PRUEBA DE HABILIDADES PRÁCTICAS CISCO

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
INGENIERÍA DE SISTEMAS
DIPLOMADO DE PROFUNDIZACION CISCO
CARTAGENA
2020

EVALUACIÓN PRUEBA DE HABILIDADES PRÁCTICAS CCNA

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DIPLOMADO DE PROFUNDIZACIÓN CISCO PRUEBA DE HABILIDADES PRÁCTICAS

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DIPLOMADO DE PROFUNDIZACION CISCO
CARTAGENA
2020

NOTA DE ACEPTACIÓN:

Presidente del Jurado

Jurado

Jurado

Cartagena, 22 de marzo de 2020

AGRADECIMIENTOS

Agradezco primeramente a Dios por Guiarme a lo largo de este camino, a mi familia que son mi motor y mayor inspiración para alcanzar mis logros y objetivos, también a la Universidad Nacional Abierta y a Distancia UNAD y al cuerpo de docentes que me permitieron adquirir conocimiento y guiarme en mi proceso de formación académico y personal.

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GLOSARIO

LAN: (Red de área local) Una red de área local, red local o LAN (del inglés local área network) es la inter conexión de una o varias computadoras y periféricos. Su extensión está limitada físicamente a un edificio o a un entorno de 200 metros, con repetidores podría llegar a la distancia de un campo de 1 kilómetro.

DNS: sistema de dominación de dominios. Sistema que proporciona una manera de asignar nombres de hots fáciles de recordar, o URL a direcciones IP.

BROADCAST: método para enviar paquetes de datos a los dispositivos de red. Los broadcast se identifican por una dirección broadcast y utiliza routers para enviar que los mensajes de broadcast se envíen a otras redes.

TRAMA: agrupación lógica de información que se envía atreves de un medio d transmisión como unidad de capa de enlace de datos. A menudo se refiere al encabezado y a la información final que se usa para la sincronización y el control de errores que rodean a los datos del usuario contenidos en la unidad

PING: herramienta para la resolución de problemas. Se usa para verificar la conectividad de la red mediante el envío de un paquete a una dirección IP específica y la espera de la respuesta.

RESUMEN

En el presente trabajo se dará solución a problemas de enrutamiento en una red, por medio del uso de comandos básicos aprendidos en el transcurso del diplomado de profundización cisco CCNA.

Se trabajará con temas de la cuarta unidad como son: Principios de Enrutamiento, Enrutamiento Dinámico, OSPF de una sola área, Listas de control de acceso, DHCP entre otros. Se busca que exista una completa apropiación de las temáticas que ayuden en el futuro ámbito laboral.

Palabras clave: Enrutamiento, redes, comandos, sistemas.

ABSTRACT

We will learn to design and create efficient solutions to problems in a network environment, using basic commands learnt during the CISCO CCNA course, as well as to install, configure, monitor, and solve problems in the equipment belonging to the infrastructure of a converged network.

This paper presents topics related to static routing, dynamic routing, routing using link status protocols, access lists, dynamic assignment of IP addresses and translations of IP addresses using NAT.

Keywords: Routing, nets, commands, systems.

INTRODUCCIÓN

Las redes son una forma de telecomunicación entre computadoras donde intercambian datos con un enlace de datos. Una red informática con la que todos están familiarizados es Internet. Los nodos o hosts de la computadora pueden acceder, crear, eliminar y alterar los datos que se encuentran en esta red. Si un dispositivo puede transmitir información a otro dispositivo, entonces se consideran redes. Las redes utilizan dispositivos como conmutadores, módems, enrutadores, puertas de enlace, etc.

En el presente trabajo se trataron los siguientes temas: enrutamiento dinámico, OSPF de una sola área, listas de control de acceso, DHCP y subnetting. Que pretende colocar en práctica lo aprendido en el periodo académico del curso Diplomado de profundización Cisco CCNA indispensable a la hora de implementar soluciones en redes de área local y apropiación de conceptos como futuros ingenieros de sistemas.

OBJETIVOS

Objetivo General:

Solucionar ejercicios de una manera práctica con la temática aprendida a lo largo del curso Cisco, y usando software de simulación como Packet Tracer.

Objetivos Específicos:

- Desarrollar soluciones a las diferentes topologías de red propuestas en los escenarios.
- Trabajar con direccionamiento IP, routing and switching así como configuración de VLANs.
- Conocer algunos de los comandos para configurar los dispositivos de red.
- Desarrollar habilidades y competencias en el área de redes de datos por medio de la resolución de problemas.

1. CONTENIDO

1.1 ESCENARIO 1

EQUIPO	PUERTO	DIRECCIÓN IP	MASCARA	ENLACE	SEGURIDAD
ISP	S0/0/0	209.17.220.1	255.255.255.252	MEDELLIN1	**PPT PAT**
	S0/0/1	209.17.220.5	255.255.255.252	BOGOTA1	**PPP CHAT**
BOGOTA1	S0/0/0	209.17.220.6	255.255.255.252	ISP	
	S0/0/1	172.29.3.9	255.255.255.252	BOGOTA2	
	S0/1/0	172.29.3.5	255.255.255.252	BOGOTA3	**1**
	S0/1/1	172.29.3.1	255.255.255.252	BOGOTA3	**2**
BOGOTA2	S0/0/0	172.29.3.10	255.255.255.252	BOGOTA1	
	S0/0/1	172.29.3.13	255.255.255.252	BOGOTA3	
	F0/0	172.29.1.1	255.255.255.0	PC-200 HOST	
PC-200 HOST	F0/0	172.29.1.2	255.255.255.0		**172.29.1.1**
BOGOTA3	S0/0/0	172.29.3.2	255.255.255.252	BOGOTA1	**2**
	S0/0/1	172.29.3.6	255.255.255.252	BOGOTA1	**1**
	S0/1/0	172.29.3.14	255.255.255.252	BOGOTA2	
	F0/0	172.29.0.1	255.255.255.0	PC-150 HOST	
PC-150 HOST	F0/0	172.29.0.2	255.255.255.0		**172.29.0.1**
MEDELLIN 1	S0/0/0	172.29.6.1	255.255.255.252	MEDELLIN2	
	S0/0/1	172.29.6.9	255.255.255.252	MEDELLIN3	**1**
	S0/1/0	172.29.6.13	255.255.255.252	MEDELLIN3	**2**
	S0/1/1	209.17.220.2	255.255.255.252	ISP	
MEDELLIN 2	S0/0/0	172.29.6.2	255.255.255.252	MEDELLIN1	
	S0/0/1	172.29.6.5	255.255.255.252	MEDELLIN3	
	F0/0	**172.29.4.1**	**255.255.255.128**	**PC-50 HOST**	

Tabla 1. Tabla de direccionamiento escenario 1

- Configuramos el Hostname y le asignamos la IP a cada router y configuramos cada PC:

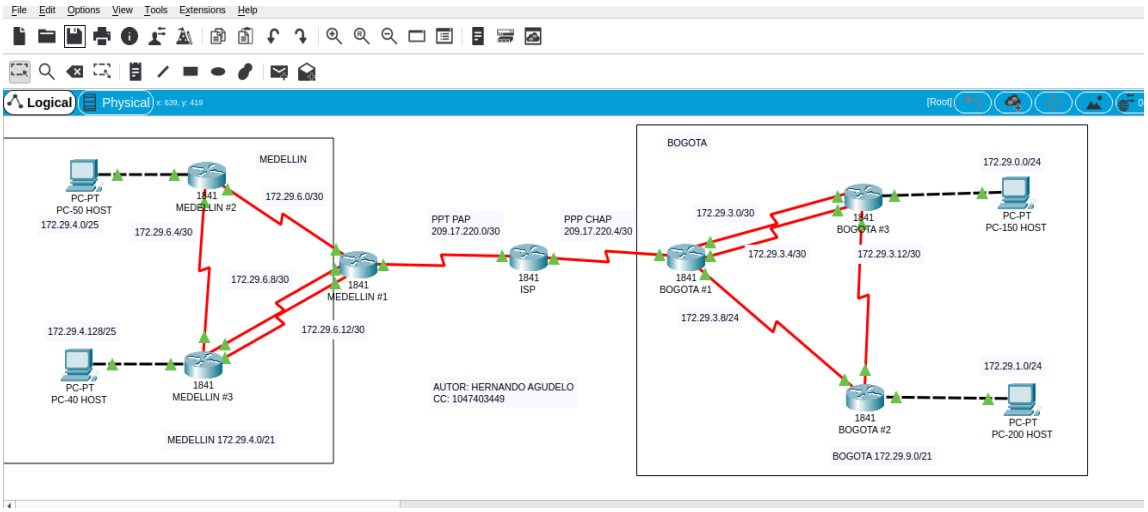


Ilustración 1. Topología Escenario 1

- Configuramos el Hostname y le asignados la IP a cada router y configuramos cada PC:

Router MEDELLIN2:

Router>en

Router>enable

Router#conf

Router#configure te

Router#configure terminal

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

Router(config)#host

Router(config)#hostname

Router(config)#hostname MEDELLIN2

MEDELLIN2(config)#int

MEDELLIN2(config)#interface s0/0/0

MEDELLIN2(config-if)#ip ad

MEDELLIN2(config-if)#ip address 172.29.6.2 255.255.255.252

MEDELLIN2(config-if)#no su

MEDELLIN2(config-if)#no shu

MEDELLIN2(config-if)#no shutdown

MEDELLIN2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

MEDELLIN2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

MEDELLIN2(config-if)#in
MEDELLIN2(config-if)#int
MEDELLIN2(config-if)#int
MEDELLIN2(config-if)#int
MEDELLIN2(config-if)#inte
MEDELLIN2(config-if)#inter
MEDELLIN2(config-if)#interface s0/0/1
MEDELLIN2(config-if)#ip address 172.29.6.5 255.255.255.252
MEDELLIN2(config-if)#no shu
MEDELLIN2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
MEDELLIN2(config-if)#int
MEDELLIN2(config-if)#int
MEDELLIN2(config-if)#interface f0/0
MEDELLIN2(config-if)#ip address 172.29.4.1 255.255.255.128
MEDELLIN2(config-if)#no shu
MEDELLIN2(config-if)#no shutdown

MEDELLIN2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

MEDELLIN2(config-if)#exit
MEDELLIN2(config)#exit
MEDELLIN2#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN2#co
MEDELLIN2#copy runn
MEDELLIN2#copy running-config star
MEDELLIN2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

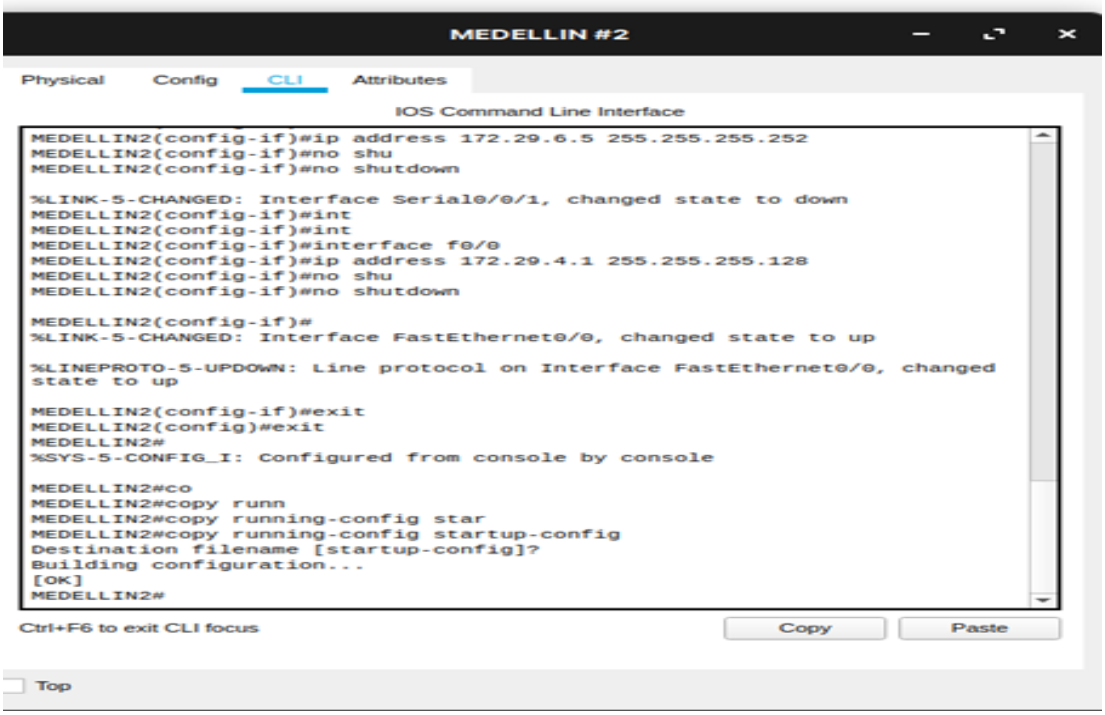


Ilustración 2. Configuración router MEDELLIN2

Router MEDELLIN3:

```
Router>en
Router>enable
Router#conf
Router#configure ter
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hos
Router(config)#hostname MEDELLIN3
MEDELLIN3(config)#int
MEDELLIN3(config)#interface s0/0/0
MEDELLIN3(config-if)#ip add 172.29.6.14 255.255.255.252
MEDELLIN3(config-if)#no sh
MEDELLIN3(config-if)#no shutdown

MEDELLIN3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

MEDELLIN3(config-if)#interface s0/0/0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, chan
MEDELLIN3(config-if)#interface s0/0/1
MEDELLIN3(config-if)#ip add
MEDELLIN3(config-if)#ip address 172.29.6.10 255.255.255.252
MEDELLIN3(config-if)#no sh
MEDELLIN3(config-if)#no shutdown

MEDELLIN3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

MEDELLIN3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
```

to up
MEDELLIN3(config-if)#interface s0/1/0
MEDELLIN3(config-if)#ip address 172.29.6.6 255.255.255.252
MEDELLIN3(config-if)#no sh
MEDELLIN3(config-if)#no shutdown

MEDELLIN3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

MEDELLIN3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

MEDELLIN3(config-if)#in
MEDELLIN3(config-if)#int
MEDELLIN3(config-if)#interface f0/0
MEDELLIN3(config-if)#ip address 172.29.4.129 255.255.255.128
MEDELLIN3(config-if)#no sh
MEDELLIN3(config-if)#no shutdown

MEDELLIN3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

MEDELLIN3(config-if)#exit
MEDELLIN3(config)#exit
MEDELLIN3#
%SYS-5-CONFIG_I: Configured from console by console copy ru
MEDELLIN3#copy running-config sta
MEDELLIN3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

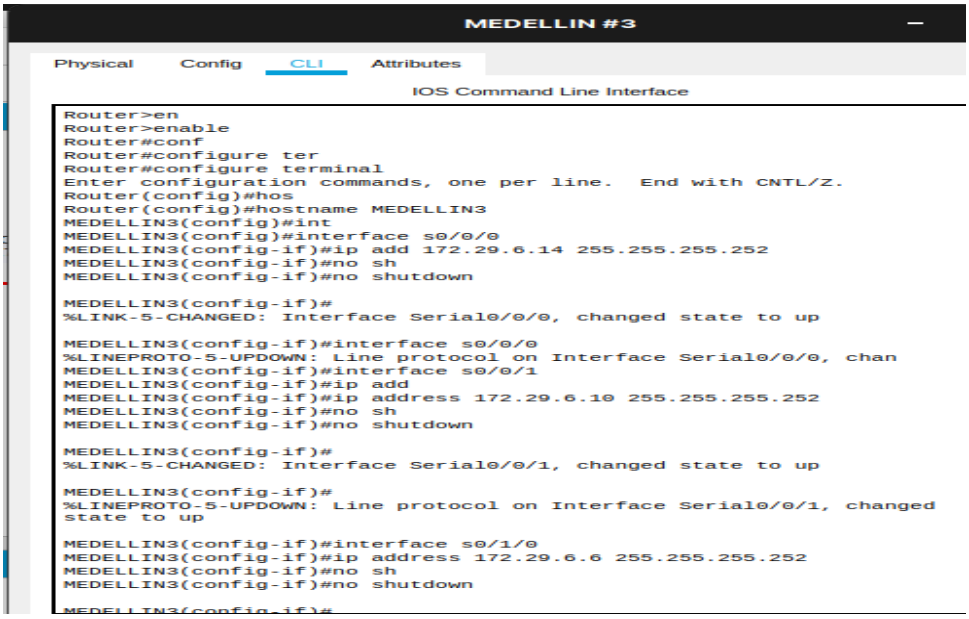


Ilustración 3. Configuración router MEDELLIN3

Router BOGOTA1:

Router>en

Router>enable

Router#conf

Router#configure ter

Router#configure terminal

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

Router(config)#host

Router(config)#hostname BOGOTA1

BOGOTA1(config)#int

BOGOTA1(config)#interface s0/0/0

BOGOTA1(config-if)#ip ad

BOGOTA1(config-if)#ip address 209.17.220.6 255.255.255.252

BOGOTA1(config-if)#no sh

BOGOTA1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down

BOGOTA1(config-if)#int
BOGOTA1(config-if)#int
BOGOTA1(config-if)#int s0/0/1
BOGOTA1(config-if)#ip add
BOGOTA1(config-if)#ip address 172.29.3.9 255.255.255.252
BOGOTA1(config-if)#no sh
BOGOTA1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
BOGOTA1(config-if)#int
BOGOTA1(config-if)#int
BOGOTA1(config-if)#int s0/1/0
BOGOTA1(config-if)#ip address 172.29.3.5 255.255.255.252
BOGOTA1(config-if)#no sh
BOGOTA1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
BOGOTA1(config-if)#int
BOGOTA1(config-if)#int s0/1/1
BOGOTA1(config-if)#ip add
BOGOTA1(config-if)#ip address 172.29.3.1 255.255.255.252
BOGOTA1(config-if)#no shu
BOGOTA1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
BOGOTA1(config-if)#exit
BOGOTA1(config)#exit
BOGOTA1#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA1#copy run
BOGOTA1#copy running-config st
BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

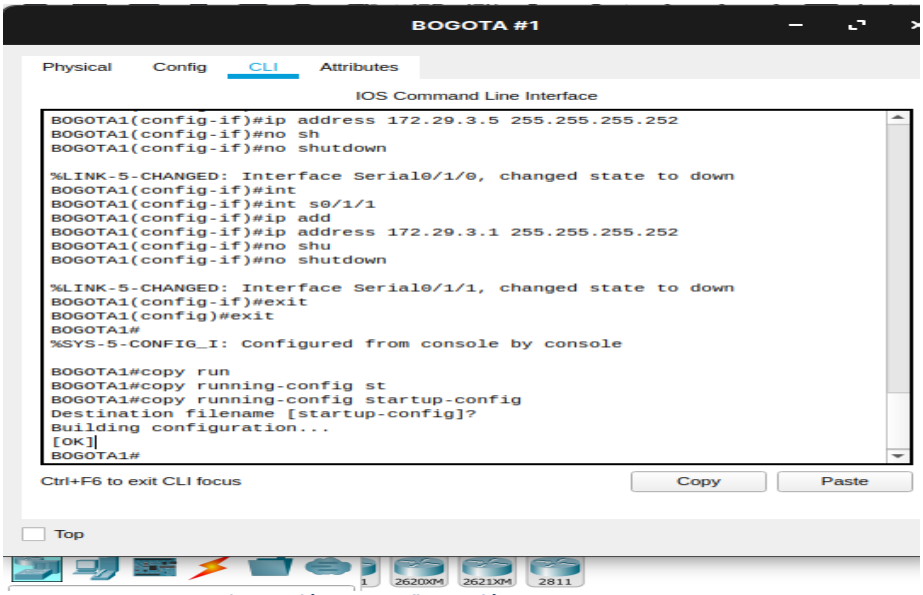


Ilustración 4. Configuración router BOGOTA1

Router BOGOTA2:

Router>en

Router>enable

Router#conf

Router#configure ter

Router#configure terminal

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

Router(config)#hos

Router(config)#hostname BOGOTA2

BOGOTA2(config)#int

BOGOTA2(config)#interface s0/0/0

BOGOTA2(config-if)#ip

BOGOTA2(config-if)#ip ad

BOGOTA2(config-if)#ip address 172.29.3.10 255.255.255.252

BOGOTA2(config-if)#no shu

BOGOTA2(config-if)#no shutdown

BOGOTA2(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

BOGOTA2(config-if)#

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

BOGOTA2(config-if)#int

BOGOTA2(config-if)#int s0/0/1

BOGOTA2(config-if)#ip address 172.29.3.13 255.255.255.252

BOGOTA2(config-if)#no sh

BOGOTA2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down

BOGOTA2(config-if)#int

BOGOTA2(config-if)#int f0/0

BOGOTA2(config-if)#ip address 172.29.1.1 255.255.255.0

BOGOTA2(config-if)#no sh

BOGOTA2(config-if)#no shutdown

BOGOTA2(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

BOGOTA2(config-if)#exit

BOGOTA2(config)#exit

BOGOTA2#

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

BOGOTA2#cop

BOGOTA2#copy ru

BOGOTA2#copy running-config st

BOGOTA2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

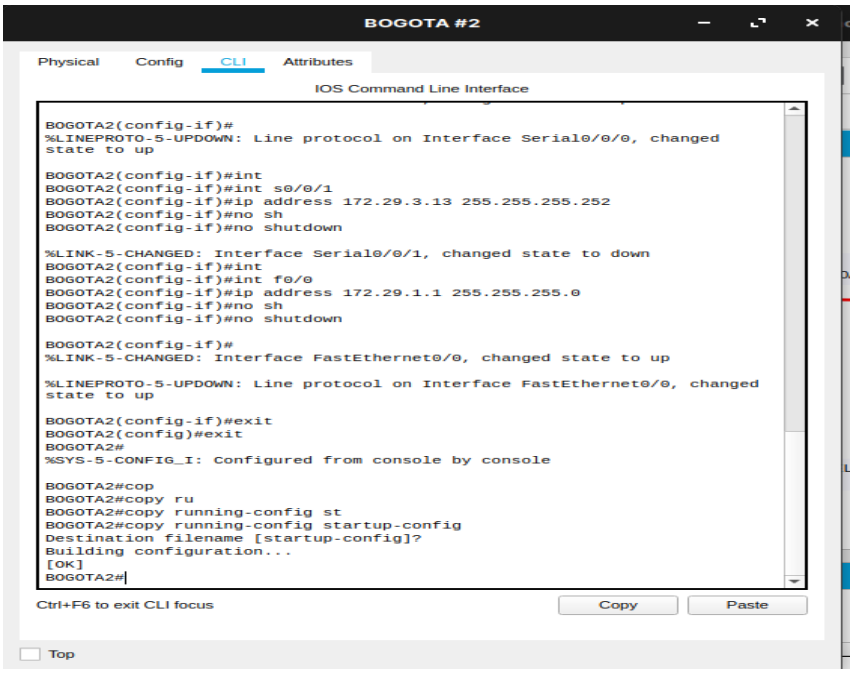


Ilustración 5. Configuración router BOGOTA2

Router BOGOTA3:

Router>EN

Router>ENable

Router#con

Router#conf

Router#configure ter

Router#configure terminal

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

Router(config)#host

Router(config)#hostname BOGOTA3

BOGOTA3(config)#int

BOGOTA3(config)#interface s0/0/0

BOGOTA3(config-if)#ip add

BOGOTA3(config-if)#ip address 172.29.3.2 255.255.255.252

BOGOTA3(config-if)#no sh

BOGOTA3(config-if)#no shutdown

BOGOTA3(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

BOGOTA3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

BOGOTA3(config-if)#int
BOGOTA3(config-if)#int s0/0/1
BOGOTA3(config-if)#ip address 172.29.3.6 255.255.255.252
BOGOTA3(config-if)#no sho
BOGOTA3(config-if)#no sh
BOGOTA3(config-if)#no shutdown

