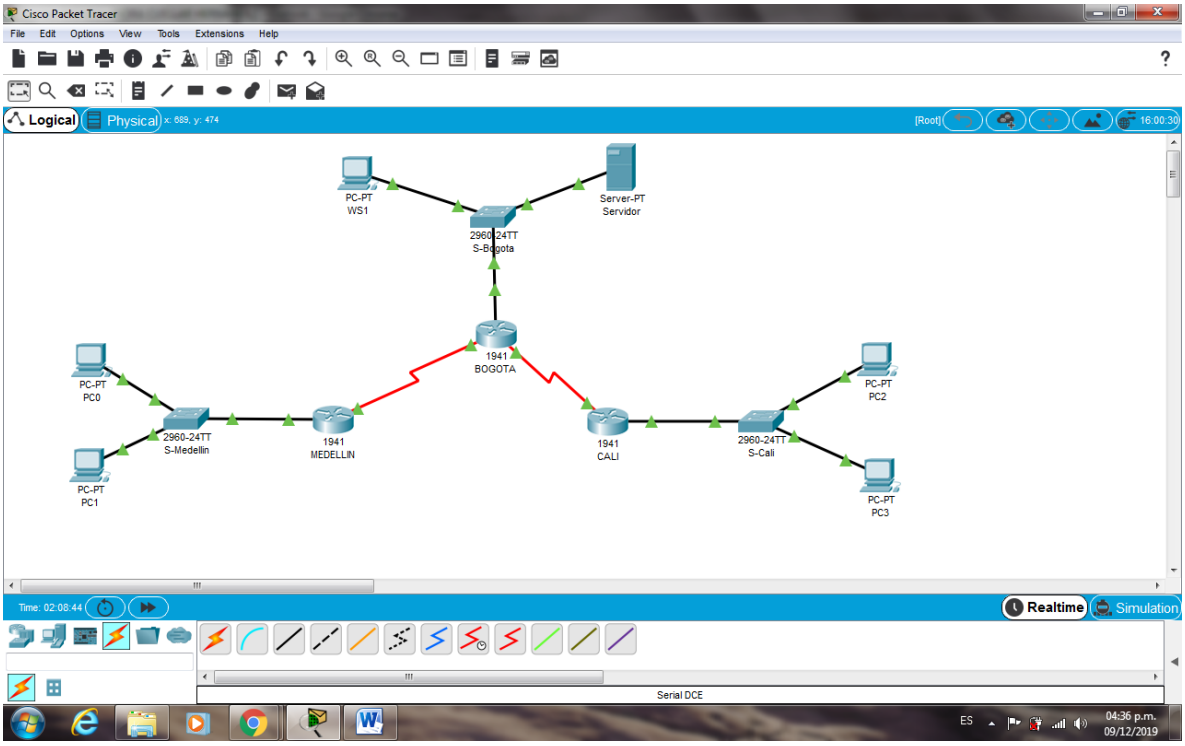

Figura 3. Configuración Routers

b. Después de cargada la configuración en los dispositivos, verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

```
BOGOTA>enable
Password:
BOGOTA#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, 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

     192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks
C       192.168.1.0/27 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
C       192.168.1.96/27 is directly connected, Serial0/0/0
L       192.168.1.98/32 is directly connected, Serial0/0/0
C       192.168.1.128/27 is directly connected, Serial0/0/1
L       192.168.1.130/32 is directly connected, Serial0/0/1

BOGOTA#
```

```
MEDELLIN>enable
Password:
MEDELLIN#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, 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

     192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.1.32/27 is directly connected, GigabitEthernet0/0
L       192.168.1.33/32 is directly connected, GigabitEthernet0/0
C       192.168.1.96/27 is directly connected, Serial0/0/0
L       192.168.1.99/32 is directly connected, Serial0/0/0

MEDELLIN#

CALI#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, 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

     192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.1.64/27 is directly connected, GigabitEthernet0/0
L       192.168.1.65/32 is directly connected, GigabitEthernet0/0
C       192.168.1.128/27 is directly connected, Serial0/0/0
L       192.168.1.131/32 is directly connected, Serial0/0/0

CALI#
```

c. Verificar el balanceo de carga que presentan los routers.

```
BOGOTA>enable
Password:
BOGOTA#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status
```

P 192.168.1.0/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
via 192.168.1.99 (2170112/2816), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2170112
via 192.168.1.131 (2170112/2816), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/1
BOGOTA#show ip eigrp topology

MEDELLIN>enable
Password:
MEDELLIN#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.98 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2682112
via 192.168.1.98 (2682112/2170112), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0
MEDELLIN#

CALI>enable
Password:
CALI#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.130 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2682112
via 192.168.1.130 (2682112/2170112), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856

```
        via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
        via Connected, Serial0/0/0
CALI#
```

d. Realizar un diagnóstico de vecinos usando el comando cdp.

```
BOGOTA>enable
Password:
BOGOTA#show cdp neighbor
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID    Local Intrfce   Holdtme    Capability   Platform    Port ID
Switch       Gig 0/0         128            S       2960        Gig 0/1
CALI         Ser 0/0/1       137            R       C1900       Ser 0/0/0
MEDELLIN     Ser 0/0/0       128            R       C1900       Ser 0/0/0
BOGOTA#
```

```
MEDELLIN#show cdp neighbor
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID    Local Intrfce   Holdtme    Capability   Platform    Port ID
Switch       Gig 0/0         123            S       2960        Gig 0/1
BOGOTA       Ser 0/0/0       130            R       C1900       Ser 0/0/0
MEDELLIN#
```

```
apability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID    Local Intrfce   Holdtme    Capability   Platform    Port ID
Switch       Gig 0/0         144            S       2960        Gig 0/1
BOGOTA       Ser 0/0/0       151            R       C1900       Ser 0/0/1
CALI#
```

e. Realizar una prueba de conectividad en cada tramo de la ruta usando Ping.

```
MEDELLIN#ping 192.168.1.99
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.99, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/17/30 ms
MEDELLIN#ping 192.168.1.131
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.131, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/17/30 ms
MEDELLIN#
```

1.6. Parte 3. Configuration de enrutamiento.

a. Asignar el protocolo de enrutamiento EIGRP a los routers considerando el direccionamiento diseñado.

b. Verificar si existe vecindad con los routers configurados con EIGRP.

```
BOGOTA#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H   Address         Interface      Hold Uptime    SRTT   RTO   Q   Seq
                                   (sec)          (ms)       Cnt  Num
0   192.168.1.99    Se0/0/0         14   00:24:38  40     1000  0   7
1   192.168.1.131   Se0/0/1         10   00:24:36  40     1000  0   7


MEDELLIN#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H   Address         Interface      Hold Uptime    SRTT   RTO   Q   Seq
                                   (sec)          (ms)       Cnt  Num
0   192.168.1.98    Se0/0/0         11   00:25:18  40     1000  0   5


CALI#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H   Address         Interface      Hold Uptime    SRTT   RTO   Q   Seq
                                   (sec)          (ms)       Cnt  Num
0   192.168.1.130   Se0/0/0         11   00:26:06  40     1000  0   6
```

SHOW IP EIGRP TOPOLOGY

```
BOGOTA#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2816
        via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
        via 192.168.1.99 (2170112/2816), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2170112
        via 192.168.1.131 (2170112/2816), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
        via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
        via Connected, Serial0/0/1


MEDELLIN#show ip eigrp topology
```

IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.98 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2682112
via 192.168.1.98 (2682112/2170112), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0

CALI#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.130 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2682112
via 192.168.1.130 (2682112/2170112), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0

c. Realizar la comprobación de las tablas de enrutamiento en cada uno de los routers para verificar cada una de las rutas establecidas.

BOGOTA#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, 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

192.168.1.0/24 is variably subnetted, 8 subnets, 2 masks

```
C       192.168.1.0/27 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
D       192.168.1.32/27 [90/2170112] via 192.168.1.99, 00:33:17, Serial0/0/0
D       192.168.1.64/27 [90/2170112] via 192.168.1.131, 00:33:15, Serial0/0/1
C       192.168.1.96/27 is directly connected, Serial0/0/0
L       192.168.1.98/32 is directly connected, Serial0/0/0
C       192.168.1.128/27 is directly connected, Serial0/0/1
L       192.168.1.130/32 is directly connected, Serial0/0/1

MEDELLIN#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, 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

     192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.98, 00:34:11, Serial0/0/0
C       192.168.1.32/27 is directly connected, GigabitEthernet0/0
L       192.168.1.33/32 is directly connected, GigabitEthernet0/0
D       192.168.1.64/27 [90/2682112] via 192.168.1.98, 00:34:09, Serial0/0/0
C       192.168.1.96/27 is directly connected, Serial0/0/0
L       192.168.1.99/32 is directly connected, Serial0/0/0
D       192.168.1.128/27 [90/2681856] via 192.168.1.98, 00:34:11, Serial0/0/0

CALI#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, 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

     192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.130, 00:35:30, Serial0/0/0
D       192.168.1.32/27 [90/2682112] via 192.168.1.130, 00:35:30, Serial0/0/0
C       192.168.1.64/27 is directly connected, GigabitEthernet0/0
L       192.168.1.65/32 is directly connected, GigabitEthernet0/0
D       192.168.1.96/27 [90/2681856] via 192.168.1.130, 00:35:30, Serial0/0/0
```

C 192.168.1.128/27 is directly connected, Serial0/0/0
L 192.168.1.131/32 is directly connected, Serial0/0/0

d. Realizar un diagnóstico para comprobar que cada uno de los puntos de la red se puedan ver y tengan conectividad entre sí. Realizar esta prueba desde un host de la red LAN del router CALI, primero a la red de MEDELLIN y luego al servidor.

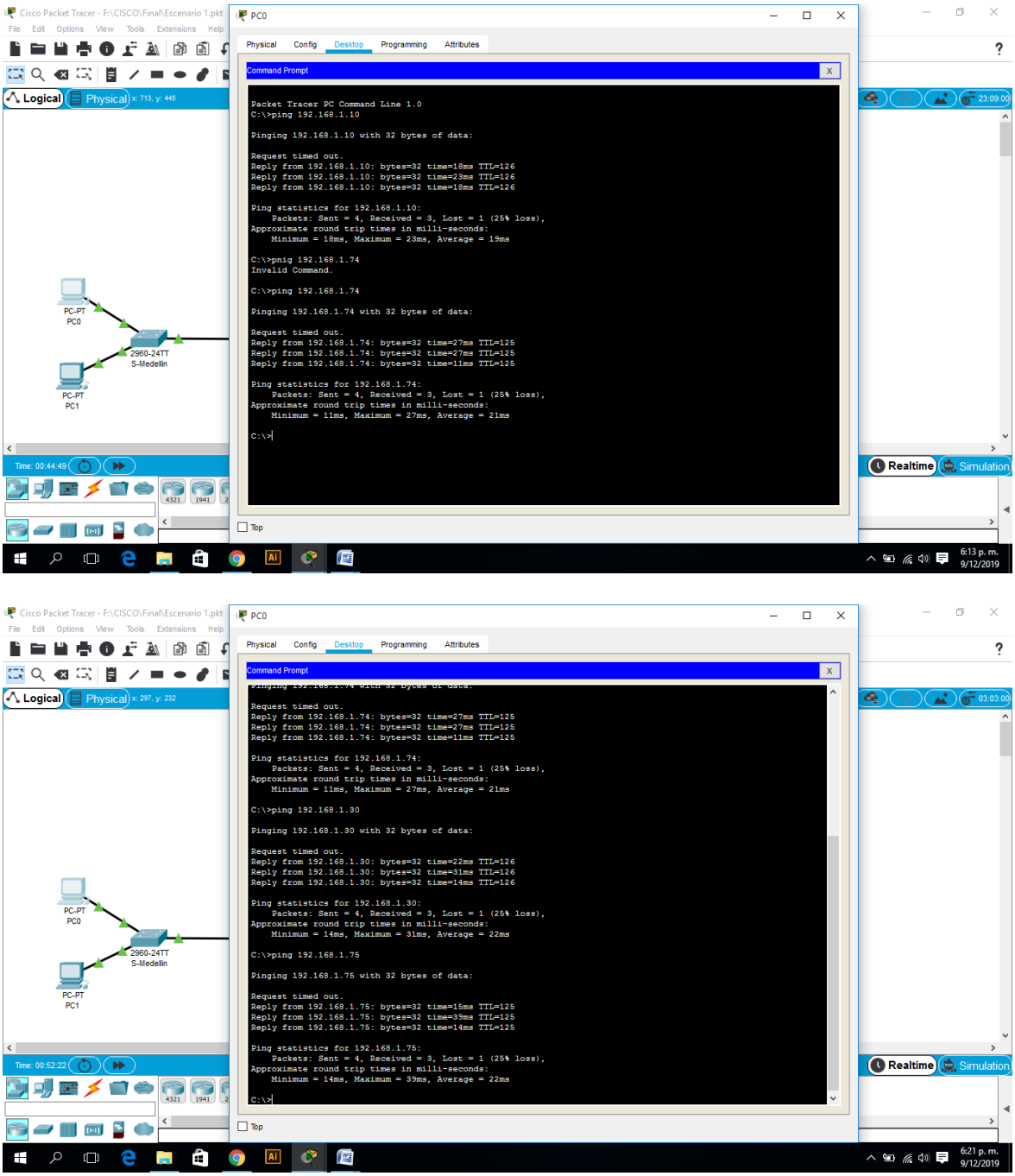

Figura 4. Comprobación Conectividad entre sí (PC0 al WS1, PC2, Servidor y PC3) - Exito

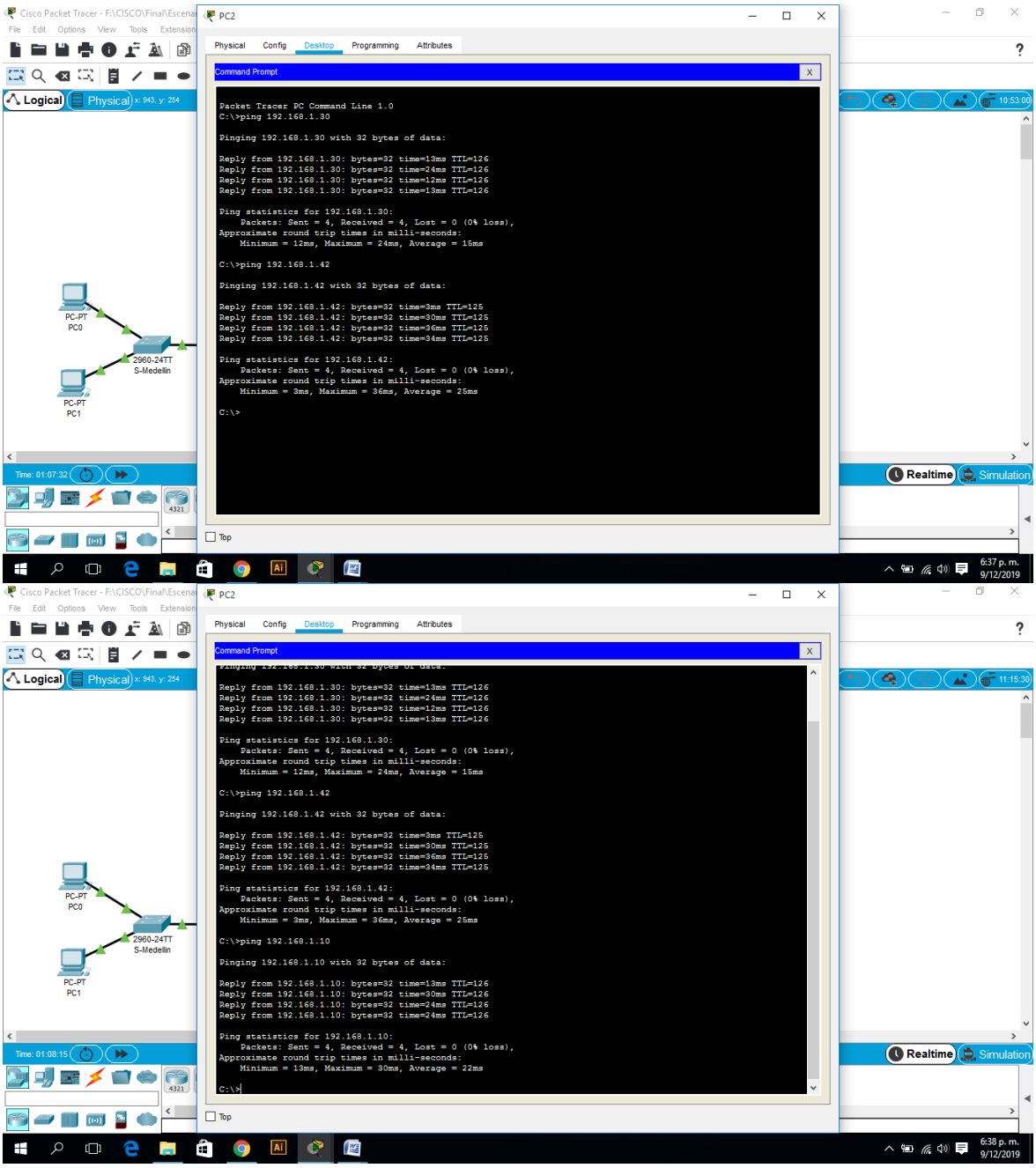

Figura 5. Comprobación Conectividad entre sí (PC2 al Servidor, PC0 y WS1) - Exito

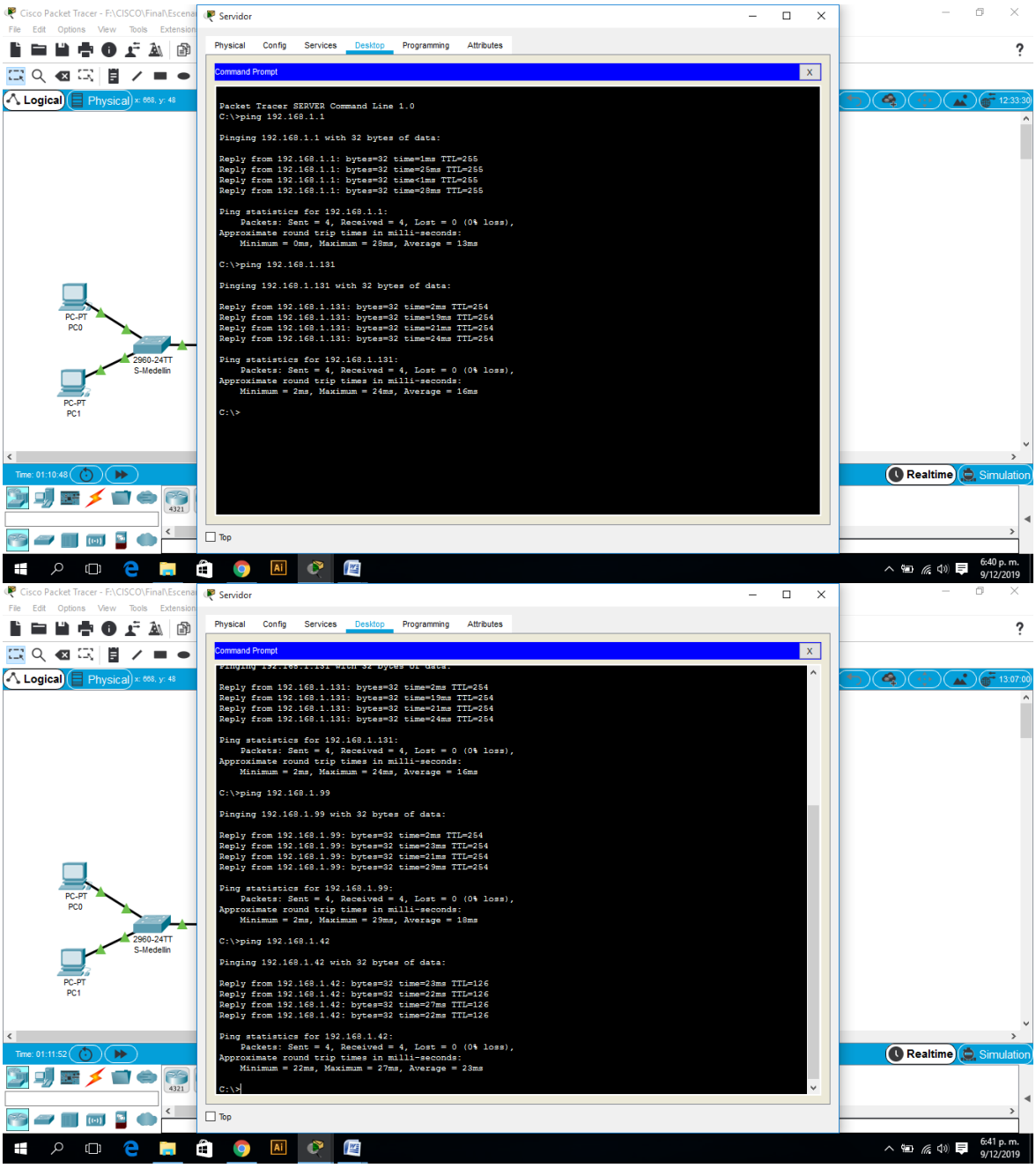

Figura 6. Comprobación Conectividad entre sí (Servidor al R Bogotá, R Cali, R Medellín y PC0) Exito

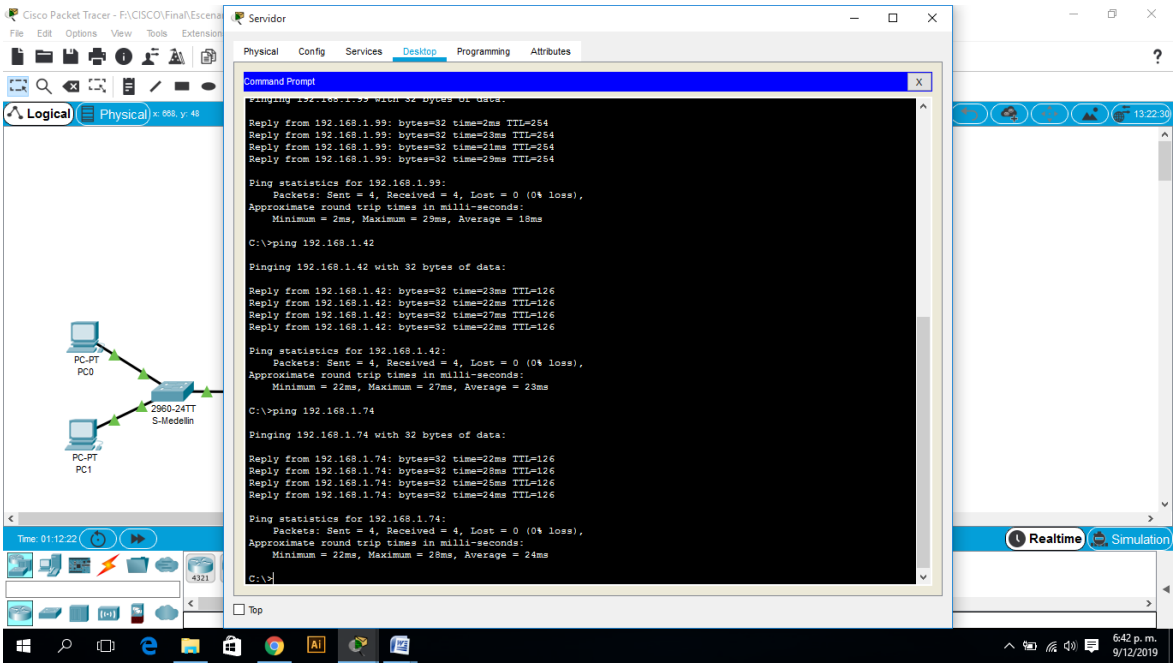

Figura 7. Comprobación Conectividad entre sí (Servidor al PC2) Exito

1.7. Parte 4: Configuración de las listas de Control de Acceso.

En este momento cualquier usuario de la red tiene acceso a todos sus dispositivos y estaciones de trabajo. El jefe de redes le solicita implementar seguridad en la red. Para esta labor se decide configurar listas de control de acceso (ACL) a los routers.
Las condiciones para crear las ACL son las siguientes:

a. Cada router debe estar habilitado para establecer conexiones Telnet con los demás routers y tener acceso a cualquier dispositivo en la red.

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname BOGOTA
BOGOTA(config)#no ip domain-lookup
BOGOTA(config)#service password-encryption
BOGOTA(config)#enable secret class
BOGOTA(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso restringido.#
BOGOTA(config)#line console 0
BOGOTA(config-line)#password cisco
BOGOTA(config-line)#login
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#line vty 0 15
BOGOTA(config-line)#password cisco

```
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#login
BOGOTA(config-line)#exit
BOGOTA(config)#end
BOGOTA#
%SYS-5-CONFIG_I: Configured from console by console
BOGOTA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
BOGOTA#
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname MEDELLIN
MEDELLIN(config)#no ip domain-lookup
MEDELLIN(config)#service password-encryption
MEDELLIN(config)#enable secret class
MEDELLIN(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Acceso restringido.#
MEDELLIN(config)#line console 0
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#login
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#line vty 0 15
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#login
MEDELLIN(config-line)#end
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console
MEDELLIN#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
MEDELLIN#
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname CALI
CALI(config)#no ip domain-lookup
CALI(config)#service password-encryption
CALI(config)#enable secret class
CALI(config)#banner motd #
Enter TEXT message.  End with the character '#'.
```

Acceso restringido.#
CALI(config)#line console 0
CALI(config-line)#password cisco
CALI(config-line)#login
CALI(config-line)#logging synchronous
CALI(config-line)#line vty 0 15
CALI(config-line)#password cisco
CALI(config-line)#logging synchronous
CALI(config-line)#login
CALI(config-line)#end
CALI#
%SYS-5-CONFIG_I: Configured from console by console
CALI#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
CALI#

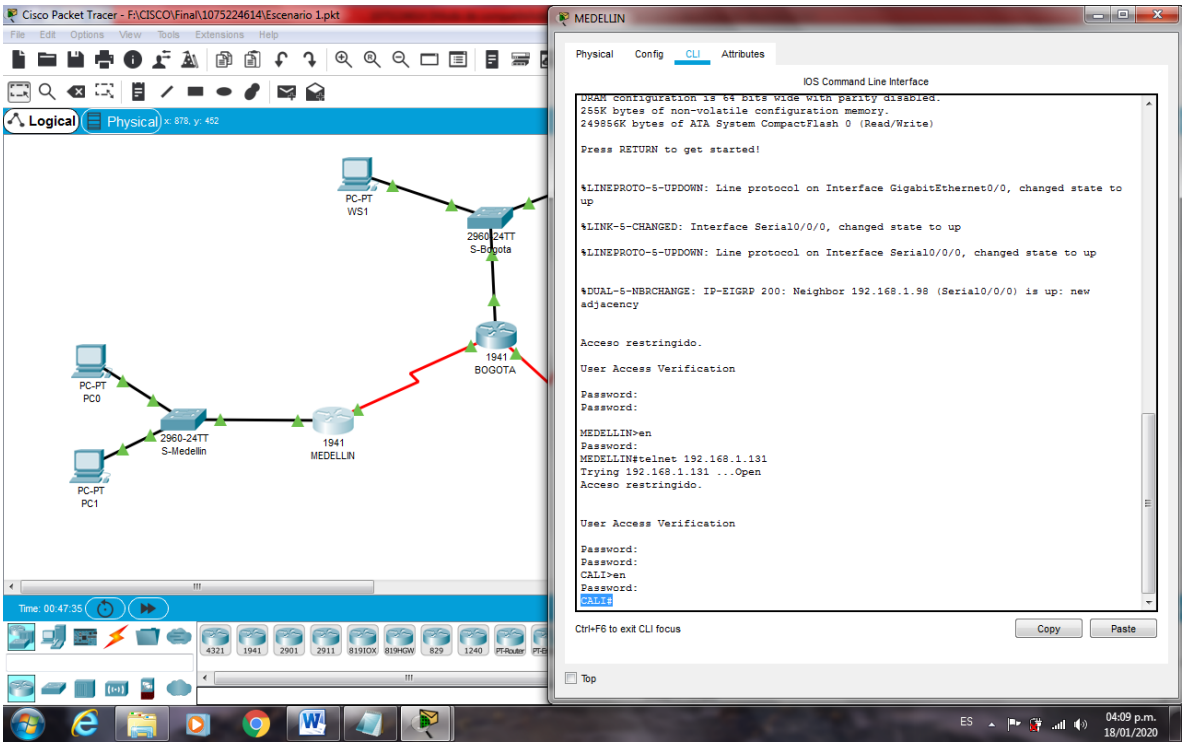

Figura 8. Comprobación Conectividad Telnet (Router Medellín a Router Cali) - Exito

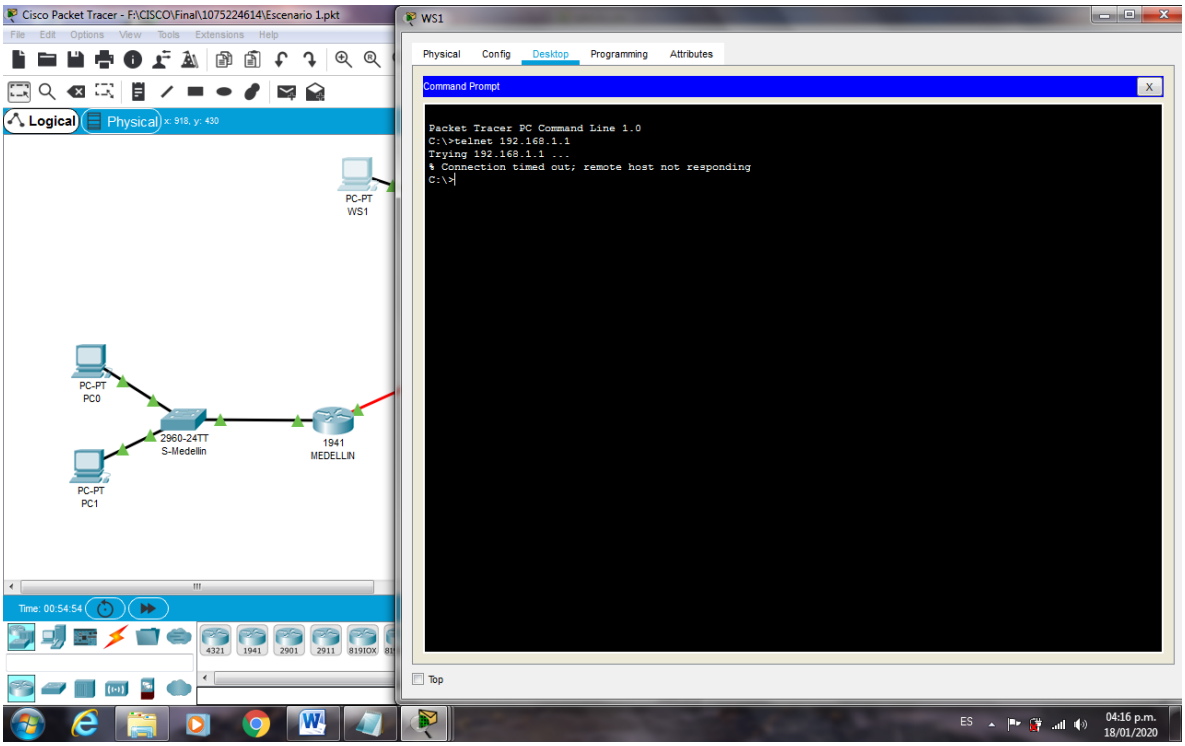

Figura 9. Comprobación Conectividad Telnet (WS-1 a Router Bogotá) – Se niega el acceso

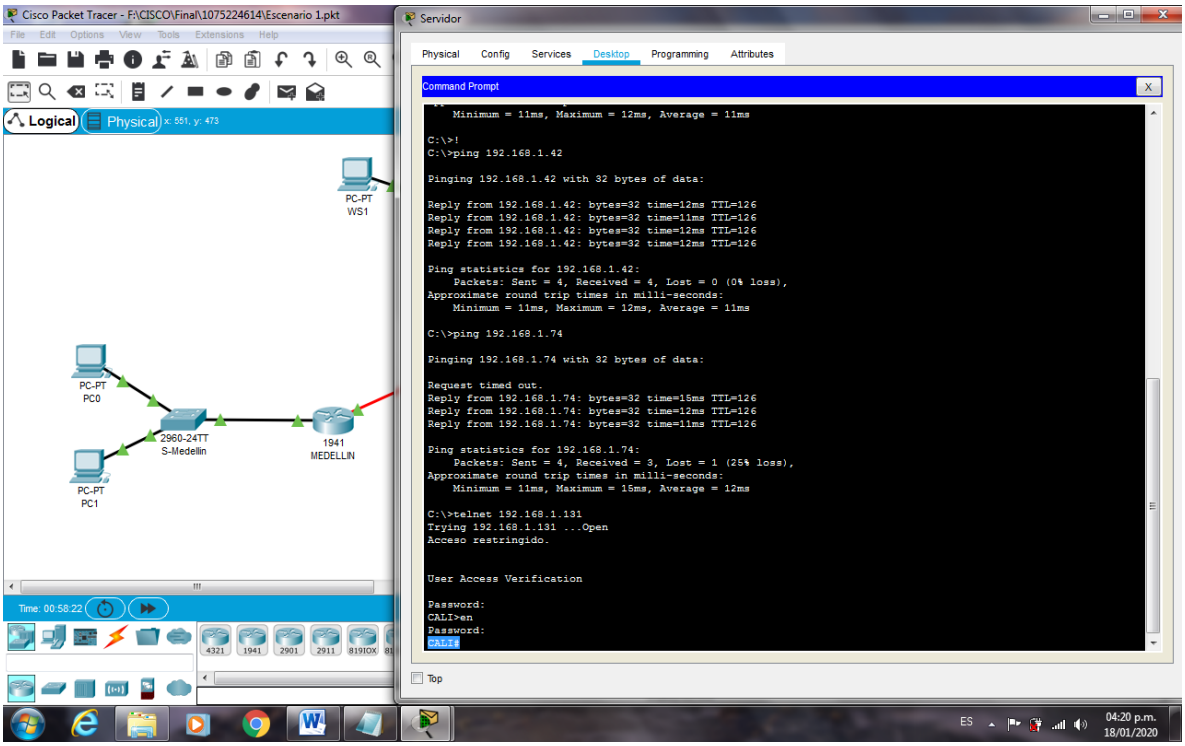

Figura 10. Comprobación Conectividad Telnet (Servidor a Router Cali) - Exito

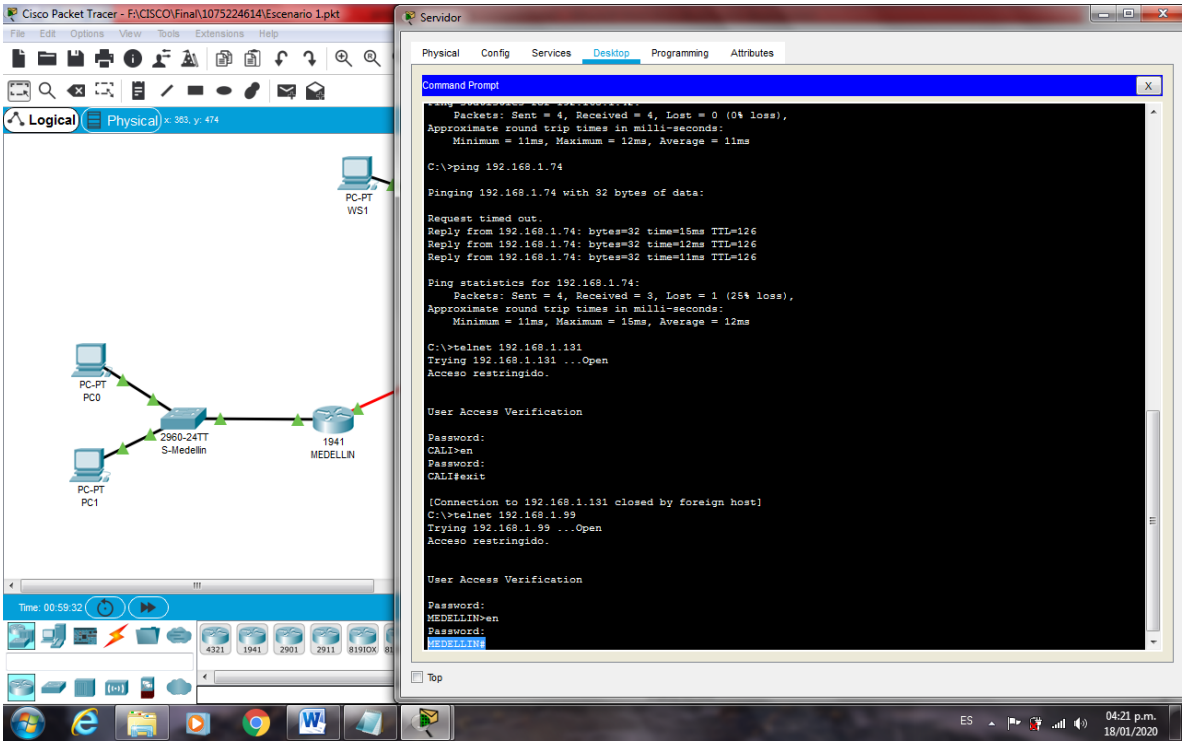

Figura 11. Comprobación Conectividad Telnet (Servidor a Router Medellin) - Exito

b. El equipo WS1 y el servidor se encuentran en la subred de administración. Solo el servidor de la subred de administración debe tener acceso a cualquier otro dispositivo en cualquier parte de la red

BOGOTA>enable
Password:
BOGOTA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#access-list 101 permit ip host 192.168.1.30 any
BOGOTA(config)#int g0/0
BOGOTA(config-if)#ip access-group 101 in
BOGOTA(config-if)#

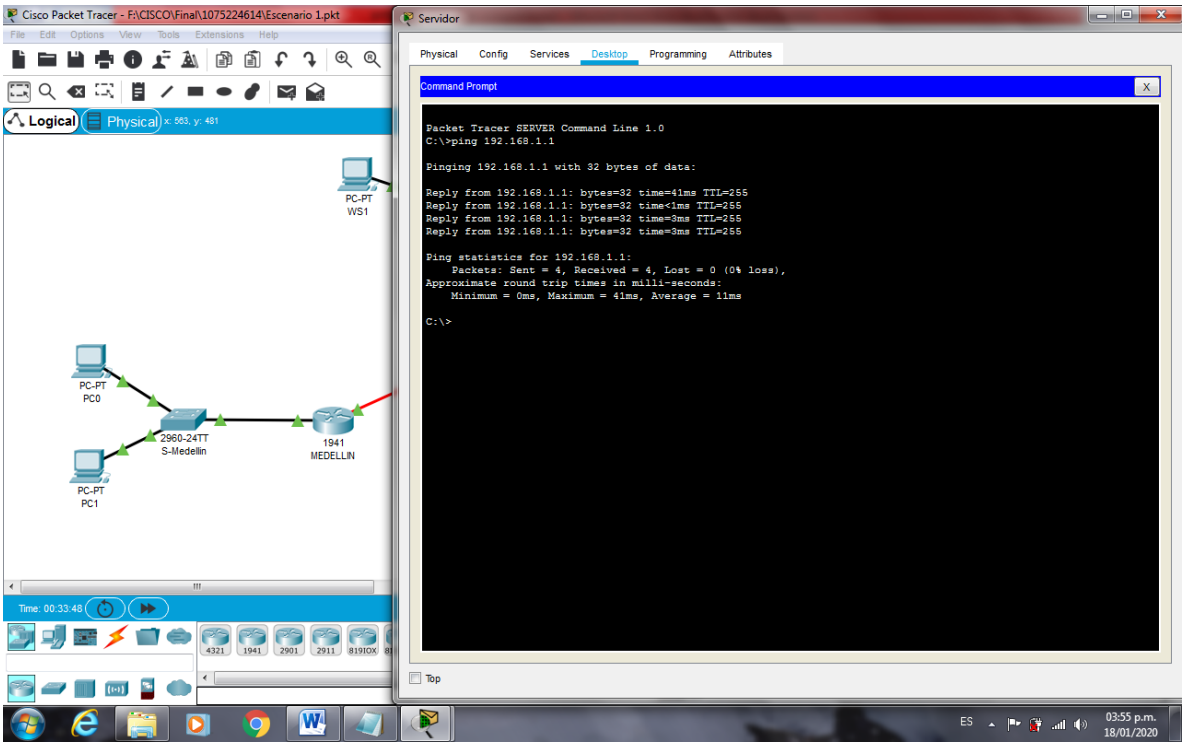

Figura 12. Comprobación Conectividad (Servidor al Router Bogotá) - Exito

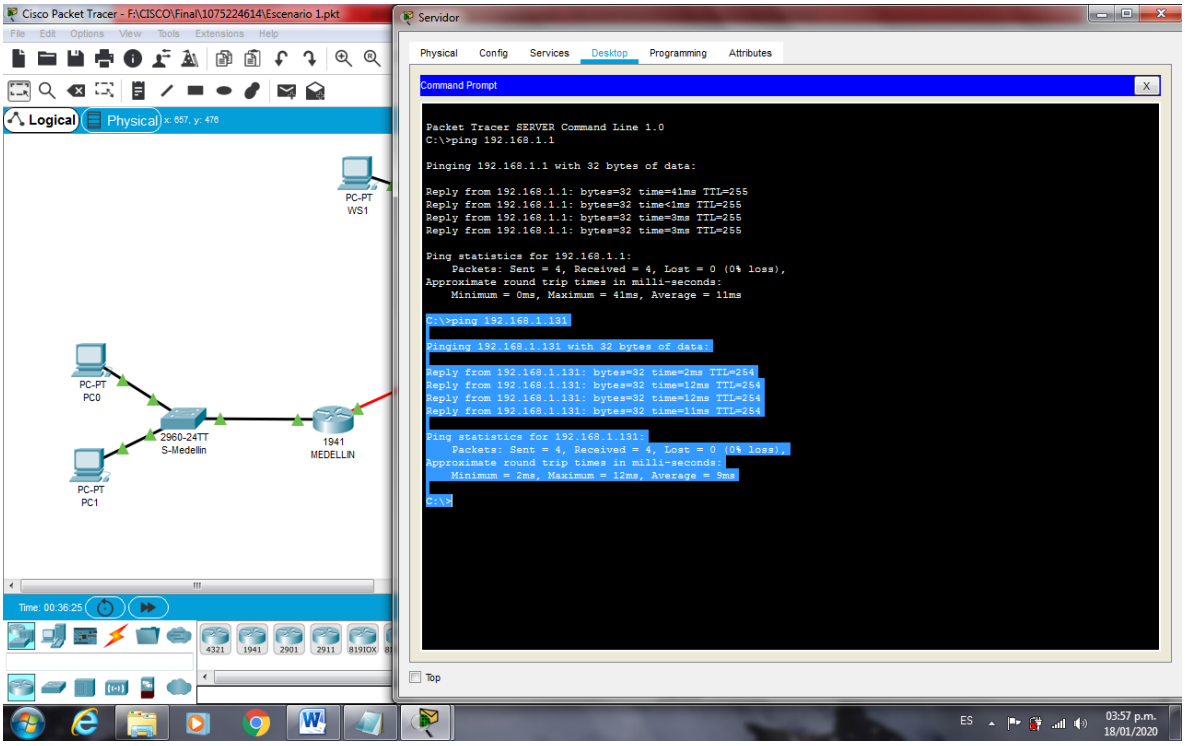

Figura 13. Comprobación Conectividad (Servidor al Router Cali) - Exito

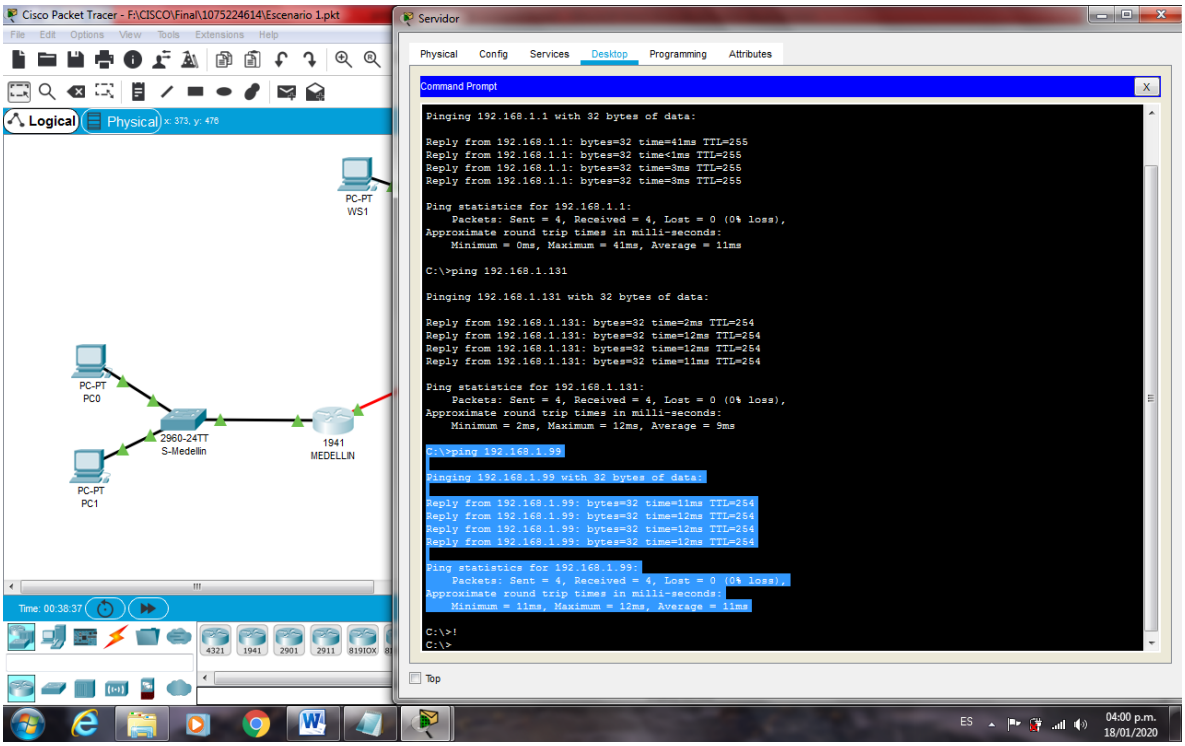

Figura 14. Comprobación Conectividad (Servidor al Router Medellín) – Éxito

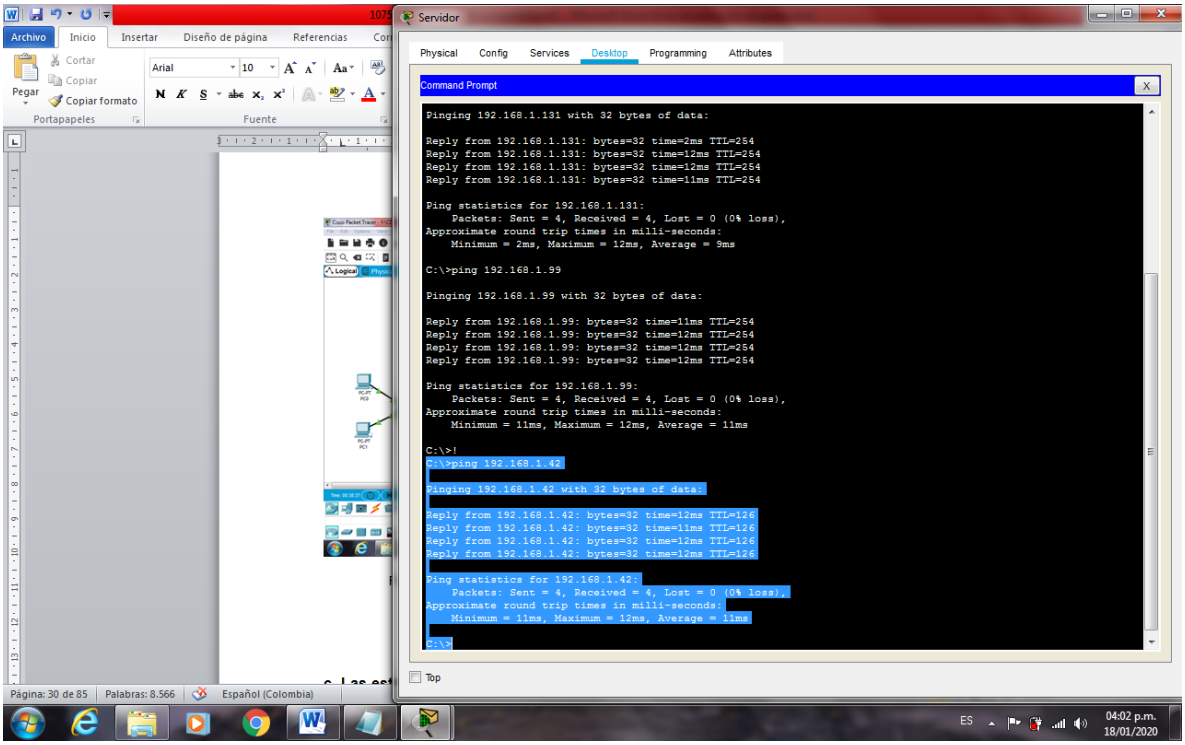

Figura 15. Comprobación Conectividad (Servidor al PC0) - Exito

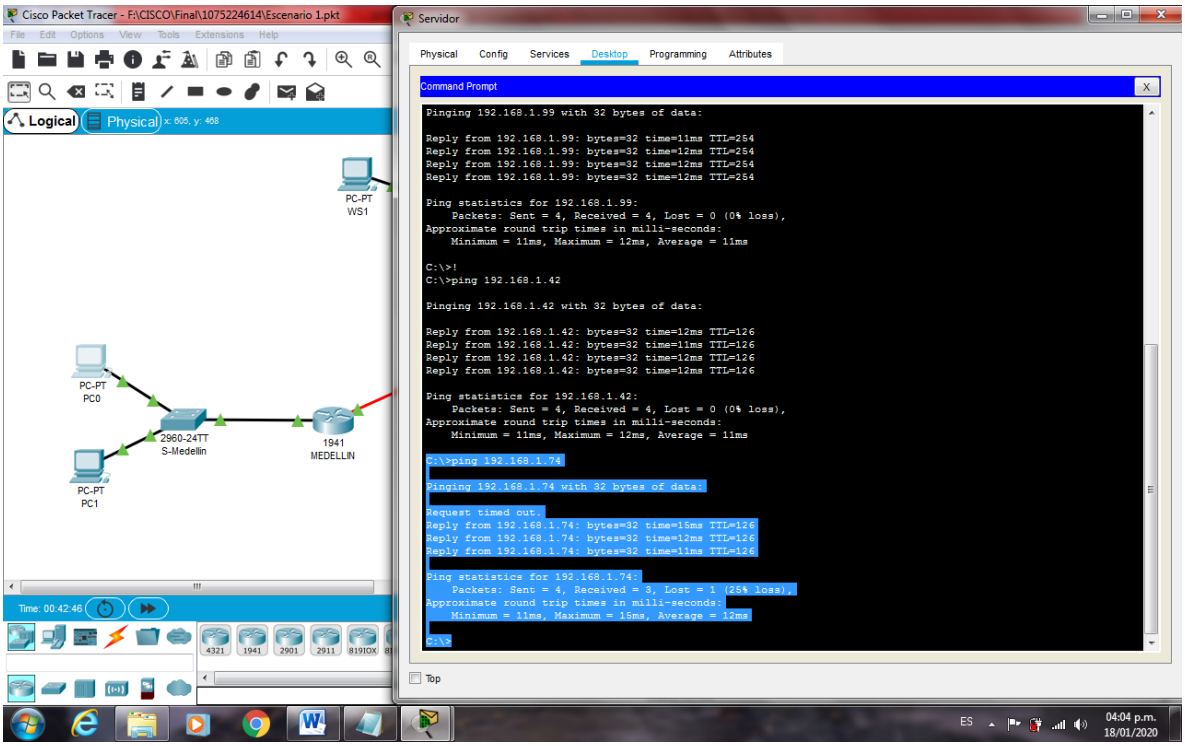

Figura 16. Comprobación Conectividad (Servidor al PC2) - Exito

c. Las estaciones de trabajo en las LAN de MEDELLIN y CALI no deben tener acceso a ningún dispositivo fuera de su subred, excepto para interconectar con el servidor

MEDELLIN>enable
Password:
MEDELLIN#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#access-list 101 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.3
MEDELLIN(config)#access-list 101 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.30
MEDELLIN(config)#int g0/0
MEDELLIN(config-if)#ip access-group 101 in
MEDELLIN(config-if)#

CALI>enable
Password:
CALI#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#access-list 101 permit ip 192.168.1.64 0.0.0.31 host 192.168.1.30
CALI(config)#int g0/0
CALI(config-if)#ip access-group 101 in
CALI(config-if)#