BOGOTA3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

BOGOTA3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

BOGOTA3(config-if)#int s0/1/0
BOGOTA3(config-if)#ip address 172.29.3.14 255.255.255.252
BOGOTA3(config-if)#no sh
BOGOTA3(config-if)#no shutdown

BOGOTA3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

BOGOTA3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

BOGOTA3(config-if)#int
BOGOTA3(config-if)#int f0/0
BOGOTA3(config-if)#ip add

```
BOGOTA3(config-if)#ip address 172.29.0.1 255.255.255.0
BOGOTA3(config-if)#no shutdown

BOGOTA3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

BOGOTA3(config-if)#exit
BOGOTA3(config)#exit
BOGOTA3#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA3#cop
BOGOTA3#copy ru
BOGOTA3#copy running-config sta
BOGOTA3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

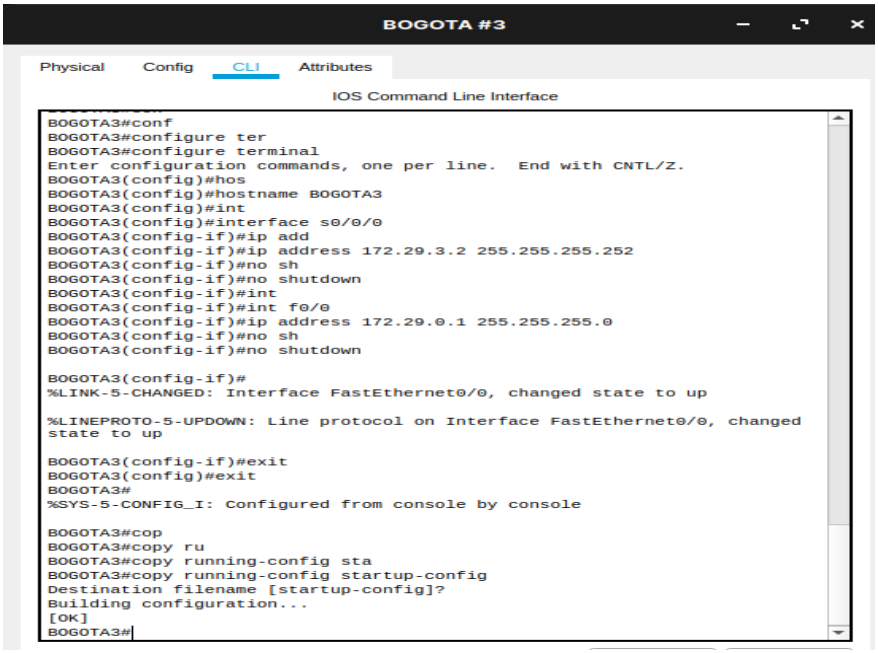


Ilustración 6. Configuración router BOGOTA3

Router ISP:

Router>en

Router>enable

Router#conf

Router#configure ter

Router#configure terminal

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

Router(config)#hos

Router(config)#hostname ISP

ISP(config)#int

ISP(config)#interface s0/0/0

ISP(config-if)#ip ad

ISP(config-if)#ip address 209.17.220.1 255.255.255.252

ISP(config-if)#no shu

ISP(config-if)#no shutdown

ISP(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

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

^
% Invalid input detected at '^' marker.

ISP(config-if)#int s0/0/1
ISP(config-if)#ip address 209.17.220.5 255.255.255.252
ISP(config-if)#no sh
ISP(config-if)#no shutdown

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

ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed
state to up

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

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

- **ROUTER ISP**

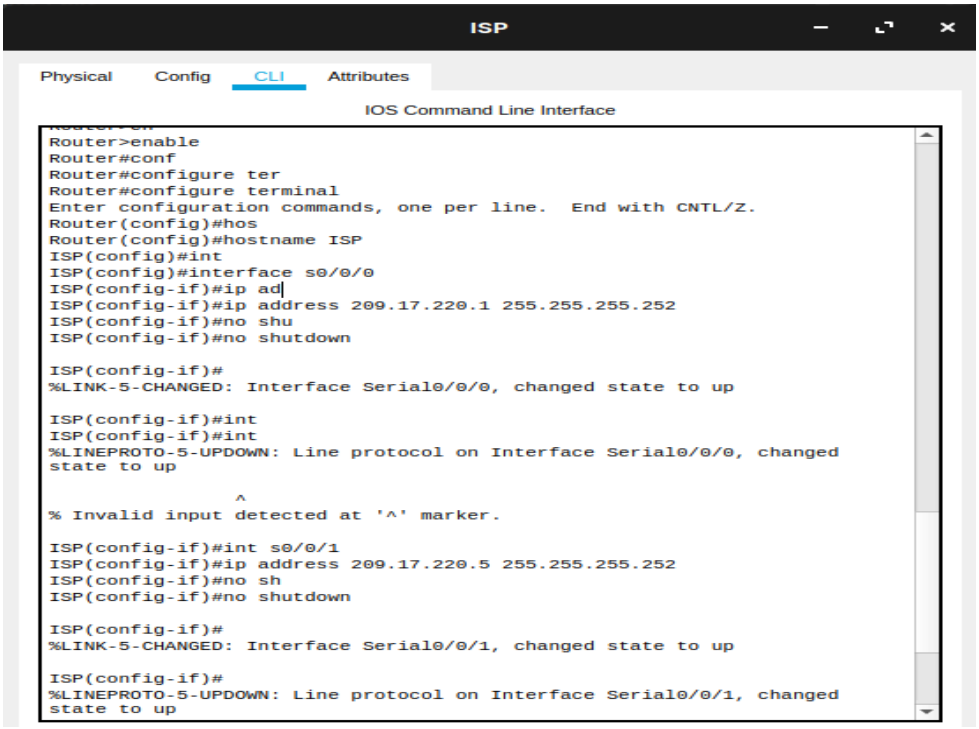


Ilustración 7. Configuración router ISP

- **PC-HOST 50:**

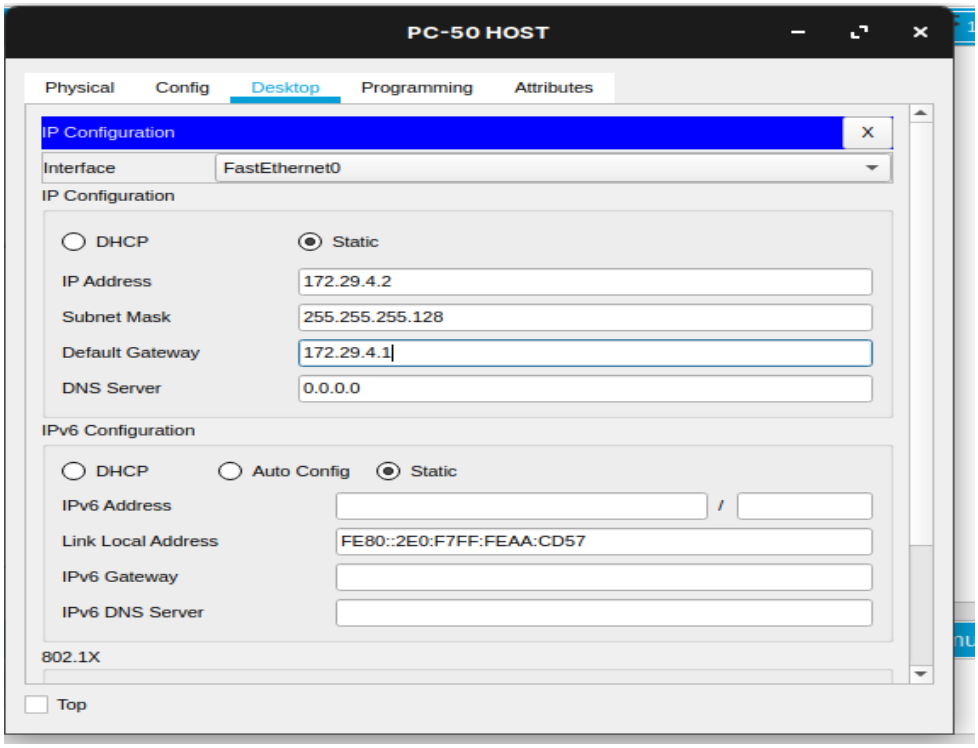


Ilustración 8.IP equipo host 50

- **PC-HOST 40:**

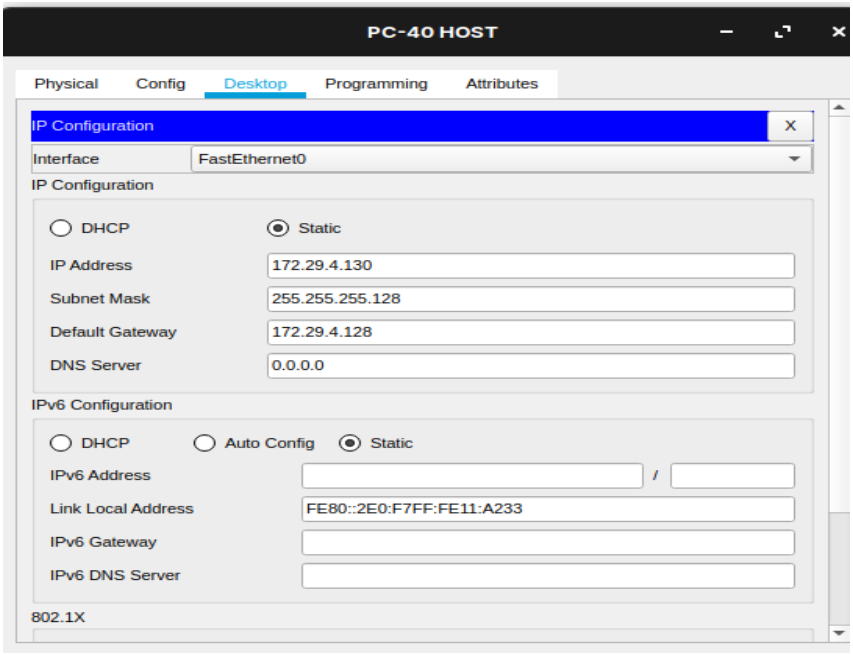


Ilustración 9. IP equipo host 40

- **PC-HOST 150:**

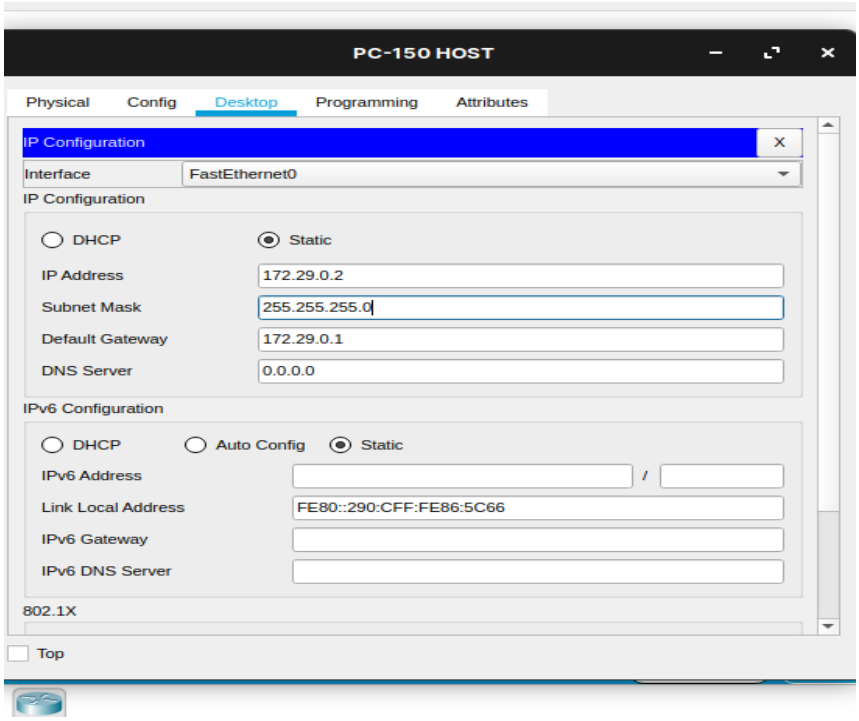


Ilustración 10. IP equipo host 150

- **PC-HOST 200:**

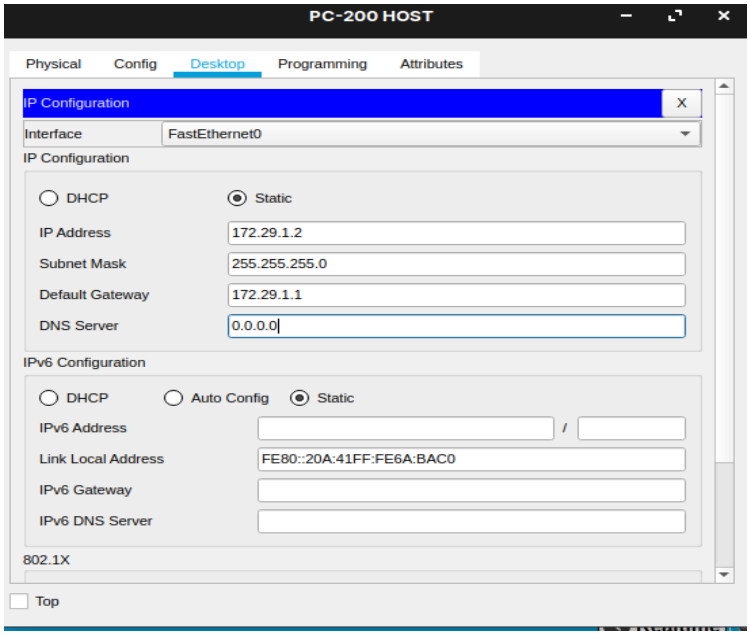


Ilustración 11. IP equipo host 200

- **Habilitamos los puertos de los router de MEDELLIN2, MEDELLIN3, BOGOTA2 y BOGOTA3**

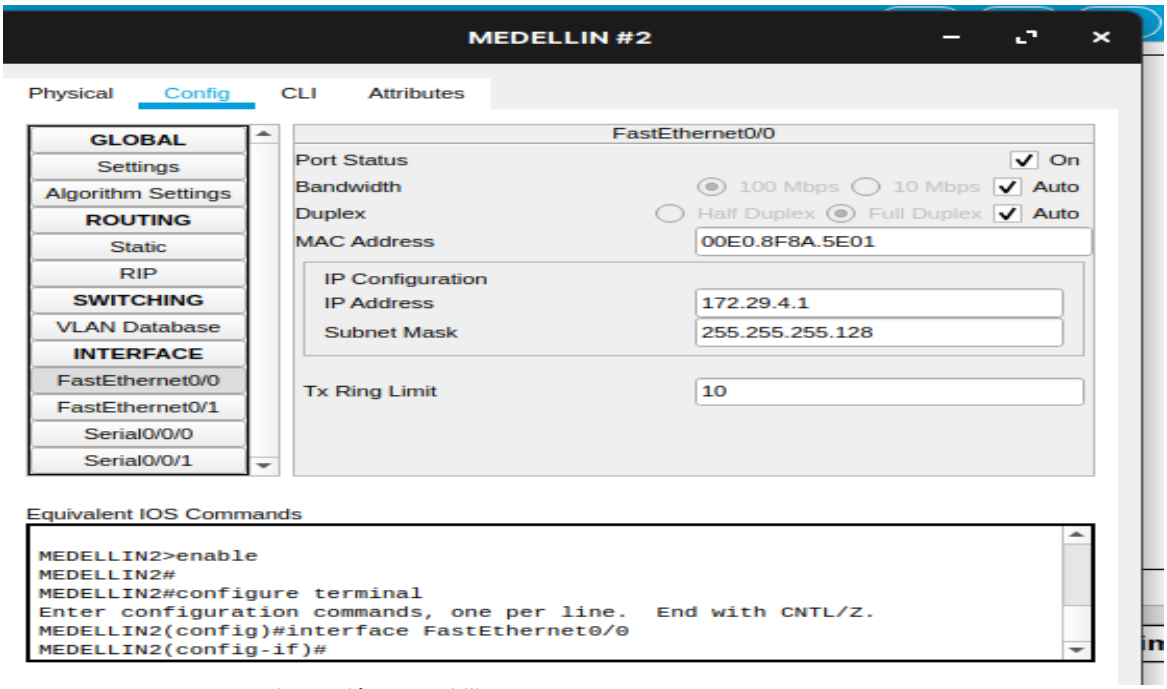


Ilustración 12.Habilitar puerto router MEDELLIN2

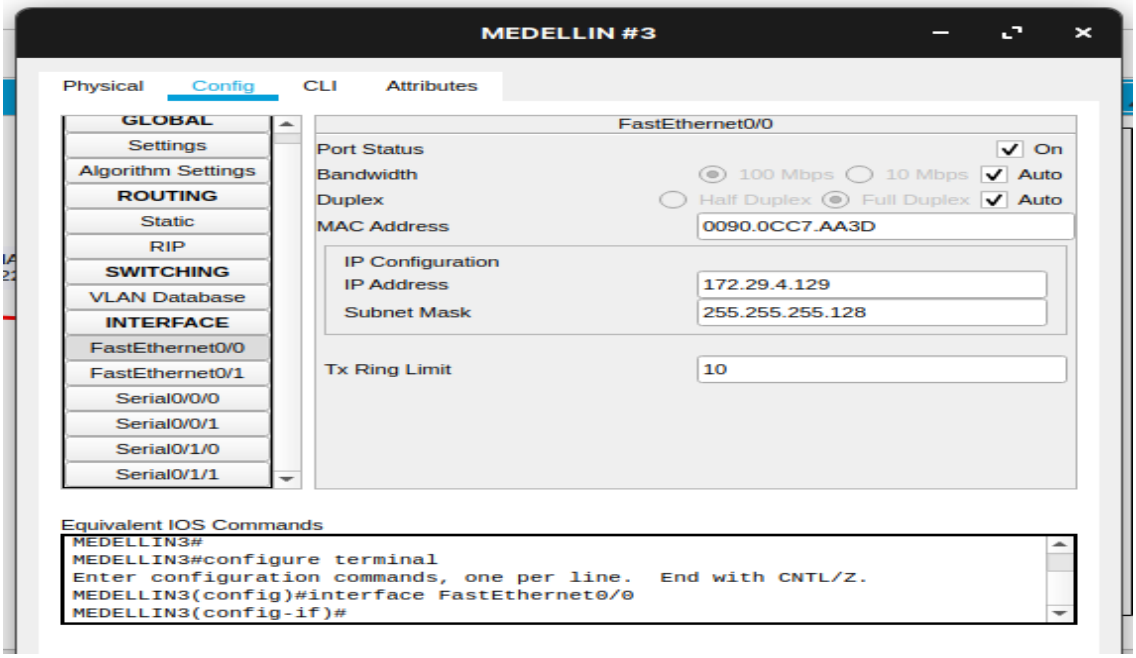


Ilustración 13. Habilitar puerto router MEDELLIN3

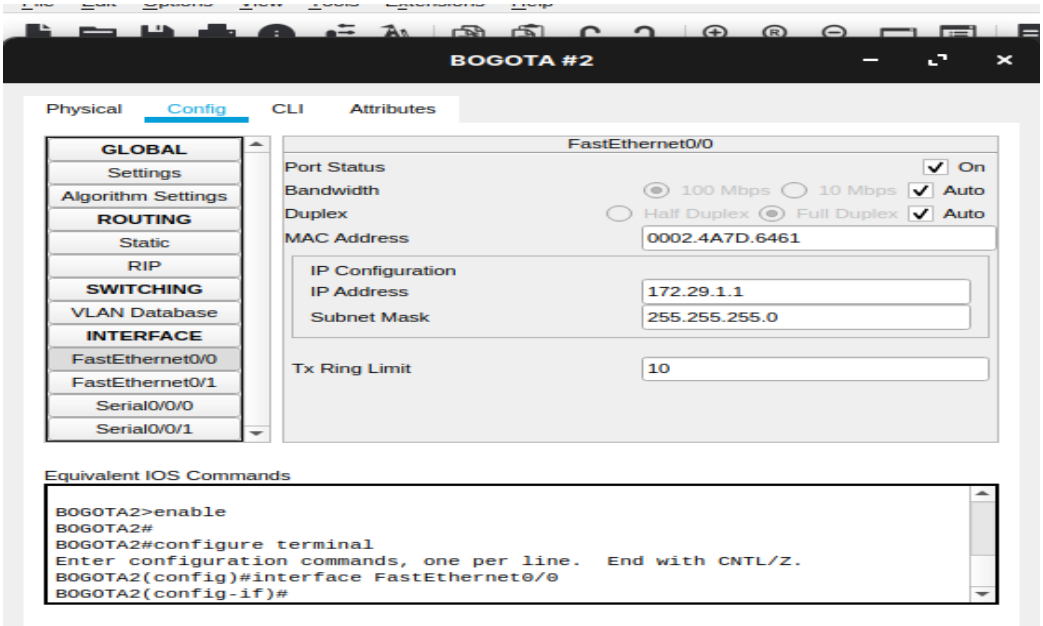


Ilustración 14.Habilitar puerto router BOGOTA2

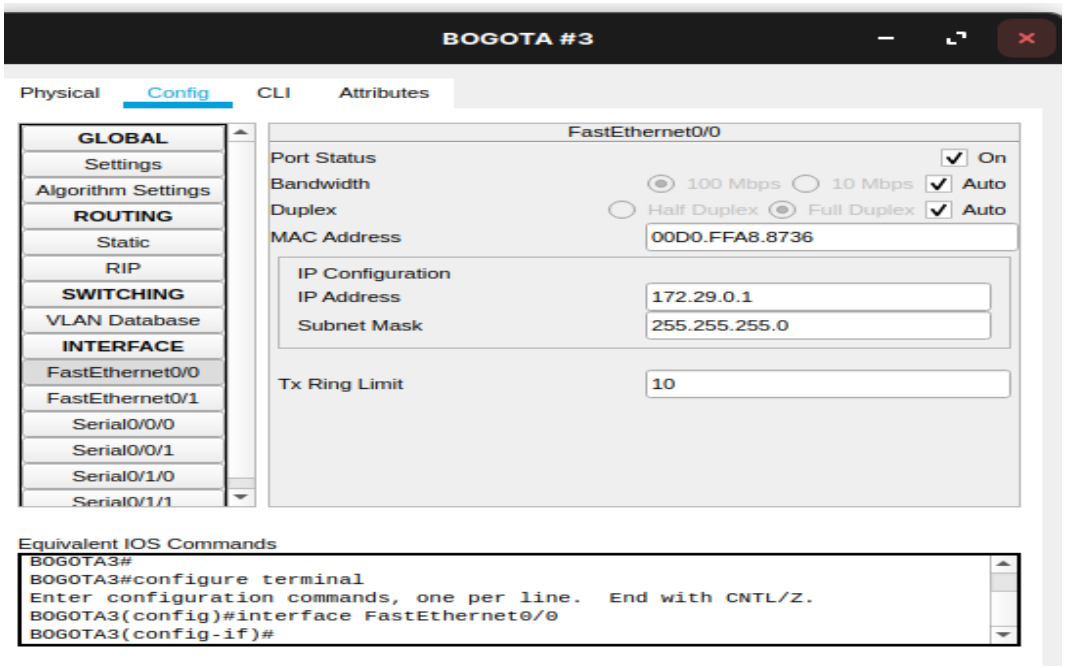


Ilustración 15. Habilitar puerto router BOGOTA3

1.1.1 Parte 1: Configuración del enrutamiento

a. Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

Router MEDELLIN1:

MEDELLIN1>EN

MEDELLIN1>ENable

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#router rip

MEDELLIN1(config-router)#versi

MEDELLIN1(config-router)#version 2

MEDELLIN1(config-router)#network172.29.6.0

^

% Invalid input detected at '^' marker.

MEDELLIN1(config-router)#network 172.29.6.0

MEDELLIN1(config-router)#network 172.29.6.8

MEDELLIN1(config-router)#network 172.29.6.12

MEDELLIN1(config-router)#network 209.17.220.0

MEDELLIN1(config-router)#exit

MEDELLIN1(config)#exit

MEDELLIN1#

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

MEDELLIN1#copy

MEDELLIN1#copy ru

MEDELLIN1#copy running-config st

MEDELLIN1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

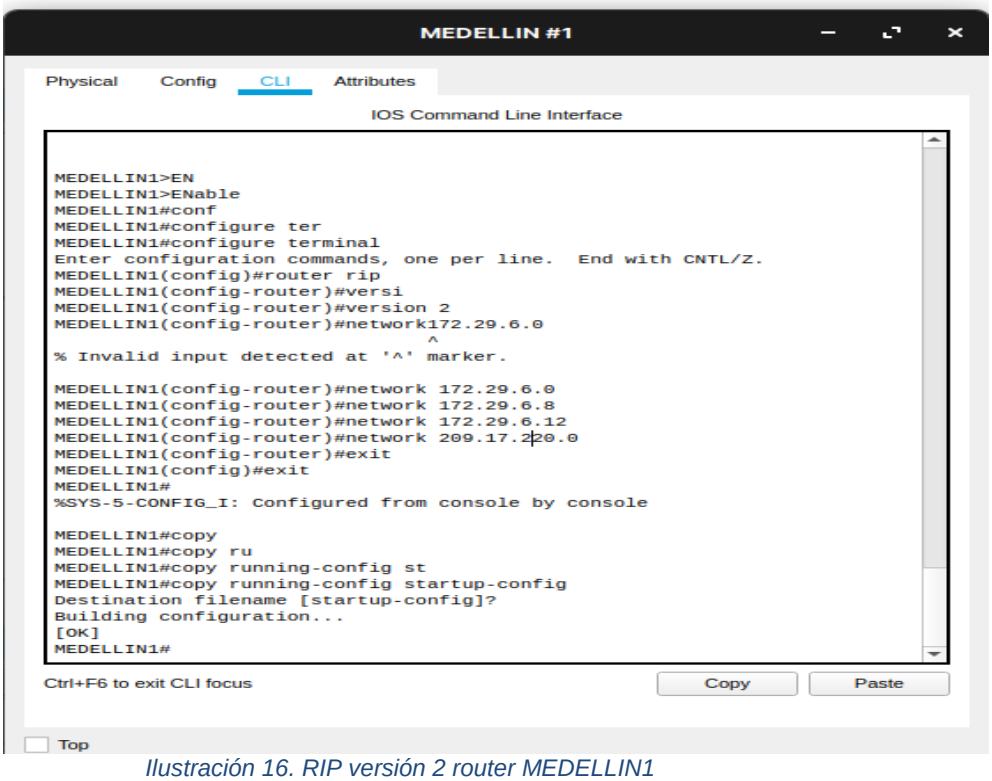


Ilustración 16. RIP versión 2 router MEDELLIN1

Router MEDELLIN2:

MEDELLIN2>enable

MEDELLIN2#conf

MEDELLIN2#configure te

MEDELLIN2#configure terminal

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

MEDELLIN2(config)#router rip

MEDELLIN2(config-router)#vers

MEDELLIN2(config-router)#version 2

MEDELLIN2(config-router)#network172.29.4.0

^

% Invalid input detected at '^' marker.

MEDELLIN2(config-router)#network 172.29.4.0

MEDELLIN2(config-router)#network 172.29.6.0

MEDELLIN2(config-router)#network 172.29.6.4

MEDELLIN2(config-router)#exit

MEDELLIN2(config)#exit

MEDELLIN2#

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

MEDELLIN2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

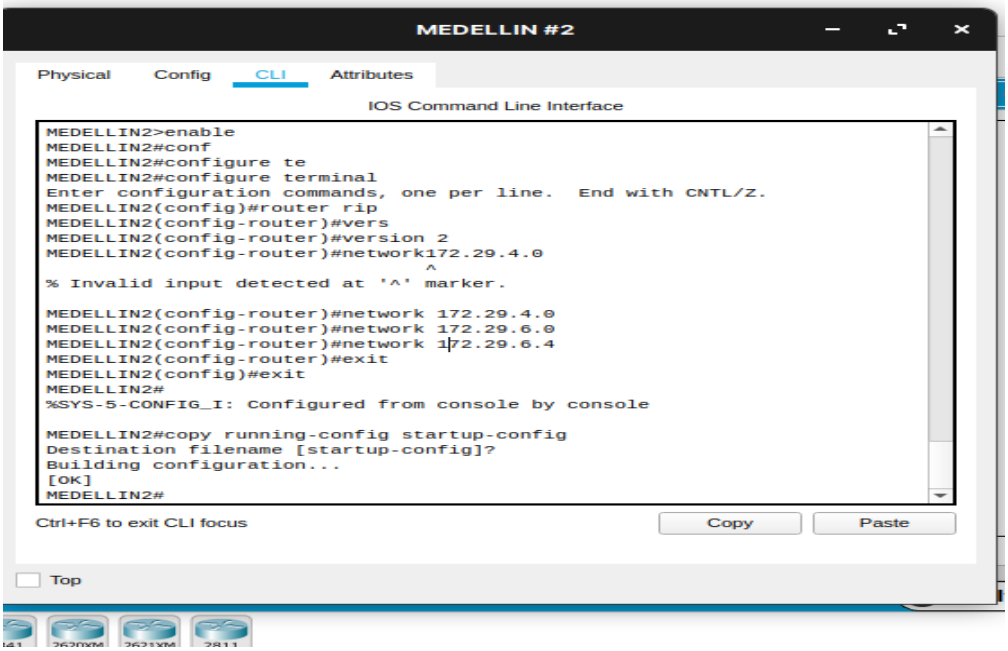


Ilustración 17. RIP versión 2 router MEDELLIN2

Router MEDELLIN3:

MEDELLIN3>EN

MEDELLIN3>ENable

MEDELLIN3#conf

MEDELLIN3#configure ter

MEDELLIN3#configure terminal

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

MEDELLIN3(config)#router rip

MEDELLIN3(config-router)#vers

MEDELLIN3(config-router)#version 2

MEDELLIN3(config-router)#network 172.29.4.128

MEDELLIN3(config-router)#network 172.29.6.4

MEDELLIN3(config-router)#network 172.29.6.8

MEDELLIN3(config-router)#network 172.29.6.12

MEDELLIN3(config-router)#exit

MEDELLIN3(config)#exit

MEDELLIN3#