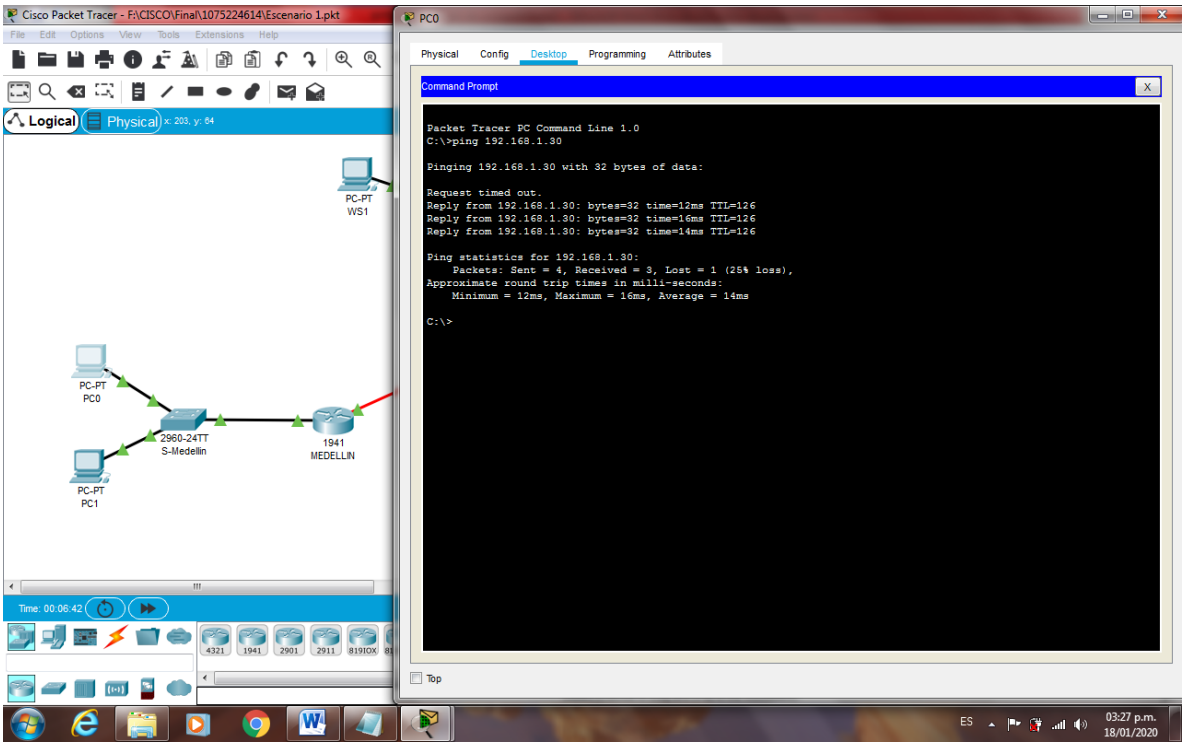

Figura 17. Comprobación Conectividad (PC0 al Srevidor) - Exito

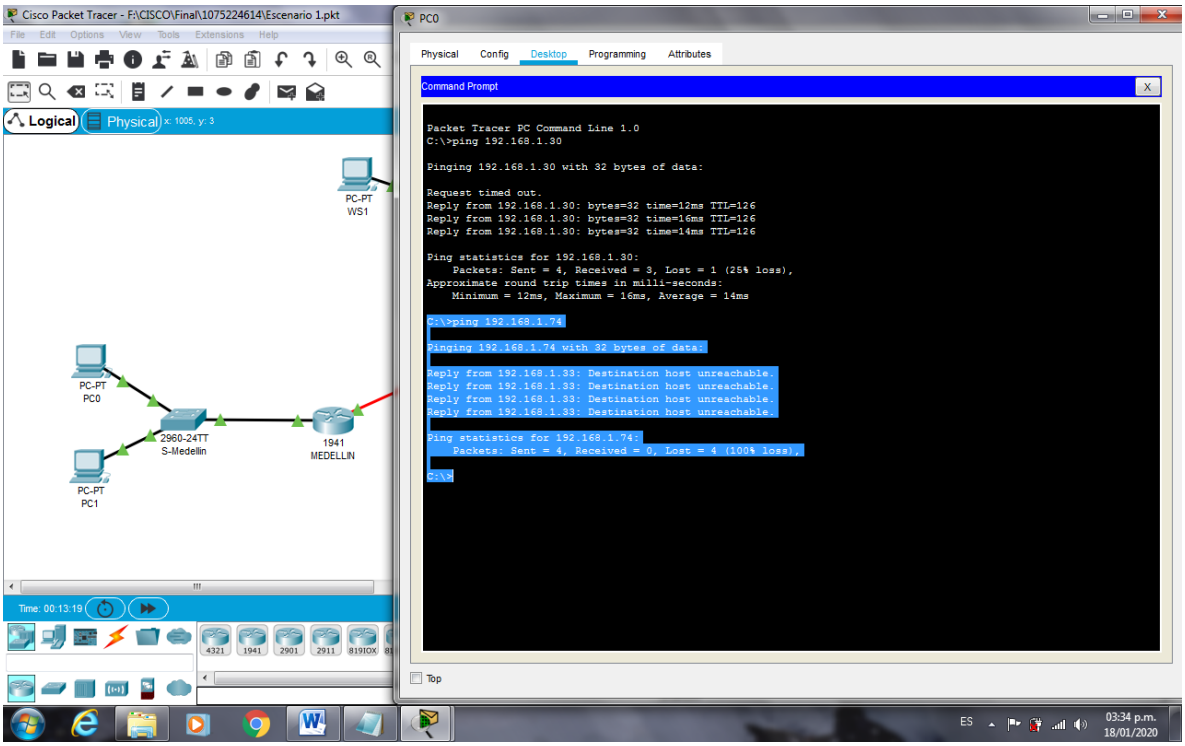

Figura 18. Comprobación Conectividad (PC0 al PC2) - Se niega el acceso

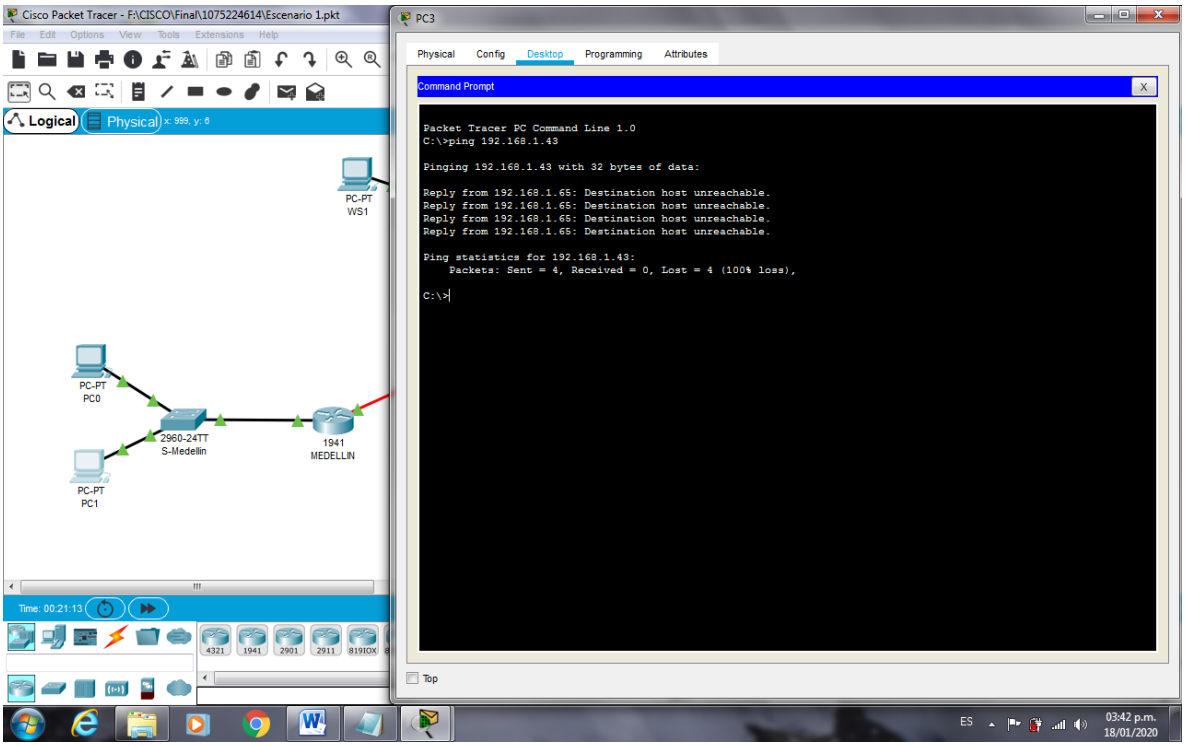

Figura 19. Comprobación Conectividad (PC3 al PC1) - Se niega el acceso

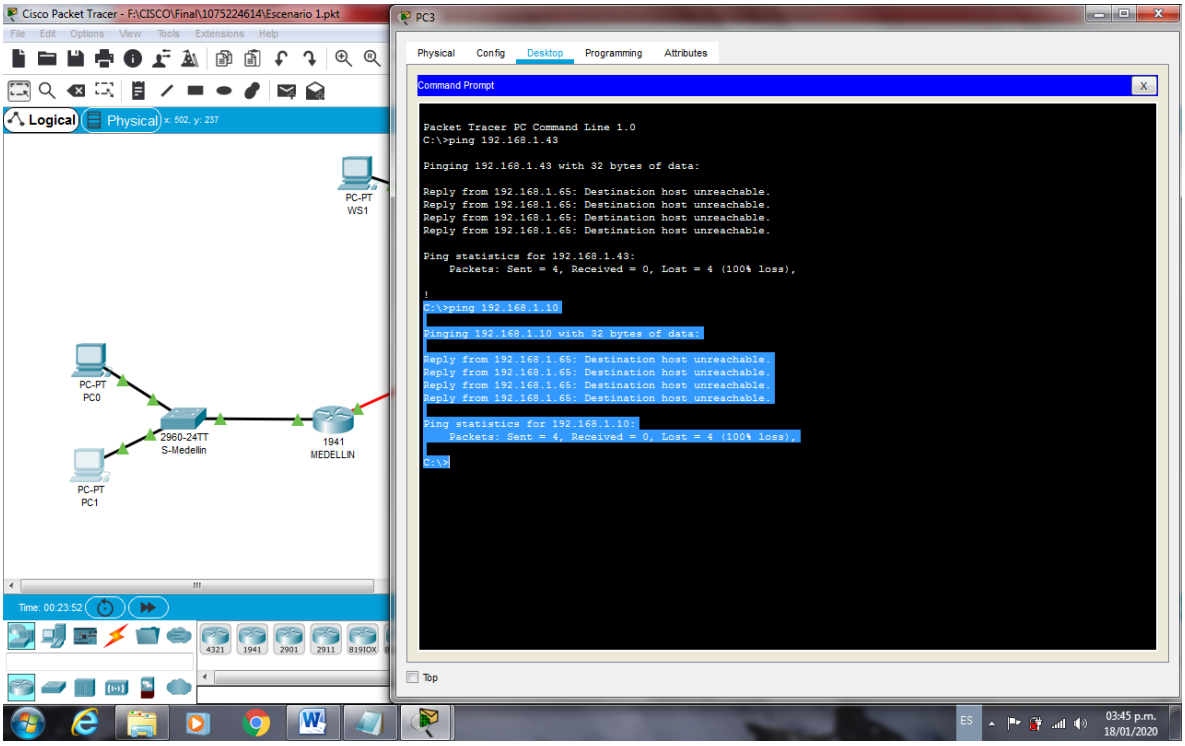

Figura 20. Comprobación Conectividad (PC3 al WS1) - Se niega el acceso

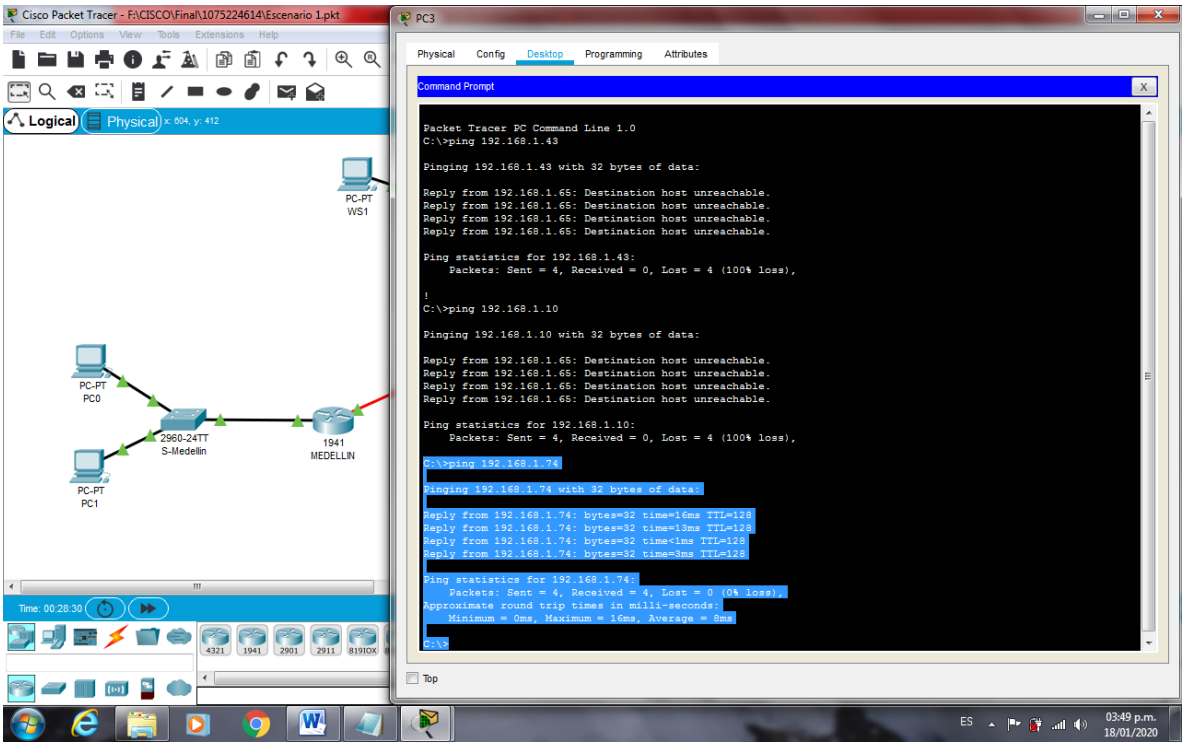

Figura 21. Comprobación Conectividad (PC3 al PC2) - Exito

1.8. Parte 5: Comprobación de la red instalada.

a. Se debe probar que la configuración de las listas de acceso fue exitosa.

b. Comprobar y Completar la siguiente tabla de condiciones de prueba para confirmar el óptimo funcionamiento de la red e.

	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	Éxito
	WS_1	Router BOGOTA	Falla
	Servidor	Router CALI	Éxito
	Servidor	Router MEDELLIN	Éxito
TELNET	LAN del Router MEDELLIN	Router CALI	Falla
	LAN del Router CALI	Router CALI	Falla
	LAN del Router MEDELLIN	Router MEDELLIN	Falla
	LAN del Router CALI	Router MEDELLIN	Falla
PING	LAN del Router CALI	WS_1	Falla
	LAN del Router MEDELLIN	WS_1	Falla
	LAN del Router MEDELLIN	LAN del Router CALI	Falla
PING	LAN del Router CALI	Servidor	Éxito
	LAN del Router MEDELLIN	Servidor	Éxito
	Servidor	LAN del Router MEDELLIN	Éxito
	Servidor	LAN del Router CALI	Éxito
	Router CALI	LAN del Router MEDELLIN	Falla
	Router MEDELLIN	LAN del Router CALI	Falla

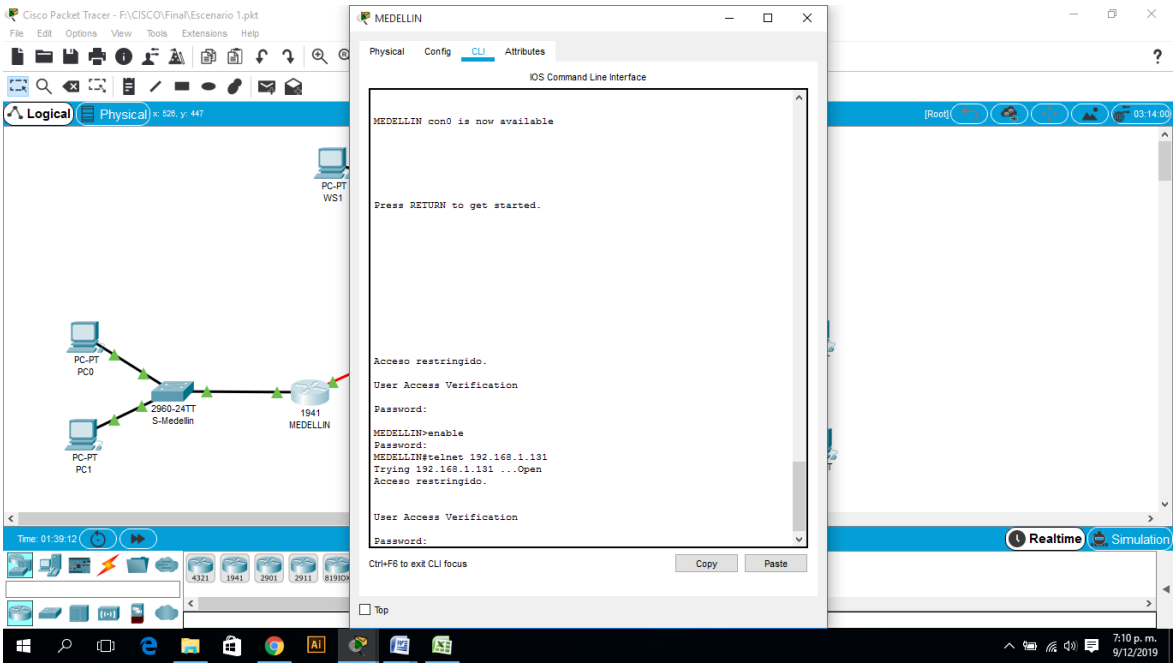

Figura 22. Comprobación listas de acceso Telnet (Router MEDELLIN - Router CALI) - Exito

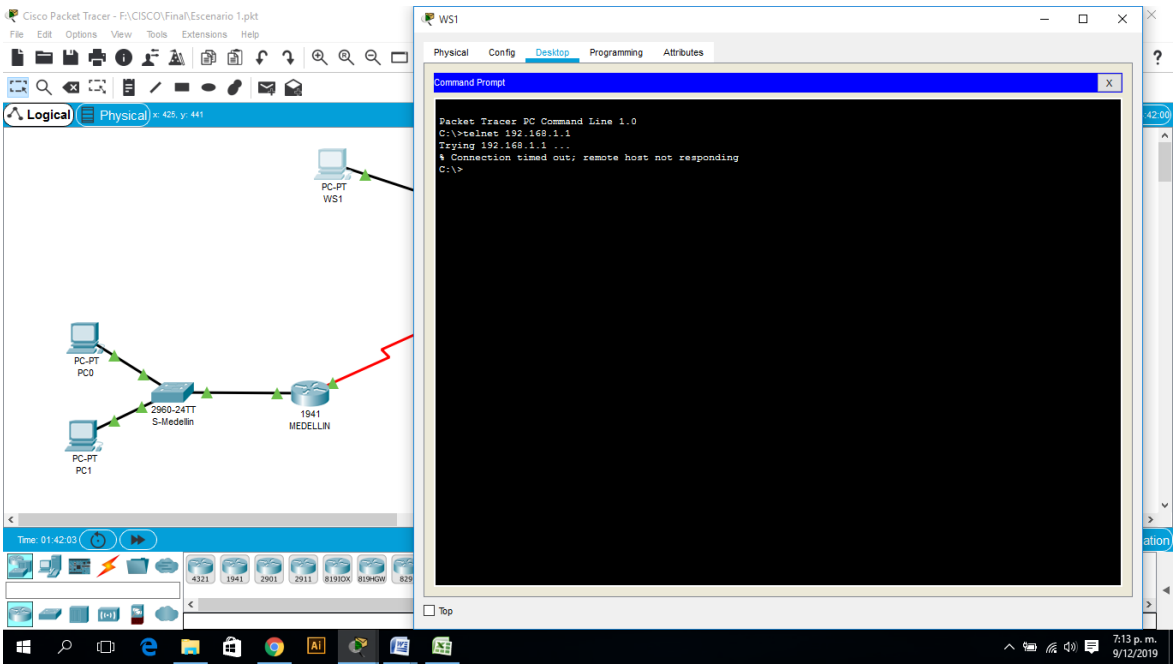

Figura 23. Comprobación listas de acceso Telnet (WS_1 - Router BOGOTA) - Falla

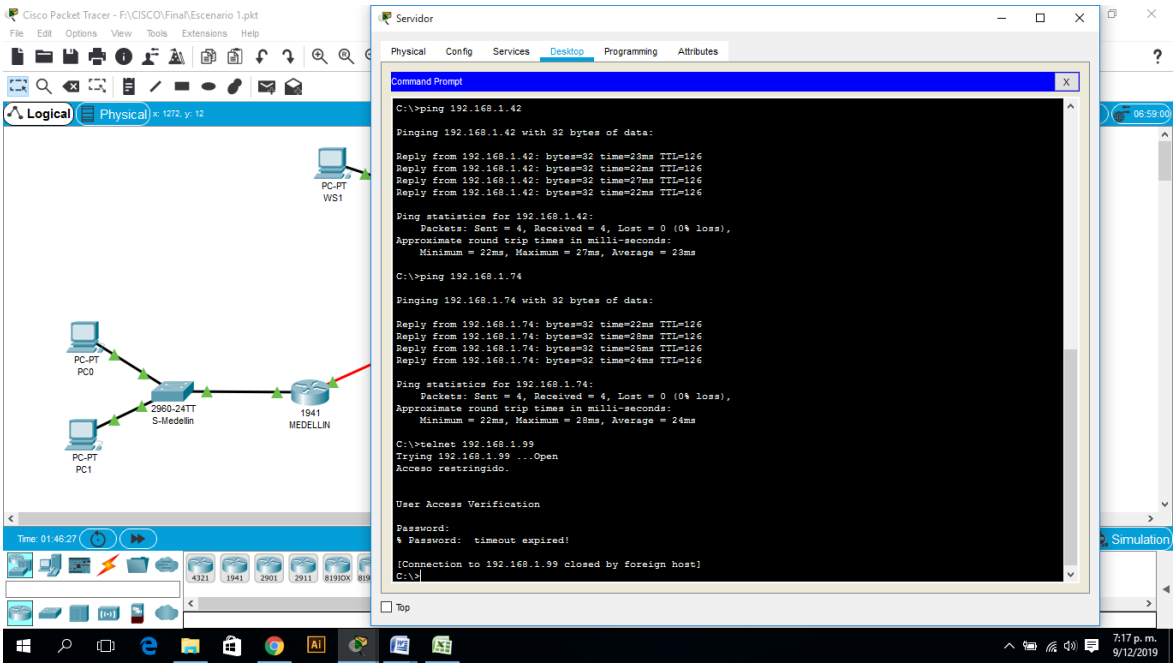

Figura 24. Comprobación listas de acceso Telnet (Servidor - Router Medellín) - Exito

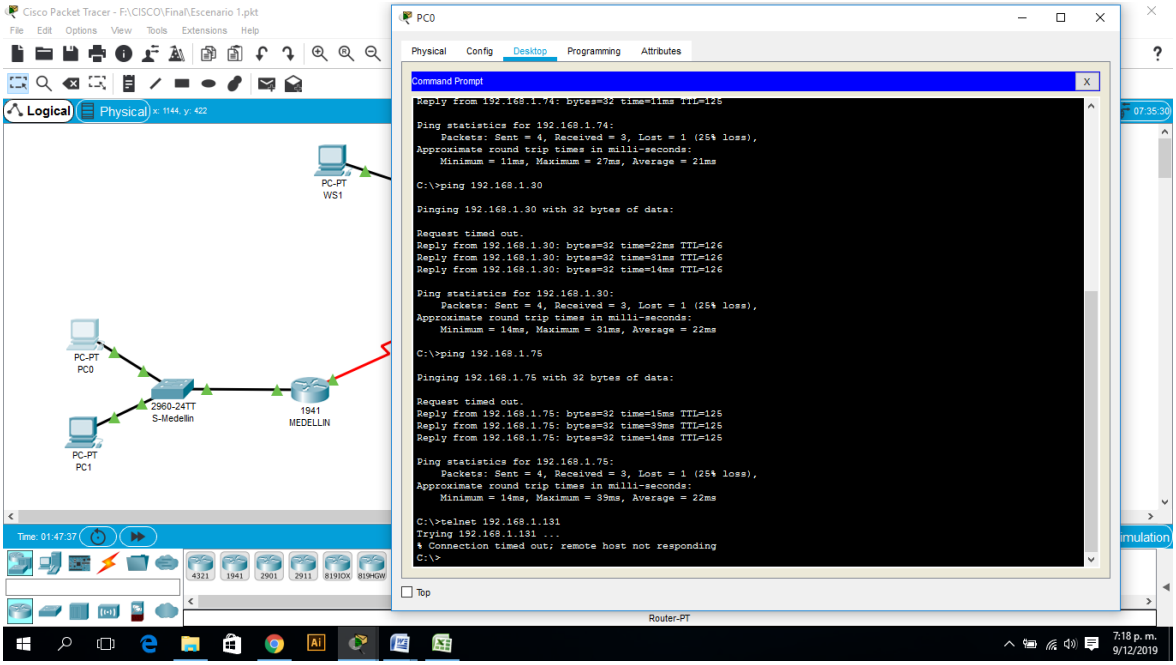

Figura 25. Comprobación listas de acceso Telnet (PC0 al Router Cali) - Falla

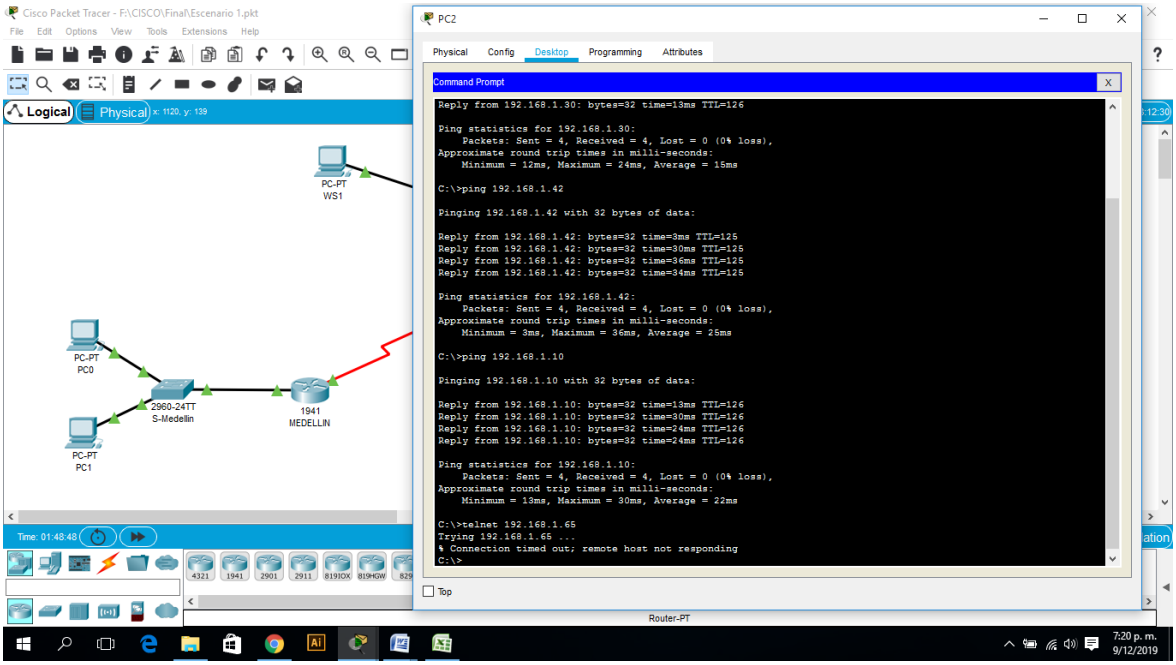

Figura 26. Comprobación listas de acceso Telnet (PC2 a Router Cali) Falla

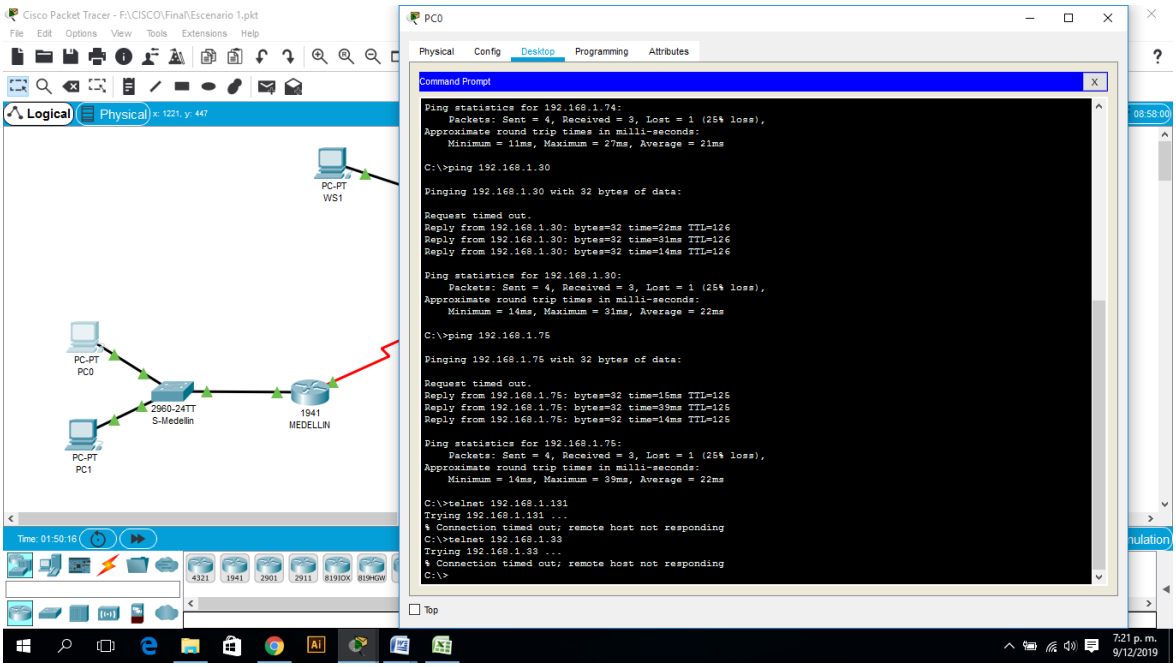

Figura 27. Comprobación listas de acceso Telnet (PC0 al Router Medellín) Falla

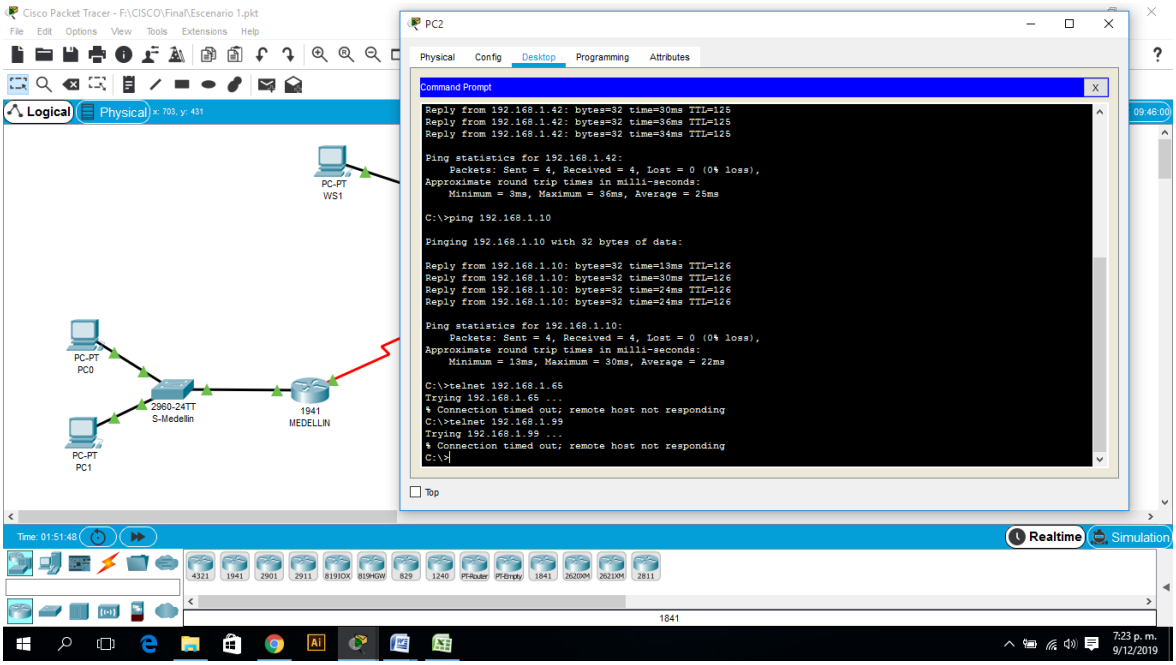

Figura 28. Comprobación listas de acceso Telnet (PC2 al Router Medellín) Falla

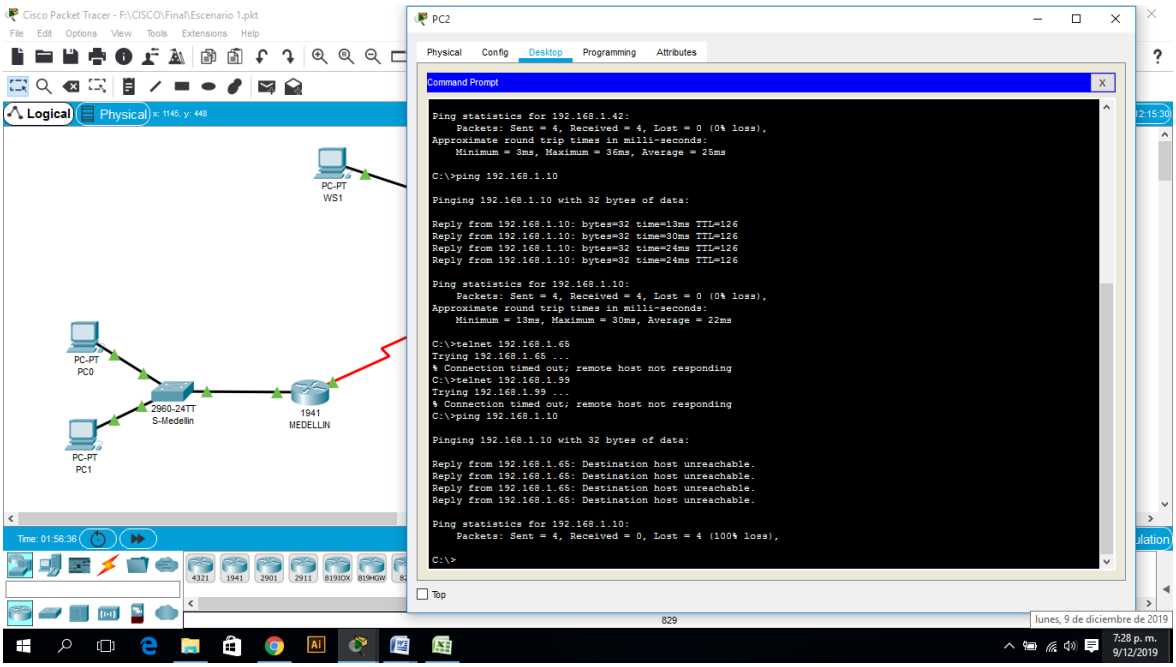

Figura 29. Comprobación listas de acceso Ping (PC2 al WS1) Falla

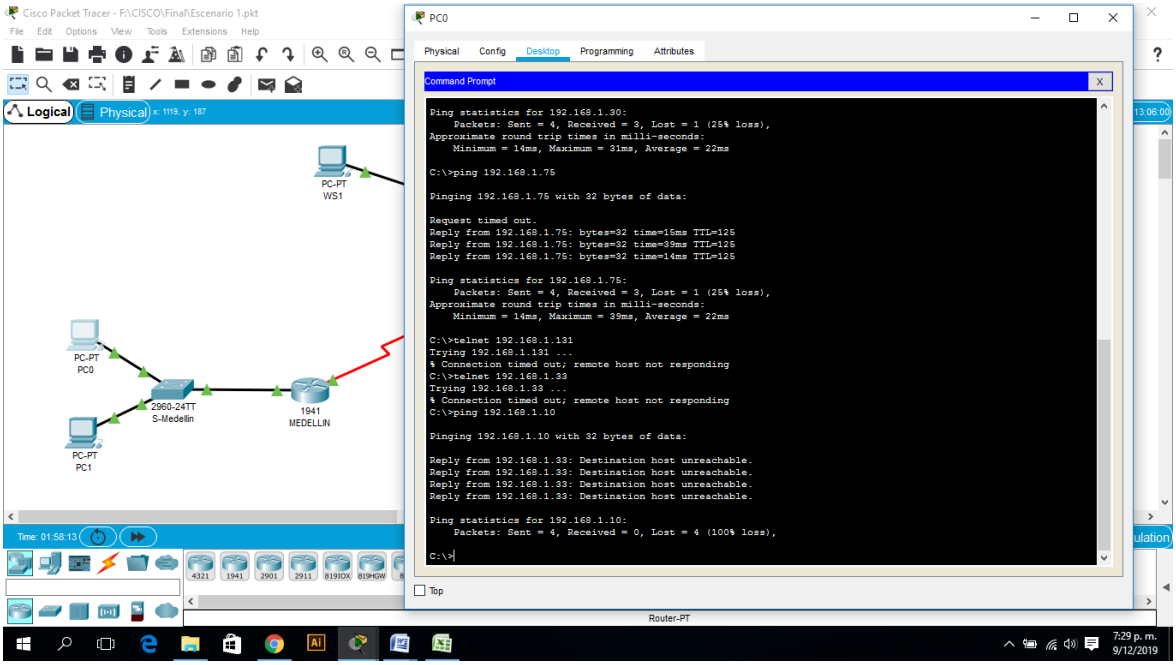

Figura 30. Comprobación listas de acceso Ping (PC0 al WS1) Falla

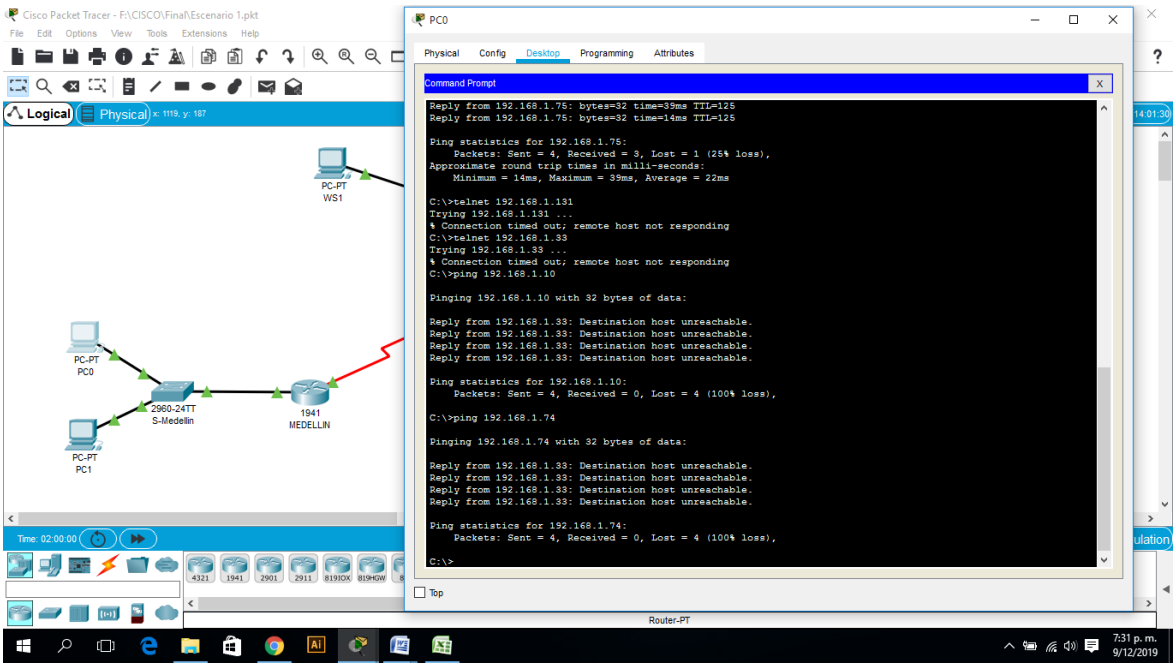

Figura 31. Comprobación listas de acceso Ping (PC0 al PC2) Falla

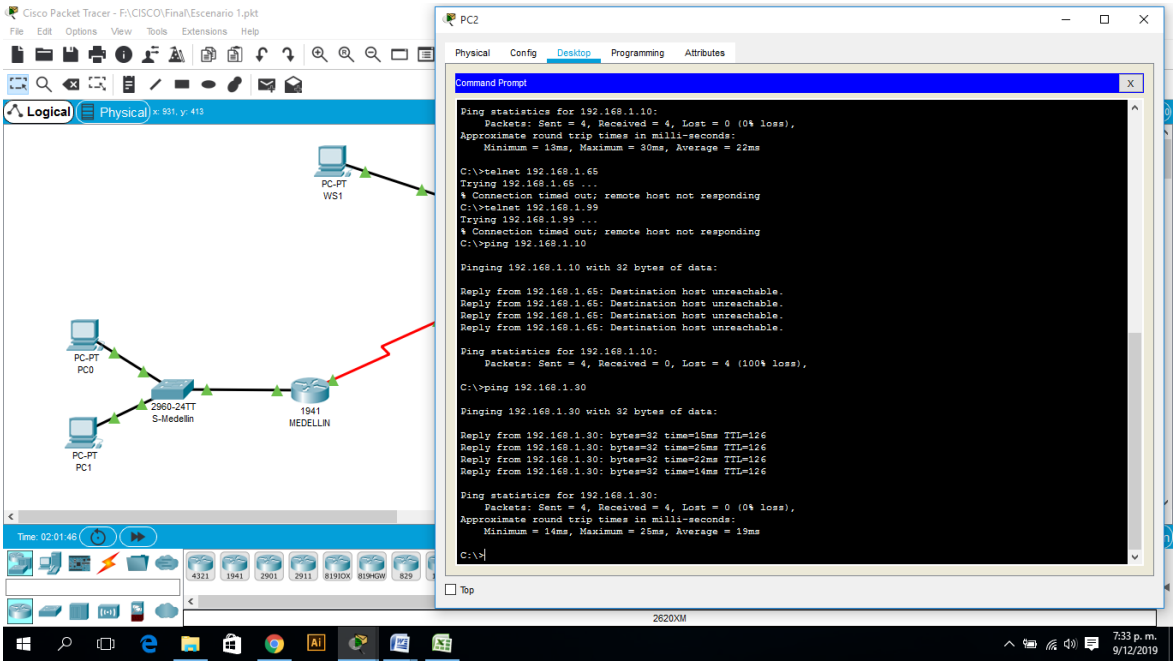

Figura 32. Comprobación listas de acceso Ping (PC2 al Servidor) Exito

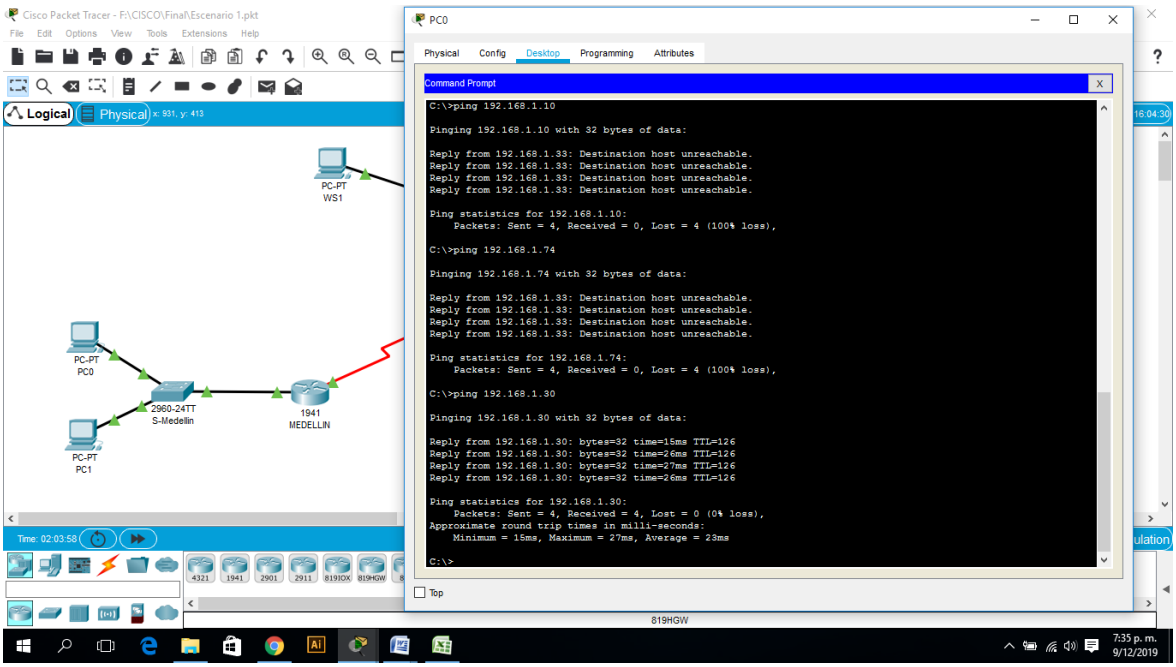

Figura 33. Comprobación listas de acceso Ping (PC0 al Servidor) Exito

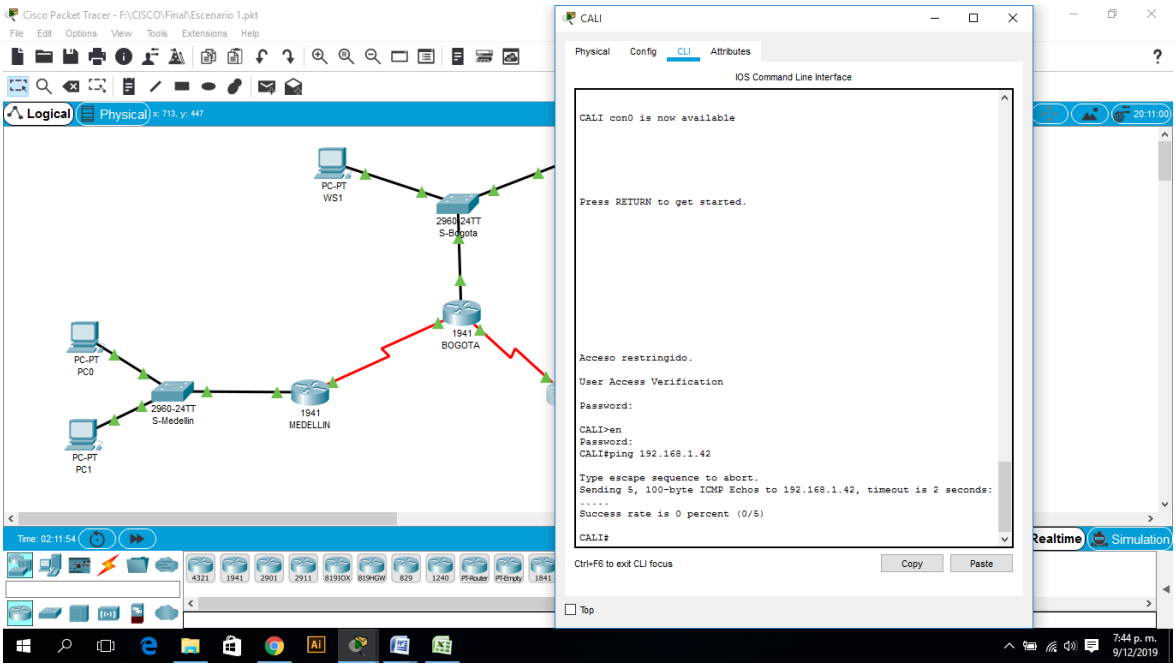

Figura 34. Comprobación listas de acceso Ping (Router Cali al PC0) Falla

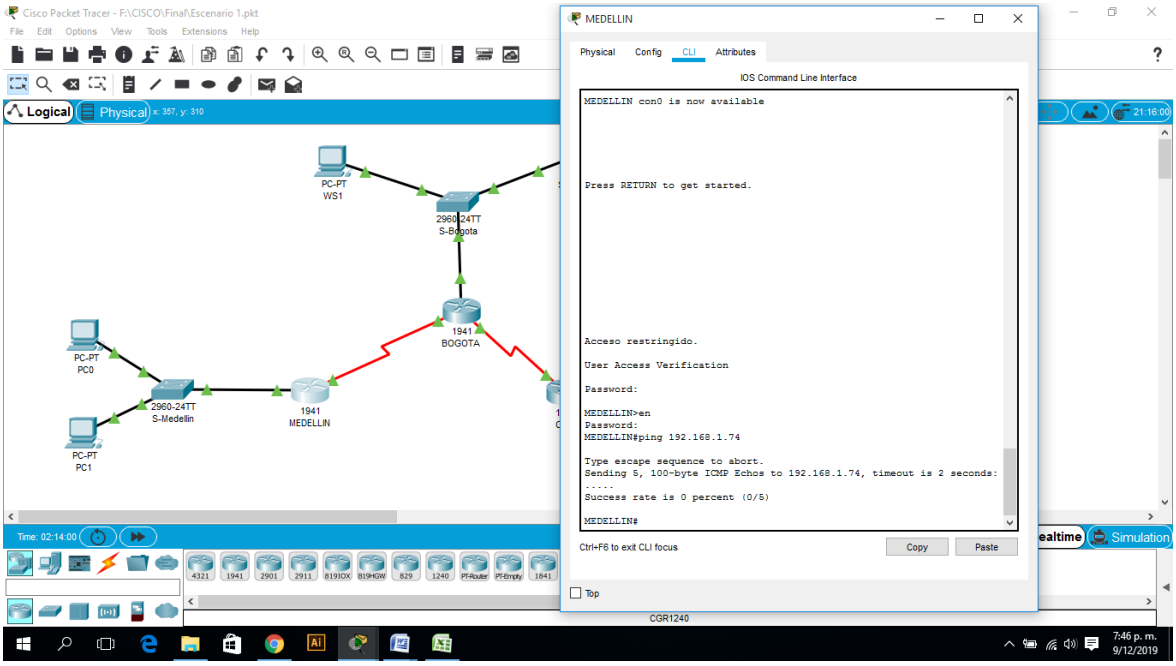

Figura 35. Comprobación listas de acceso Ping (Router Medellin al PC2) Falla

2. ESCENARIO 2

Una empresa tiene la conexión a internet en una red Ethernet, lo cual deben adaptarlo para facilitar que sus routers y las redes que incluyen puedan, por esa vía, conectarse a internet, pero empleando las direcciones de la red LAN original.

Desarrollo
Los siguientes son los requerimientos necesarios:

2.1. Todos los routers deberán tener lo siguiente:

- Configuración básica.

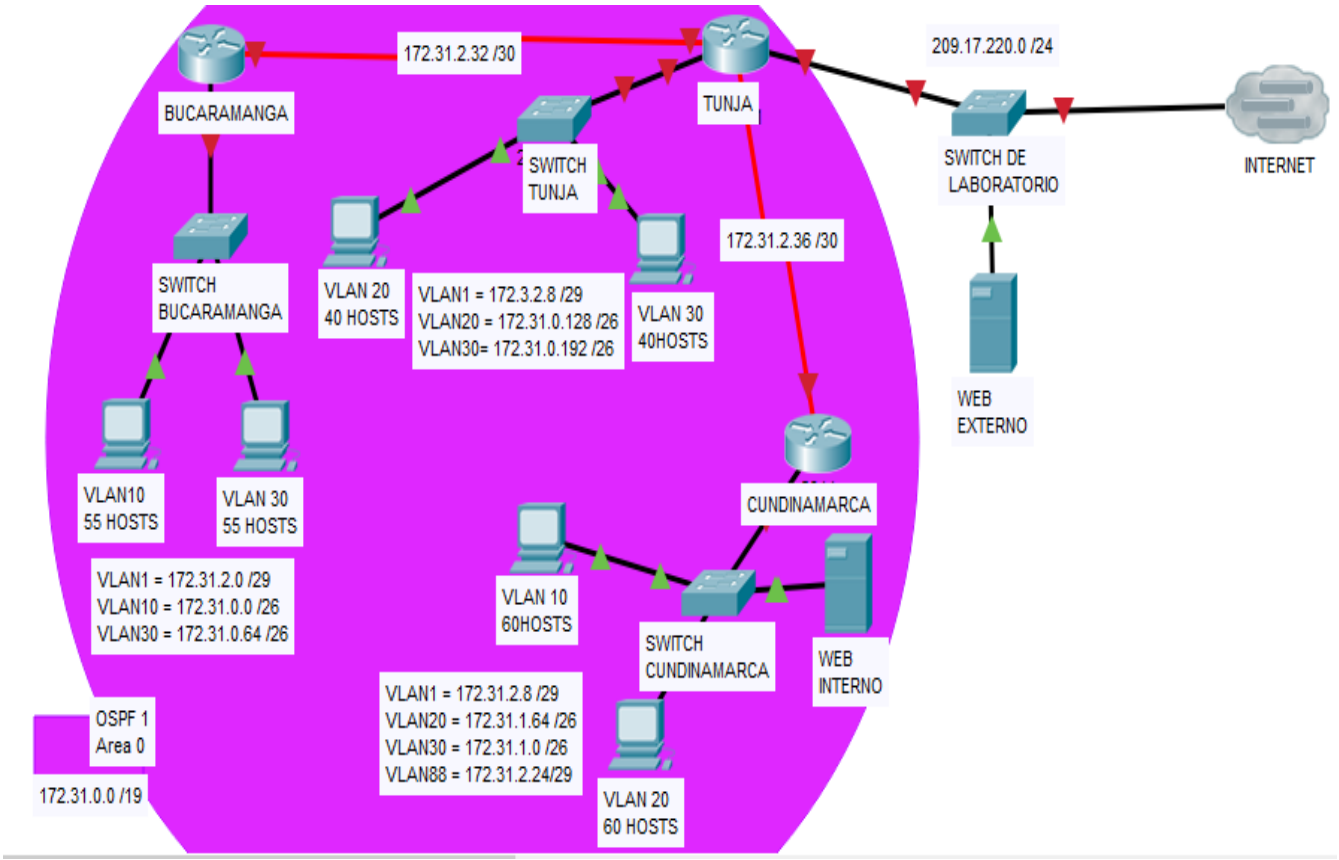

Figura 36. Modelo Topología Escenario 2

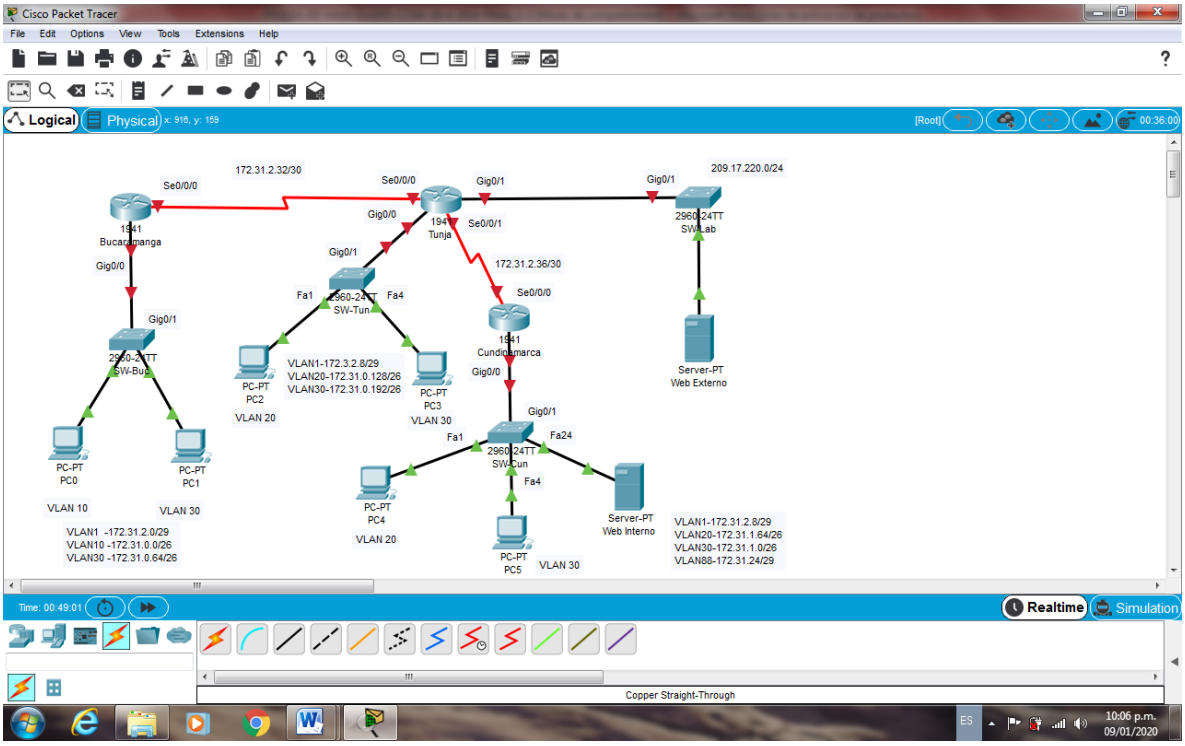

Figura 37. Topología Escenario 2

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #ATENCION SOLO ACCESO AUTORIZADO!!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Bucaramanga
Bucaramanga(config)#int g0/0.1
Bucaramanga(config-subif)#encapsulation dot1q 1
Bucaramanga(config-subif)#ip address 172.31.2.1 255.255.255.248
Bucaramanga(config-subif)#int g0/0.10
Bucaramanga(config-subif)#encapsulation dot1q 10
Bucaramanga(config-subif)#ip address 172.31.0.1 255.255.255.192
Bucaramanga(config-subif)#int g0/0.30
Bucaramanga(config-subif)#encapsulation dot1q 30
```

```
Bucaramanga(config-subif)#ip address 172.31.0.65 255.255.255.192
Bucaramanga(config-subif)#int g0/0
Bucaramanga(config-if)#no shutdown

Bucaramanga(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

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

%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1,
changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10,
changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30,
changed state to up

Bucaramanga(config-if)#int s0/0/0
Bucaramanga(config-if)#ip address 172.31.2.34 255.255.255.252
Bucaramanga(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Bucaramanga(config-if)#router ospf 1
Bucaramanga(config-router)#do show ip route connected
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1

Bucaramanga(config-router)#network 172.31.0.0 0.0.0.63 area 0
Bucaramanga(config-router)#network 172.31.0.64 0.0.0.63 area 0
Bucaramanga(config-router)#network 172.31.2.0 0.0.0.7 area 0
Bucaramanga(config-router)#network 172.31.2.32 0.0.0.3 area 0
Bucaramanga(config-router)#
Bucaramanga(config-router)#exit
Bucaramanga(config)#exit
Bucaramanga#
%SYS-5-CONFIG_I: Configured from console by console

Bucaramanga#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, 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

172.31.0.0/16 is variably subnetted, 6 subnets, 3 masks
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
L 172.31.0.1/32 is directly connected, GigabitEthernet0/0.10
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
L 172.31.0.65/32 is directly connected, GigabitEthernet0/0.30
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.1/32 is directly connected, GigabitEthernet0/0.1

Bucaramanga#


Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #ATENCION SOLO ACCESO AUTORIZADO!!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Tunja
Tunja(config)#int g0/0.1
Tunja(config-subif)#encapsulation dot1q 1
Tunja(config-subif)#ip address 172.3.2.9 255.255.255.248
Tunja(config-subif)#int g0/0.20
Tunja(config-subif)#encapsulation dot1q 20
Tunja(config-subif)#ip address 172.31.0.129 255.255.255.192
Tunja(config-subif)#int g0/0.30
Tunja(config-subif)#encapsulation dot1q 30
Tunja(config-subif)#ip address 172.31.0.193 255.255.255.192
Tunja(config-subif)#int g0/0
Tunja(config-if)#no shutdown

Tunja(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

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

%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up

Tunja(config-if)#int s0/0/0
Tunja(config-if)#ip address 172.31.2.33 255.255.255.252
Tunja(config-if)#no shutdown

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

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

Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip address 172.31.2.37 255.255.255.252
Tunja(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Tunja(config-if)#exit
Tunja(config)#int g0/1
Tunja(config-if)#ip address 209.165.220.1 255.255.255.0
Tunja(config-if)#no shutdown

Tunja(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

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

Tunja(config-if)#router ospf 1
Tunja(config-router)#do show ip route connected
C 172.3.2.8/29 is directly connected, GigabitEthernet0/0.1

```
C   172.31.0.128/26  is directly connected, GigabitEthernet0/0.20
C   172.31.0.192/26  is directly connected, GigabitEthernet0/0.30
C   172.31.2.32/30  is directly connected, Serial0/0/0
C   209.165.220.0/24  is directly connected, GigabitEthernet0/1

Tunja(config-router)#network 172.3.2.8 0.0.0.7 area 0
Tunja(config-router)#network 172.31.0.128 0.0.0.63 area 0
Tunja(config-router)#network 172.31.0.192 0.0.0.63 area 0
Tunja(config-router)#network 172.31.2.32 0.0.0.3 area 0
Tunja(config-router)#
01:39:40: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0 from
LOADING to FULL, Loading Done

Tunja(config-router)#network 172.31.2.36 0.0.0.3 area 0
Tunja(config-router)#exit
Tunja(config)#exit
Tunja#
%SYS-5-CONFIG_I: Configured from console by console

Tunja#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, 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

     172.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
L       172.3.2.9/32 is directly connected, GigabitEthernet0/0.1
     172.31.0.0/16 is variably subnetted, 9 subnets, 4 masks
O       172.31.0.0/26 [110/65] via 172.31.2.34, 00:01:36, Serial0/0/0
O       172.31.0.64/26 [110/65] via 172.31.2.34, 00:01:36, Serial0/0/0
C       172.31.0.128/26 is directly connected, GigabitEthernet0/0.20
L       172.31.0.129/32 is directly connected, GigabitEthernet0/0.20
C       172.31.0.192/26 is directly connected, GigabitEthernet0/0.30
L       172.31.0.193/32 is directly connected, GigabitEthernet0/0.30
O       172.31.2.0/29 [110/65] via 172.31.2.34, 00:01:36, Serial0/0/0
C       172.31.2.32/30 is directly connected, Serial0/0/0
L       172.31.2.33/32 is directly connected, Serial0/0/0
     209.165.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.220.0/24 is directly connected, GigabitEthernet0/1
L       209.165.220.1/32 is directly connected, GigabitEthernet0/1

Tunja#
```

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #ATENCION SOLO ACCESO AUTORIZADO!!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Cundinamarca
Cundinamarca(config)#int g0/0.1
Cundinamarca(config-subif)#encapsulation dot1q 1
Cundinamarca(config-subif)#ip address 172.31.2.9 255.255.255.248
Cundinamarca(config-subif)#int g0/0.20
Cundinamarca(config-subif)#encapsulation dot1q 20
Cundinamarca(config-subif)#ip address 172.31.1.65 255.255.255.192
Cundinamarca(config-subif)#int g0/0.30
Cundinamarca(config-subif)#encapsulation dot1q 30
Cundinamarca(config-subif)#ip address 172.31.1.1 255.255.255.192
Cundinamarca(config-subif)#int g0/0.88
Cundinamarca(config-subif)#encapsulation dot1q 88
Cundinamarca(config-subif)#ip address 172.31.2.25 255.255.255.248
Cundinamarca(config-subif)#int g0/0
Cundinamarca(config-if)#no shutdown

Cundinamarca(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

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

%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1,
changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.88, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.88, changed state to up

Cundinamarca(config-if)#int s0/0/0
Cundinamarca(config-if)#ip address 172.31.2.38 255.255.255.252
Cundinamarca(config-if)#no shutdown

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

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

Cundinamarca(config-if)#exit
Cundinamarca(config)#router ospf 1
Cundinamarca(config-router)#do show ip route connected
C 172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
C 172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
C 172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
C 172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
C 172.31.2.36/30 is directly connected, Serial0/0/0

Cundinamarca(config-router)#network 172.31.1.0 0.0.0.63 area 0
Cundinamarca(config-router)#network 172.31.1.64 0.0.0.63 area 0
Cundinamarca(config-router)#network 172.31.2.8 0.0.0.7 area 0
Cundinamarca(config-router)#network 172.31.2.24 0.0.0.7 area 0
Cundinamarca(config-router)#network 172.31.2.36 0.0.0.3 area 0
Cundinamarca(config-router)#
02:08:05: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from LOADING to FULL, Loading Done

Cundinamarca(config-router)#exit
Cundinamarca(config)#exit
Cundinamarca#

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

Cundinamarca#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, 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

     172.3.0.0/29 is subnetted, 1 subnets
O       172.3.2.8/29 [110/65] via 172.31.2.37, 00:00:51, Serial0/0/0
     172.31.0.0/16 is variably subnetted, 16 subnets, 4 masks
O       172.31.0.0/26 [110/129] via 172.31.2.37, 00:00:51, Serial0/0/0
O       172.31.0.64/26 [110/129] via 172.31.2.37, 00:00:51, Serial0/0/0
O       172.31.0.128/26 [110/65] via 172.31.2.37, 00:00:51, Serial0/0/0
O       172.31.0.192/26 [110/65] via 172.31.2.37, 00:00:51, Serial0/0/0
C       172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
L       172.31.1.1/32 is directly connected, GigabitEthernet0/0.30
C       172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
L       172.31.1.65/32 is directly connected, GigabitEthernet0/0.20
O       172.31.2.0/29 [110/129] via 172.31.2.37, 00:00:51, Serial0/0/0
C       172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
L       172.31.2.9/32 is directly connected, GigabitEthernet0/0.1
C       172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
L       172.31.2.25/32 is directly connected, GigabitEthernet0/0.88
O       172.31.2.32/30 [110/128] via 172.31.2.37, 00:00:51, Serial0/0/0
C       172.31.2.36/30 is directly connected, Serial0/0/0
L       172.31.2.38/32 is directly connected, Serial0/0/0

Cundinamarca#

Switch>en
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW-Buc
SW-Buc(config)#vlan 1
SW-Buc(config-vlan)#vlan 10
SW-Buc(config-vlan)#vlan 30
SW-Buc(config-vlan)#int f0/1
SW-Buc(config-if)#switchport mode access
SW-Buc(config-if)#switchport access vlan 10
```

```
SW-Buc(config-if)#int f0/4
SW-Buc(config-if)#switchport mode access
SW-Buc(config-if)#switchport access vlan 30
SW-Buc(config-if)#int g0/1
SW-Buc(config-if)#switchport mode trunk

SW-Buc(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down

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

SW-Buc(config-if)#exit
SW-Buc(config)#int vlan 1
SW-Buc(config-if)#ip address 172.31.2.3 255.255.255.248
SW-Buc(config-if)#no shutdown

SW-Buc(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

SW-Buc(config-if)#ip default-gateway 172.31.2.1
SW-Buc(config)#

Switch>en
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW-Tun
SW-Tun(config)#vlan 1
SW-Tun(config-vlan)#vlan 20
SW-Tun(config-vlan)#vlan 30
SW-Tun(config-vlan)#int f0/1
SW-Tun(config-if)#switchport mode access
SW-Tun(config-if)#switchport access vlan 20
SW-Tun(config-if)#int f0/4
SW-Tun(config-if)#switchport mode access
SW-Tun(config-if)#switchport access vlan 30
SW-Tun(config-if)#int g0/1
SW-Tun(config-if)#switchport mode trunk