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

MEDELLIN3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

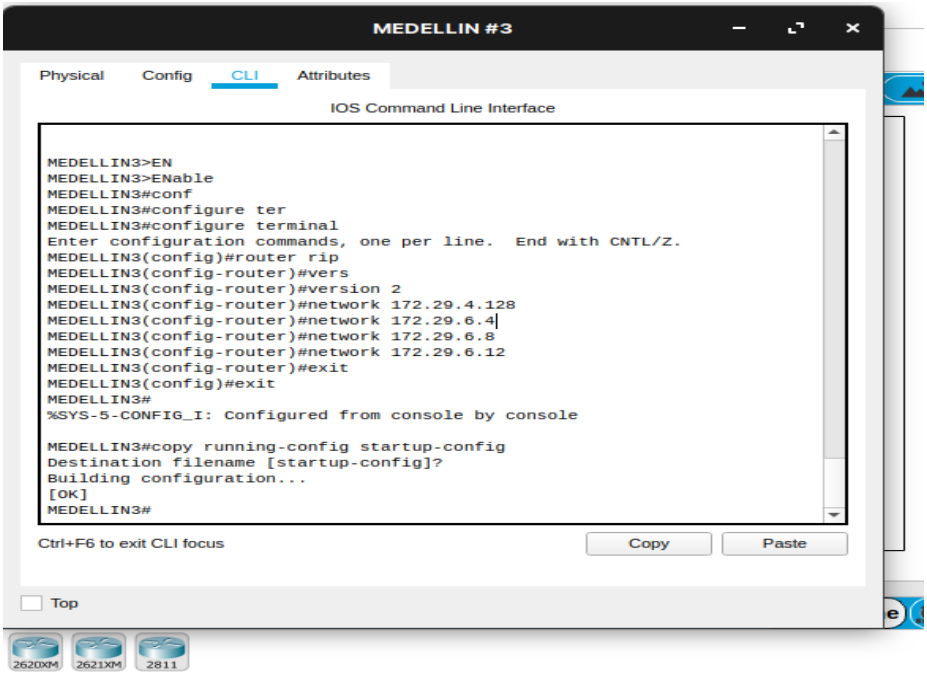


Ilustración 18. RIP versión 2 router MEDELLIN3

Router BOGOTA1:

BOGOTA1>EN

BOGOTA1>ENable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#router rip

BOGOTA1(config-router)#ver

BOGOTA1(config-router)#version 2

BOGOTA1(config-router)#network 172.29.3.0

BOGOTA1(config-router)#network 172.29.3.4

BOGOTA1(config-router)#network 172.29.3.8

BOGOTA1(config-router)#network 209.17.220.4

BOGOTA1(config-router)#exit

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

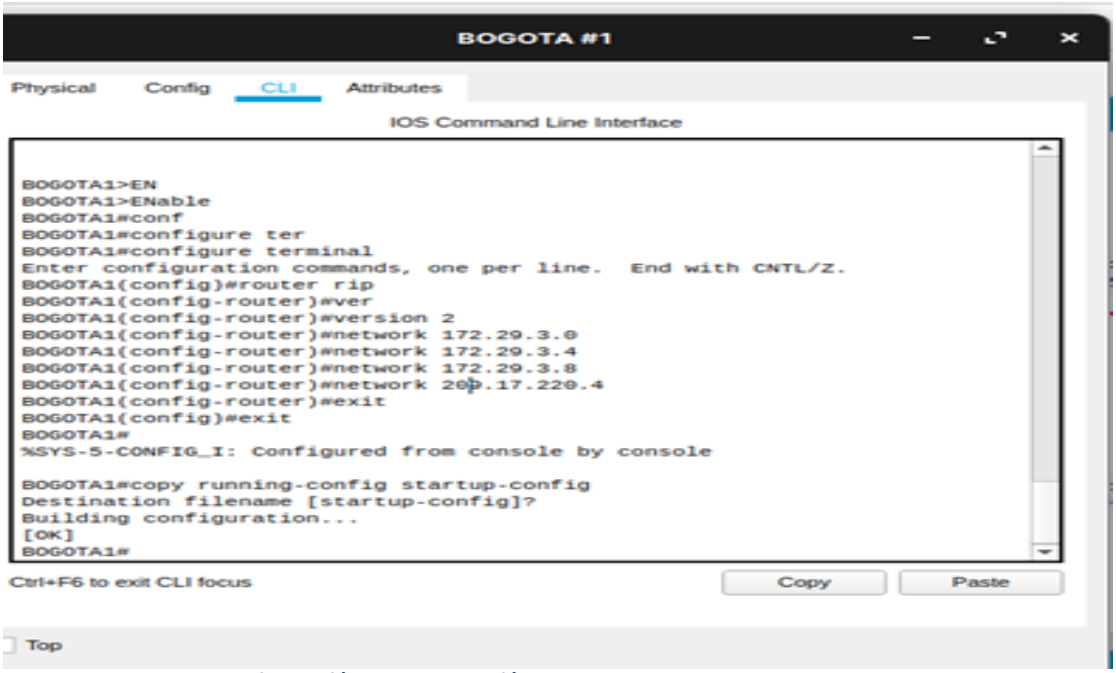


Ilustración 19. RIP versión 2 router BOGOTA1

Router BOGOTA2:

BOGOTA2>en

BOGOTA2>enable

BOGOTA2#conf

BOGOTA2#configure ter

BOGOTA2#configure terminal

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

BOGOTA2(config)#router rip

BOGOTA2(config-router)#vers

BOGOTA2(config-router)#version 2

BOGOTA2(config-router)#network 172.29.1.0

BOGOTA2(config-router)#network 172.29.3.8

BOGOTA2(config-router)#network 172.29.3.12

BOGOTA2(config-router)#exit

BOGOTA2(config)#exit

BOGOTA2#

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

BOGOTA2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

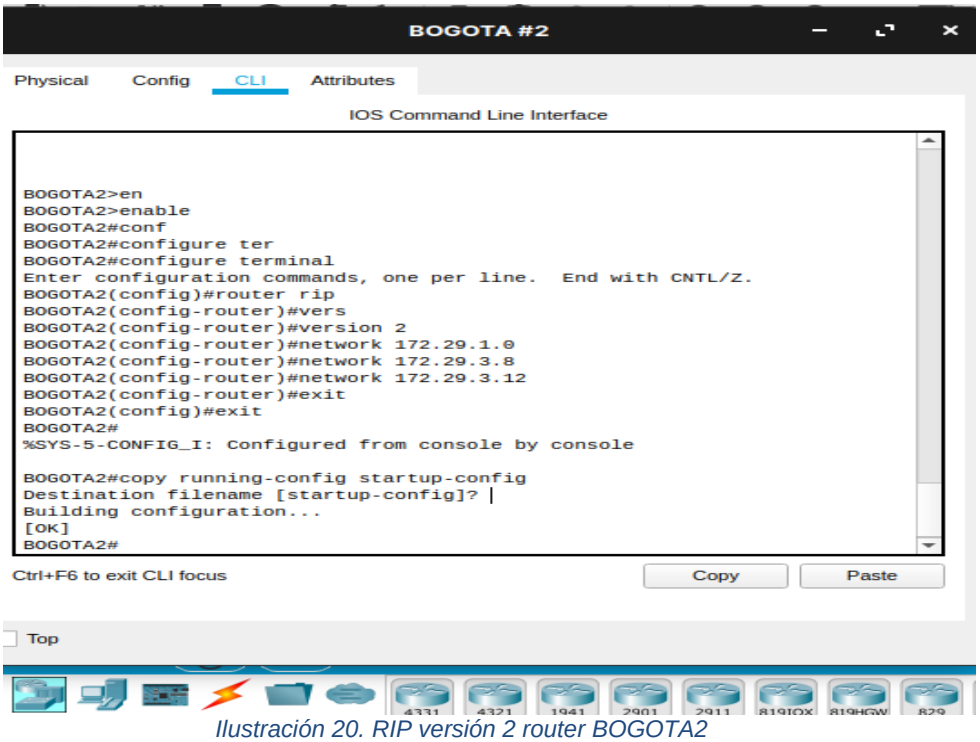


Ilustración 20. RIP versión 2 router BOGOTA2

Router BOGOTA3:

BOGOTA3>EN

BOGOTA3>ENable

BOGOTA3#cong

BOGOTA3#conf

BOGOTA3#configure ter

BOGOTA3#configure terminal

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

BOGOTA3(config)#router rip

BOGOTA3(config-router)#ver

BOGOTA3(config-router)#version 2

BOGOTA3(config-router)#network 172.29.0.0

BOGOTA3(config-router)#network 172.29.3.0

BOGOTA3(config-router)#network 172.29.3.4

BOGOTA3(config-router)#network 172.29.3.12

BOGOTA3(config-router)#exit

BOGOTA3(config)#exit

BOGOTA3#

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

BOGOTA3#co

BOGOTA3#cop

BOGOTA3#copy ru

BOGOTA3#copy running-config st

BOGOTA3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

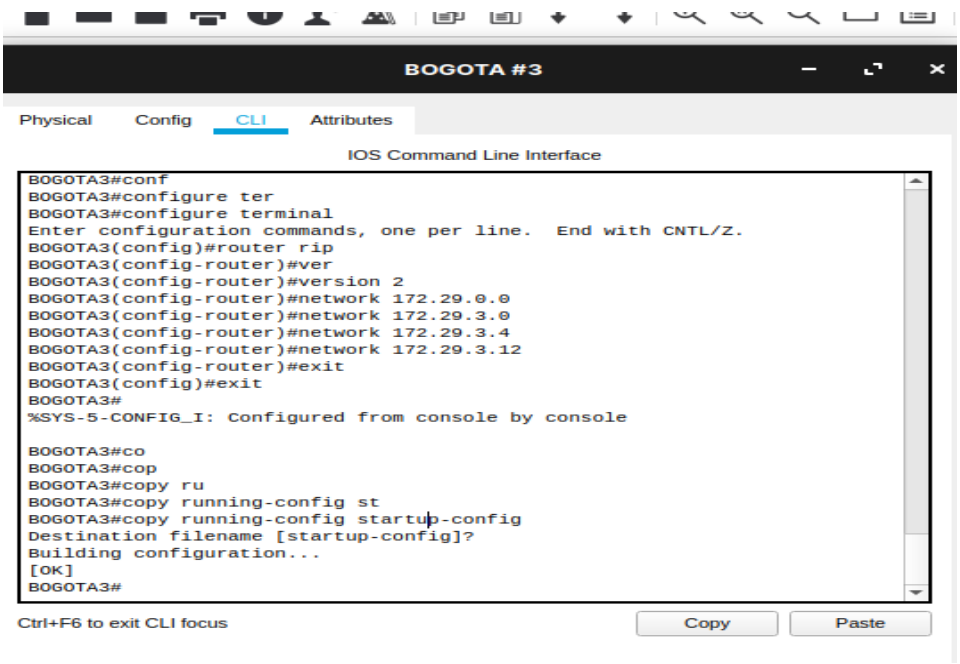


Ilustración 21. RIP versión 2 router BOGOTA3

Router ISP:

ISP>enable

ISP#conf

ISP#configure te

ISP#configure terminal

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

ISP(config)#rout

ISP(config)#router ri

ISP(config)#router rip

ISP(config-router)#ver

ISP(config-router)#version 2

ISP(config-router)#network 209.17.220.0

ISP(config-router)#network 209.17.220.4

ISP(config-router)#exit

ISP(config)#exit

ISP#

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

ISP#cop

ISP#copy ru

ISP#copy running-config st

ISP#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

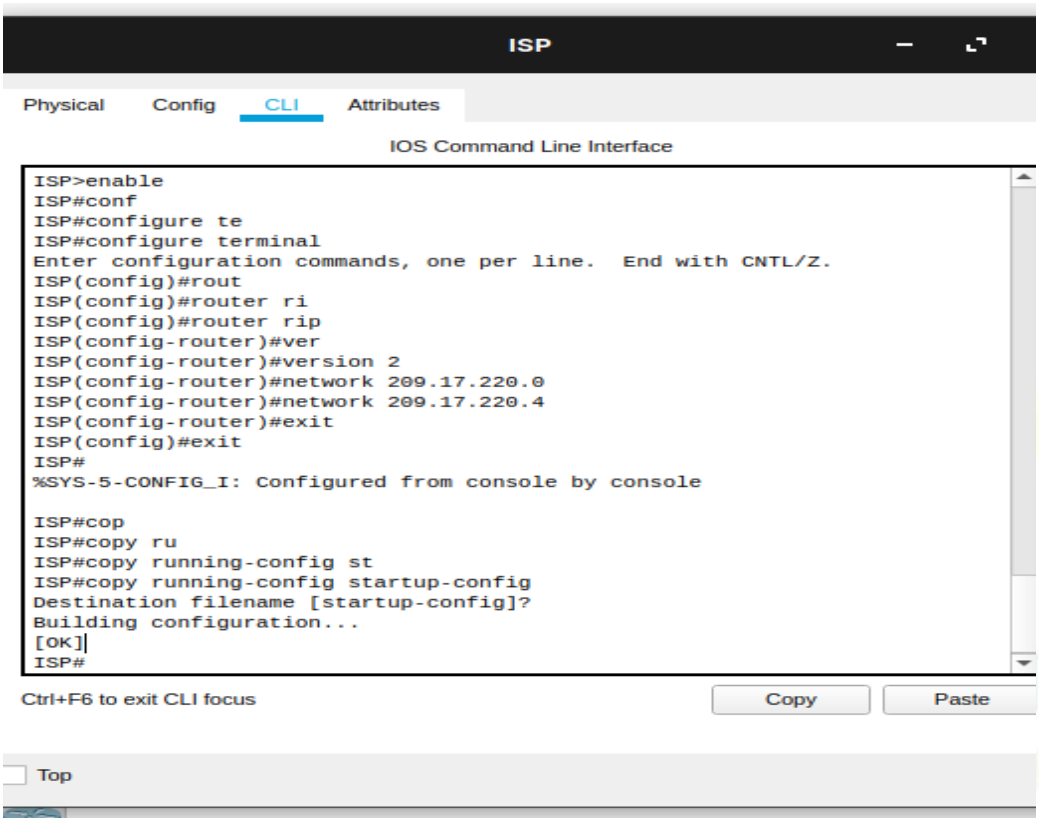


Ilustración 22. RIP versión 2 router ISP

- **Desactivamos la sumarización automática:**

Router MEDELLIN1:

MEDELLIN1>EN

MEDELLIN1>ENable

MEDELLIN1#RO

MEDELLIN1#con

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#rout

MEDELLIN1(config)#router rip

MEDELLIN1(config-router)#no auto-summary

MEDELLIN1(config-router)#end

MEDELLIN1#

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

MEDELLIN1#copy

MEDELLIN1#copy ru

MEDELLIN1#copy running-config st

MEDELLIN1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

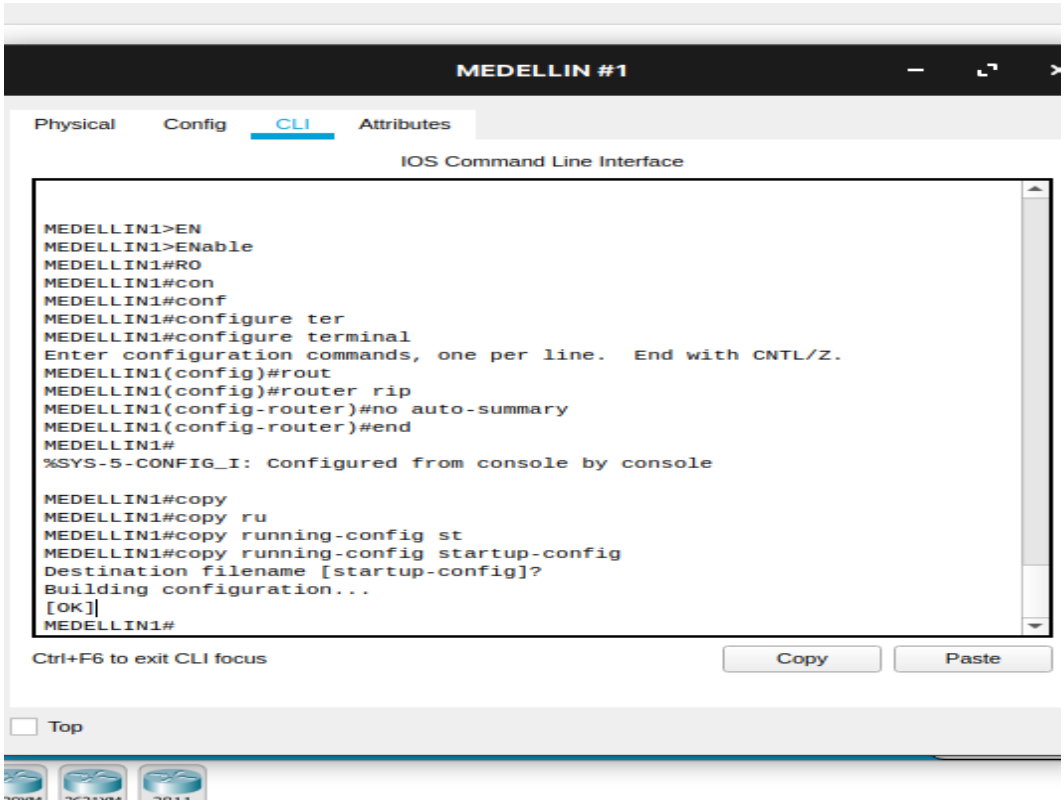


Ilustración 23. Desactivar sumarización router MEDELLIN1

Router MEDELLIN2:

MEDELLIN2>en
MEDELLIN2>enable
MEDELLIN2#conf
MEDELLIN2#configure ter
MEDELLIN2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN2(config)#rout
MEDELLIN2(config)#router rip
MEDELLIN2(config-router)#no au
MEDELLIN2(config-router)#no auto-summary
MEDELLIN2(config-router)#end
MEDELLIN2#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN2#copy
MEDELLIN2#copy ri
MEDELLIN2#copy r
MEDELLIN2#copy running-config s
MEDELLIN2#copy running-config st
MEDELLIN2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

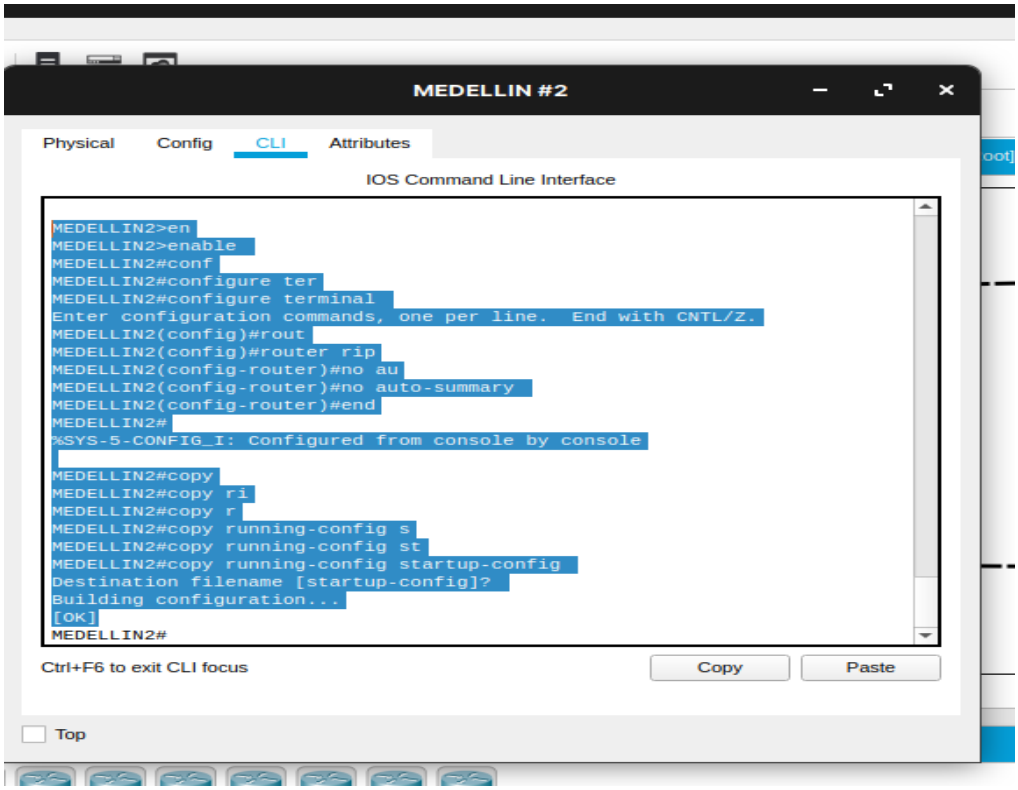


Ilustración 24. Desactivar sumarización router MEDELLIN2

Router MEDELLIN3:

MEDELLIN3>en

MEDELLIN3>enable

MEDELLIN3#conf

MEDELLIN3#configure ter

MEDELLIN3#configure terminal

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

MEDELLIN3(config)#rout

MEDELLIN3(config)#router ri

MEDELLIN3(config)#router rip

MEDELLIN3(config-router)#ver

MEDELLIN3(config-router)#version 2

MEDELLIN3(config-router)#no au

MEDELLIN3(config-router)#no auto-summary

MEDELLIN3(config-router)#end

MEDELLIN3#

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

MEDELLIN3#copy

MEDELLIN3#copy run

MEDELLIN3#copy running-config st

MEDELLIN3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

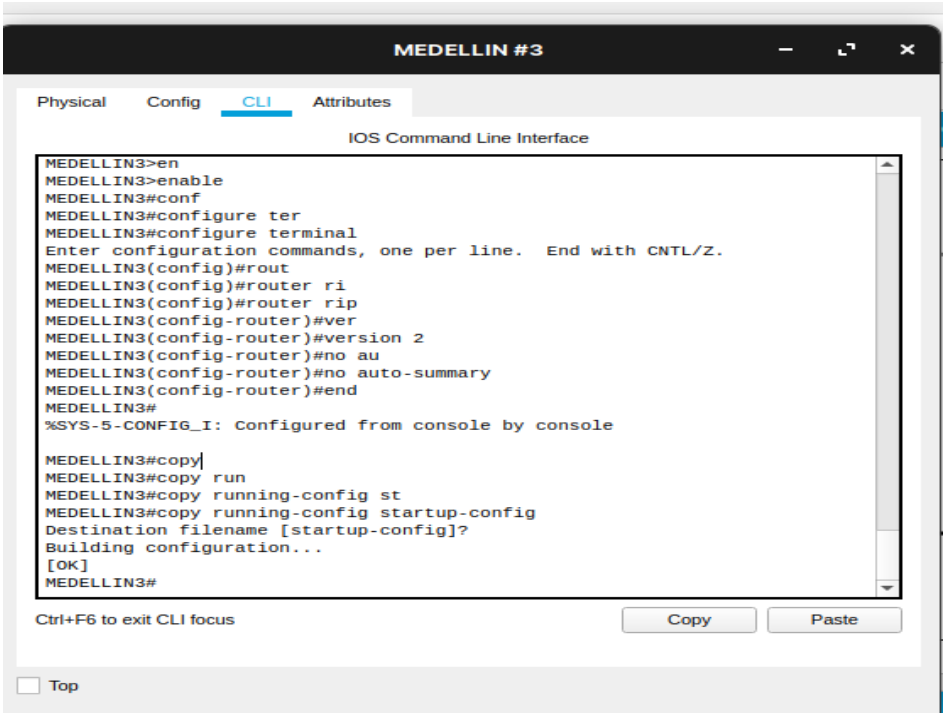


Ilustración 25. Desactivar sumarización router MEDELLIN3

Router BOGOTA1:

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#rout

BOGOTA1(config)#router ri

BOGOTA1(config)#router rip

BOGOTA1(config-router)#no aut

BOGOTA1(config-router)#no auto-summary

BOGOTA1(config-router)#end

BOGOTA1#