SW-Tun(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down
```

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

SW-Tun(config-if)#exit
SW-Tun(config)#int vlan 1
SW-Tun(config-if)#ip address 172.3.2.11 255.255.255.248
SW-Tun(config-if)#no shutdown

SW-Tun(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

SW-Tun(config-if)#ip default-gateway 172.3.2.9
SW-Tun(config)#

Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW-Cun
SW-Cun(config)#vlan 1
SW-Cun(config-vlan)#vlan 20
SW-Cun(config-vlan)#vlan 30
SW-Cun(config-vlan)#vlan 88
SW-Cun(config-vlan)#exit
SW-Cun(config)#int f0/1
SW-Cun(config-if)#switchport mode access
SW-Cun(config-if)#switchport access vlan 20
SW-Cun(config-if)#int f0/4
SW-Cun(config-if)#switchport mode access
SW-Cun(config-if)#switchport access vlan 30
SW-Cun(config-if)#int f0/24
SW-Cun(config-if)#switchport mode access
SW-Cun(config-if)#switchport access vlan 88
SW-Cun(config-if)#int g0/1
SW-Cun(config-if)#switchport mode trunk

SW-Cun(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down

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

```
SW-Cun(config-if)#exit
SW-Cun(config)#int vlan 1
SW-Cun(config-if)#ip address 172.31.2.11 255.255.255.248
SW-Cun(config-if)#no shutdown

SW-Cun(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

SW-Cun(config-if)#ip default-gateway 172.31.2.9
SW-Cun(config)#
```

- **Autenticación local con AAA.**

```
Bucaramanga>en
Bucaramanga(config)#username admin secret admin123
Bucaramanga(config)#aaa new-model
Bucaramanga(config)#aaa authentication login AUTHLOCAL local
Bucaramanga(config)#line console 0
Bucaramanga(config-line)#login authentication AUTHLOCAL
Bucaramanga(config-line)#line vty 0 15
Bucaramanga(config-line)#login authentication AUTHLOCAL
Bucaramanga(config-line)#

Tunja(config)#username admin secret admin123
Tunja(config)#aaa new-model
Tunja(config)#aaa authentication login AUTHLOCAL local
Tunja(config)#line console 0
Tunja(config-line)#login authentication AUTHLOCAL
Tunja(config-line)#line vty 0 15
Tunja(config-line)#login authentication AUTHLOCAL
Tunja(config-line)#

Cundinamarca(config)#username admin secret admin123
Cundinamarca(config)#aaa new-model
Cundinamarca(config)#aaa authentication login AUTHLOCAL local
Cundinamarca(config)#line console 0
Cundinamarca(config-line)#login authentication AUTHLOCAL
Cundinamarca(config-line)#line vty 0 15
Cundinamarca(config-line)#login authentication AUTHLOCAL
Cundinamarca(config-line)#
```

- **Cifrado de contraseñas.**

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #Acceso restringido!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Bucaramanga
Bucaramanga(config)#
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #Acceso restringido!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Tunja
Tunja(config)#


Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#banner motd #Acceso restringido!#
Router(config)#enable secret class
Router(config)#line console 0
Router(config-line)#password cisco
```

```
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#hostname Cundinamarca
Cundinamarca(config)#
```

- **Un máximo de internos para acceder al router.**

Bucaramanga(config-line)#login block-for 10 attempts 3 within 60

Tunja(config-line)#login block-for 10 attempts 3 within 60

Cundinamarca(config-line)#login block-for 10 attempts 3 within 60

- **Máximo tiempo de acceso al detectar ataques.**

Bucaramanga(config-line)#login block-for 10 attempts 3 within 60

Tunja(config-line)#login block-for 10 attempts 3 within 60

Cundinamarca(config-line)#login block-for 10 attempts 3 within 60

- **Establezca un servidor TFTP y almacene todos los archivos necesarios de los routers**

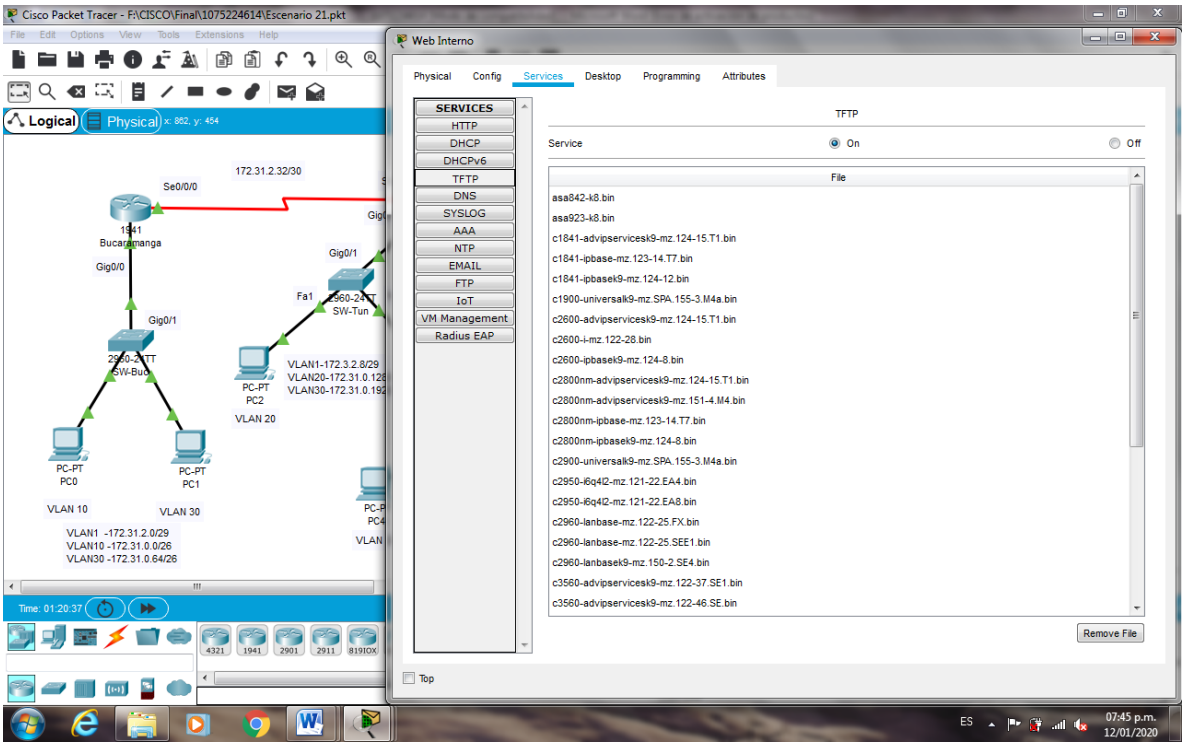

Figura 38. Establecimiento de un servidor TFTP y almacenacmiento de los archivos de los routers

2.2. El DHCP deberá proporcionar solo direcciones a los hosts de Bucaramanga y Cundinamarca

```
Tunja(config)#ip dhcp excluded-address 172.31.0.1 172.31.0.2
Tunja(config)#ip dhcp excluded-address 172.31.0.65 172.31.0.66
Tunja(config)#ip dhcp excluded-address 172.31.1.65 172.31.1.66
Tunja(config)#ip dhcp excluded-address 172.31.1.1 172.31.1.2
Tunja(config)#ip dhcp pool VLAN10BUC
Tunja(dhcp-config)#network 172.31.0.0 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.1
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN30BUC
Tunja(dhcp-config)#network 172.31.0.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.65
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN20CUN
Tunja(dhcp-config)#network 172.31.1.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.1.65
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN30CUN
Tunja(dhcp-config)#network 172.31.1.0 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.1.1
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#
```

```
Bucaramanga(config)#int g0/0.10
Bucaramanga(config-subif)#ip helper-address 172.31.2.33
Bucaramanga(config-subif)#int g0/0.30
Bucaramanga(config-subif)#ip helper-address 172.31.2.33
Bucaramanga(config-subif)#
```

```
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip helper-address 172.31.2.37
Cundinamarca(config-subif)#int g0/0.30
Cundinamarca(config-subif)#ip helper-address 172.31.2.37
Cundinamarca(config-subif)#
```

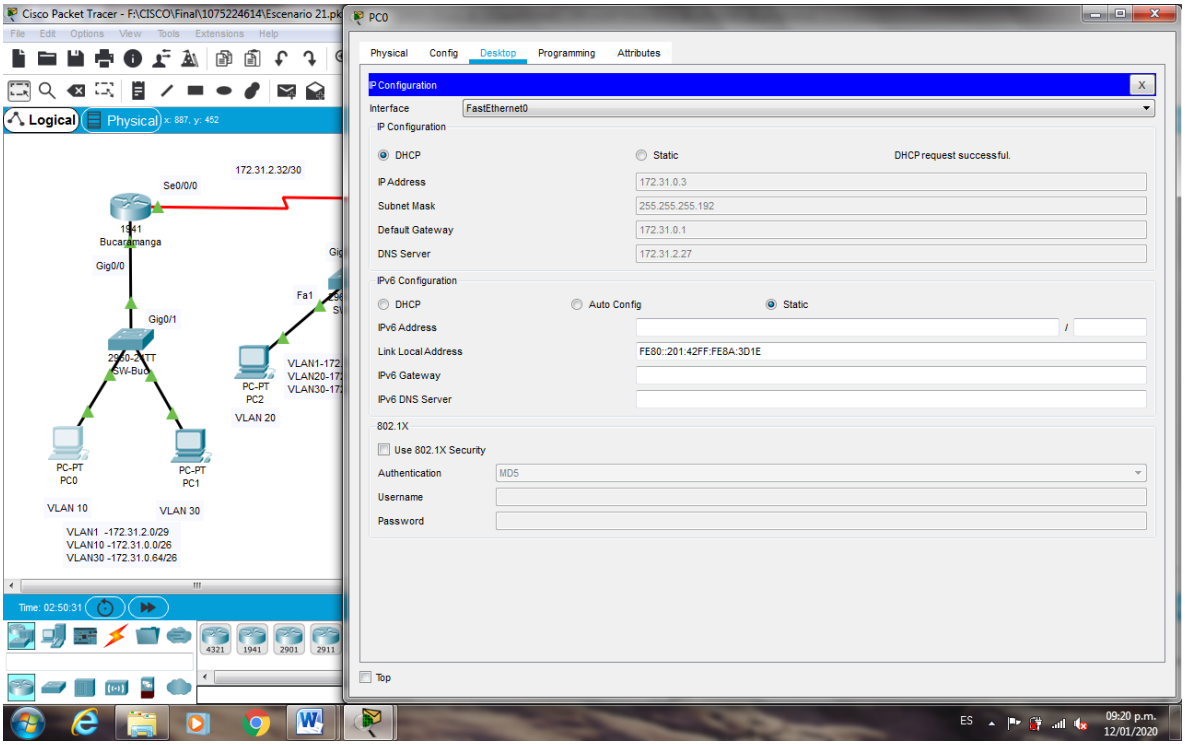

Figura 39. Configuración DHCP PC0

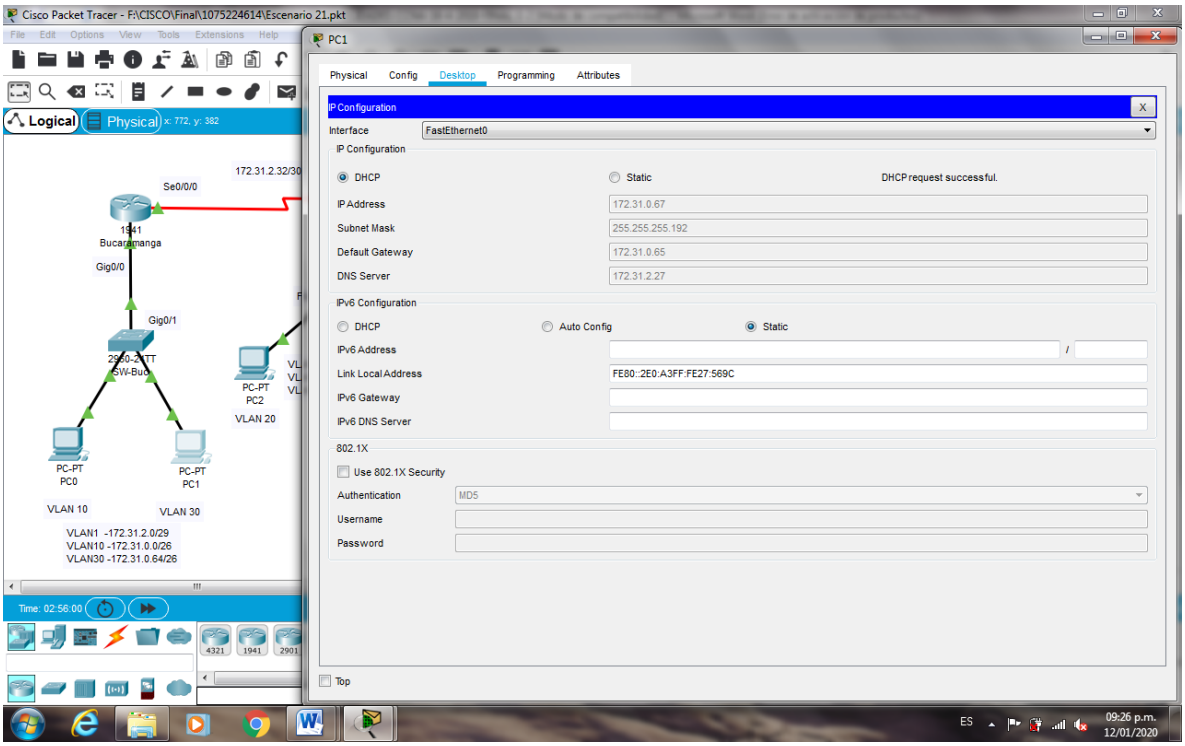

Figura 40. Configuración DHCP PC1

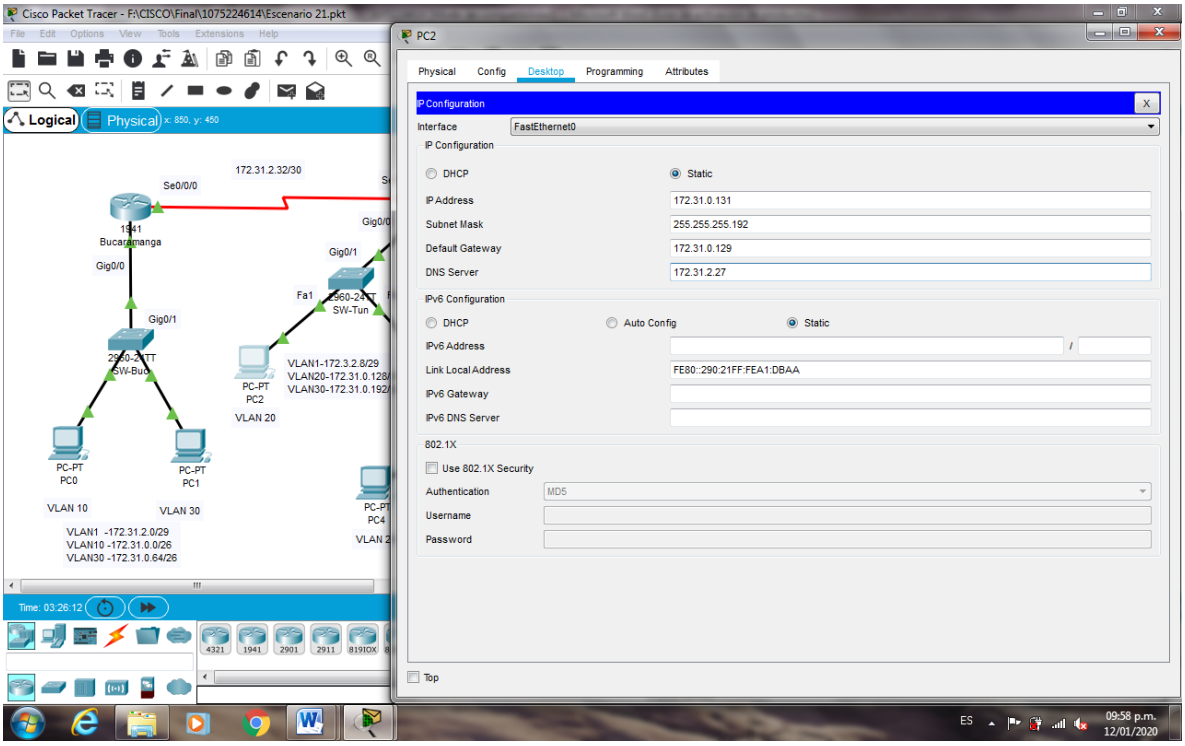

Figura 41. Configuración DHCP PC2

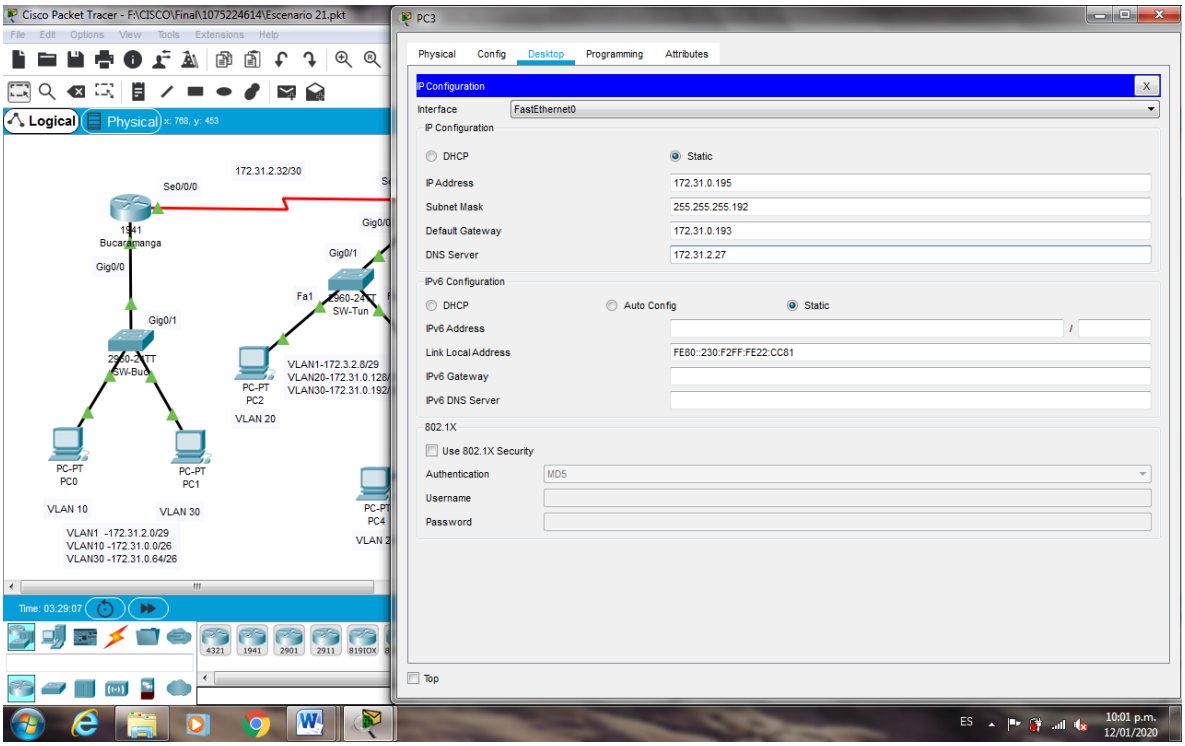

Figura 42. Configuración DHCP PC3

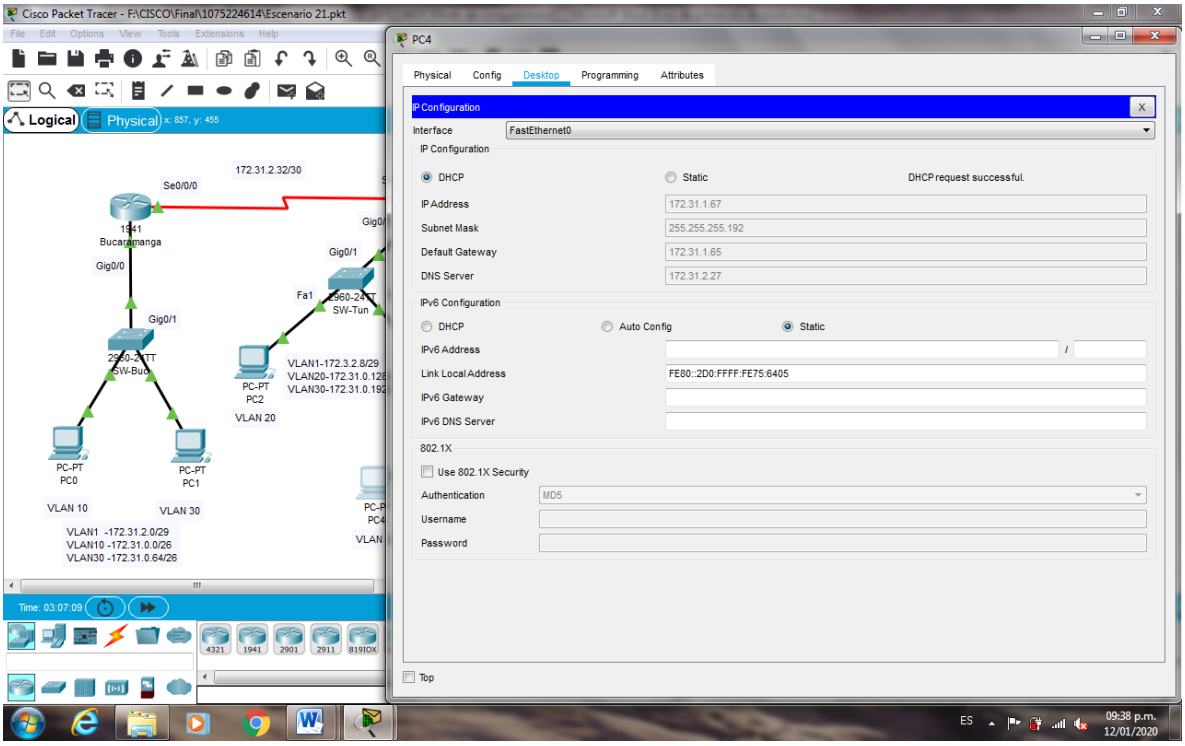

Figura 43. Configuración DHCP PC4

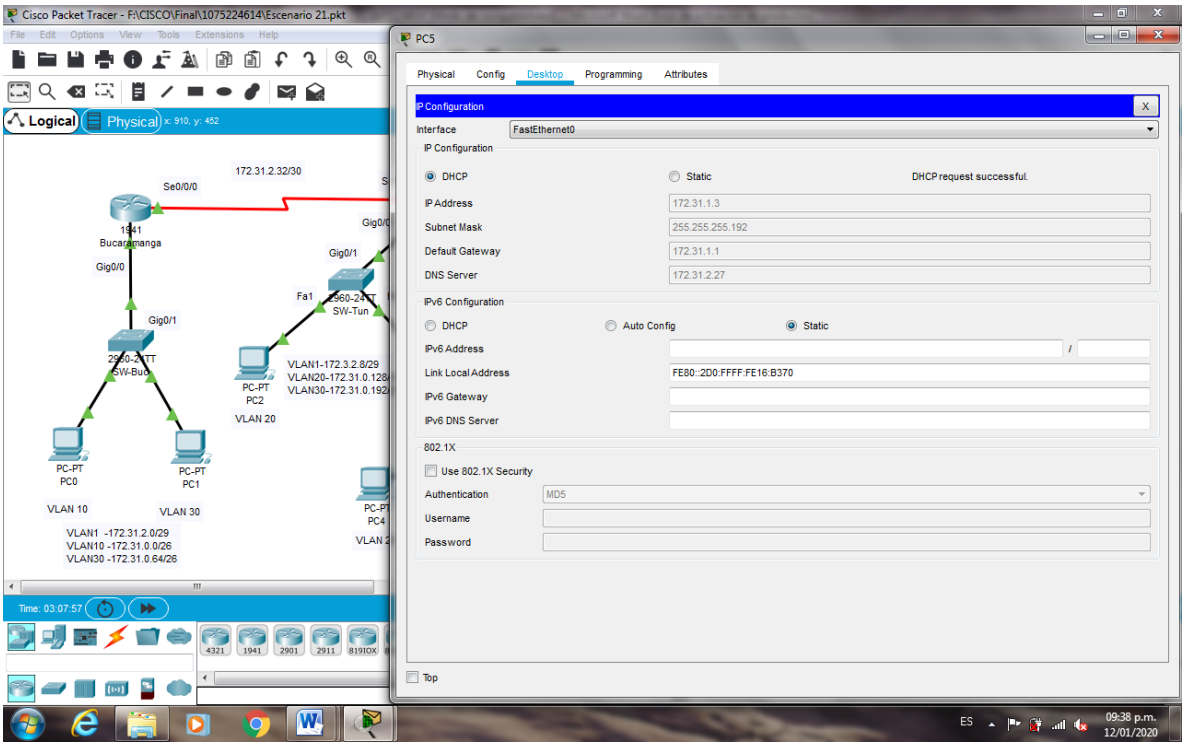

Figura 44. Configuración DHCP PC5

2.3. El web server deberá tener NAT estático y el resto de los equipos de la topología emplearan NAT de sobrecarga (PAT).

```
Tunja(config)#ip dhcp excluded-address 172.31.0.1 172.31.0.2
Tunja(config)#ip dhcp excluded-address 172.31.0.65 172.31.0.66
Tunja(config)#ip dhcp excluded-address 172.31.1.65 172.31.1.66
Tunja(config)#ip dhcp excluded-address 172.31.1.1 172.31.1.2
Tunja(config)#ip dhcp pool VLAN10BUC
Tunja(dhcp-config)#network 172.31.0.0 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.1
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN30BUC
Tunja(dhcp-config)#network 172.31.0.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.65
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN20CUN
Tunja(dhcp-config)#network 172.31.1.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.1.65
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN30CUN
Tunja(dhcp-config)#network 172.31.1.0 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.1.1
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#
```

```
Tunja con0 is now available
Press RETURN to get started.
Acceso restringido!
User Access Verification

Tunja(config)#ip nat inside source static 172.31.2.27 209.165.220.3
Tunja(config)#access-list 1 permit 172.0.0.0 0.255.255.255
Tunja(config)#ip nat inside source list 1 interface g0/1 overload
Tunja(config)#int g0/1
Tunja(config-if)#ip nat outside
Tunja(config-if)#int g0/0.1
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int g0/0.20
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int g0/0.30
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int s0/0/0
Tunja(config-if)#ip nat inside
Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip nat inside
Tunja(config-if)#exit
Tunja(config)#ip route 0.0.0.0 0.0.0.0 209.165.220.2
Tunja(config)#router ospf 1
Tunja(config-router)#default-information originate
Tunja(config-router)#exit
Tunja(config)#exit

Tunja#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, 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 209.165.220.2 to network 0.0.0.0

172.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.3.2.9/32 is directly connected, GigabitEthernet0/0.1
172.31.0.0/16 is variably subnetted, 15 subnets, 4 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 01:28:55, Serial0/0/0
O 172.31.0.64/26 [110/65] via 172.31.2.34, 01:28:55, Serial0/0/0
C 172.31.0.128/26 is directly connected, GigabitEthernet0/0.20
L 172.31.0.129/32 is directly connected, GigabitEthernet0/0.20
C 172.31.0.192/26 is directly connected, GigabitEthernet0/0.30
```

L 172.31.0.193/32 is directly connected, GigabitEthernet0/0.30
O 172.31.1.0/26 [110/65] via 172.31.2.38, 04:08:55, Serial0/0/1
O 172.31.1.64/26 [110/65] via 172.31.2.38, 04:08:55, Serial0/0/1
O 172.31.2.0/29 [110/65] via 172.31.2.34, 01:28:55, Serial0/0/0
O 172.31.2.8/29 [110/65] via 172.31.2.38, 04:08:55, Serial0/0/1
O 172.31.2.24/29 [110/65] via 172.31.2.38, 04:08:55, Serial0/0/1
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.33/32 is directly connected, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/1
L 172.31.2.37/32 is directly connected, Serial0/0/1
209.165.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.165.220.0/24 is directly connected, GigabitEthernet0/1
L 209.165.220.1/32 is directly connected, GigabitEthernet0/1
S* 0.0.0.0/0 [1/0] via 209.165.220.2

Tunja#

Bucaramanga#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, 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 172.31.2.33 to network 0.0.0.0

172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8/29 [110/65] via 172.31.2.33, 01:24:08, Serial0/0/0
172.31.0.0/16 is variably subnetted, 15 subnets, 4 masks
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
L 172.31.0.1/32 is directly connected, GigabitEthernet0/0.10
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
L 172.31.0.65/32 is directly connected, GigabitEthernet0/0.30
O 172.31.0.128/26 [110/65] via 172.31.2.33, 01:24:08, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 01:24:08, Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 01:24:08, Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 01:24:08, Serial0/0/0
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.1/32 is directly connected, GigabitEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 01:24:08, Serial0/0/0
O 172.31.2.24/29 [110/129] via 172.31.2.33, 01:24:08, Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.34/32 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 01:24:08, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.33, 00:08:56, Serial0/0/0

Bucaramanga#

```
Cundinamarca#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, 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 172.31.2.37 to network 0.0.0.0

172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8/29 [110/65] via 172.31.2.37, 04:07:07, Serial0/0/0
172.31.0.0/16 is variably subnetted, 16 subnets, 4 masks
O 172.31.0.0/26 [110/129] via 172.31.2.37, 01:27:07, Serial0/0/0
O 172.31.0.64/26 [110/129] via 172.31.2.37, 01:27:07, Serial0/0/0
O 172.31.0.128/26 [110/65] via 172.31.2.37, 04:07:07, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.37, 04:07:07, Serial0/0/0
C 172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
L 172.31.1.1/32 is directly connected, GigabitEthernet0/0.30
C 172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
L 172.31.1.65/32 is directly connected, GigabitEthernet0/0.20
O 172.31.2.0/29 [110/129] via 172.31.2.37, 01:27:07, Serial0/0/0
C 172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.9/32 is directly connected, GigabitEthernet0/0.1
C 172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
L 172.31.2.25/32 is directly connected, GigabitEthernet0/0.88
O 172.31.2.32/30 [110/128] via 172.31.2.37, 01:27:17, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/0
L 172.31.2.38/32 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.37, 00:11:55, Serial0/0/0

Cundinamarca#

Tunja#show ip nat translation
Pro  Inside global     Inside local       Outside local      Outside global
---  209.165.220.3     172.31.2.27        ---                ---

Tunja#
```

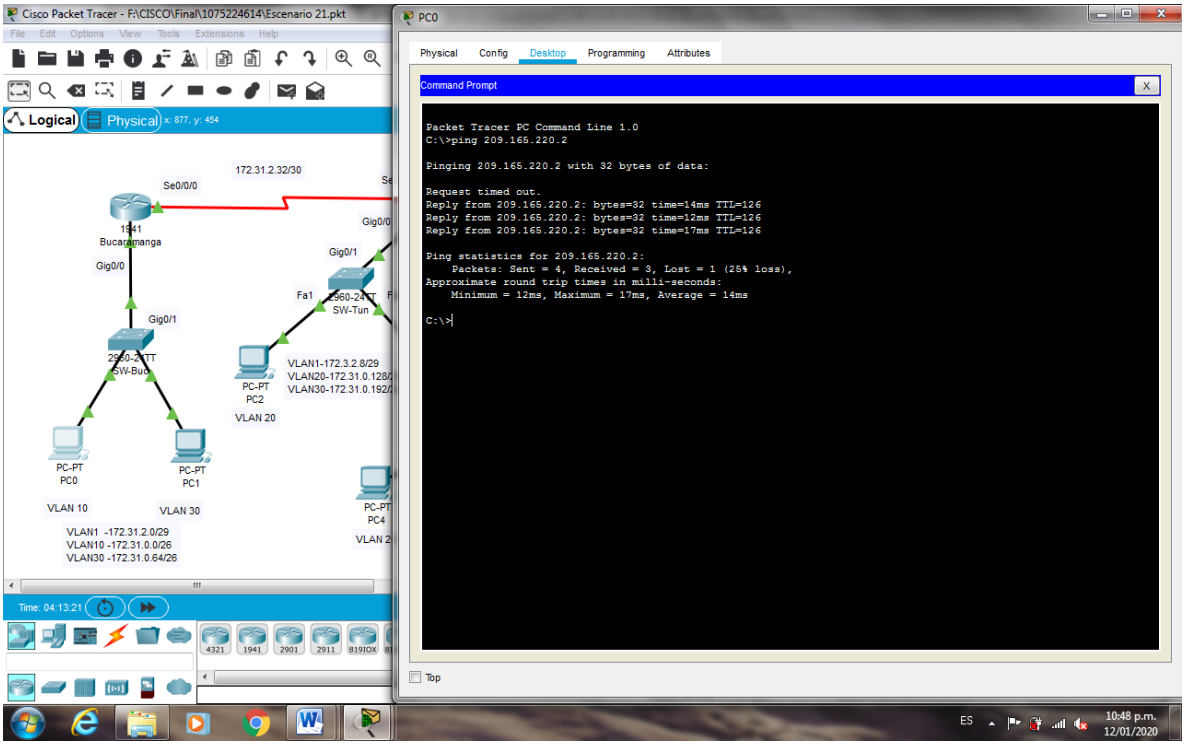

Figura 45. Comprobación ping a Servidor

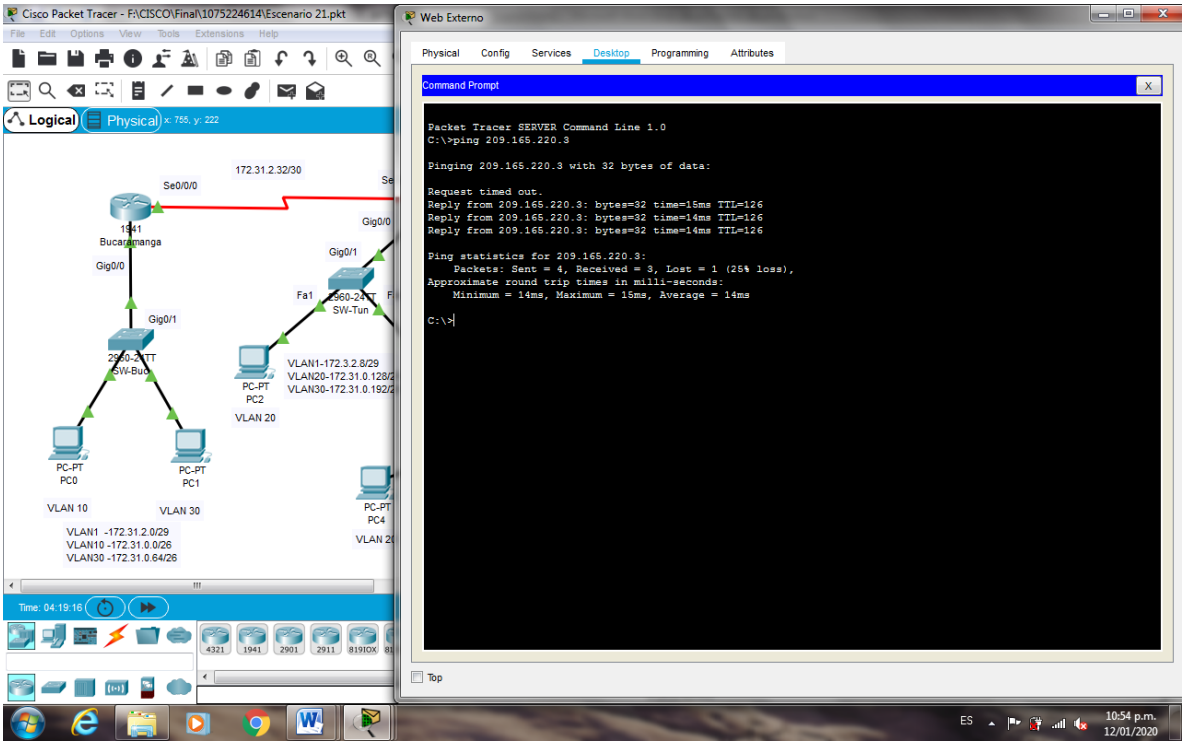

Figura 46. Comprobación ping NAT estático

2.4. El enrutamiento deberá tener autenticación.

Bucaramanga(config)#int s0/0/0
Bucaramanga(config-if)#ip ospf authentication message-digest
Bucaramanga(config-if)#ip ospf message-digest-key 1 md5 cisco123
Bucaramanga(config-if)#
04:26:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Dead timer expired

04:26:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down or detached

Bucaramanga(config-if)#

Cundinamarca(config)#int s0/0/0
Cundinamarca(config-if)#ip ospf authentication message-digest
Cundinamarca(config-if)#ip ospf message-digest-key 1 md5 cisco123
Cundinamarca(config-if)#
04:34:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Dead timer expired

04:34:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down or detached

Cundinamarca(config-if)#

Tunja(config)#int s0/0/0
Tunja(config-if)#ip ospf authentication message-digest
Tunja(config-if)#ip ospf message-digest-key 1 md5 cisco123
Tunja(config-if)#
04:37:14: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0 from LOADING to FULL, Loading Done

Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip ospf authentication message-digest
Tunja(config-if)#ip ospf message-digest-key 1 md5 cisco123
Tunja(config-if)#
04:38:50: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1 from LOADING to FULL, Loading Done

Tunja(config-if)#

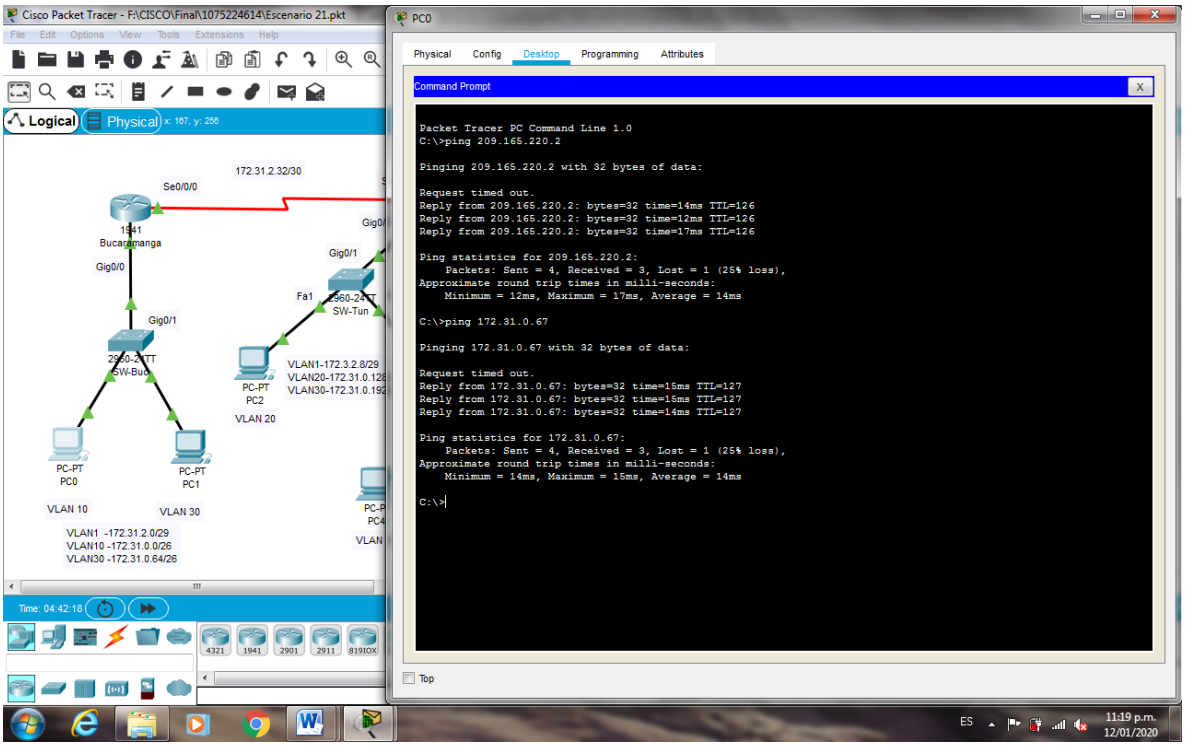

Figura 47. Comprobación ping PC0 a PC1

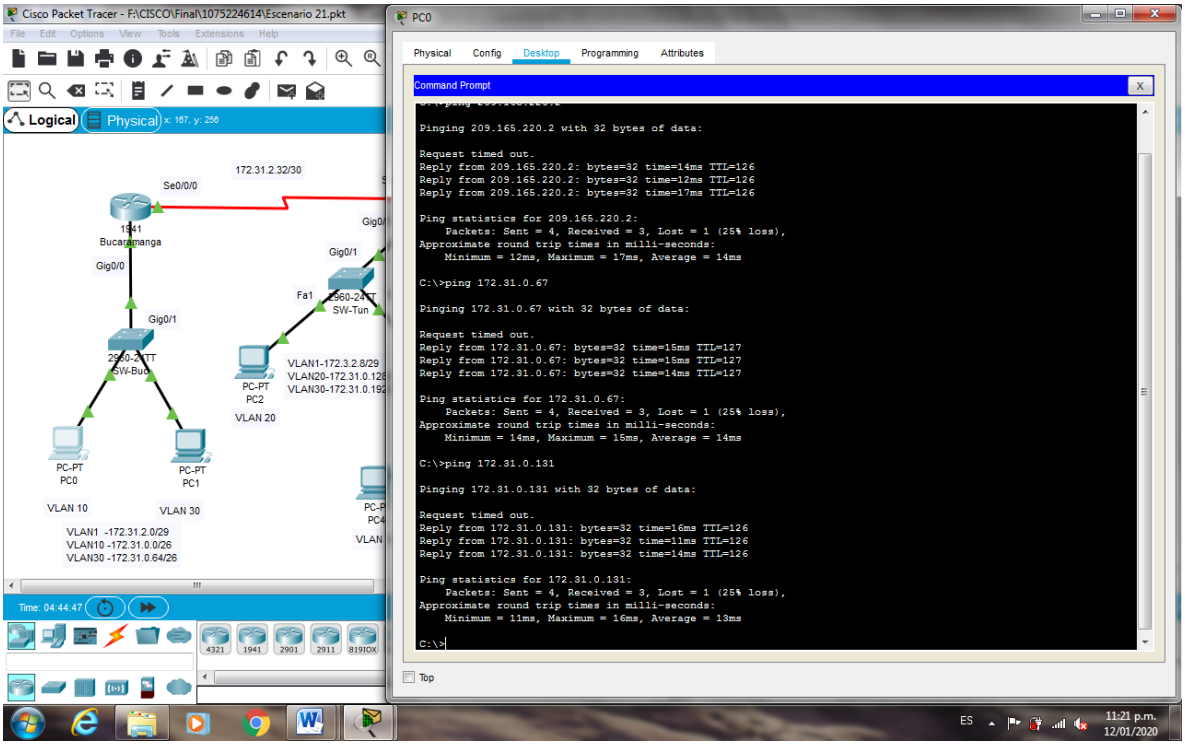

Figura 48. Comprobación ping PC0 a PC2

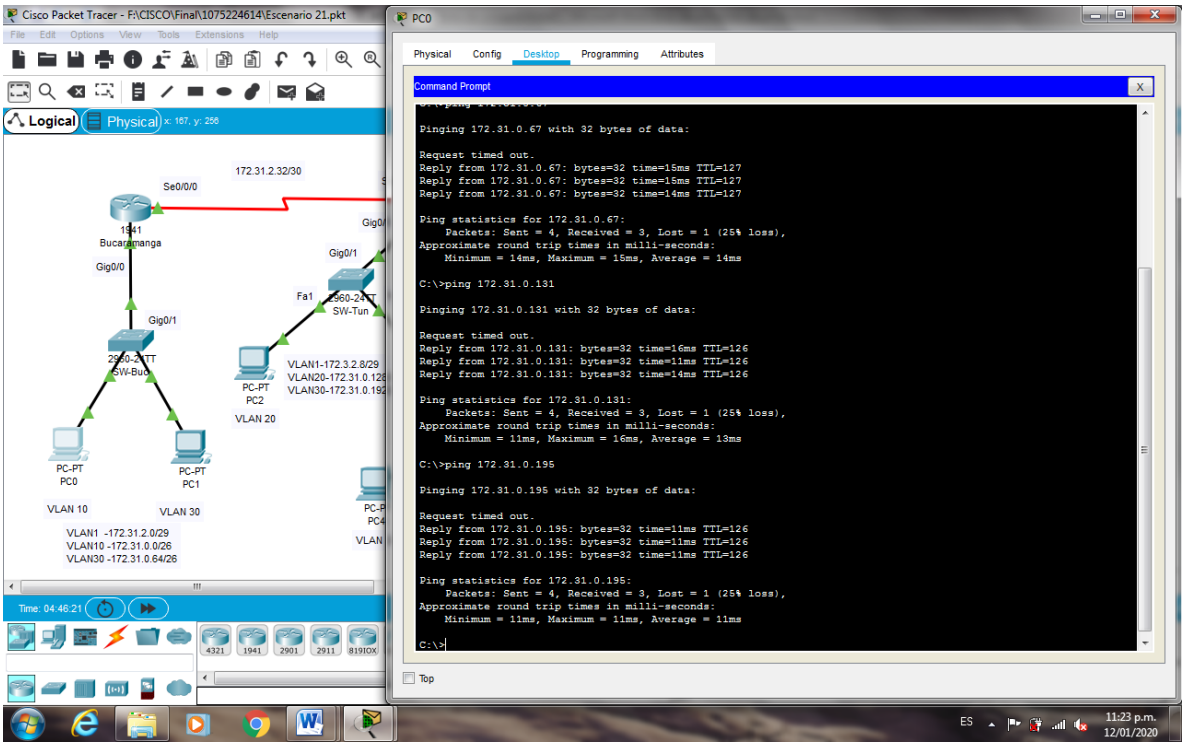

Figura 49. Comprobación ping PC0 a PC3

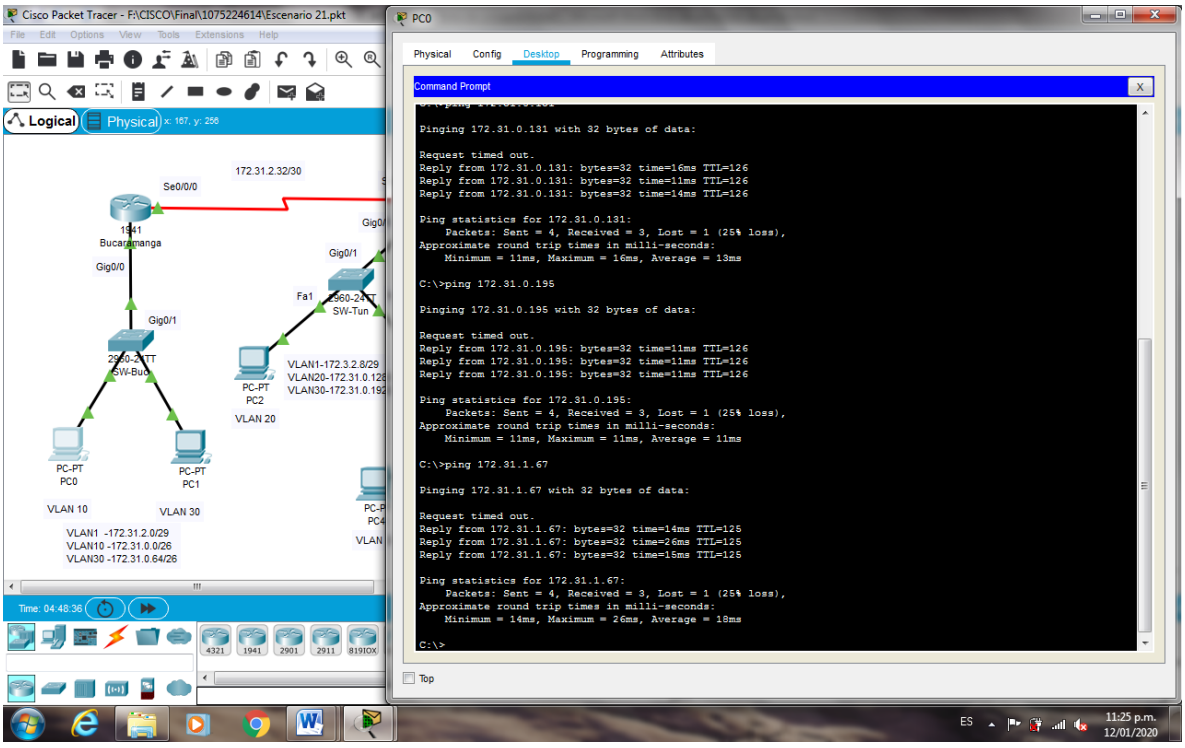

Figura 50. Comprobación ping PC0 a PC4

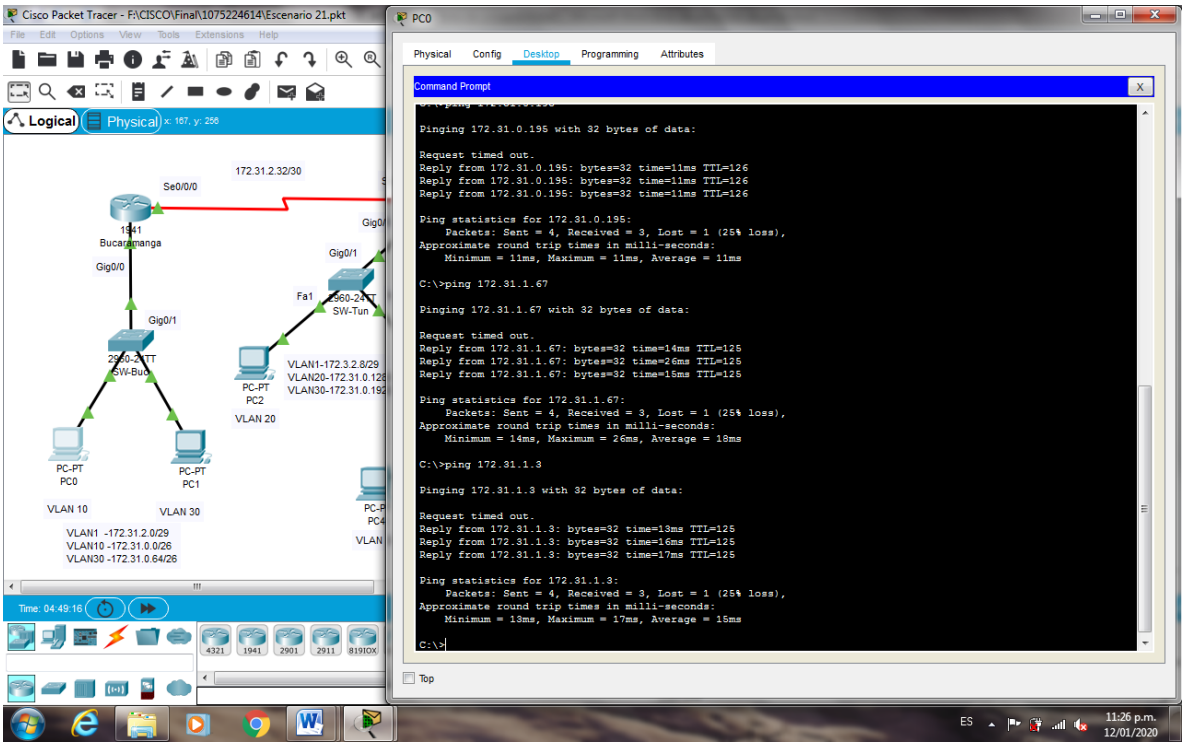

Figura 51. Comprobación ping PC0 a PC5

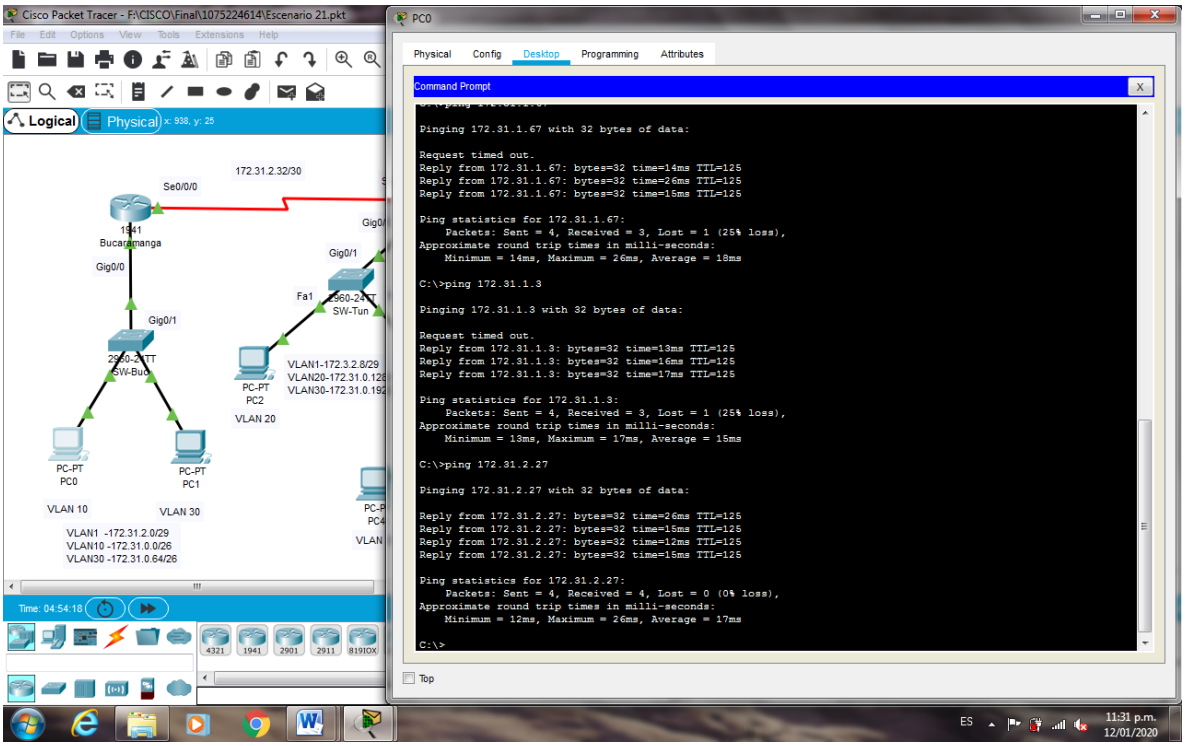

Figura 52. Comprobación ping PC0 a Servidor

2.5 Listas de control de acceso:

- **Los hosts de VLAN 20 en Cundinamarca no acceden a internet, solo a la red interna de Tunja.**

Cundinamarca(config)#access-list 101 deny ip 172.31.1.64 0.0.0.63 209.165.220.0 0.0.0.255
Cundinamarca(config)#access-list 101 permit ip any any
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip access-group 101 in
Cundinamarca(config-subif)#

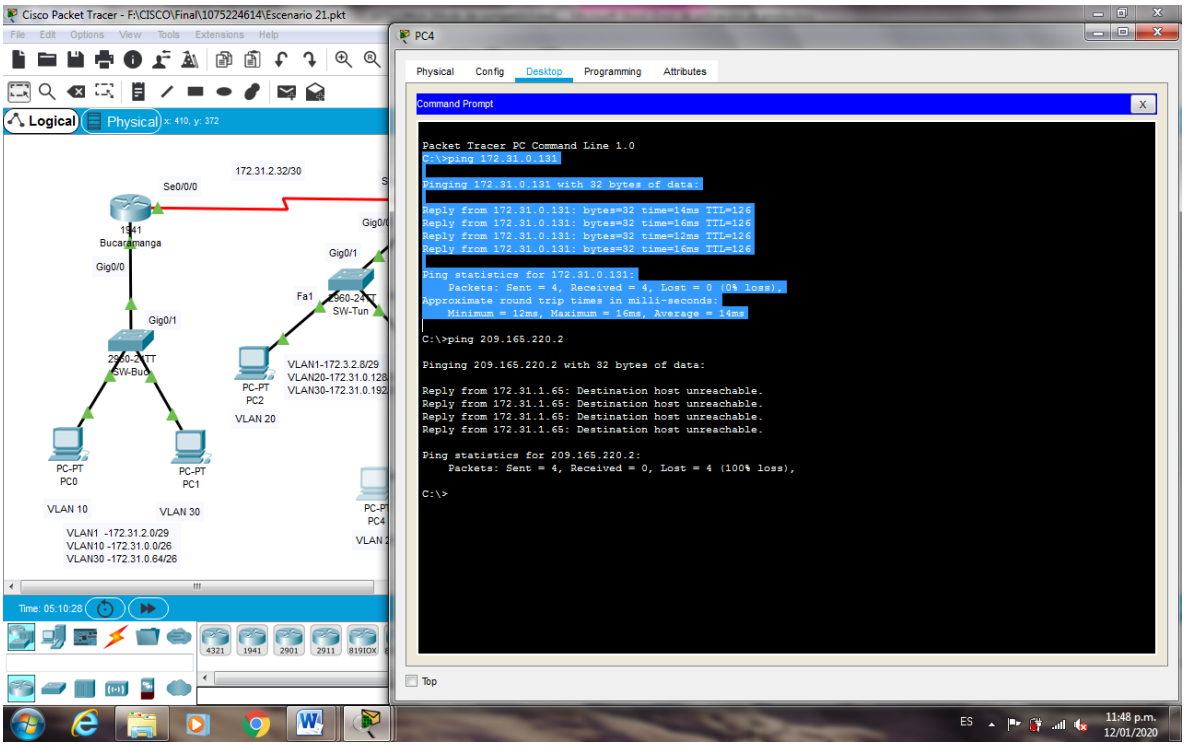

Figura 53. Comprobación ping VLAN 20 (PC4 a PC2) Exito

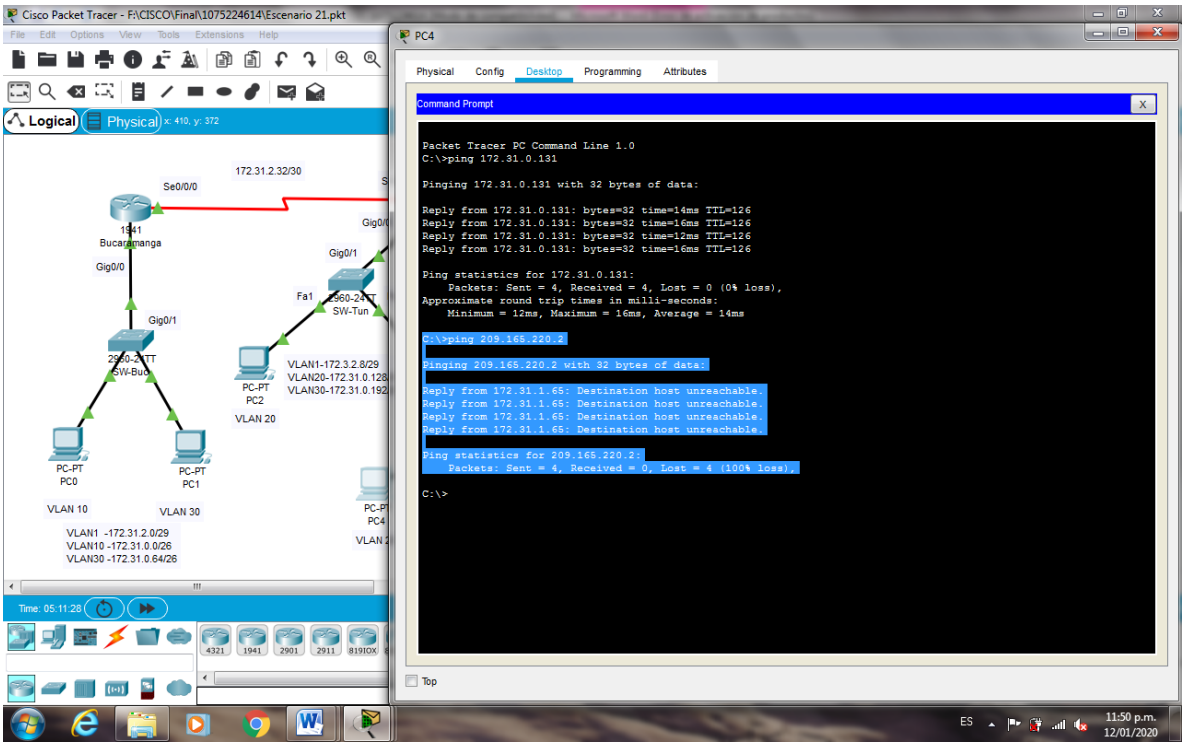

Figura 54. Comprobación ping VLAN 20 (PC4 a Servidor) Se niega el acceso

- **Los hosts de VLAN 10 en Cundinamarca si acceden a internet y no a la red interna de Tunja**

Cundinamarca(config)#access-list 102 permit ip 172.31.1.0 0.0.0.63 209.165.220.0 0.0.0.255
Cundinamarca(config)#access-list 102 deny ip any any
Cundinamarca(config)#int g0/0.30
Cundinamarca(config-subif)#ip access-group 102 in
Cundinamarca(config-subif)#