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

BOGOTA1#cop

BOGOTA1#copy r

BOGOTA1#copy running-config st

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

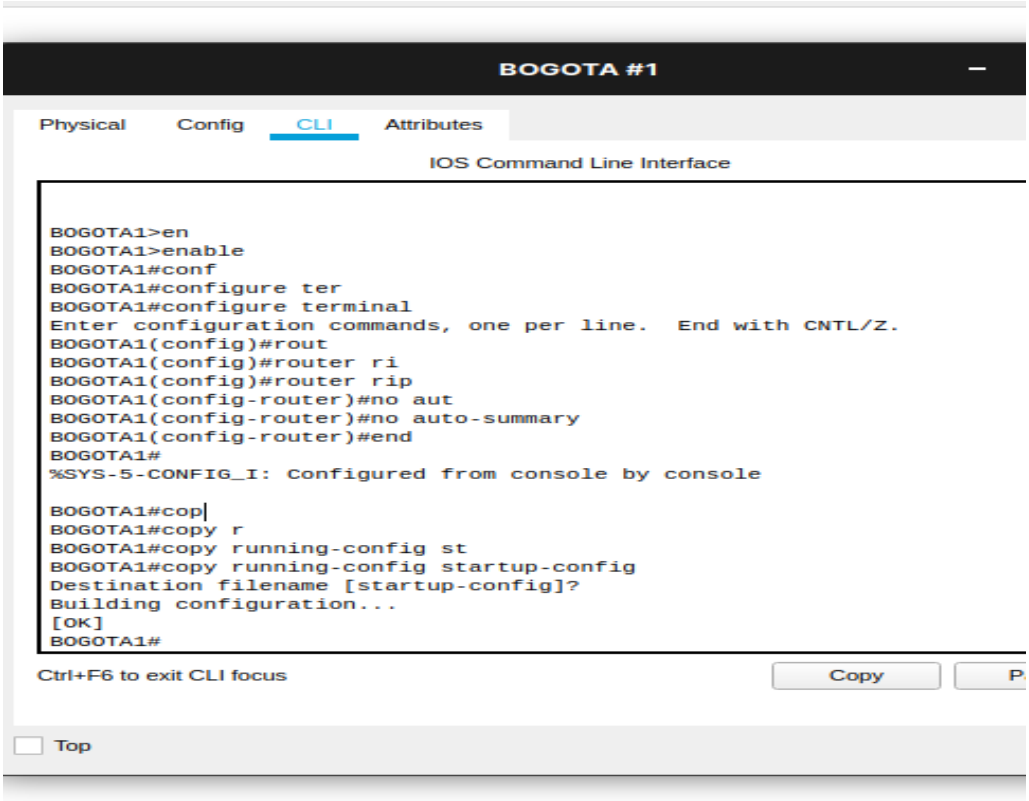


Ilustración 26. Desactivar sumarización router BOGOTA1

Router BOGOTA2:

BOGOTA2>EN

BOGOTA2>ENable

BOGOTA2#con

BOGOTA2#conf

BOGOTA2#configure te

BOGOTA2#configure terminal

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

BOGOTA2(config)#rou

BOGOTA2(config)#router ri

BOGOTA2(config)#router rip

BOGOTA2(config-router)#no au

BOGOTA2(config-router)#no auto-summary

BOGOTA2(config-router)#end

BOGOTA2#

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

BOGOTA2#cop

BOGOTA2#copy r

BOGOTA2#copy running-config st

BOGOTA2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

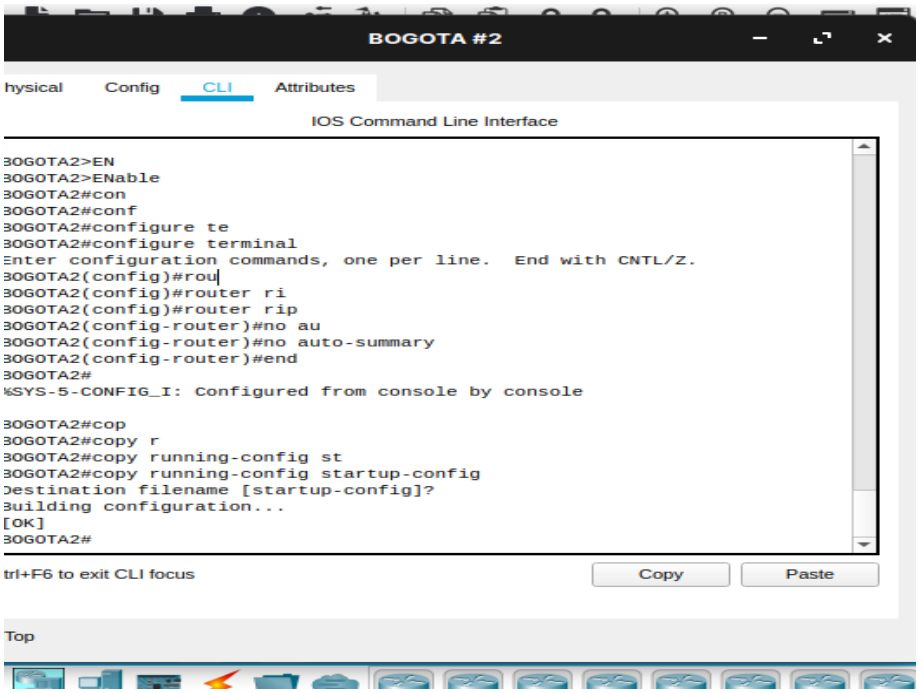


Ilustración 27. Desactivar sumarización router BOGOTA2

Router BOGOTA3:

BOGOTA3>en

BOGOTA3>enable

BOGOTA3#conf

BOGOTA3#configure ter

BOGOTA3#configure terminal

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

BOGOTA3(config)#rout

BOGOTA3(config)#router ri

BOGOTA3(config)#router rip

BOGOTA3(config-router)#ver

BOGOTA3(config-router)#version 2

BOGOTA3(config-router)#no au

BOGOTA3(config-router)#no auto-summary

BOGOTA3(config-router)#end

BOGOTA3#

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

BOGOTA3#cop

BOGOTA3#copy ru

BOGOTA3#copy running-config st

BOGOTA3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

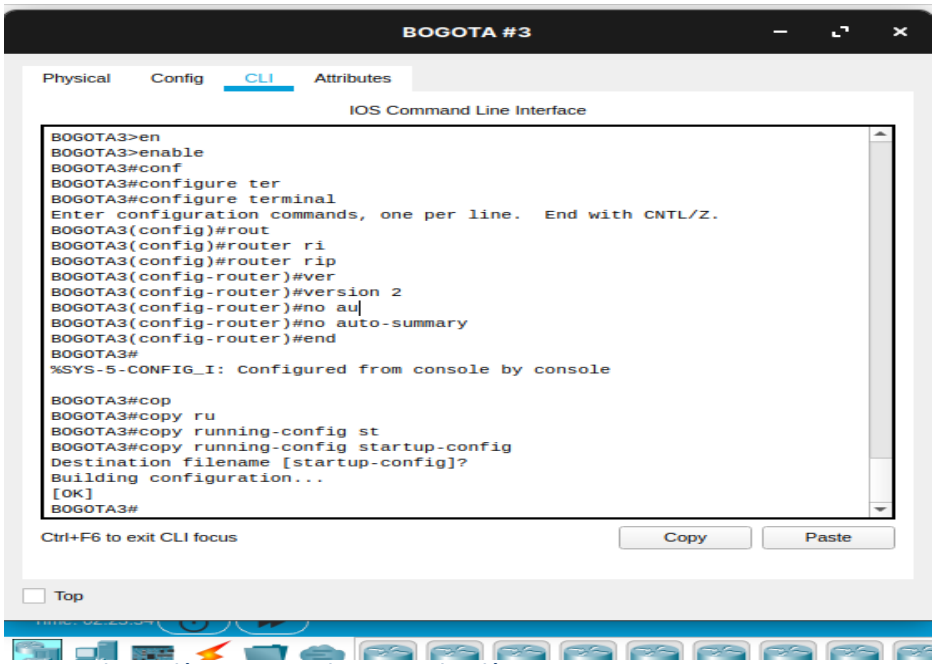


Ilustración 28. Desactivar sumarización router BOGOTA3

Router ISP:

ISP>en

ISP>enable

ISP#conf

ISP#configure ter

ISP#configure terminal

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

ISP(config)#rout

ISP(config)#router rip

ISP(config-router)#no aut

ISP(config-router)#no auto-summary

ISP(config-router)#end

ISP#

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

ISP#cop

ISP#copy ru

ISP#copy running-config st

ISP#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

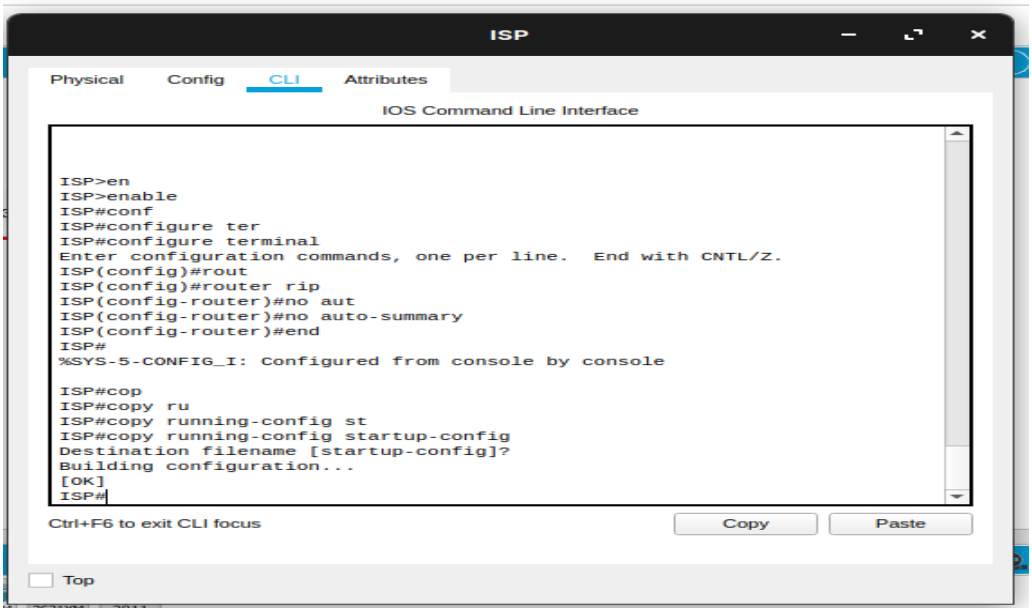


Ilustración 29. Desactivar sumarización router ISP

b. Los routers Bogota1 y Medellín1 deberán añadir a su configuración de enrutamiento una ruta por defecto hacia el ISP y, a su vez, redistribuirla dentro de las publicaciones de RIP.

En los router MEDELLIN1 Y BOGOTA1 es necesario configurar una ruta por defecto hacia ISP

- **Configuramos una ruta estática de MEDELLIN1 a ISP:**

MEDELLIN1>EN
MEDELLIN1>ENable
MEDELLIN1#conf
MEDELLIN1#configure ter
MEDELLIN1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#ip route 0.0.0.0 0.0.0.0 serial 0/1/1
MEDELLIN1(config)#exit
MEDELLIN1#
%SYS-5-CONFIG_I: Configured from console by console

También se puede realizar por medio de la IP con su salto:

MEDELLIN1#conf
MEDELLIN1#configure ter
MEDELLIN1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.1
MEDELLIN1(config)#rout
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#versi
MEDELLIN1(config-router)#version 2
MEDELLIN1(config-router)#default-information originate

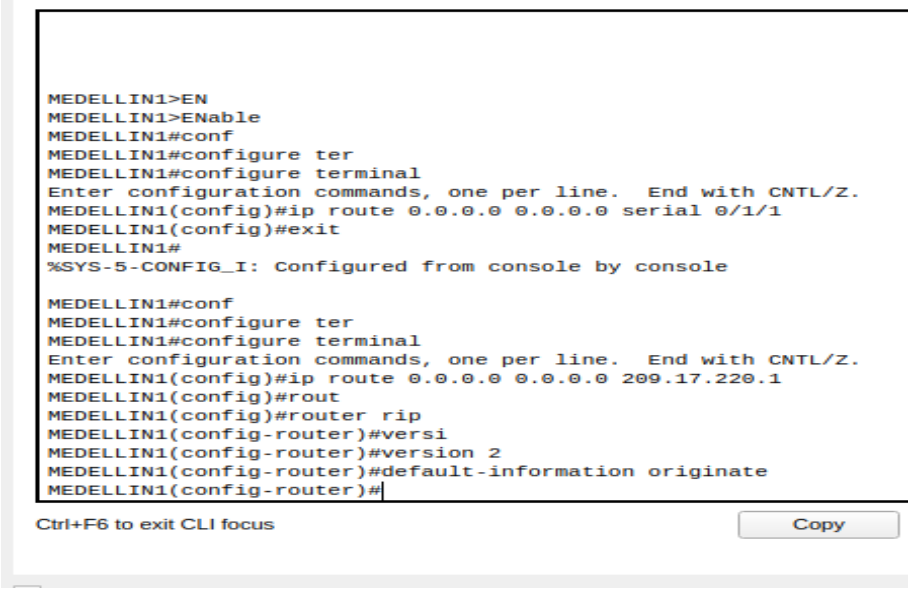


Ilustración 30. Ruta por defecto router MEDELLIN1 a router ISP

- **Configuramos una ruta estática de BOGOTA1 a ISP:**

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0

BOGOTA1(config)#exit

También se puede realizar por medio de la IP con su salto:

BOGOTA1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.5

BOGOTA1(config)#router rip

BOGOTA1(config-router)#versi

BOGOTA1(config-router)#version 2

BOGOTA1(config-router)#default-information originat

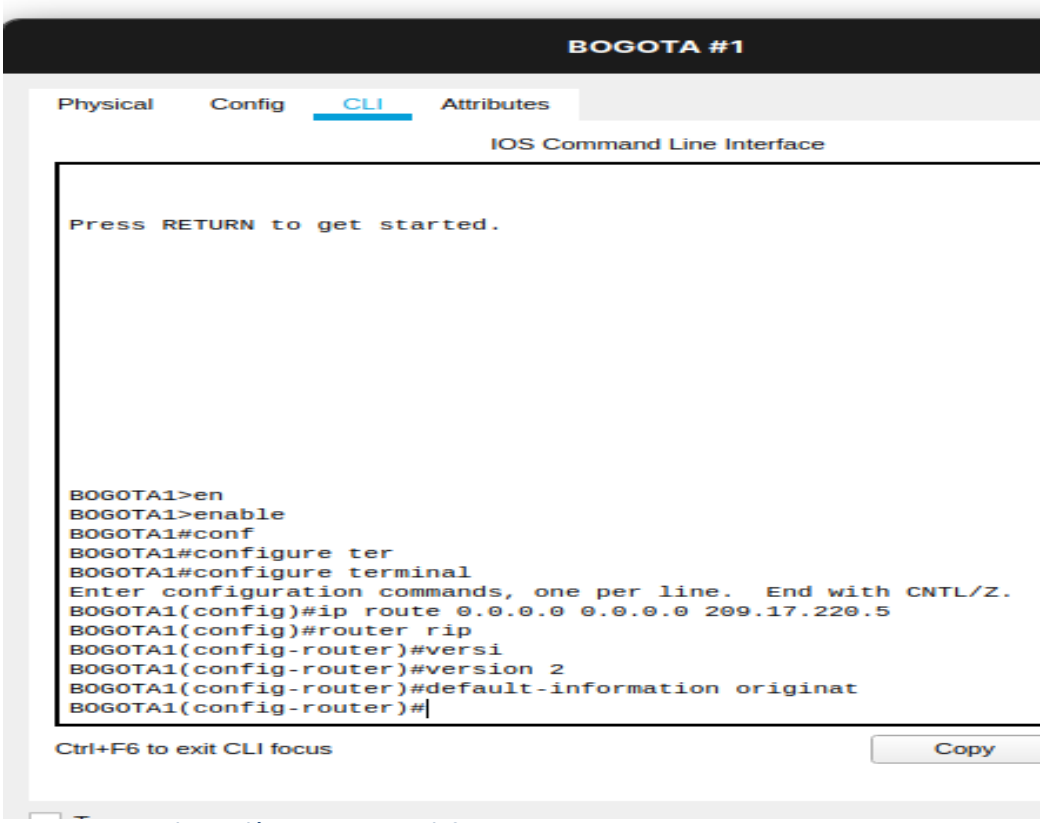


Ilustración 31. Ruta por defecto router BOGOTA1 a router ISP

- **Realizamos la redistribución:**

MEDELLIN1>en

MEDELLIN1>enable

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#rout

MEDELLIN1(config)#router ri

MEDELLIN1(config)#router rip

MEDELLIN1(config-router)#ver

MEDELLIN1(config-router)#version 2

MEDELLIN1(config-router)#redistribute rip metric 1

MEDELLIN1(config-router)#exit

MEDELLIN1(config)#exit

MEDELLIN1#

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

MEDELLIN1#copy ru

MEDELLIN1#copy running-config st

MEDELLIN1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

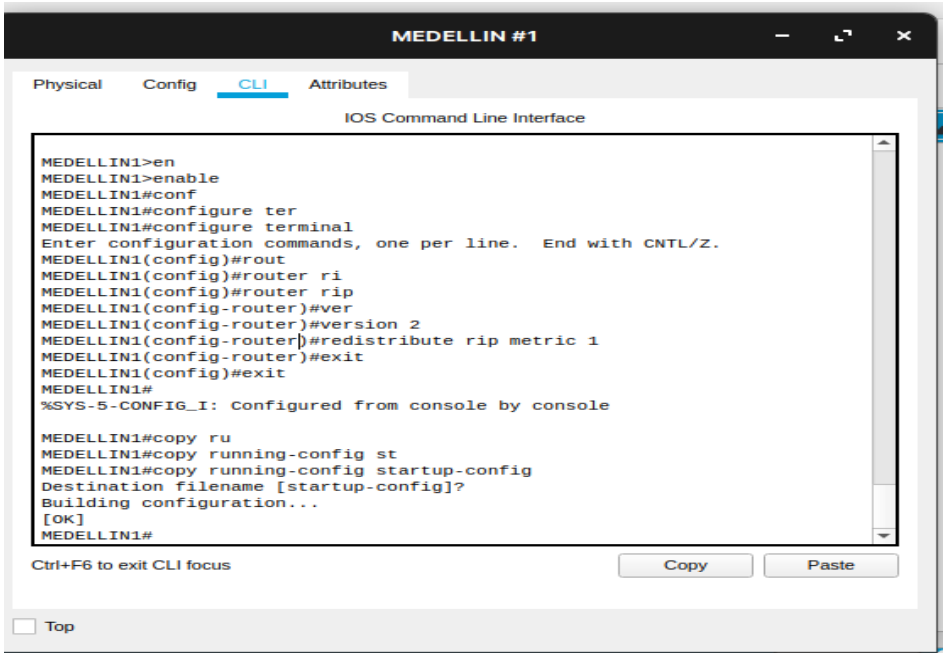


Ilustración 32. Redistribución router MEDELLIN1

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#rou

BOGOTA1(config)#router ri

BOGOTA1(config)#router rip

BOGOTA1(config-router)#ver

BOGOTA1(config-router)#version 2

BOGOTA1(config-router)#redistribute rip metric 1

BOGOTA1(config-router)#exit

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#cop

BOGOTA1#copy ru

BOGOTA1#copy running-config st

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

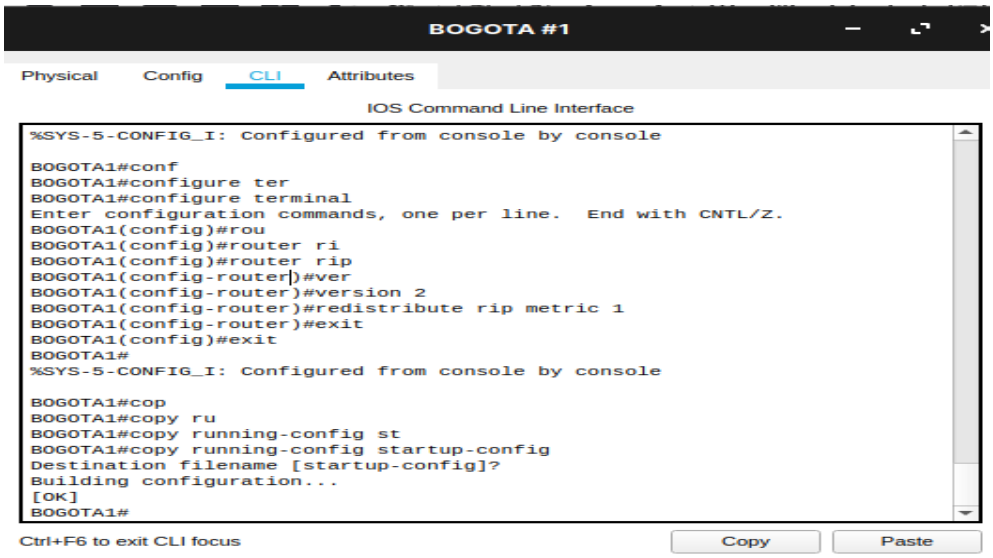


Ilustración 33. Redistribución router BOGOTA1

C. El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarizan las subredes de cada uno a /22.

primero sumamos y configuramos una ruta estática de ISP a BOGOTA1 y MEDELLIN1

```
ISP>EN
ISP>ENable
ISP#conf
ISP#configure ter
ISP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#ip route 172.29.4.0 255.255.252.0 s0/0/0
ISP(config)#ip route 172.29.0.0 255.255.252.0 s0/0/1
ISP(config)#exit
ISP#
%SYS-5-CONFIG_I: Configured from console by console

ISP#cop
ISP#copy ru
ISP#copy running-config st
ISP#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

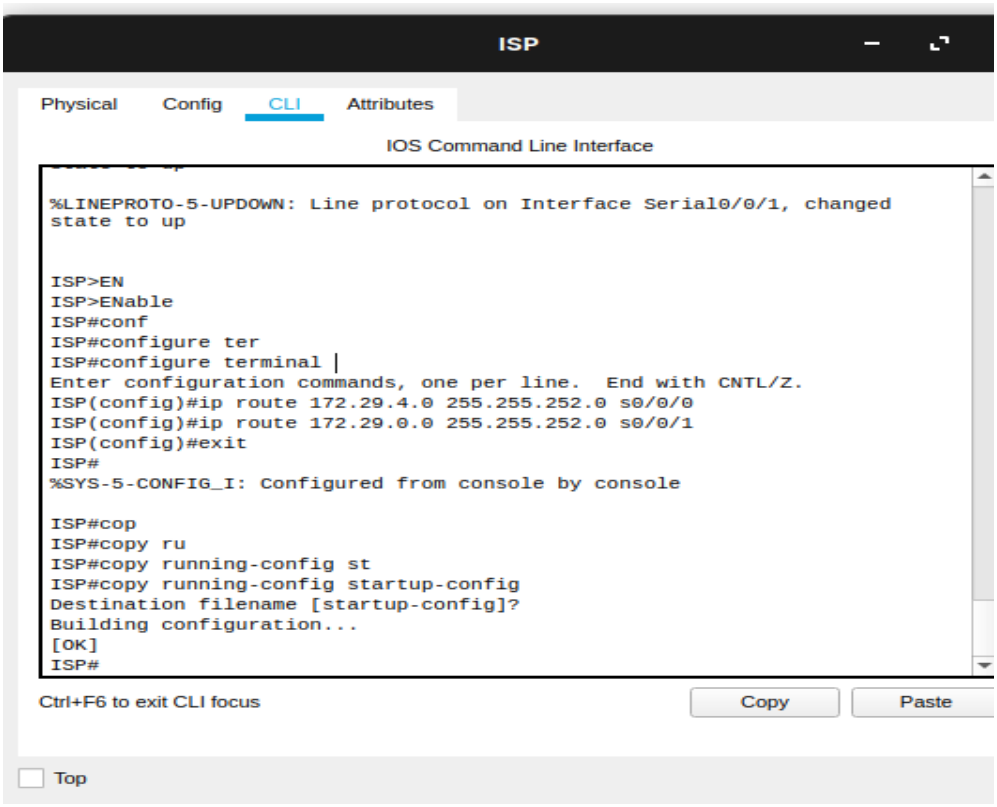


Ilustración 34. Ruta estática router ISP

- **Para MEDELLIN tenemos las siguientes redes:**

172.29.4.0/25

172.29.6.4/30

172.29.6.0/30

172.29.6.12/30

172.29.6.8/30

172.29.4.128/25

172.29.4.0/22

- **Para BOGOTA tenemos las siguientes redes**:

172.29.3.0/30

172.29.3.8/30

172.29.3.4/30

172.29.3.12/30

172.29.0.0/24

172.29.1.0/24

172.29.0.0/22

Realizamos PING desde el router de BOGOTA3 a BOGOTA1 para comprobar la conectividad:

BOGOTA3>en

BOGOTA3>enable

BOGOTA3#ping 172.29.3.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 172.29.3.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/6/27 ms

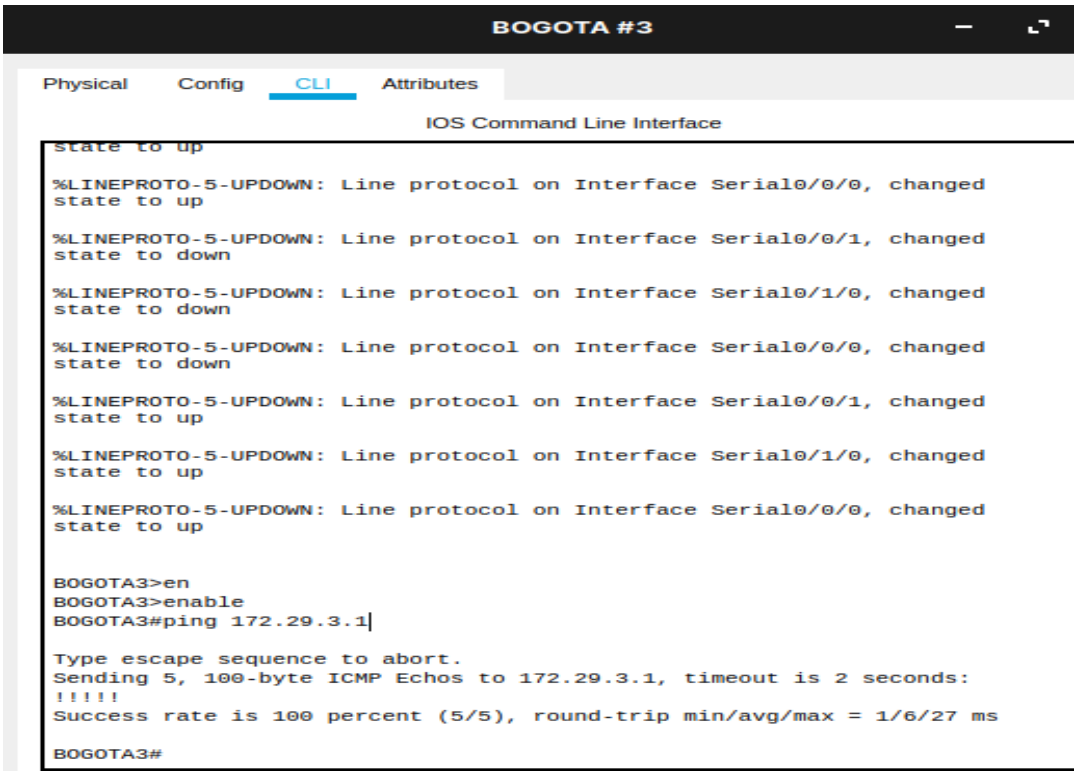


Ilustración 35. Ping de router BOGOTA3 a router BOGOTA1

1.1.2 Parte 2: Tabla de Enrutamiento.

a. Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

Revisamos la tabla de enrutamiento de cada router utilizando el comando "show ip route":

Router MEDELLIN1:

MEDELLIN1>EN
MEDELLIN1>ENable
MEDELLIN1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R 172.29.0.0/24 [120/3] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.1.0/24 [120/3] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.3.0/30 [120/2] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.3.4/30 [120/2] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.3.8/30 [120/2] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.3.12/30 [120/3] via 209.17.220.1, 00:00:22, Serial0/1/1
R 172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:28, Serial0/0/0
R 172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:21, Serial0/0/1
[120/1] via 172.29.6.14, 00:00:21, Serial0/1/0
C 172.29.6.0/30 is directly connected, Serial0/0/0

R 172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:21, Serial0/0/1

[120/1] via 172.29.6.2, 00:00:28, Serial0/0/0

[120/1] via 172.29.6.14, 00:00:21, Serial0/1/0

C 172.29.6.8/30 is directly connected, Serial0/0/1

C 172.29.6.12/30 is directly connected, Serial0/1/0

209.17.220.0/30 is subnetted, 2 subnets

C 209.17.220.0 is directly connected, Serial0/1/1

R 209.17.220.4 [120/1] via 209.17.220.1, 00:00:22, Serial0/1/1

S* 0.0.0.0/0 is directly connected, Serial0/1/1

[1/0] via 209.17.220.1

MEDELLIN1#

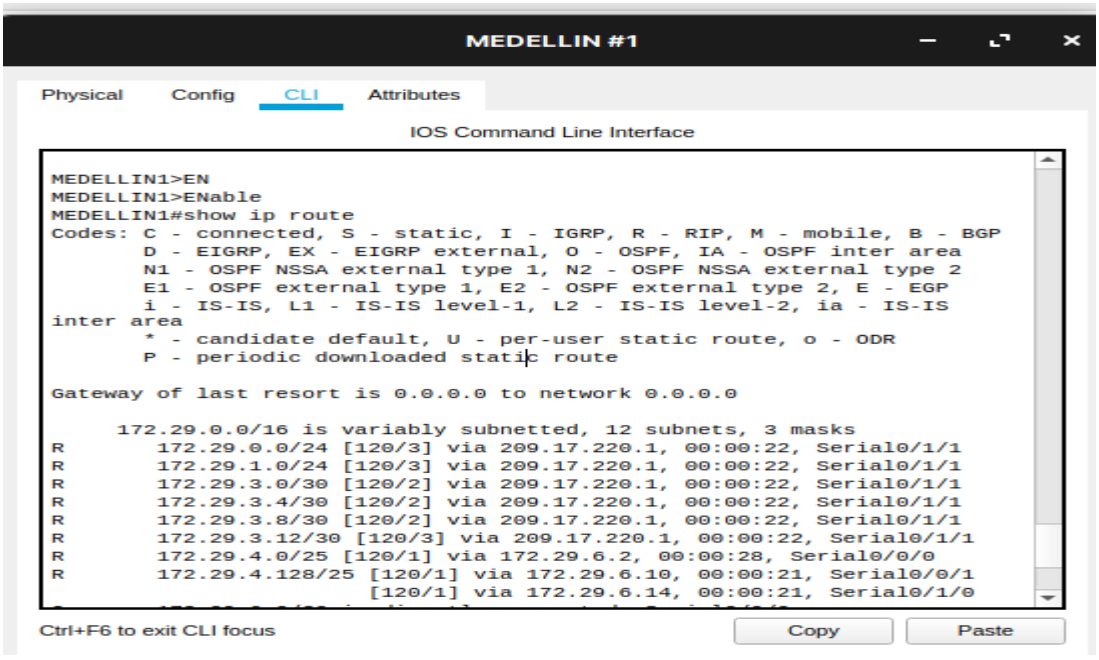


Ilustración 36. Show ip router MEDELLIN1

```
MEDELLIN2>en
MEDELLIN2>enable
MEDELLIN2#show ip rou
MEDELLIN2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.1 to network 0.0.0.0
172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R 172.29.0.0/24 [120/4] via 172.29.6.1, 00:00:29, Serial0/0/0
R 172.29.1.0/24 [120/4] via 172.29.6.1, 00:00:29, Serial0/0/0
R 172.29.3.0/30 [120/3] via 172.29.6.1, 00:00:29, Serial0/0/0
R 172.29.3.4/30 [120/3] via 172.29.6.1, 00:00:29, Serial0/0/0
R 172.29.3.8/30 [120/3] via 172.29.6.1, 00:00:29, Serial0/0/0
R 172.29.3.12/30 [120/4] via 172.29.6.1, 00:00:29, Serial0/0/0
C 172.29.4.0/25 is directly connected, FastEthernet0/0
R 172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:10, Serial0/0/1
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
R 172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:29, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:10, Serial0/0/1
R 172.29.6.12/30 [120/1] via 172.29.6.6, 00:00:10, Serial0/0/1
[120/1] via 172.29.6.1, 00:00:29, Serial0/0/0
209.17.220.0/30 is subnetted, 2 subnets
R 209.17.220.0 [120/1] via 172.29.6.1, 00:00:29, Serial0/0/0
R 209.17.220.4 [120/2] via 172.29.6.1, 00:00:29, Serial0/0/0
R* 0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:29, Serial0/0/0
```

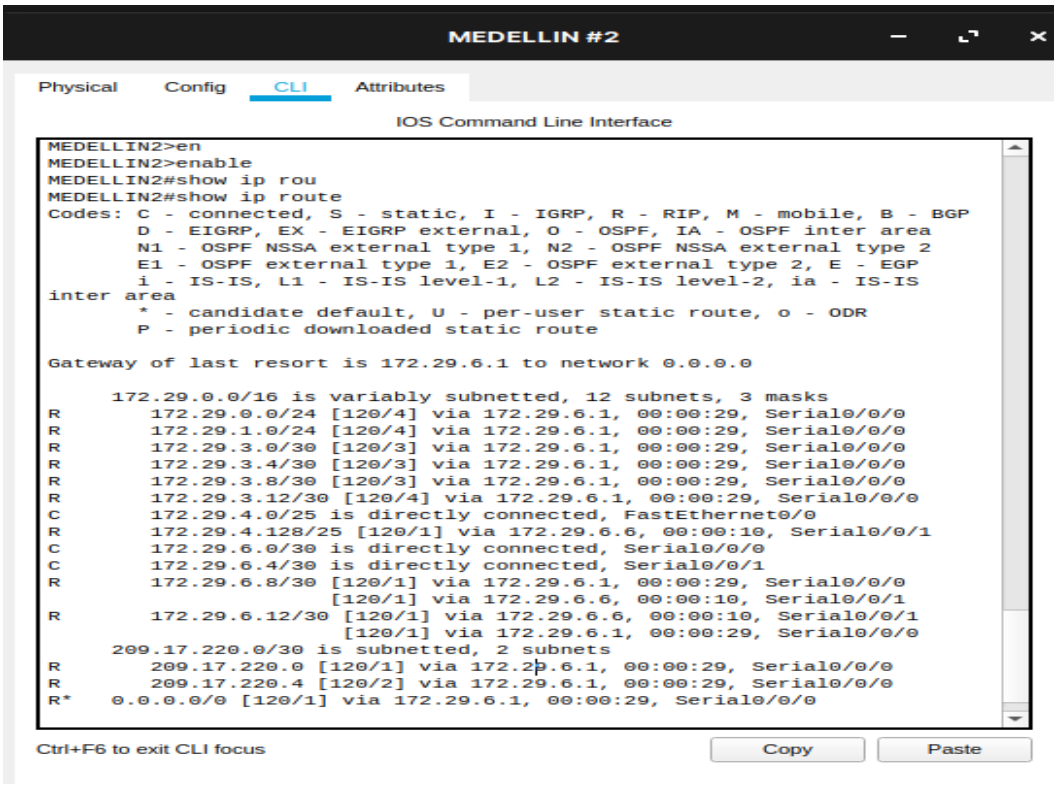


Ilustración 37. Show ip router MEDELLIN2

MEDELLIN3>en

MEDELLIN3>enable

MEDELLIN3#conf

MEDELLIN3#configure ter

MEDELLIN3#configure terminal

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

MEDELLIN3(config)#exit

MEDELLIN3#

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

MEDELLIN3#show ip rou

MEDELLIN3#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R 172.29.0.0/24 [120/4] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/4] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.1.0/24 [120/4] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/4] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.3.0/30 [120/3] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/3] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.3.4/30 [120/3] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/3] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.3.8/30 [120/3] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/3] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.3.12/30 [120/4] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/4] via 172.29.6.13, 00:00:08, Serial0/0/0
R 172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:17, Serial0/1/0
C 172.29.4.128/25 is directly connected, FastEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/1] via 172.29.6.5, 00:00:17, Serial0/1/0
[120/1] via 172.29.6.13, 00:00:08, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/1/0
C 172.29.6.8/30 is directly connected, Serial0/0/1
C 172.29.6.12/30 is directly connected, Serial0/0/0
209.17.220.0/30 is subnetted, 2 subnets
R 209.17.220.0 [120/1] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:08, Serial0/0/0
R 209.17.220.4 [120/2] via 172.29.6.9, 00:00:08, Serial0/0/1
[120/2] via 172.29.6.13, 00:00:08, Serial0/0/0

R* 0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:08, Serial0/0/1

[120/1] via 172.29.6.13, 00:00:08, Serial0/0/0

P

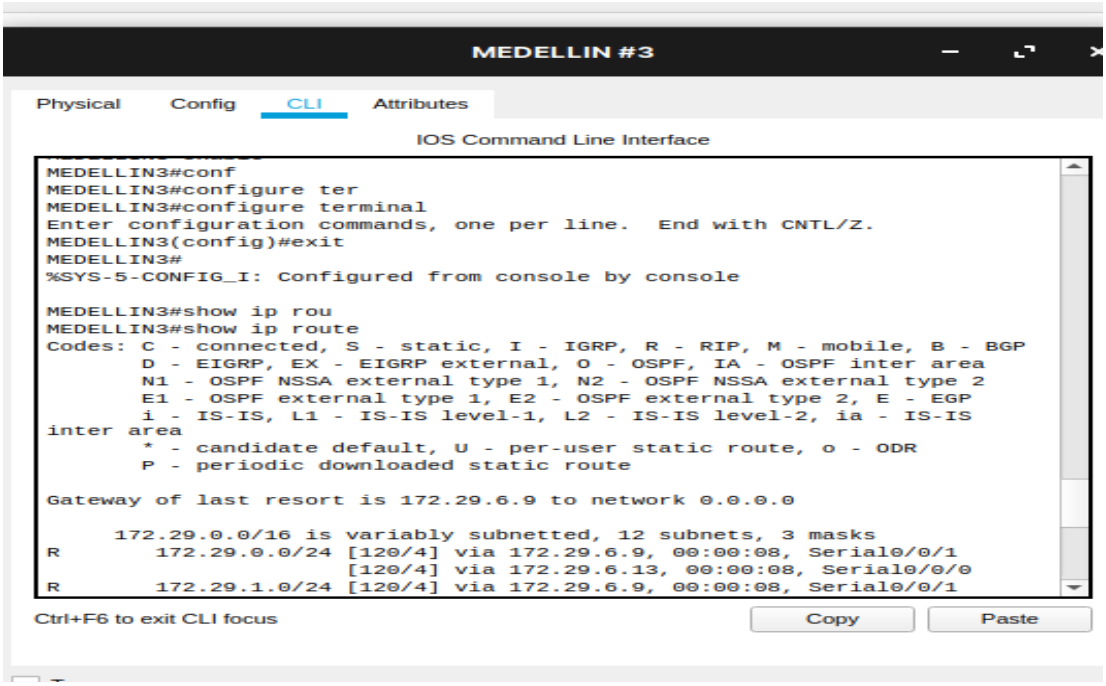


Ilustración 38. Show ip router MEDELLIN3

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#show i

BOGOTA1#show ip router

^

% Invalid input detected at '^' marker.

```
BOGOTA1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R 172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:27, Serial0/1/0
[120/1] via 172.29.3.2, 00:00:27, Serial0/1/1
R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:01, Serial0/0/1
C 172.29.3.0/30 is directly connected, Serial0/1/1
C 172.29.3.4/30 is directly connected, Serial0/1/0
C 172.29.3.8/30 is directly connected, Serial0/0/1
R 172.29.3.12/30 [120/1] via 172.29.3.6, 00:00:27, Serial0/1/0
[120/1] via 172.29.3.10, 00:00:01, Serial0/0/1
[120/1] via 172.29.3.2, 00:00:27, Serial0/1/1
R 172.29.4.0/25 [120/3] via 209.17.220.5, 00:00:07, Serial0/0/0
R 172.29.4.128/25 [120/3] via 209.17.220.5, 00:00:07, Serial0/0/0
R 172.29.6.0/30 [120/2] via 209.17.220.5, 00:00:07, Serial0/0/0
R 172.29.6.4/30 [120/3] via 209.17.220.5, 00:00:07, Serial0/0/0
R 172.29.6.8/30 [120/2] via 209.17.220.5, 00:00:07, Serial0/0/0
R 172.29.6.12/30 [120/2] via 209.17.220.5, 00:00:07, Serial0/0/0
209.17.220.0/30 is subnetted, 2 subnets
R 209.17.220.0 [120/1] via 209.17.220.5, 00:00:07, Serial0/0/0
C 209.17.220.4 is directly connected, Serial0/0/0
S* 0.0.0.0/0 is directly connected, Serial0/0/0
```