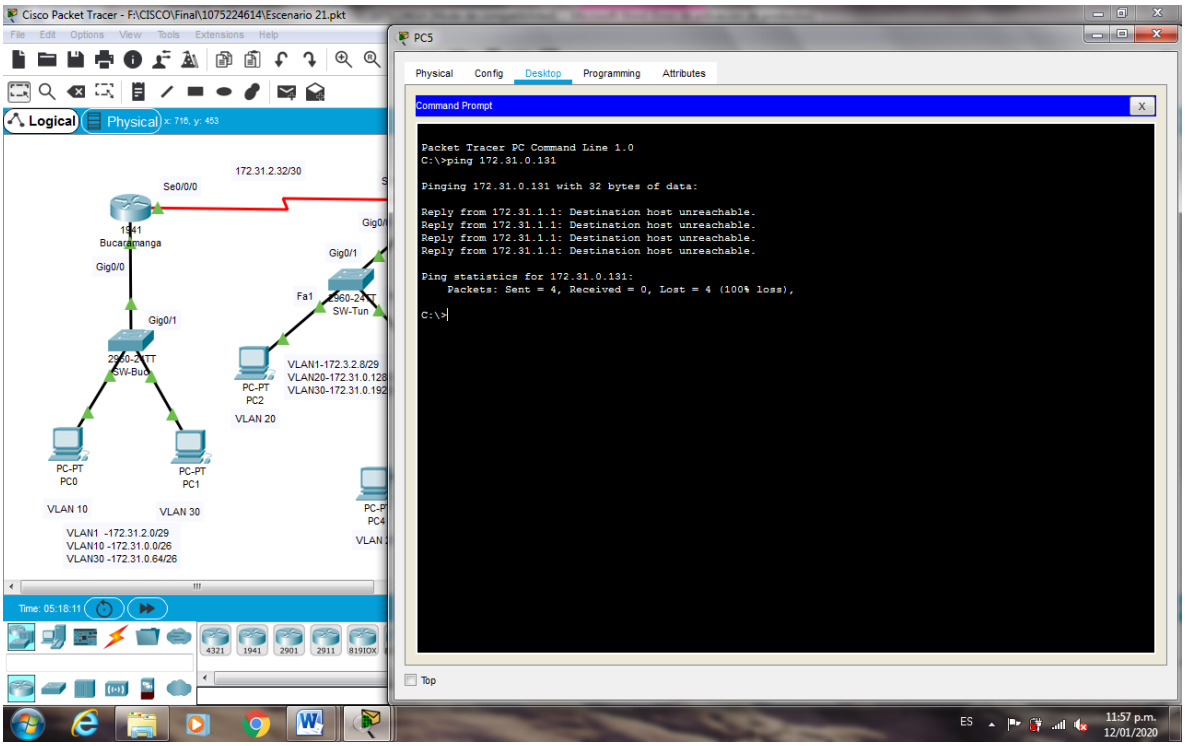

Figura 55. Comprobación ping VLAN 10 (PC5 a PC2) Se niega el acceso

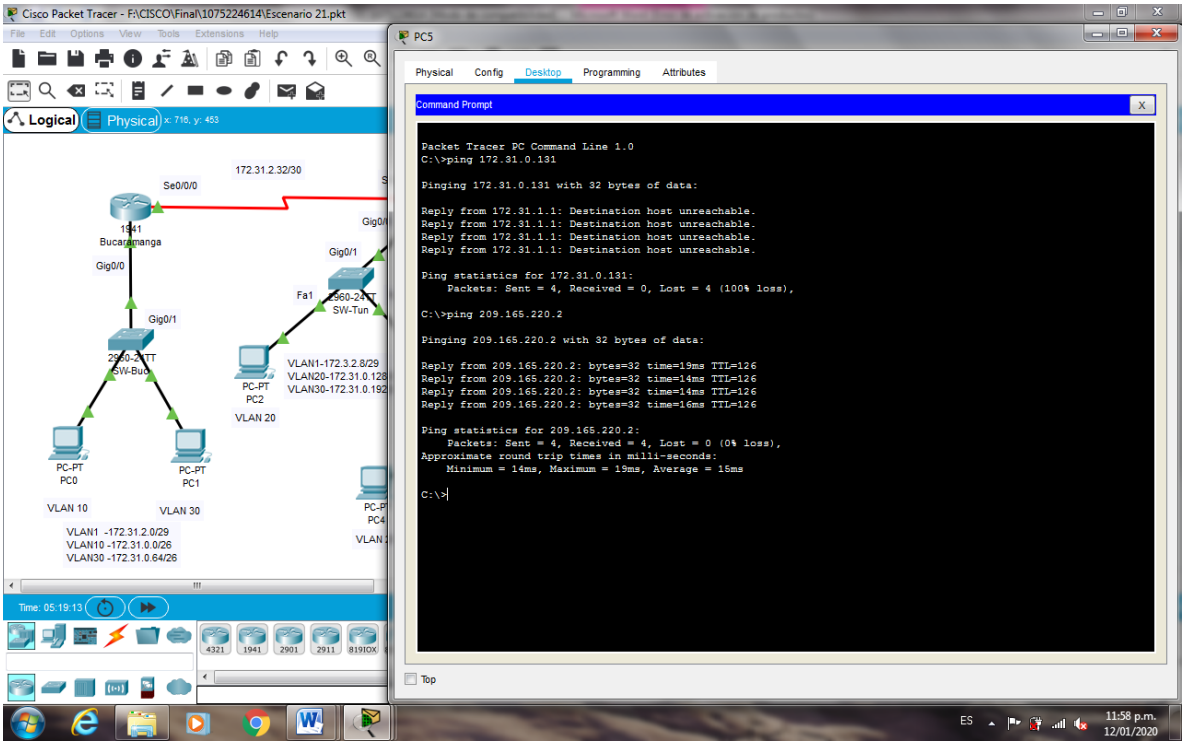

Figura 56. Comprobación ping VLAN 10 (PC5 a Servidor Externo) Exito

- **Los hosts de VLAN 30 en Tunja solo acceden a servidores web y ftp de internet**

Tunja(config)#access-list 101 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 80
Tunja(config)#access-list 101 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 21
Tunja(config)#access-list 101 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 20
Tunja(config)#int g0/0.30
Tunja(config-subif)#ip access-group 101 in
Tunja(config-subif)#

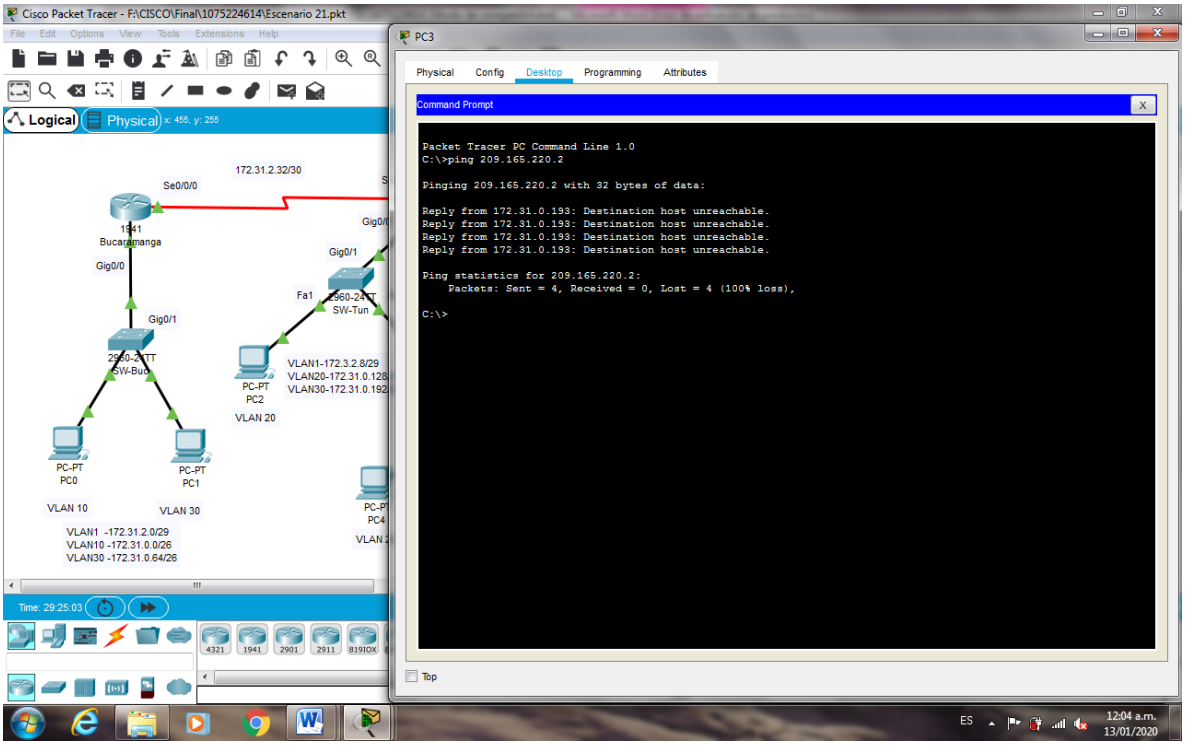

Figura 57. Comprobación ping VLAN 30 (PC3 a Servidor Externo) Se niega el acceso

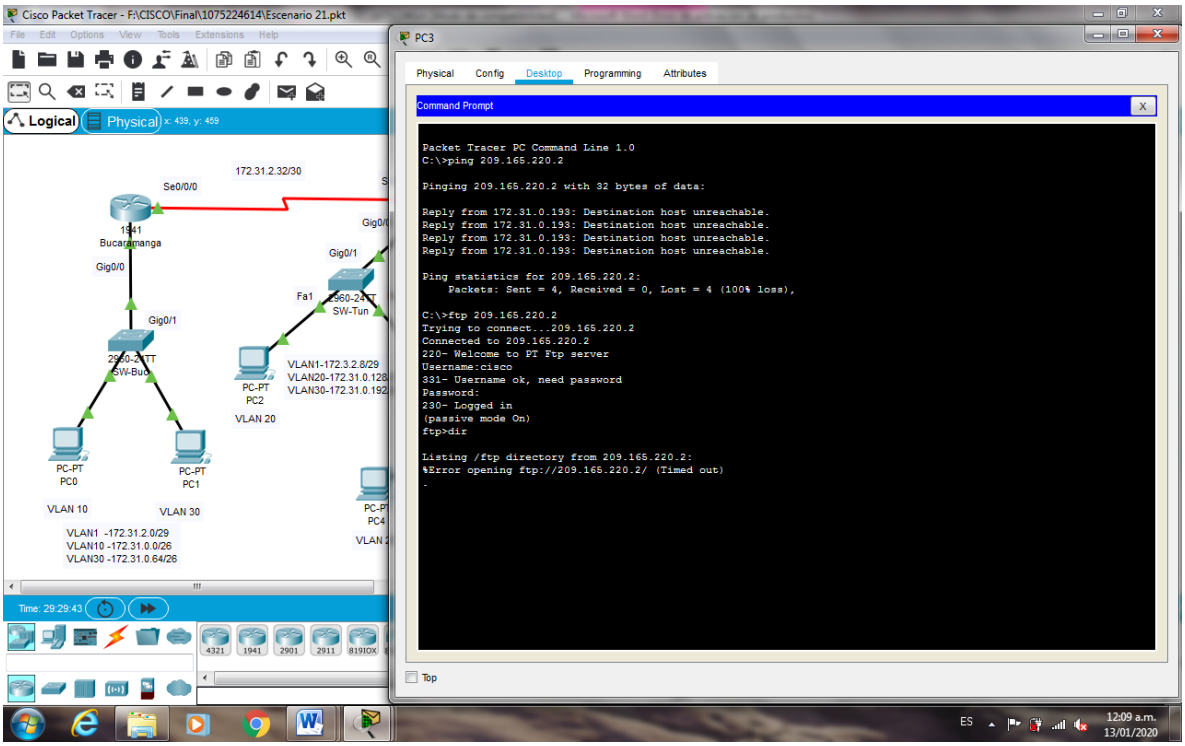

Figura 58. Comprobación ftp VLAN 30 (PC3 a Servidor Externo) Exito

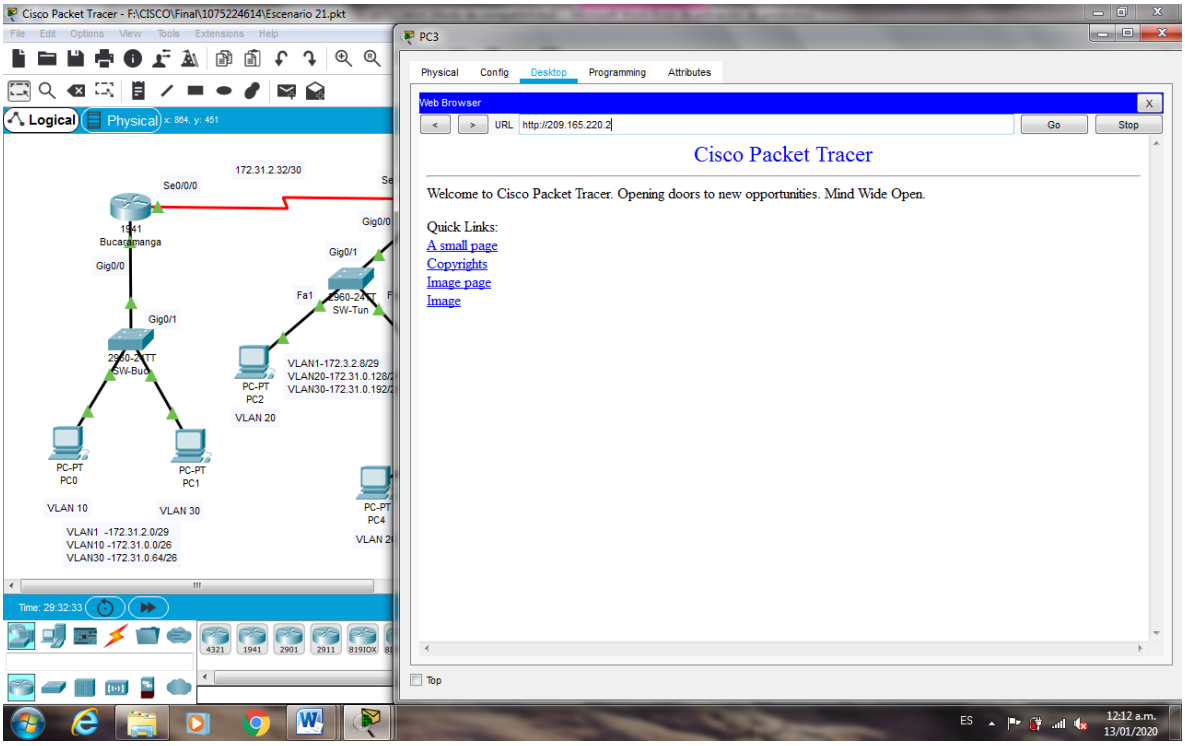

Figura 59. Comprobación web VLAN 30 (PC3 a Servidor Externo) Exito

- **Los hosts de VLAN 20 en Tunja solo acceden a la VLAN 20 de Cundinamarca y VLAN 10 de Bucaramanga.**

```
Tunja(config)#access-list 102 permit ip 172.31.0.128 0.0.0.63 172.31.1.64 0.0.0.63
Tunja(config)#access-list 102 permit ip 172.31.0.128 0.0.0.63 172.31.0.0 0.0.0.63
Tunja(config)#int g0/0.20
Tunja(config-subif)#ip access-group 102 in
Tunja(config-subif)#
```

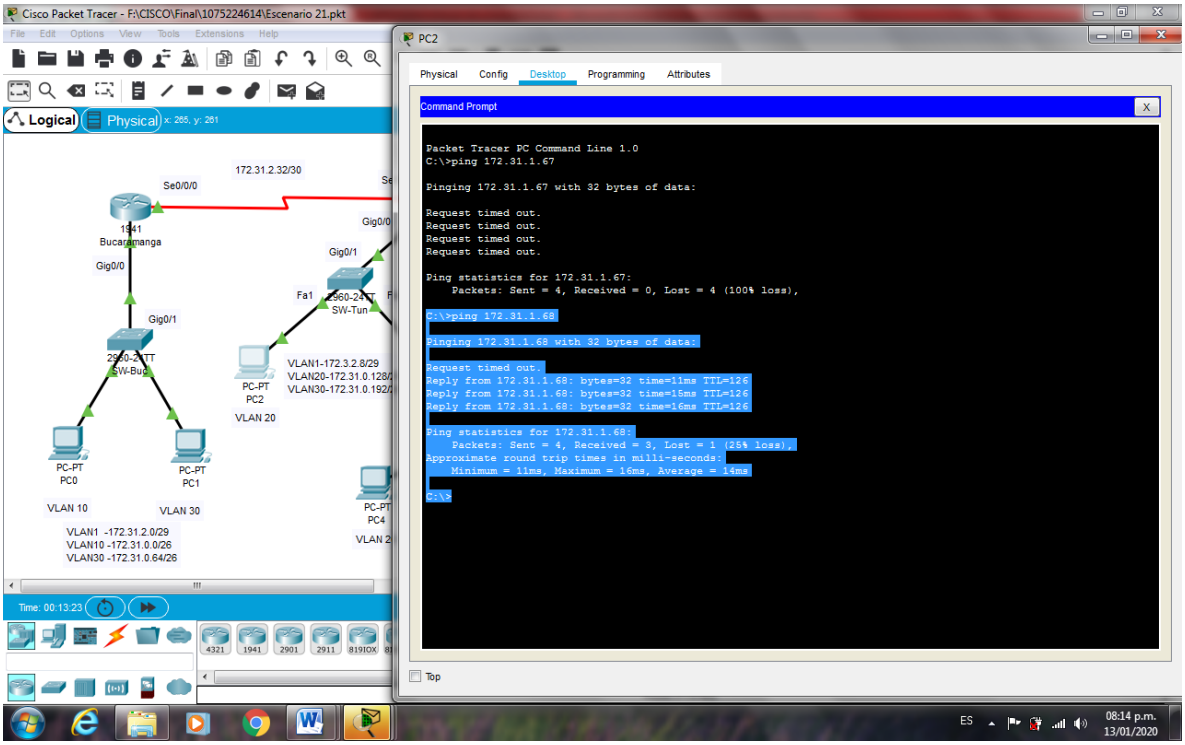

Figura 60. Comprobación VLAN 20 (PC2 a PC4) Exito

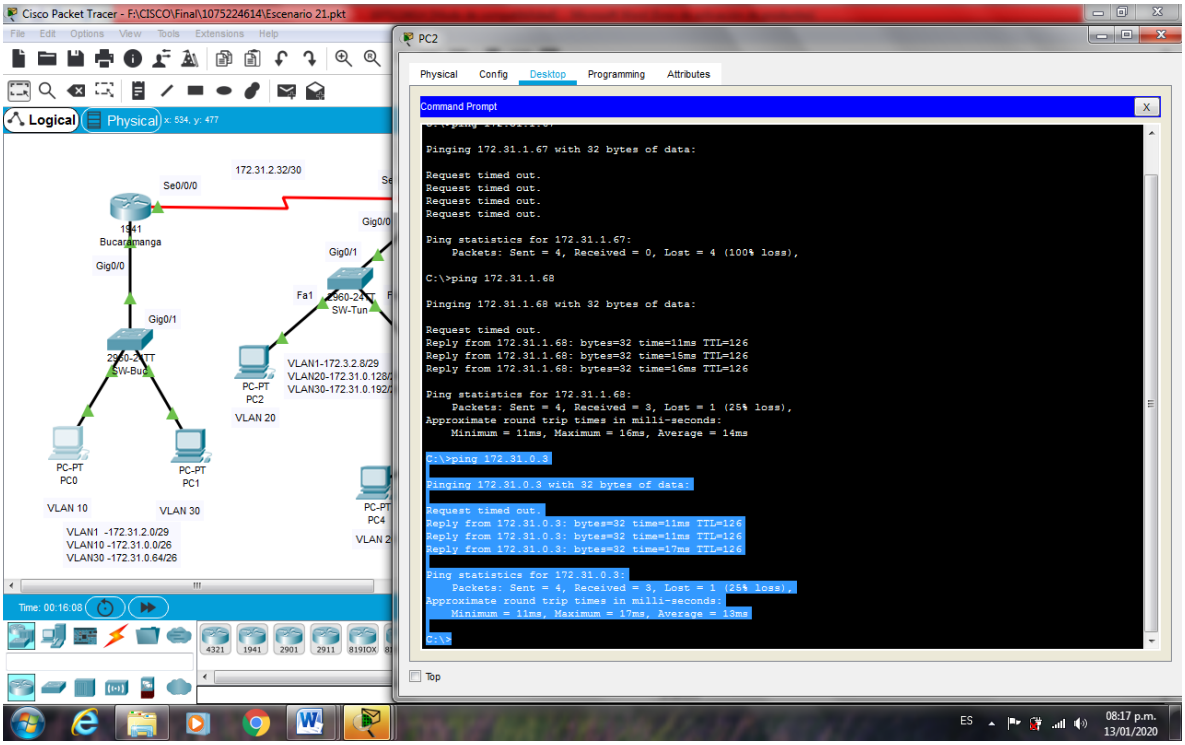

Figura 61. Comprobación VLAN 20 (PC2 a PC0) Exito

- **Los hosts de VLAN 30 de Bucaramanga acceden a internet y a cualquier equipo de VLAN 10.**

Bucaramanga(config)#access-list 101 permit ip 172.31.0.64 0.0.0.63 209.165.220.0 0.0.0.255
Bucaramanga(config)#int g0/0.30
Bucaramanga(config-subif)#ip access-group 101 in
Bucaramanga(config-subif)#

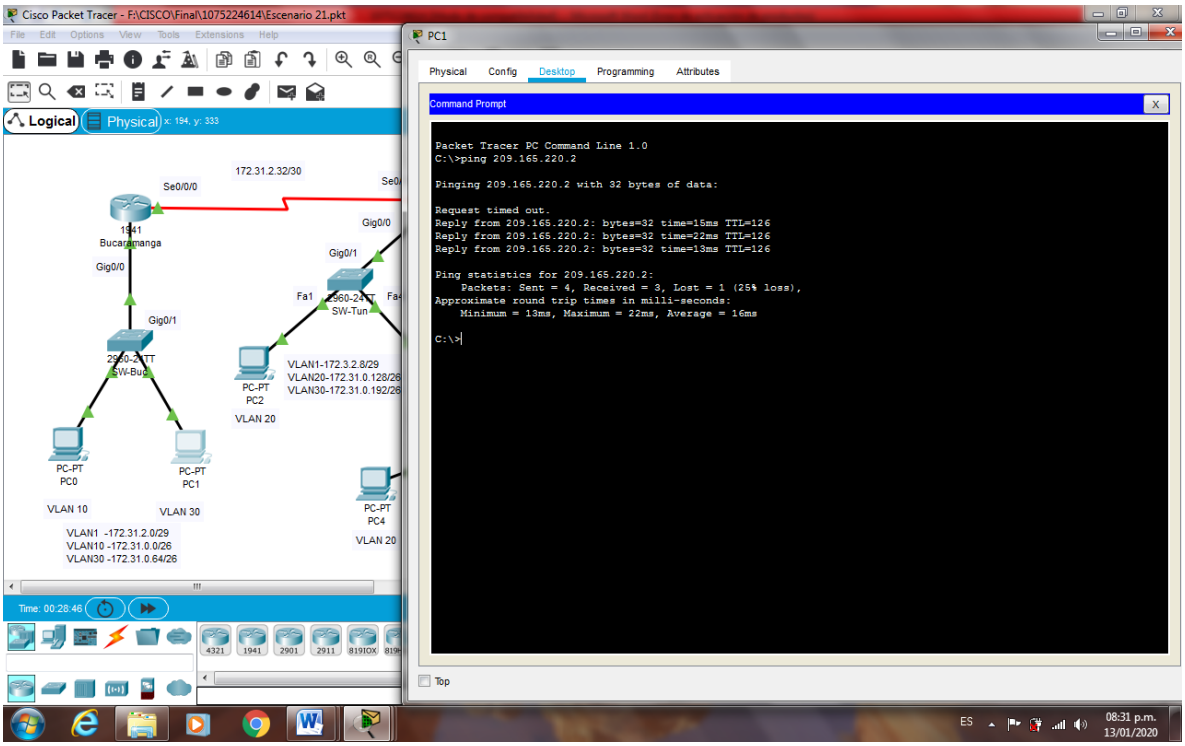

Figura 62. Comprobación VLAN 30 (PC1 a Internet) Exito

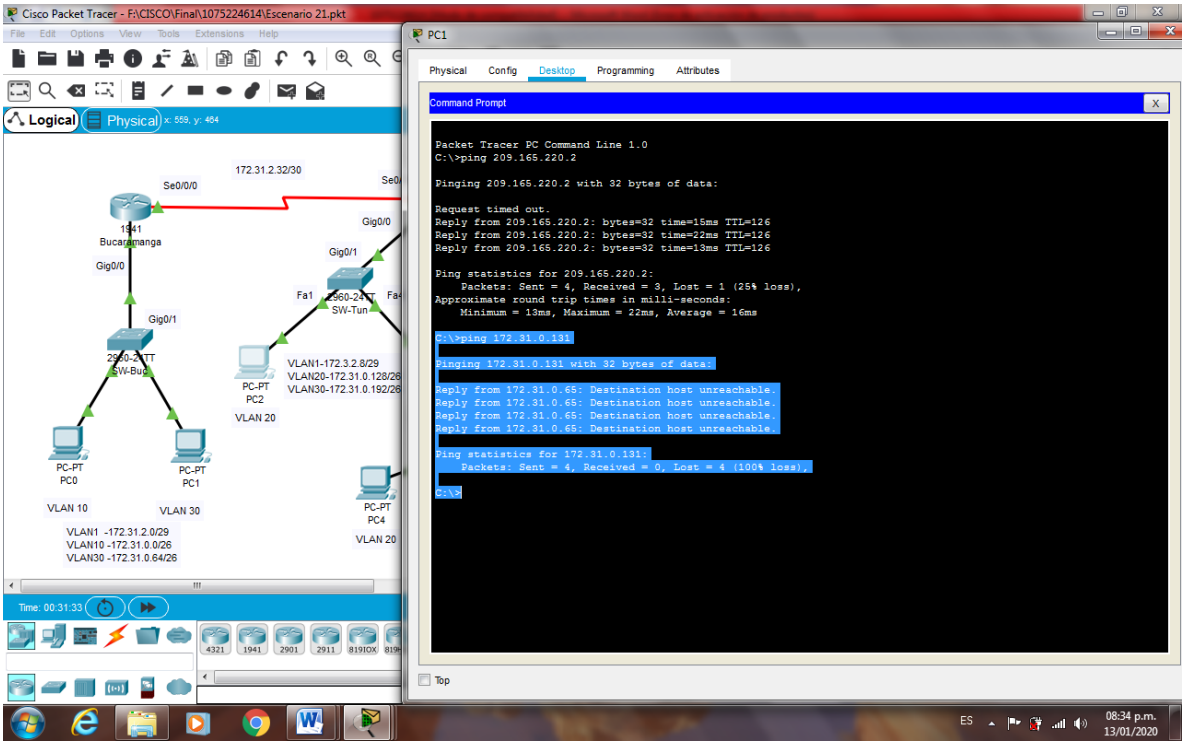

Figura 63. Comprobación VLAN 30 (PC1 a PC2) Se niega el acceso

- **Los hosts de VLAN 10 en Bucaramanga acceden a la red de Cundinamarca (VLAN 20) y Tunja (VLAN 20), no internet.**

Bucaramanga(config)#access-list 102 permit ip 172.31.0.0 0.0.0.63 172.31.1.64 0.0.0.63
Bucaramanga(config)#access-list 102 permit ip 172.31.0.0 0.0.0.63 172.31.0.128 0.0.0.63
Bucaramanga(config)#int g0/0.10
Bucaramanga(config-subif)#ip access-group 102 in
Bucaramanga(config-subif)#