[1/0] via 209.17.220.5

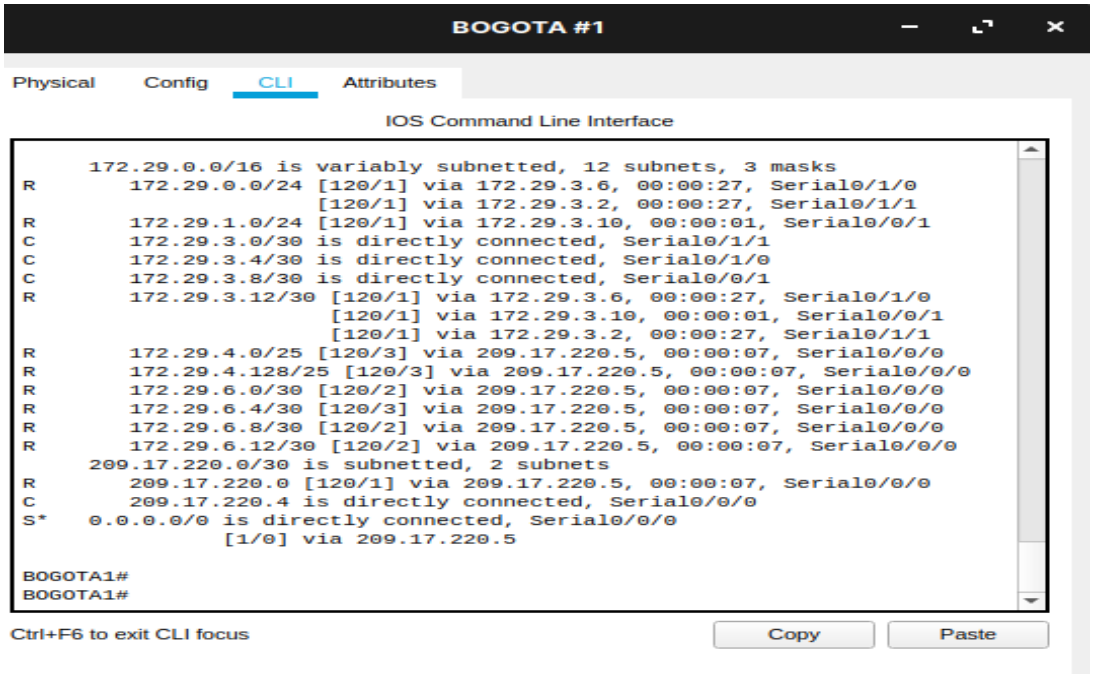


Ilustración 39. Show ip router BOGOTA1

BOGOTA2>en

BOGOTA2>enable

BOGOTA2#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is 172.29.3.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks

R 172.29.0.0/24 [120/1] via 172.29.3.14, 00:00:21, Serial0/0/1

C 172.29.1.0/24 is directly connected, FastEthernet0/0

R 172.29.3.0/30 [120/1] via 172.29.3.14, 00:00:21, Serial0/0/1

[120/1] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.3.4/30 [120/1] via 172.29.3.14, 00:00:21, Serial0/0/1

[120/1] via 172.29.3.9, 00:00:18, Serial0/0/0

C 172.29.3.8/30 is directly connected, Serial0/0/0

C 172.29.3.12/30 is directly connected, Serial0/0/1

R 172.29.4.0/25 [120/4] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.4.128/25 [120/4] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.6.0/30 [120/3] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.6.4/30 [120/4] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.6.8/30 [120/3] via 172.29.3.9, 00:00:18, Serial0/0/0

R 172.29.6.12/30 [120/3] via 172.29.3.9, 00:00:18, Serial0/0/0

209.17.220.0/30 is subnetted, 2 subnets

R 209.17.220.0 [120/2] via 172.29.3.9, 00:00:18, Serial0/0/0

R 209.17.220.4 [120/1] via 172.29.3.9, 00:00:18, Serial0/0/0

R* 0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:18, Serial0/0/0

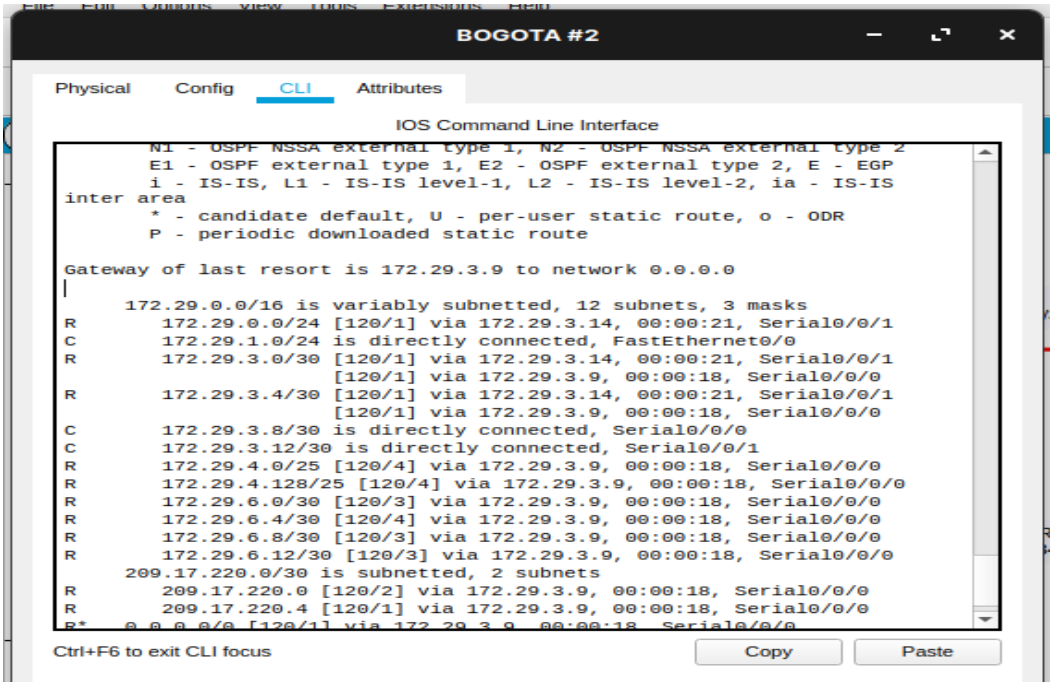


Ilustración 40. Show ip router BOGOTA2

```
BOGOTA3>en
BOGOTA3>enable
BOGOTA3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.3.5 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
C 172.29.0.0/24 is directly connected, FastEthernet0/0
R 172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:24, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
R 172.29.3.8/30 [120/1] via 172.29.3.13, 00:00:24, Serial0/1/0
[120/1] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:24, Serial0/0/1
C 172.29.3.12/30 is directly connected, Serial0/1/0
R 172.29.4.0/25 [120/4] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:24, Serial0/0/1
R 172.29.4.128/25 [120/4] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:24, Serial0/0/1
R 172.29.6.0/30 [120/3] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/3] via 172.29.3.5, 00:00:24, Serial0/0/1
R 172.29.6.4/30 [120/4] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:24, Serial0/0/1
R 172.29.6.8/30 [120/3] via 172.29.3.1, 00:00:24, Serial0/0/0
[120/3] via 172.29.3.5, 00:00:24, Serial0/0/1
```

R 172.29.6.12/30 [120/3] via 172.29.3.1, 00:00:24, Serial0/0/0

[120/3] via 172.29.3.5, 00:00:24, Serial0/0/1

209.17.220.0/30 is subnetted, 2 subnets

R 209.17.220.0 [120/2] via 172.29.3.1, 00:00:24, Serial0/0/0

[120/2] via 172.29.3.5, 00:00:24, Serial0/0/1

R 209.17.220.4 [120/1] via 172.29.3.5, 00:00:24, Serial0/0/1

[120/1] via 172.29.3.1, 00:00:24, Serial0/0/0

R* 0.0.0.0/0 [120/1] via 172.29.3.5, 00:00:24, Serial0/0/1

[120/1] via 172.29.3.1, 00:00:24, Serial0/0/0

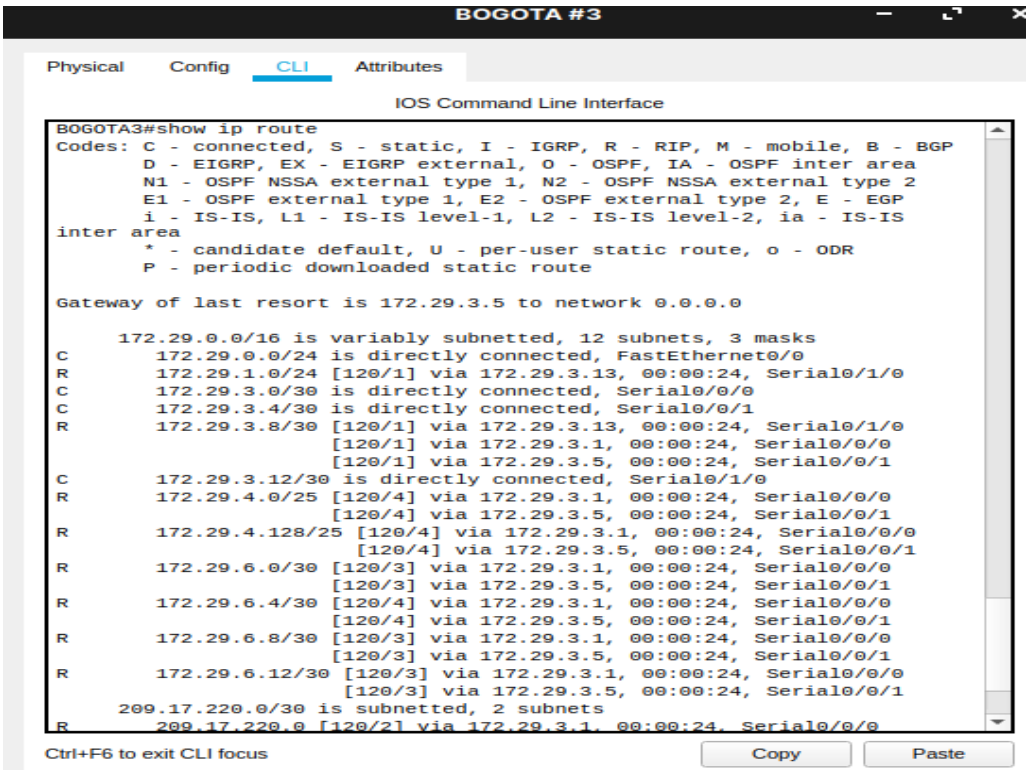


Ilustración 41. Show ip router BOGOTA3

ISP>en

ISP>enable

ISP#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 209.17.220.2 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 14 subnets, 4 masks
S 172.29.0.0/22 is directly connected, Serial0/0/1
R 172.29.0.0/24 [120/2] via 209.17.220.6, 00:00:07, Serial0/0/1
R 172.29.1.0/24 [120/2] via 209.17.220.6, 00:00:07, Serial0/0/1
R 172.29.3.0/30 [120/1] via 209.17.220.6, 00:00:07, Serial0/0/1
R 172.29.3.4/30 [120/1] via 209.17.220.6, 00:00:07, Serial0/0/1
R 172.29.3.8/30 [120/1] via 209.17.220.6, 00:00:07, Serial0/0/1
R 172.29.3.12/30 [120/2] via 209.17.220.6, 00:00:07, Serial0/0/1
S 172.29.4.0/22 is directly connected, Serial0/0/0
R 172.29.4.0/25 [120/2] via 209.17.220.2, 00:00:06, Serial0/0/0
R 172.29.4.128/25 [120/2] via 209.17.220.2, 00:00:06, Serial0/0/0
R 172.29.6.0/30 [120/1] via 209.17.220.2, 00:00:06, Serial0/0/0
R 172.29.6.4/30 [120/2] via 209.17.220.2, 00:00:06, Serial0/0/0
R 172.29.6.8/30 [120/1] via 209.17.220.2, 00:00:06, Serial0/0/0
R 172.29.6.12/30 [120/1] via 209.17.220.2, 00:00:06, Serial0/0/0
209.17.220.0/30 is subnetted, 2 subnets
C 209.17.220.0 is directly connected, Serial0/0/0
C 209.17.220.4 is directly connected, Serial0/0/1
R* 0.0.0.0/0 [120/1] via 209.17.220.2, 00:00:06, Serial0/0/0
[120/1] via 209.17.220.6, 00:00:07, Serial0/0/1

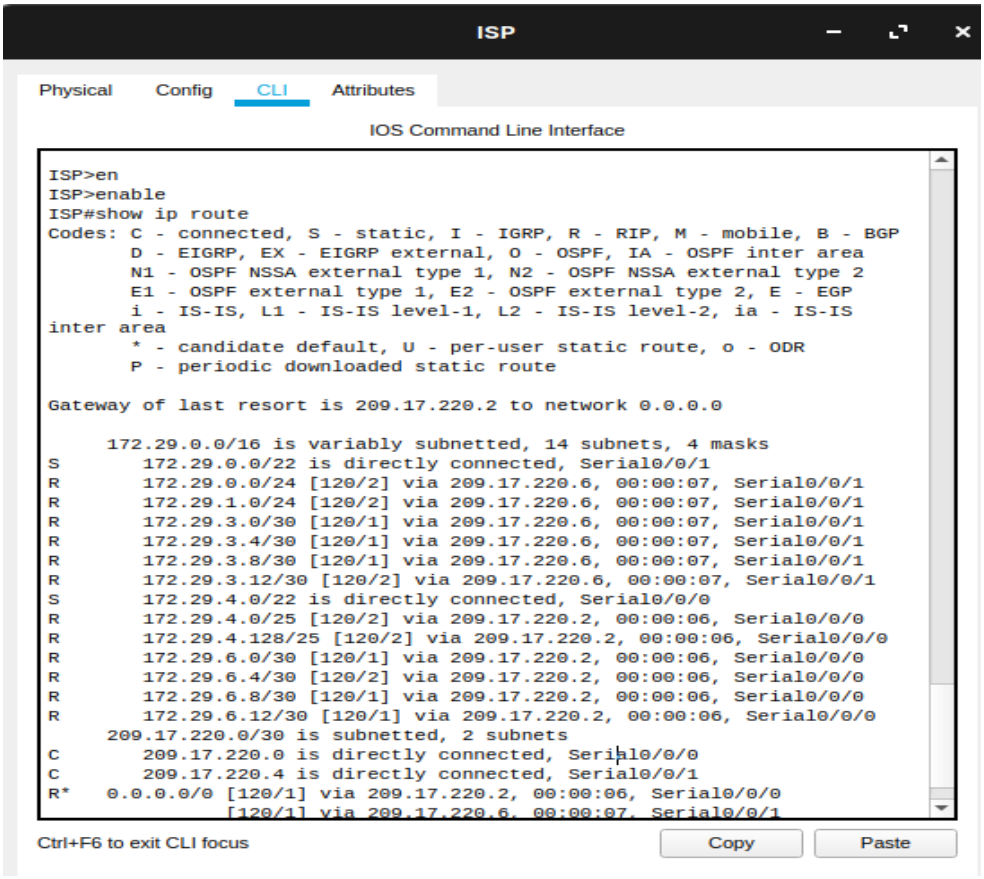


Ilustración 42. Show ip router ISP

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

Utilizamos el comando “show ip route”, “show ip protocols” y “debug ip packet” para ver el balanceo de carga en los router de MEDELLIN1, MEDELLIN3, BOGOTA1, BOGOTA3

Router MEDELLIN1:

```
R       172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:10, Serial0/1/0
C       172.29.4.128/25 is directly connected, FastEthernet0/0
R       172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:02, Serial0/0/1
                      [120/1] via 172.29.6.5, 00:00:10, Serial0/1/0
                      [120/1] via 172.29.6.13, 00:00:02, Serial0/0/0
C       172.29.6.4/30 is directly connected, Serial0/1/0
C       172.29.6.8/30 is directly connected, Serial0/0/1
C       172.29.6.12/30 is directly connected, Serial0/0/0
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0 [120/1] via 172.29.6.9, 00:00:02, Serial0/0/1
                     [120/1] via 172.29.6.13, 00:00:02, Serial0/0/0
R       209.17.220.4 [120/2] via 172.29.6.9, 00:00:02, Serial0/0/1
                     [120/2] via 172.29.6.13, 00:00:02, Serial0/0/0
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:02, Serial0/0/1
               [120/1] via 172.29.6.13, 00:00:02, Serial0/0/0
```

Ilustración 43. Verificar balanceo router MEDELLIN1 – Show ip route

MEDELLIN3#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 23 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

FastEthernet0/0 2 2

Serial0/1/0 2 2

Serial0/0/1 2 2

Serial0/0/0 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

  172.29.0.0

Passive Interface(s):

Routing Information Sources:

  Gateway Distance Last Update

172.29.6.9 120 00:00:13

172.29.6.13 120 00:00:13

172.29.6.5 120 00:00:21

Distance: (default is 120)

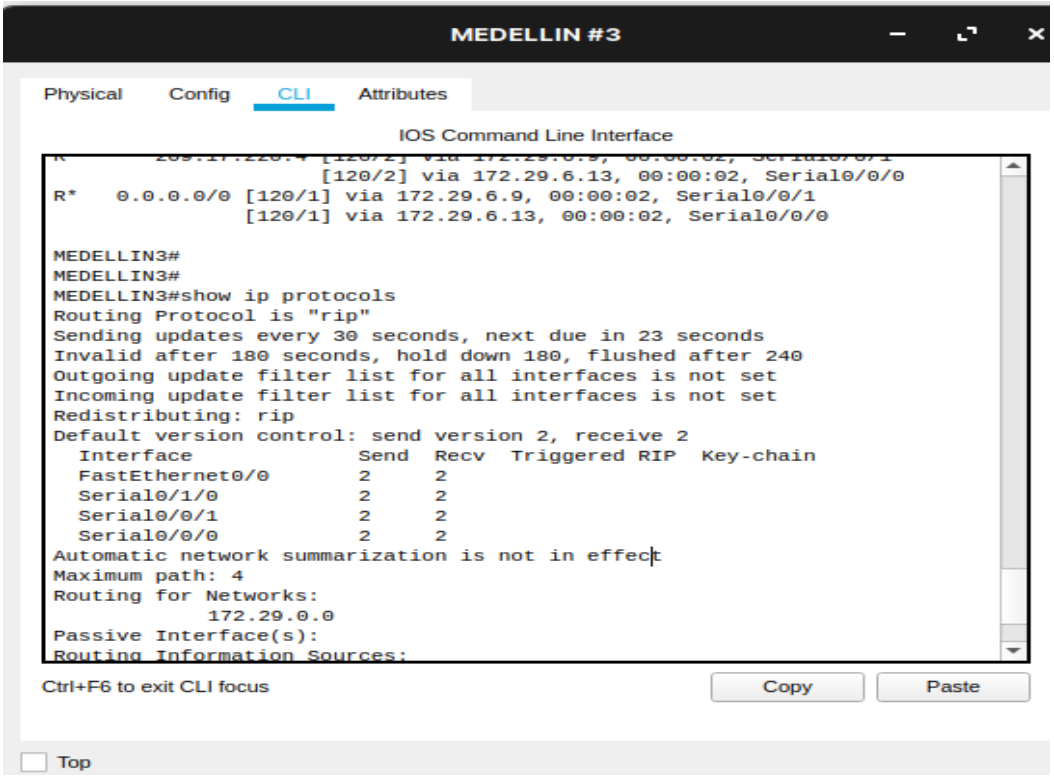


Ilustración 44. Verificar balanceo router MEDELLIN3 - Show ip route

MEDELLIN1>en

MEDELLIN1>enable

MEDELLIN1#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 11 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip, static

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/0/1 2 2

Serial0/0/0 2 2

Serial0/1/1 2 2

Serial0/1/0 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

172.29.0.0

209.17.220.0

Passive Interface(s):

Routing Information Sources:

Gateway Distance Last Update

209.17.220.1 120 00:00:18

172.29.6.2 120 00:00:21

172.29.6.10 120 00:00:04

172.29.6.14 120 00:00:04

Distance: (default is 120)

MEDELLIN1#debug ip packet

Packet debugging is on

MEDELLIN1#

IP: s=172.29.6.2 (Serial0/0/0), d=224.0.0.9 len 92, rcvd 2

IP: s=209.17.220.1 (Serial0/1/1), d=224.0.0.9 len 172, rcvd 2

IP: s=172.29.6.9 (local), d=224.0.0.9 (Serial0/0/1), len 272, sending broad/multicast

IP: s=172.29.6.1 (local), d=224.0.0.9 (Serial0/0/0), len 272, sending broad/multicast

IP: s=209.17.220.2 (local), d=224.0.0.9 (Serial0/1/1), len 172, sending broad/multicast

IP: s=172.29.6.13 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast

IP: s=172.29.6.10 (Serial0/0/1), d=224.0.0.9 len 112, rcvd 2

IP: s=172.29.6.14 (Serial0/1/0), d=224.0.0.9 len 112, rcvd 2

IP: s=172.29.6.2 (Serial0/0/0), d=224.0.0.9 len 92, rcvd 2

IP: s=209.17.220.1 (Serial0/1/1), d=224.0.0.9 len 172, rcvd 2

IP: s=172.29.6.9 (local), d=224.0.0.9 (Serial0/0/1), len 272, sending broad/multicast

IP: s=172.29.6.1 (local), d=224.0.0.9 (Serial0/0/0), len 272, sending broad/multicast

IP: s=209.17.220.2 (local), d=224.0.0.9 (Serial0/1/1), len 172, sending broad/multicast

IP: s=172.29.6.13 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast

MEDELLIN1#

IP: s=172.29.6.10 (Serial0/0/1), d=224.0.0.9 len 112, rcvd 2

IP: s=172.29.6.14 (Serial0/1/0), d=224.0.0.9 len 112, rcvd 2

IP: s=172.29.6.2 (Serial0/0/0), d=224.0.0.9 len 92, rcvd 2

IP: s=209.17.220.1 (Serial0/1/1), d=224.0.0.9 len 172, rcvd 2

IP: s=172.29.6.9 (local), d=224.0.0.9 (Serial0/0/1), len 272, sending broad/multicast

IP: s=172.29.6.1 (local), d=224.0.0.9 (Serial0/0/0), len 272, sending broad/multicast

IP: s=209.17.220.2 (local), d=224.0.0.9 (Serial0/1/1), len 172, sending broad/multicast

IP: s=172.29.6.13 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast

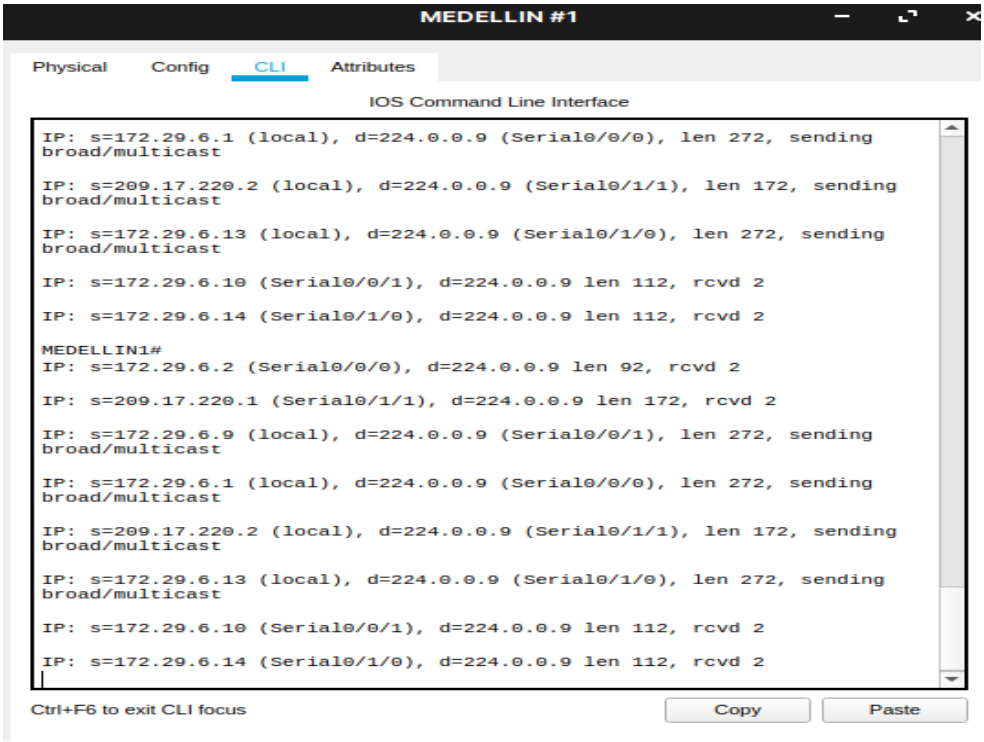


Ilustración 45. Verificar balanceo router MEDELLIN1 - Show ip protocols

Nota: Detenemos el debug con “no debug all”.