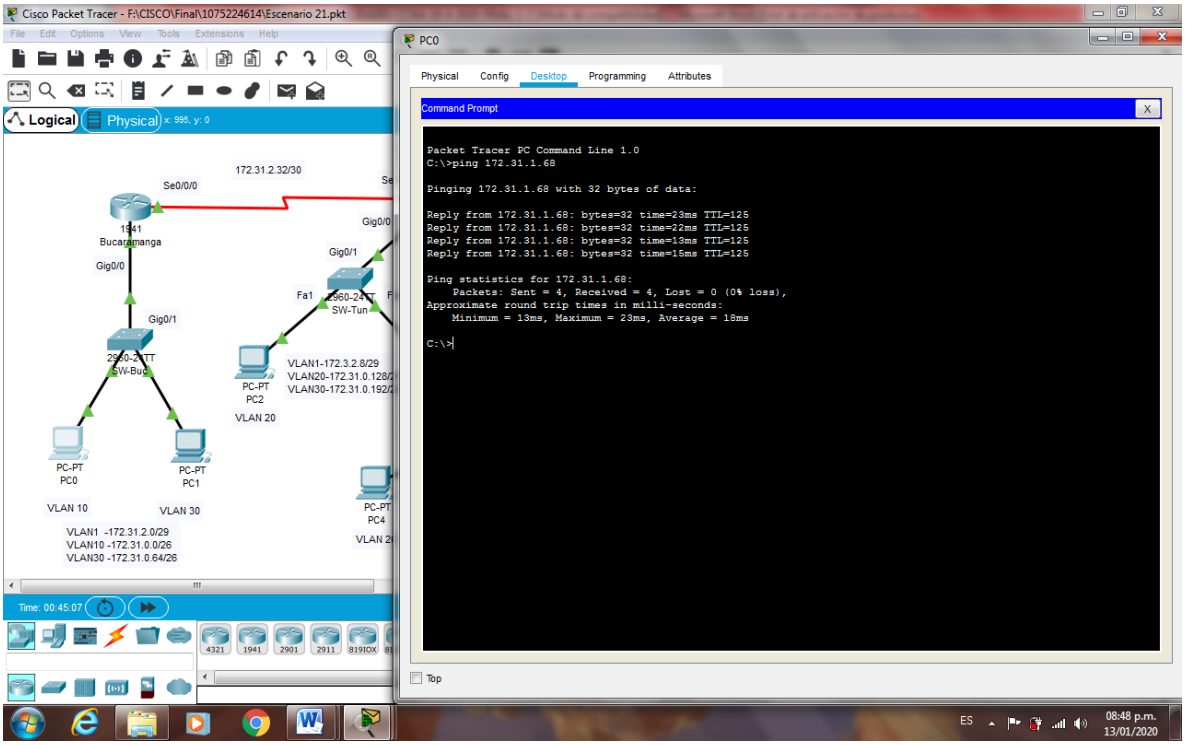

Figura 64. Comprobación VLAN 10 (PC0 a PC4) Exito

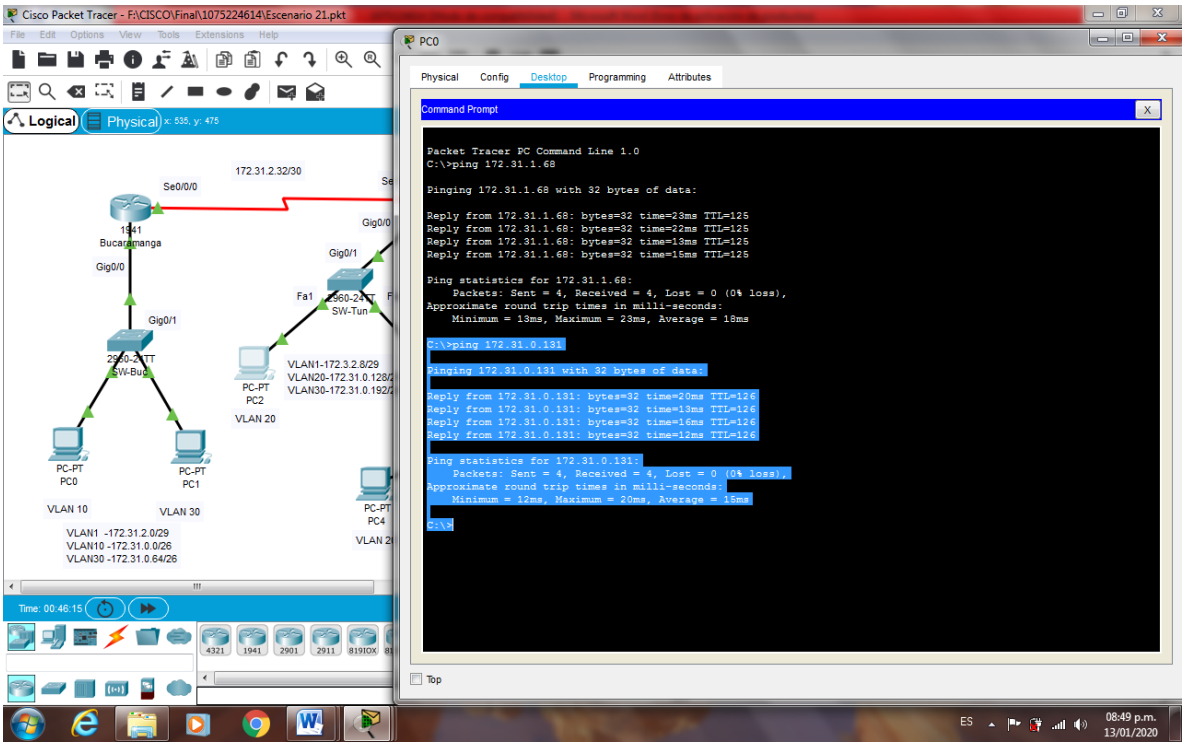

Figura 65. Comprobación VLAN 10 (PC0 a PC2) Exito

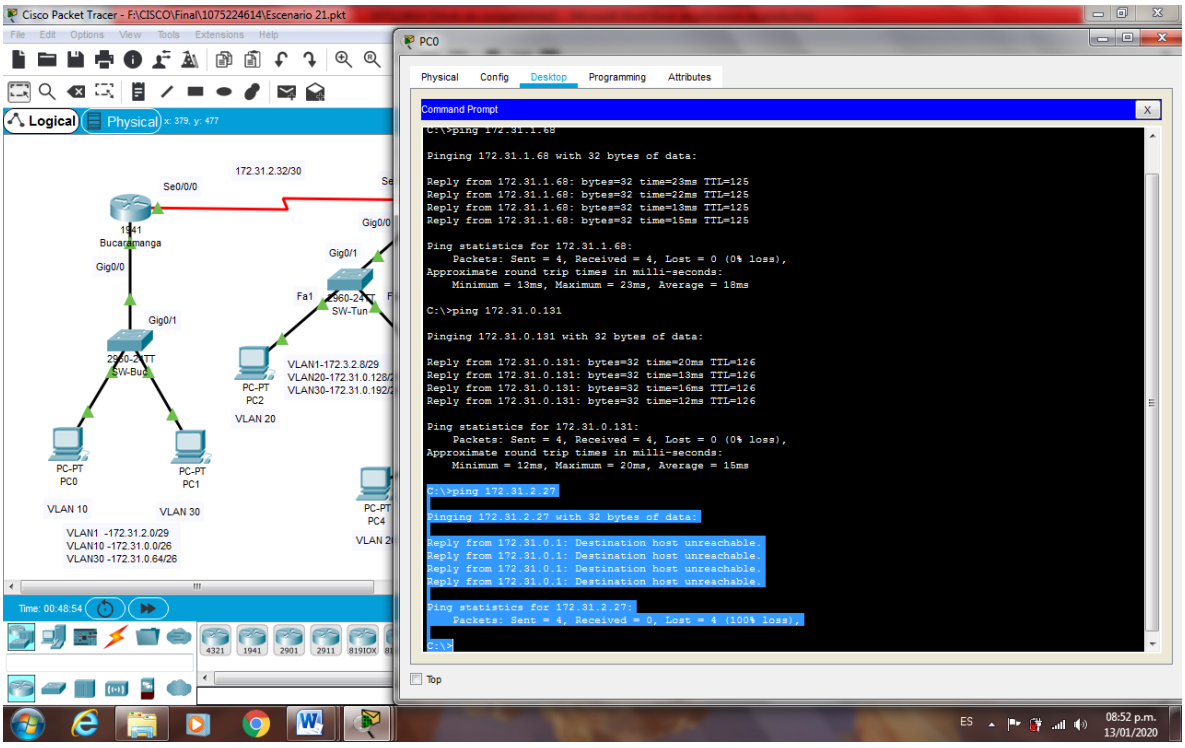

Figura 66. Comprobación VLAN 10 (PC0 a Web Inerno) Se niega el acceso

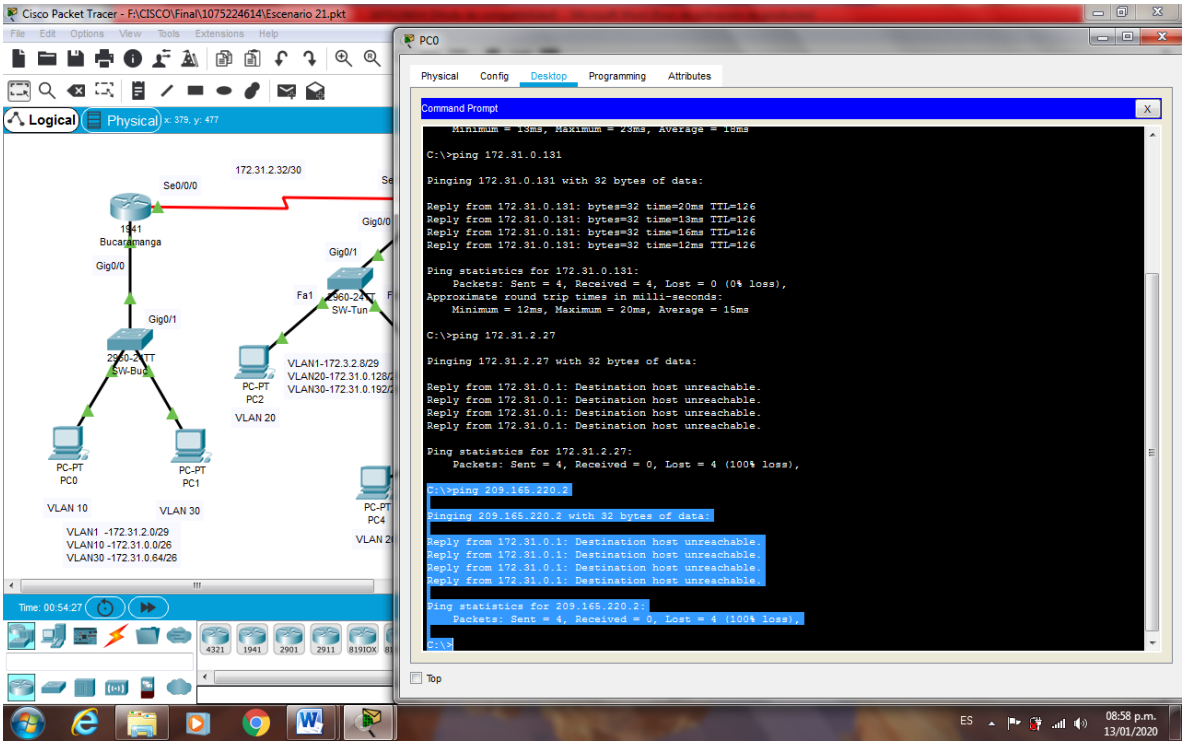

Figura 67. Comprobación VLAN 10 (PC0 a No Internet) Exito

- **Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad**

Bucaramanga(config)#access-list 103 deny ip 172.31.2.0 0.0.0.7 172.31.0.0 0.0.0.63
Bucaramanga(config)#access-list 103 deny ip 172.31.0.64 0.0.0.63 172.31.0.0 0.0.0.63
Bucaramanga(config)#access-list 103 permit ip any any
Bucaramanga(config)#int g0/0.10
Bucaramanga(config-subif)#ip access-group 103 out
Bucaramanga(config-subif)#

Tunja(config)#access-list 103 deny ip 172.3.2.8 0.0.0.7 172.31.0.128 0.0.0.63
Tunja(config)#access-list 103 deny ip 172.3.0.192 0.0.0.63 172.31.0.128 0.0.0.63
Tunja(config)#access-list 103 permit ip any any
Tunja(config)#int g0/0.20
Tunja(config-subif)#ip access-group 103 out
Tunja(config-subif)#

```
Cundinamarca(config)#access-list 103 deny ip 172.31.2.8 0.0.0.7 172.31.1.64
0.0.0.63
Cundinamarca(config)#access-list 103 deny ip 172.31.1.0 0.0.0.63 172.31.1.64
0.0.0.63
Cundinamarca(config)#access-list 103 deny ip 172.31.2.24 0.0.0.7 172.31.1.64
0.0.0.63
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip access-group 103 out
Cundinamarca(config-subif)#
```

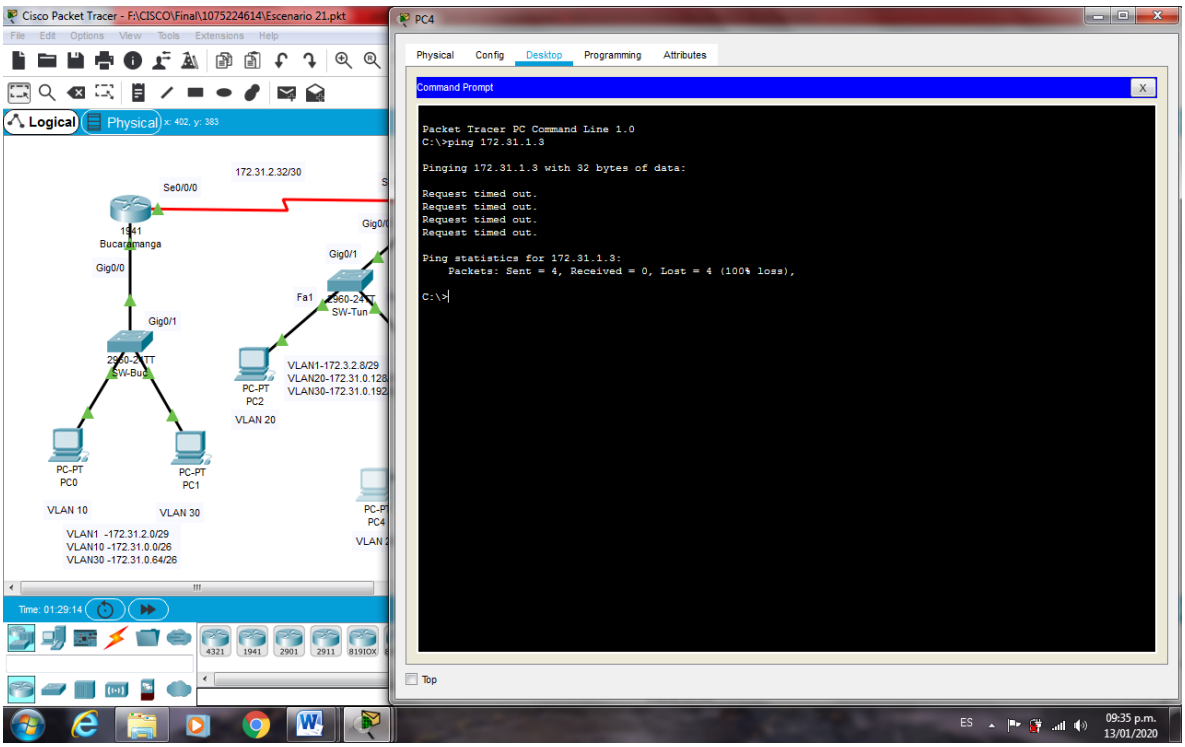

Figura 68. Comprobación una VLAN no pueden acceder a los de otra VLAN (PC4 a PC5) Exito

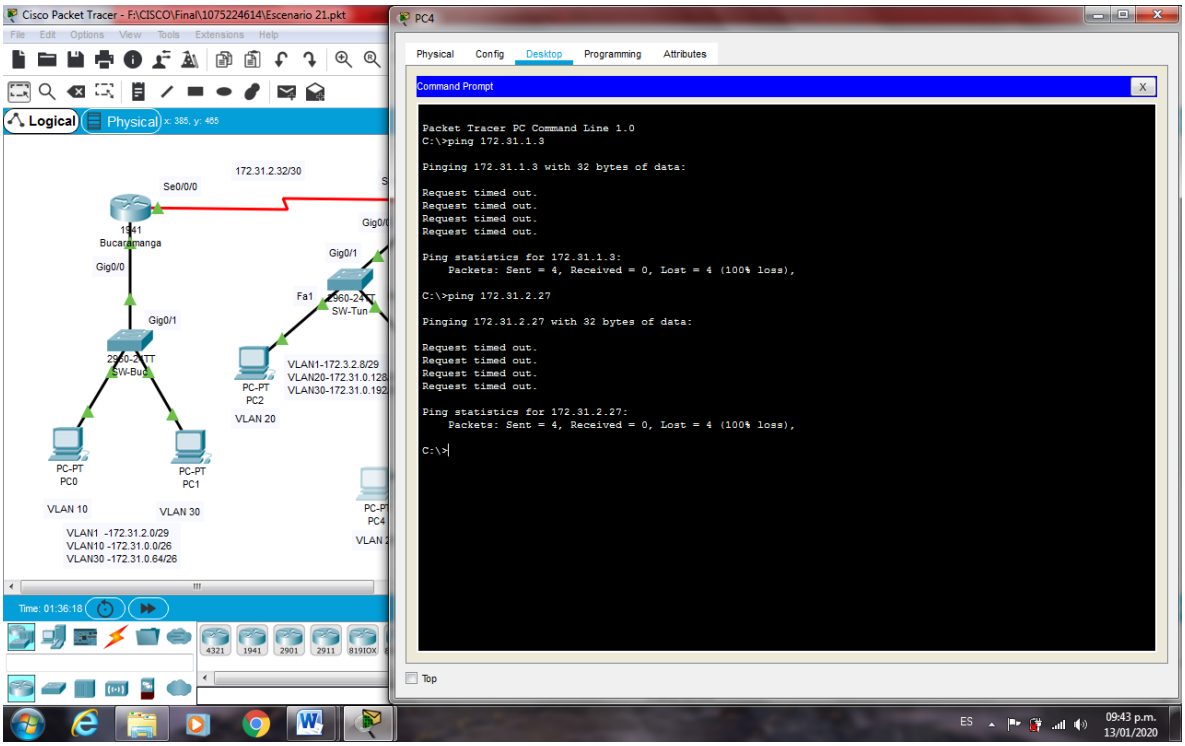

Figura 69. Comprobación una VLAN no pueden acceder a los de otra VLAN (PC4 a Web Interno) Exito

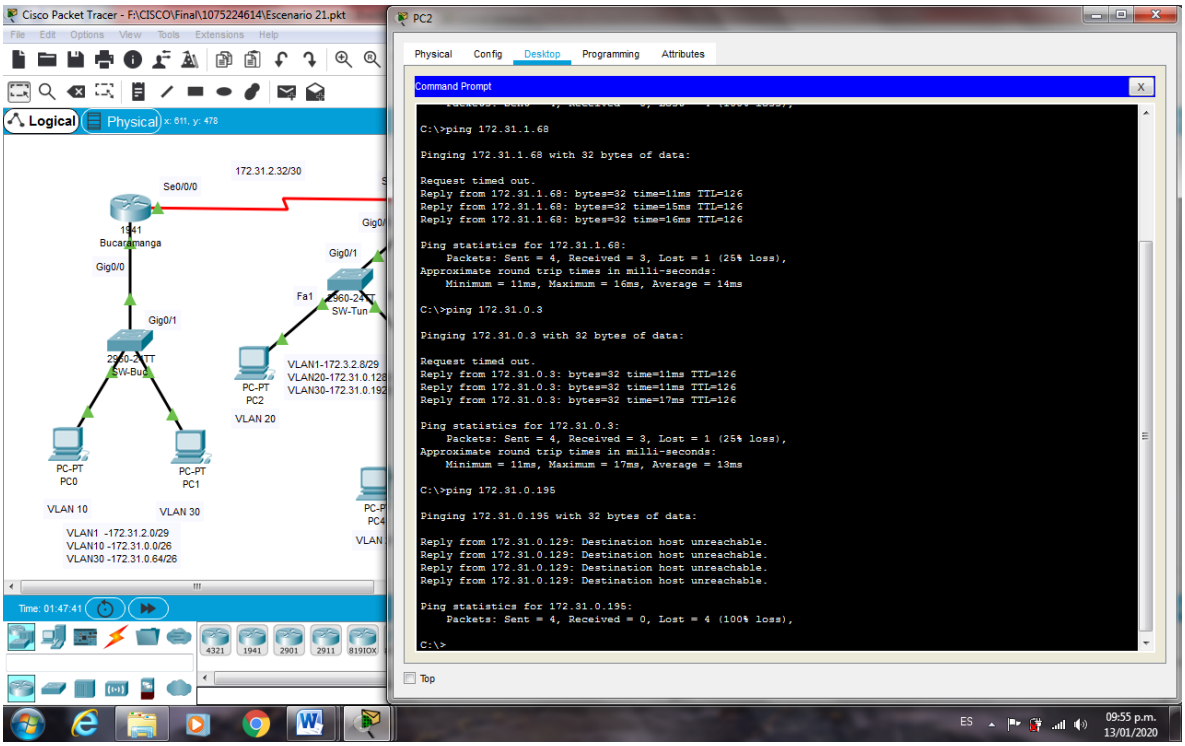

Figura 70. Comprobación una VLAN no pueden acceder a los de otra VLAN (PC2 a PC3) Exito

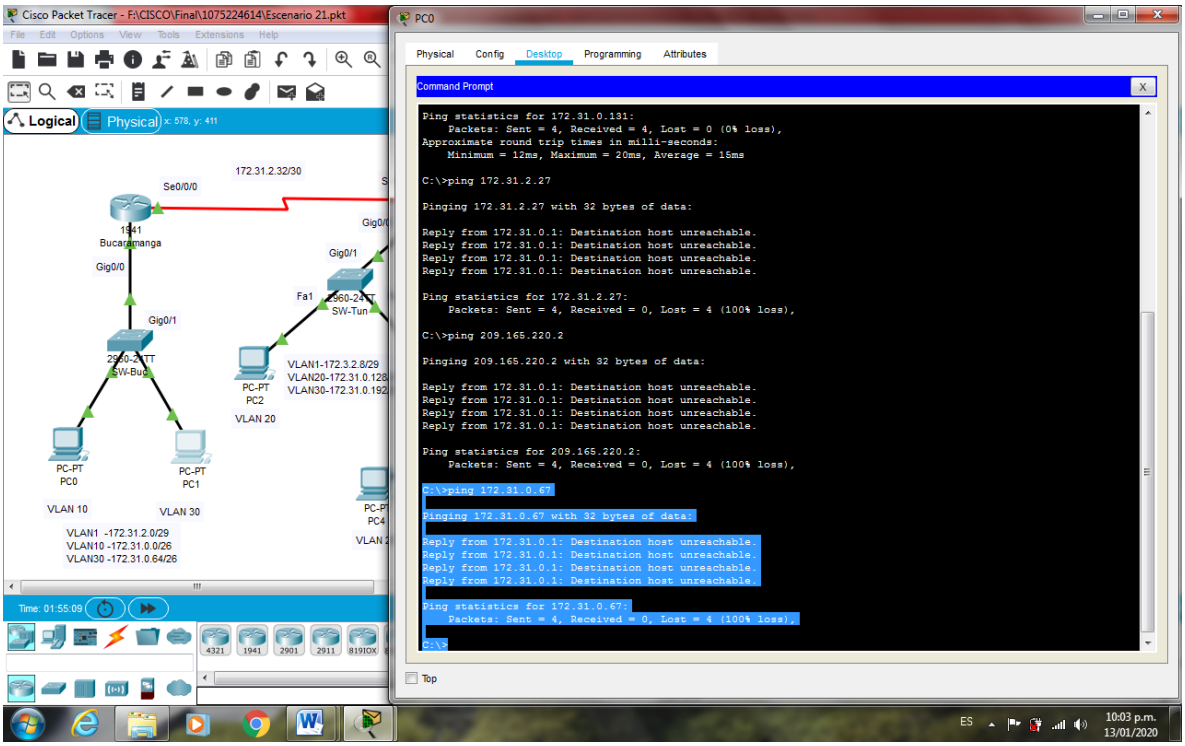

Figura 71. Comprobación una VLAN no pueden acceder a los de otra VLAN (PC0 a PC1) Exito

- **Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen accedo a los routers e internet.**

```
Bucaramanga(config-subif)#access-list 2 permit 172.31.2.0 0.0.0.7
Bucaramanga(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Bucaramanga(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Bucaramanga(config)#line vty 0 15
Bucaramanga(config-line)#access-class 2 in
Bucaramanga(config-line)#

Tunja(config-subif)#access-list 2 permit 172.31.2.0 0.0.0.7
Tunja(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Tunja(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Tunja(config)#line vty 0 15
Tunja(config-line)#access-class 2 in
Tunja(config-line)#

Cundinamarca(config-subif)#access-list 2 permit 172.31.2.0 0.0.0.7
Cundinamarca(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Cundinamarca(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Cundinamarca(config)#line vty 0 15
Cundinamarca(config-line)#access-class 2 in
Cundinamarca(config-line)#
```

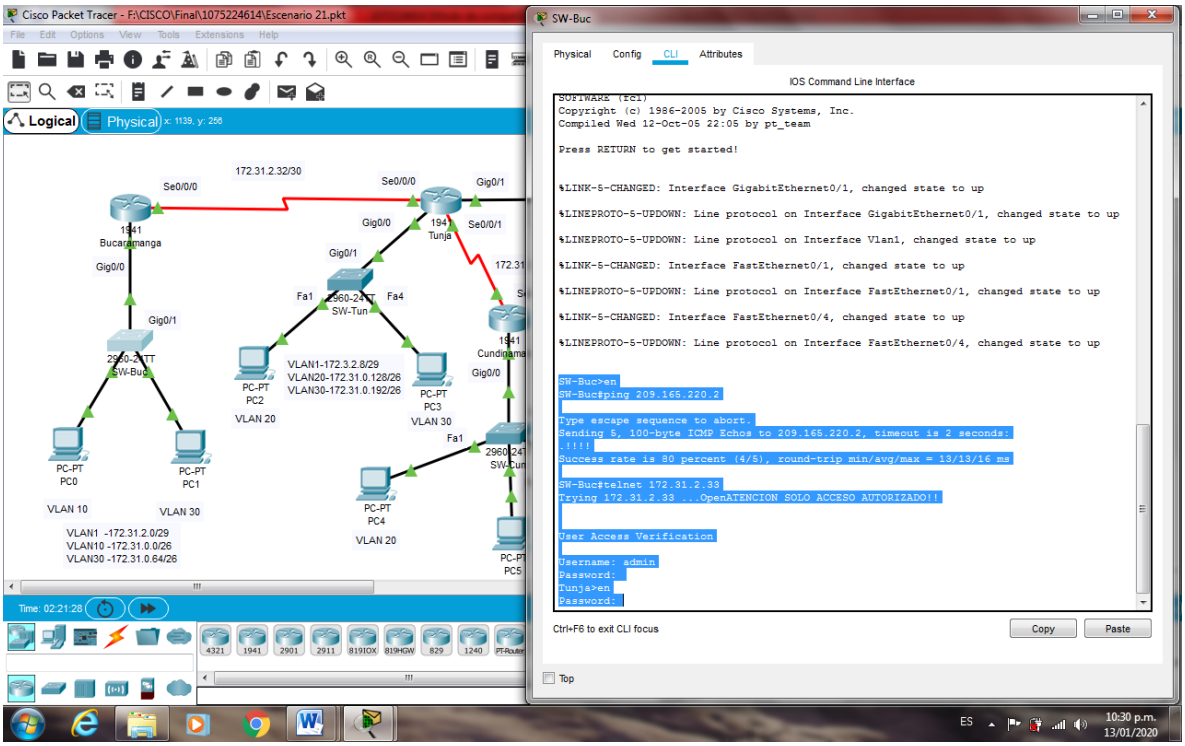

Figura 72. Comprobación VLAN administrativas y de la VLAN de servidores tienen accedo a los routers e internet (SW-Buc a Tunja) Exito

2.6. VLSM: utilizar la dirección 172.31.0.0 /18 para el direccionamiento.

Aspectos a tener en cuenta

- Habilitar VLAN en cada switch y permitir su enrutamiento.
- Enrutamiento OSPF con autenticación en cada router.
- Servicio DHCP en el router Tunja, mediante el helper address, para los routers Bucaramanga y Cundinamarca.
- Configuración de NAT estático y de sobrecarga.
- Establecer una lista de control de acceso de acuerdo con los criterios señalados.
- Habilitar las opciones en puerto consola y terminal virtual

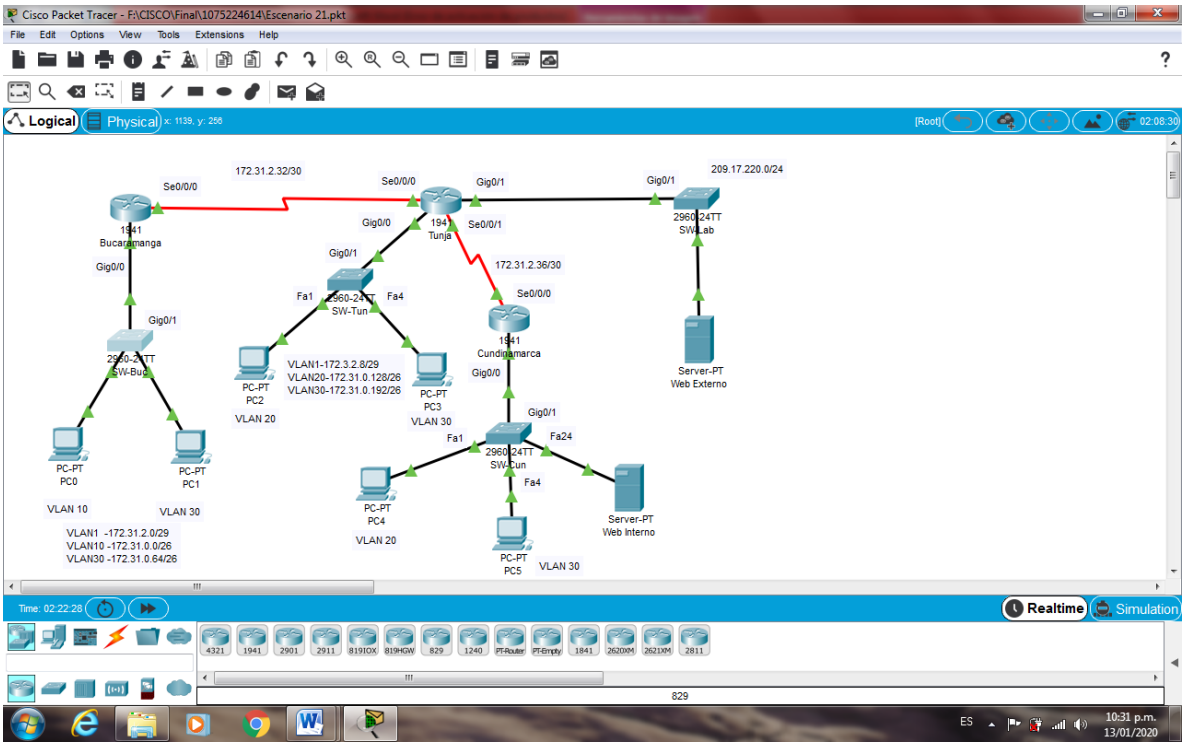

Figura 73. Tipología Escenario 2 completo

CONCLUSIONES

- El desarrollo del presente trabajo permitió poner en práctica el conocimiento y habilidades adquiridas en el Diplomado de Profundización CCNA para la configuración e interconección entre sí cada uno de los dispositivos que forman la estructura planteada en el primer y segundo escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

- El desarrollo de las actividades propuestas durante el Diplomado de Profundización CCNA, fue una base para poder desarrollar el presente trabajo final y experiencia satisfactoria de poder culminar con éxito el diplomado.

- Como profesionales, tenemos la capacidad de diseñar y construir una red que satisfaga las necesidades del cliente.

- Hemos sido gestor de nuestro propio conocimiento y aprendizaje, el poder trabajar colaborativamente y recibir siempre retroalimentación del Tutor, para corregir errores y despejar dudas.

ANEXOS

Link PKA Escenario 1

https://1drv.ms/u/s!AuwGEWC9xqv0giexpUQMCK5Wviep

Link PKA Escenario 2

https://1drv.ms/u/s!AuwGEWC9xqv0giixpUQMCK5Wviep

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