Router MEDELLIN3:

```
Gateway of last resort is 172.29.6.9 to network 0.0.0.0

     172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R       172.29.0.0/24 [120/4] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/4] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.1.0/24 [120/4] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/4] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.3.0/30 [120/3] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/3] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.3.4/30 [120/3] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/3] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.3.8/30 [120/3] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/3] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.3.12/30 [120/4] via 172.29.6.9, 00:00:04, Serial0/0/1
                       [120/4] via 172.29.6.13, 00:00:04, Serial0/0/0
R       172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:00, Serial0/1/0
C       172.29.4.128/25 is directly connected, FastEthernet0/0
R       172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:04, Serial0/0/1
                      [120/1] via 172.29.6.5, 00:00:00, Serial0/1/0
                      [120/1] via 172.29.6.13, 00:00:04, Serial0/0/0
C       172.29.6.4/30 is directly connected, Serial0/1/0
C       172.29.6.8/30 is directly connected, Serial0/0/1
C       172.29.6.12/30 is directly connected, Serial0/0/0
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0 [120/1] via 172.29.6.9, 00:00:04, Serial0/0/1
                     [120/1] via 172.29.6.13, 00:00:04, Serial0/0/0
R       209.17.220.4 [120/2] via 172.29.6.9, 00:00:04, Serial0/0/1
                     [120/2] via 172.29.6.13, 00:00:04, Serial0/0/0
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:04, Serial0/0/1
               [120/1] via 172.29.6.13, 00:00:04, Serial0/0/0
```

Ilustración 46. Verificar balanceo router MEDELLIN3 - Show ip route

```
MEDELLIN3#show ip pro
MEDELLIN3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 1 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 2 2
Serial0/1/0 2 2
Serial0/0/1 2 2
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
Routing Information Sources:
  Gateway Distance Last Update
  172.29.6.9 120 00:00:19
  172.29.6.13 120 00:00:19
  172.29.6.5 120 00:00:16
Distance: (default is 120)
MEDELLIN3#
MEDELLIN3#
MEDELLIN3#deb
MEDELLIN3#debug ip pa
MEDELLIN3#debug ip packet
Packet debugging is on
```

MEDELLIN3#
IP: s=172.29.4.129 (local), d=224.0.0.9 (FastEthernet0/0), len 312, sending broad/multicast
IP: s=172.29.6.6 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast
IP: s=172.29.6.10 (local), d=224.0.0.9 (Serial0/0/1), len 112, sending broad/multicast
IP: s=172.29.6.14 (local), d=224.0.0.9 (Serial0/0/0), len 112, sending broad/multicast
IP: s=172.29.6.9 (Serial0/0/1), d=224.0.0.9 len 272, rcvd 2
IP: s=172.29.6.13 (Serial0/0/0), d=224.0.0.9 len 272, rcvd 2
IP: s=172.29.6.5 (Serial0/1/0), d=224.0.0.9 len 252, rcvd 2
IP: s=172.29.4.129 (local), d=224.0.0.9 (FastEthernet0/0), len 312, sending broad/multicast
IP: s=172.29.6.6 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast
IP: s=172.29.6.10 (local), d=224.0.0.9 (Serial0/0/1), len 112, sending broad/multicast
IP: s=172.29.6.14 (local), d=224.0.0.9 (Serial0/0/0), len 112, sending broad/multicast
IP: s=172.29.6.9 (Serial0/0/1), d=224.0.0.9 len 272, rcvd 2
IP: s=172.29.6.13 (Serial0/0/0), d=224.0.0.9 len 272, rcvd 2
IP: s=172.29.6.5 (Serial0/1/0), d=224.0.0.9 len 252, rcvd 2
IP: s=172.29.4.129 (local), d=224.0.0.9 (FastEthernet0/0), len 312, sending broad/multicast
IP: s=172.29.6.6 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast
IP: s=172.29.6.10 (local), d=224.0.0.9 (Serial0/0/1), len 112, sending broad/multicast
IP: s=172.29.6.14 (local), d=224.0.0.9 (Serial0/0/0), len 112, sending broad/multicast

IP: s=172.29.6.9 (Serial0/0/1), d=224.0.0.9 len 272, rcvd 2

IP: s=172.29.6.13 (Serial0/0/0), d=224.0.0.9 len 272, rcvd 2

IP: s=172.29.6.5 (Serial0/1/0), d=224.0.0.9 len 252, rcvd 2

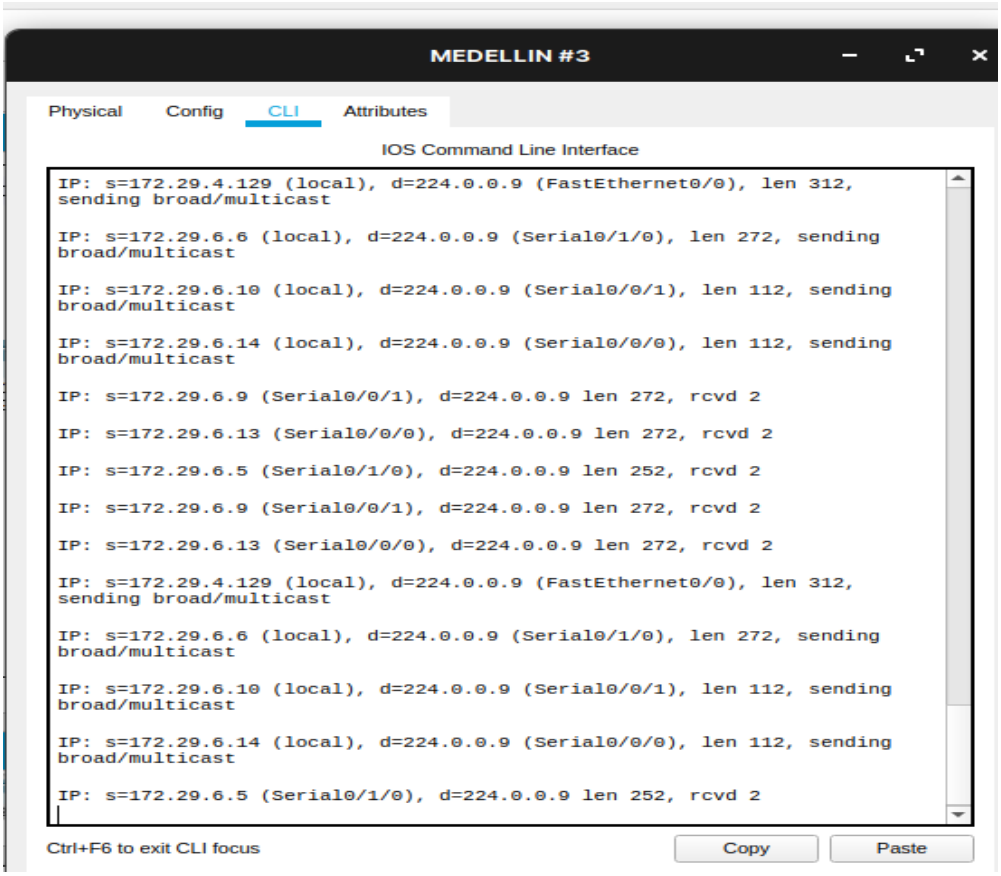


Ilustración 47. Verificar balanceo router MEDELLIN3 - Show ip protocols

Router BOGOTA1:

BOGOTA1>show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks

R 172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:08, Serial0/1/0

[120/1] via 172.29.3.2, 00:00:08, Serial0/1/1

R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1

C 172.29.3.0/30 is directly connected, Serial0/1/1

C 172.29.3.4/30 is directly connected, Serial0/1/0

C 172.29.3.8/30 is directly connected, Serial0/0/1

R 172.29.3.12/30 [120/1] via 172.29.3.6, 00:00:08, Serial0/1/0

[120/1] via 172.29.3.10, 00:00:03, Serial0/0/1

[120/1] via 172.29.3.2, 00:00:08, Serial0/1/1

R 172.29.4.0/25 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0

R 172.29.4.128/25 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0

R 172.29.6.0/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0

R 172.29.6.4/30 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0

R 172.29.6.8/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0

R 172.29.6.12/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0

209.17.220.0/30 is subnetted, 2 subnets

R 209.17.220.0 [120/1] via 209.17.220.5, 00:00:14, Serial0/0/0

C 209.17.220.4 is directly connected, Serial0/0/0

S* 0.0.0.0/0 is directly connected, Serial0/0/0

[1/0] via 209.17.220.5

```
Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:08, Serial0/1/0
                      [120/1] via 172.29.3.2, 00:00:08, Serial0/1/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1
C       172.29.3.0/30 is directly connected, Serial0/1/1
C       172.29.3.4/30 is directly connected, Serial0/1/0
C       172.29.3.8/30 is directly connected, Serial0/0/1
R       172.29.3.12/30 [120/1] via 172.29.3.6, 00:00:08, Serial0/1/0
                       [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1
                       [120/1] via 172.29.3.2, 00:00:08, Serial0/1/1
R       172.29.4.0/25 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0
R       172.29.4.128/25 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0
R       172.29.6.0/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0
R       172.29.6.4/30 [120/3] via 209.17.220.5, 00:00:14, Serial0/0/0
R       172.29.6.8/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0
R       172.29.6.12/30 [120/2] via 209.17.220.5, 00:00:14, Serial0/0/0
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0 [120/1] via 209.17.220.5, 00:00:14, Serial0/0/0
C       209.17.220.4 is directly connected, Serial0/0/0
S*   0.0.0.0/0 is directly connected, Serial0/0/0
                [1/0] via 209.17.220.5
```

Ilustración 48. Verificar balanceo router BOGOTA1 - Show ip route

```
BOGOTA1>en
BOGOTA1>enable
BOGOTA1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/1/0 2 2
Serial0/0/0 2 2
Serial0/0/1 2 2
Serial0/1/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
  209.17.220.0
Passive Interface(s):
Routing Information Sources:
  Gateway Distance Last Update
  172.29.3.6 120 00:00:23
  172.29.3.2 120 00:00:23
  172.29.3.10 120 00:00:15
  209.17.220.5 120 01:40:20
Distance: (default is 120)
BOGOTA1#
BOGOTA1#
BOGOTA1#debug ip packet
```

Packet debugging is on

BOGOTA1#

IP: s=172.29.3.5 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast
IP: s=209.17.220.6 (local), d=224.0.0.9 (Serial0/0/0), len 172, sending broad/multicast
IP: s=172.29.3.9 (local), d=224.0.0.9 (Serial0/0/1), len 272, sending broad/multicast
IP: s=172.29.3.1 (local), d=224.0.0.9 (Serial0/1/1), len 272, sending broad/multicast
IP: s=209.17.220.5 (Serial0/0/0), d=224.0.0.9 len 172, rcvd 2

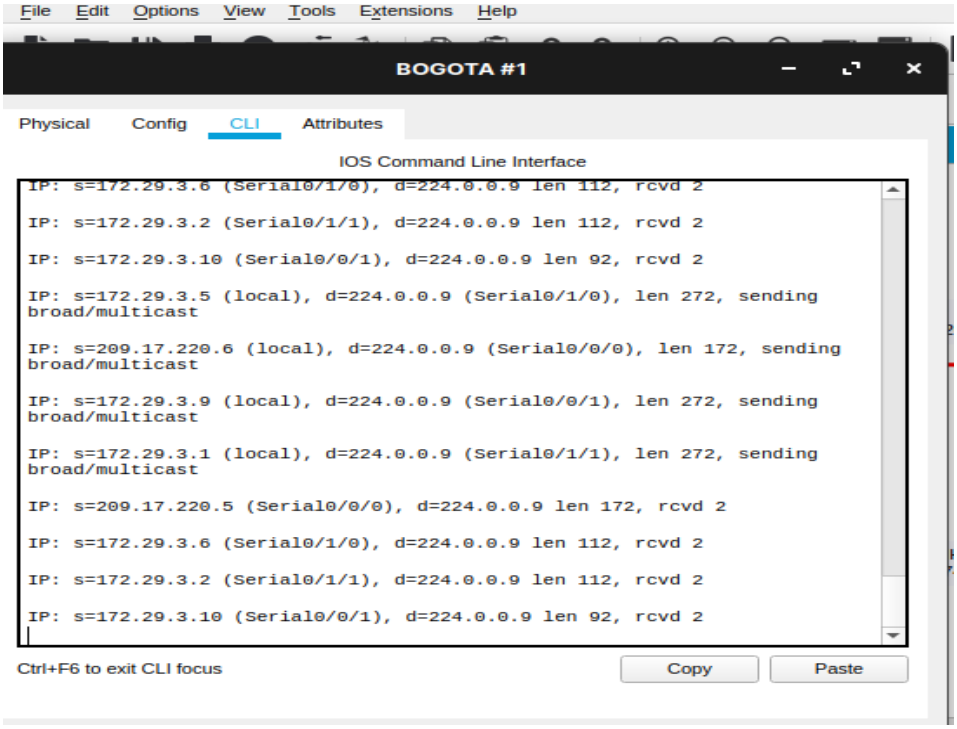


Ilustración 49. Verificar balanceo router BOGOTA1 - Show ip protocols

BOGOTA3>en

BOGOTA3>enable

BOGOTA3#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is 172.29.3.5 to network 0.0.0.0
172.29.0.0/16 is variably subnetted, 12 subnets, 3 masks
C 172.29.0.0/24 is directly connected, FastEthernet0/0
R 172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:19, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
R 172.29.3.8/30 [120/1] via 172.29.3.13, 00:00:19, Serial0/1/0
[120/1] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:06, Serial0/0/1
C 172.29.3.12/30 is directly connected, Serial0/1/0
R 172.29.4.0/25 [120/4] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:06, Serial0/0/1
R 172.29.4.128/25 [120/4] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:06, Serial0/0/1
R 172.29.6.0/30 [120/3] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/3] via 172.29.3.5, 00:00:06, Serial0/0/1
R 172.29.6.4/30 [120/4] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/4] via 172.29.3.5, 00:00:06, Serial0/0/1
R 172.29.6.8/30 [120/3] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/3] via 172.29.3.5, 00:00:06, Serial0/0/1
R 172.29.6.12/30 [120/3] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/3] via 172.29.3.5, 00:00:06, Serial0/0/1
209.17.220.0/30 is subnetted, 2 subnets
R 209.17.220.0 [120/2] via 172.29.3.1, 00:00:06, Serial0/0/0
[120/2] via 172.29.3.5, 00:00:06, Serial0/0/1
R 209.17.220.4 [120/1] via 172.29.3.5, 00:00:06, Serial0/0/1
[120/1] via 172.29.3.1, 00:00:06, Serial0/0/0
R* 0.0.0.0/0 [120/1] via 172.29.3.5, 00:00:06, Serial0/0/1
[120/1] via 172.29.3.1, 00:00:06, Serial0/0/0

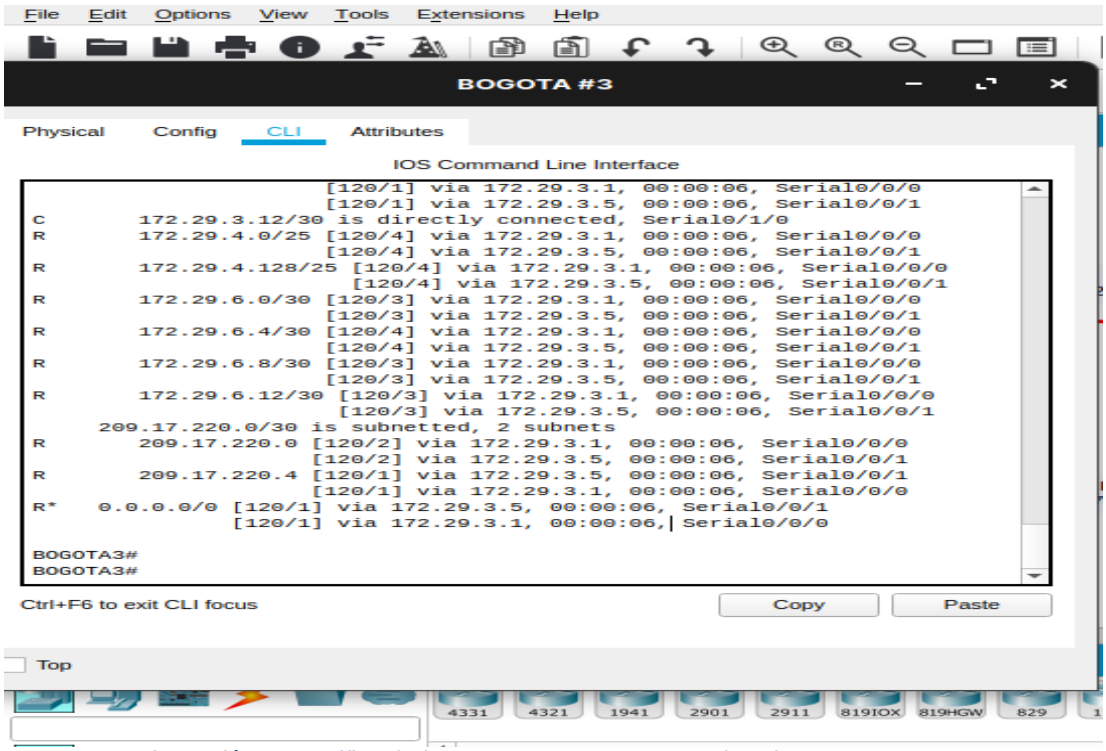


Ilustración 50. Verificar balanceo router BOGOTA3 - Show ip route

BOGOTA3#
BOGOTA3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 5 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
FastEthernet0/0 2 2
Serial0/0/1 2 2
Serial0/1/0 2 2
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0

Passive Interface(s):

Routing Information Sources:

  Gateway Distance Last Update

172.29.3.5 120 00:00:18

172.29.3.1 120 00:00:18

172.29.3.13 120 00:00:25

Distance: (default is 120)

BOGOTA3#

BOGOTA3#

BOGOTA3#debug ip packet

Packet debugging is on

BOGOTA3#

IP: s=172.29.3.13 (Serial0/1/0), d=224.0.0.9 len 252, rcvd 2

IP: s=172.29.0.1 (local), d=224.0.0.9 (FastEthernet0/0), len 312, sending broad/multicast

IP: s=172.29.3.6 (local), d=224.0.0.9 (Serial0/0/1), len 112, sending broad/multicast

IP: s=172.29.3.14 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast

IP: s=172.29.3.2 (local), d=224.0.0.9 (Serial0/0/0), len 112, sending broad/multicast

IP: s=172.29.3.5 (Serial0/0/1), d=224.0.0.9 len 272, rcvd 2

IP: s=172.29.3.1 (Serial0/0/0), d=224.0.0.9 len 272, rcvd 2

IP: s=172.29.3.13 (Serial0/1/0), d=224.0.0.9 len 252, rcvd 2

IP: s=172.29.0.1 (local), d=224.0.0.9 (FastEthernet0/0), len 312, sending broad/multicast

IP: s=172.29.3.6 (local), d=224.0.0.9 (Serial0/0/1), len 112, sending broad/multicast

IP: s=172.29.3.14 (local), d=224.0.0.9 (Serial0/1/0), len 272, sending broad/multicast

IP: s=172.29.3.2 (local), d=224.0.0.9 (Serial0/0/0), len 112, sending broad/multicast

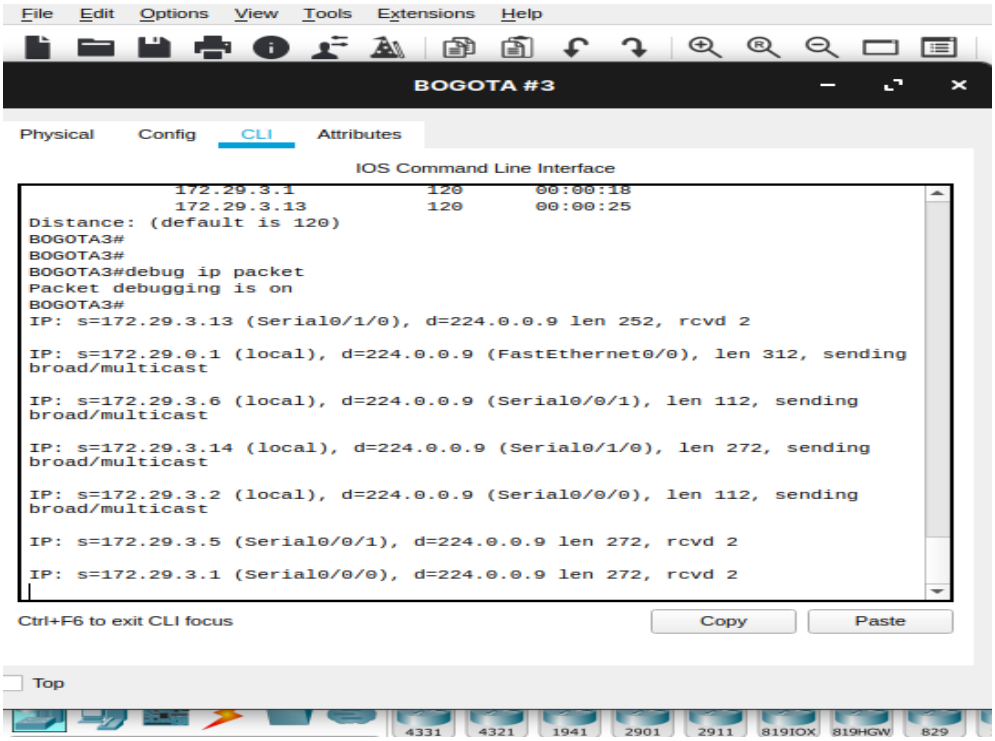


Ilustración 51. Verificar balanceo router BOGOTA3 - Show ip protocols

Router ISP:

ISP>enable

ISP#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 18 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/0/0 2 2

Serial0/0/1 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

209.17.220.0

Passive Interface(s):

Routing Information Sources:

Gateway Distance Last Update

209.17.220.2 120 00:00:22
209.17.220.6 120 00:00:16

Distance: (default is 120)

ISP#

ISP#

ISP#debug ip packet

Packet debugging is on

ISP#

IP: s=209.17.220.2 (Serial0/0/0), d=224.0.0.9 len 172, rcvd 2

IP: s=209.17.220.6 (Serial0/0/1), d=224.0.0.9 len 172, rcvd 2

IP: s=209.17.220.1 (local), d=224.0.0.9 (Serial0/0/0), len 172, sending broad/multicast

IP: s=209.17.220.5 (local), d=224.0.0.9 (Serial0/0/1), len 172, sending broad/multicast

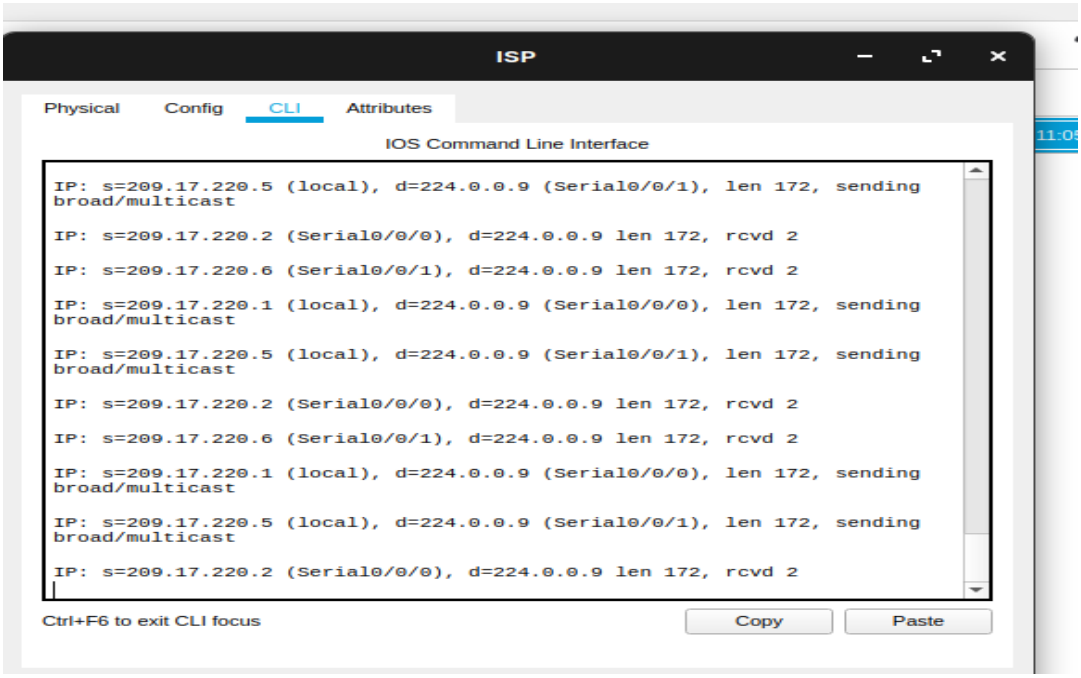


Ilustración 52. Verificar balanceo router ISP - Show ip protocols

C. Obsérvese en los routers Bogotá1 y Medellín1 cierta similitud por su ubicación, por tener dos enlaces de conexión hacia otro router y por la ruta por defecto que manejan.

Router MEDELLIN1:

```
MEDELLIN1#sho
MEDELLIN1#show ip
MEDELLIN1#show ip pro
MEDELLIN1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 0 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
  Interface             Send  Recv  Triggered RIP  Key-chain
  Serial0/0/1           2     2
  Serial0/0/0           2     2
  Serial0/1/1           2     2
  Serial0/1/0           2     2
Automatic network summarization is not in effect
```

Ilustración 53. Observar similitud router MEDELLIN1 de BOGOTA1

Router BOGOTA1:

```
BOGOTA1#no debug all
All possible debugging has been turned off
BOGOTA1#sho
BOGOTA1#show ip pro
BOGOTA1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
  Interface             Send  Recv  Triggered RIP  Key-chain
  Serial0/1/0           2     2
  Serial0/0/0           2     2
  Serial0/0/1           2     2
  Serial0/1/1           2     2
```

Ilustración 54. Observar similitud router BOGOTA1 de MEDELLIN1

D. Los routers Medellín2 y Bogotá2 también presentan redes conectadas directamente y recibidas mediante RIP.

Router MEDELLIN2:

```
MEDELLIN2>ENable
MEDELLIN2#show ip pro
MEDELLIN2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 10 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface             Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0       2     2
  Serial0/0/1           2     2
  Serial0/0/0           2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
            172.29.0.0
Passive Interface(s):
Routing Information Sources:
            Gateway         Distance      Last Update
            172.29.6.1           120      00:00:19
            172.29.6.6           120      00:00:28
Distance: (default is 120)
```

Ilustración 55. Red RIP router MEDELLIN2

Router BOGOTA2:

```
BOGOTA2>enable
BOGOTA2#show ip pr
BOGOTA2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 24 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface             Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0       2     2
  Serial0/0/1           2     2
  Serial0/0/0           2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
            172.29.0.0
Passive Interface(s):
Routing Information Sources:
            Gateway         Distance      Last Update
            172.29.3.9           120      00:00:16
            172.29.3.14          120      00:00:22
Distance: (default is 120)
```

Ilustración 56. Red RIP router BOGOTA2

E. Las tablas de los routers restantes deben permitir visualizar rutas redundantes para el caso de la ruta por defecto.

Router MEDELLIN3:

Cuando hay más de un camino, son rutas redundantes:

```
R       172.29.3.12/30 [120/4] via 172.29.6.9, 00:00:08, Serial0/0/1
                       [120/4] via 172.29.6.13, 00:00:08, Serial0/0/0
```

Ilustración 57. Router MEDELLIN3

```
Maximum path: 4
Routing for Networks:
            172.29.0.0
Passive Interface(s):
Routing Information Sources:
            Gateway         Distance      Last Update
            172.29.6.9           120      00:00:22
            172.29.6.13          120      00:00:22
            172.29.6.5           120      00:00:12
Distance: (default is 120)
```

Router BOGOTA3:

```
Routing for Networks:
            172.29.0.0
Passive Interface(s):
Routing Information Sources:
            Gateway         Distance      Last Update
            172.29.3.5           120      00:00:11
            172.29.3.1           120      00:00:11
            172.29.3.13          120      00:00:09
```

Ilustración 58. Rutas redundantes BOGOTA3

F. El router ISP solo debe indicar sus rutas estáticas adicionales a las directamente conectadas.

ISP>

ISP>en

ISP>enable

```
ISP#no debug all
All possible debugging has been turned off
ISP#show ipprotocols
^
% Invalid input detected at '^' marker.

ISP#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 15 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/0 2 2
Serial0/0/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  209.17.220.0
Passive Interface(s):
Routing Information Sources:
  Gateway Distance Last Update
  209.17.220.2 120 00:00:28
  209.17.220.6 120 00:00:04
Distance: (default is 120)
ISP#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
```

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is 209.17.220.2 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 14 subnets, 4 masks

S 172.29.0.0/22 is directly connected, Serial0/0/1

R 172.29.0.0/24 [120/2] via 209.17.220.6, 00:00:01, Serial0/0/1

R 172.29.1.0/24 [120/2] via 209.17.220.6, 00:00:01, Serial0/0/1

R 172.29.3.0/30 [120/1] via 209.17.220.6, 00:00:01, Serial0/0/1

R 172.29.3.4/30 [120/1] via 209.17.220.6, 00:00:01, Serial0/0/1

R 172.29.3.8/30 [120/1] via 209.17.220.6, 00:00:01, Serial0/0/1

R 172.29.3.12/30 [120/2] via 209.17.220.6, 00:00:01, Serial0/0/1

S 172.29.4.0/22 is directly connected, Serial0/0/0

R 172.29.4.0/25 [120/2] via 209.17.220.2, 00:00:28, Serial0/0/0

R 172.29.4.128/25 [120/2] via 209.17.220.2, 00:00:28, Serial0/0/0

R 172.29.6.0/30 [120/1] via 209.17.220.2, 00:00:28, Serial0/0/0

R 172.29.6.4/30 [120/2] via 209.17.220.2, 00:00:28, Serial0/0/0

R 172.29.6.8/30 [120/1] via 209.17.220.2, 00:00:28, Serial0/0/0

R 172.29.6.12/30 [120/1] via 209.17.220.2, 00:00:28, Serial0/0/0

209.17.220.0/30 is subnetted, 2 subnets

C 209.17.220.0 is directly connected, Serial0/0/0

C 209.17.220.4 is directly connected, Serial0/0/1

R* 0.0.0.0/0 [120/1] via 209.17.220.2, 00:00:28, Serial0/0/0

[120/1] via 209.17.220.6, 00:00:01, Serial0/0/1

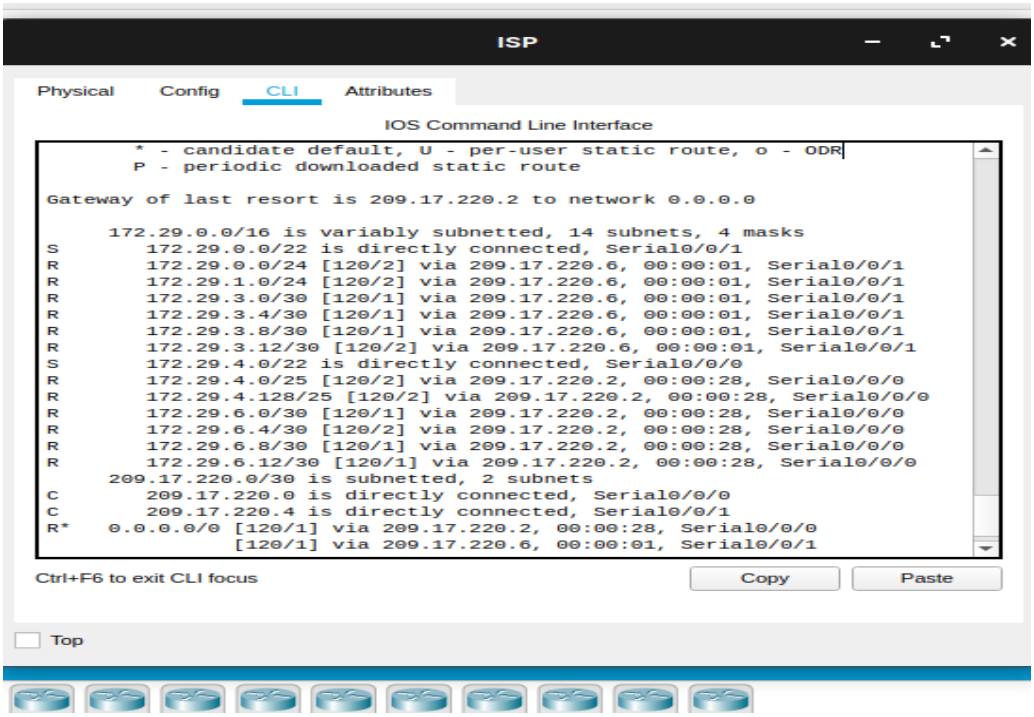


Ilustración 59. Rutas estáticas y adicionales router ISP

1.1.3 Parte 3: Deshabilitar la propagación del protocolo RIP.

A. Para no propagar las publicaciones por interfaces que no lo requieran se debe deshabilitar la propagación del protocolo RIP, en la siguiente tabla se indican las interfaces de cada router que no necesitan desactivación.

Utilizamos el comando de configuración del router passive-interface para evitar que las actualizaciones de routing se transmitan a través del router.

El router sabe llegar a la IP 209.17.225.5 a través de la interfaz S0/0/0 del router de BOGOTA1, por lo tanto, la vamos a desactivar:

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#router rip

BOGOTA1(config-router)#ser

BOGOTA1(config-router)#ver

BOGOTA1(config-router)#version 2

BOGOTA1(config-router)#passive-interface serial0/0/0

BOGOTA1(config-router)#exit

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

```
BOGOTA1>en
BOGOTA1>enable
BOGOTA1#conf
BOGOTA1#configure ter
BOGOTA1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
BOGOTA1(config)#router rip
BOGOTA1(config-router)#ser
BOGOTA1(config-router)#ver
BOGOTA1(config-router)#version 2
BOGOTA1(config-router)#passive-interface serial0/0/0
BOGOTA1(config-router)#exit
BOGOTA1(config)#exit
BOGOTA1#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Ilustración 60. Deshabilitar propagación del protocolo RIP router BOGOTA1

El router sabe llegar a la IP 172.29.6.2 através de la interfaz S0/0/0 del router de MEDELLIN1, por lo tanto, la vamos a desactivar:

MEDELLIN1>en

MEDELLIN1>enable

MEDELLIN1#conf

```
MEDELLIN1#configure ter
MEDELLIN1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#rout
MEDELLIN1(config)#router ip
MEDELLIN1(config)#router ip
^
% Invalid input detected at '^' marker.

MEDELLIN1(config)#router ri
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#ver
MEDELLIN1(config-router)#version 2
MEDELLIN1(config-router)#passive-interface serial0/0/0
MEDELLIN1(config-router)#exit
MEDELLIN1(config)#exit
MEDELLIN1#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
MEDELLIN1>en
MEDELLIN1>enable
MEDELLIN1#conf
MEDELLIN1#configure ter
MEDELLIN1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
MEDELLIN1(config)#rout
MEDELLIN1(config)#router ip
MEDELLIN1(config)#router ip
                  ^
% Invalid input detected at '^' marker.

MEDELLIN1(config)#router ri
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#ver
MEDELLIN1(config-router)#version 2
MEDELLIN1(config-router)#passive-interface serial0/0/0
MEDELLIN1(config-router)#exit
MEDELLIN1(config)#exit
MEDELLIN1#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
MEDELLIN1#
```

Ilustración 61. Deshabilitar propagación del protocolo RIP router MEDELLIN1

- **Desactivamos la F0/0 del router de BOGOTA2:**

BOGOTA2>en

BOGOTA2>enable

BOGOTA2#conf

BOGOTA2#configure ter

BOGOTA2#configure terminal

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

BOGOTA2(config)#router ri

BOGOTA2(config)#router rip

BOGOTA2(config-router)#vir

BOGOTA2(config-router)#vers

BOGOTA2(config-router)#version 2

BOGOTA2(config-router)#passive-interface f0/0

BOGOTA2(config-router)#exit

BOGOTA2(config)#exit

BOGOTA2#

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

BOGOTA2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

```
BOGOTA2>en
BOGOTA2>enable
BOGOTA2#conf
BOGOTA2#configure ter
BOGOTA2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
BOGOTA2(config)#router ri
BOGOTA2(config)#router rip
BOGOTA2(config-router)#vir
BOGOTA2(config-router)#vers
BOGOTA2(config-router)#version 2
BOGOTA2(config-router)#passive-interface f0/0
BOGOTA2(config-router)#exit
BOGOTA2(config)#exit
BOGOTA2#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
BOGOTA2#
```

Ilustración 62. Deshabilitar propagación del protocolo RIP router BOGOTA2

- **Desactivamos la F0/0 del router de BOGOTA3:**

BOGOTA3>en

BOGOTA3>enable

BOGOTA3#conf

BOGOTA3#configure ter

BOGOTA3#configure terminal

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

BOGOTA3(config)#rout

BOGOTA3(config)#router rip

BOGOTA3(config-router)#ver

BOGOTA3(config-router)#version 2

BOGOTA3(config-router)#passive-interface f0/0

BOGOTA3(config-router)#exit

BOGOTA3(config)#exit

BOGOTA3#

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

BOGOTA3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

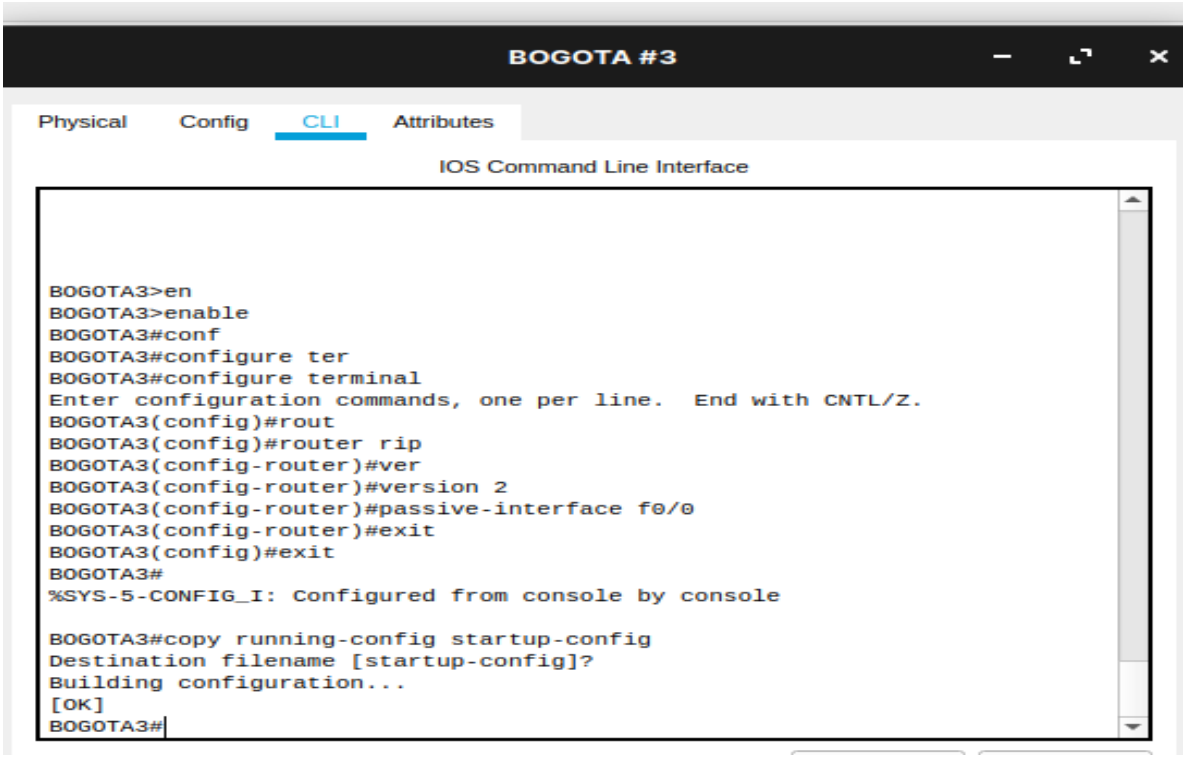


Ilustración 63. Deshabilitar propagación del protocolo RIP router BOGOTA3

- **Desactivamos la F0/0 del router de MEDELLIN2:**

MEDELLIN2>en

MEDELLIN2>enable

MEDELLIN2#cong

MEDELLIN2#conf

MEDELLIN2#configure ter

MEDELLIN2#configure terminal

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

MEDELLIN2(config)#rou

MEDELLIN2(config)#router rip

MEDELLIN2(config-router)#ver

MEDELLIN2(config-router)#version

% Incomplete command.

MEDELLIN2(config-router)#version 2

MEDELLIN2(config-router)#passive-interface f0/0

MEDELLIN2(config-router)#exit

MEDELLIN2(config)#exit

MEDELLIN2#

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

MEDELLIN2#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

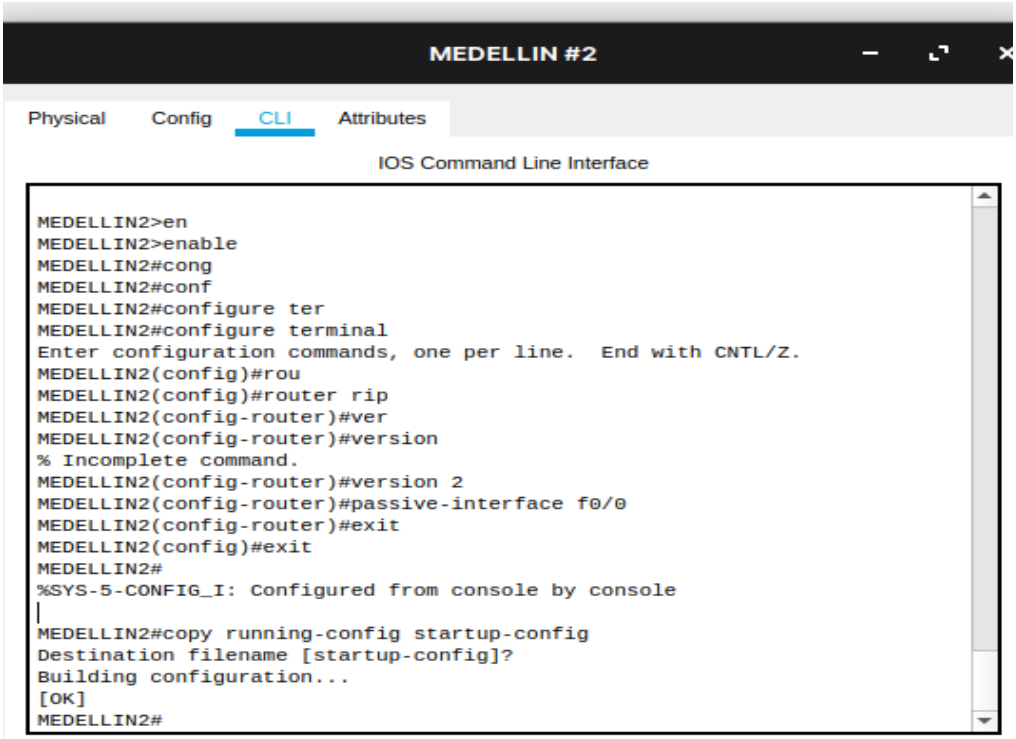


Ilustración 64. Deshabilitar propagación del protocolo RIP router MEDELLIN2

- **Desactivamos la F0/0 del router de MEDELLIN3:**

```
MEDELLIN3>en
MEDELLIN3>enable
MEDELLIN3#conf
MEDELLIN3#configure ter
MEDELLIN3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN3(config)#rou
MEDELLIN3(config)#router rip
MEDELLIN3(config)#router rip
MEDELLIN3(config-router)#vers
MEDELLIN3(config-router)#version 2
MEDELLIN3(config-router)#passive-interface f0/0
MEDELLIN3(config-router)#exit
MEDELLIN3(config)#exit
MEDELLIN3#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
MEDELLIN3>en
MEDELLIN3>enable
MEDELLIN3#conf
MEDELLIN3#configure ter
MEDELLIN3#configure terminal
Enter configuration commands, one per line.  End with
MEDELLIN3(config)#rou
MEDELLIN3(config)#router rip
MEDELLIN3(config)#router rip
MEDELLIN3(config-router)#vers
MEDELLIN3(config-router)#version 2
MEDELLIN3(config-router)#passive-interface f0/0
MEDELLIN3(config-router)#exit
MEDELLIN3(config)#exit
MEDELLIN3#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Ilustración 65. Deshabilitar propagación del protocolo RIP router MEDELLIN3

- **Desactivamos la S0/0/0 y S0/0/1 del router del SP:**

ISP>en

ISP>enable

ISP#con

ISP#conf

ISP#configure ter

ISP#configure terminal

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

ISP(config)#route

ISP(config)#router rip

ISP(config-router)#ver

ISP(config-router)#version 2

ISP(config-router)#passive-interface serial0/0/0

ISP(config-router)#passive-interface serial0/0/1

ISP(config-router)#exit

ISP(config)#exit

ISP#

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

ISP#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

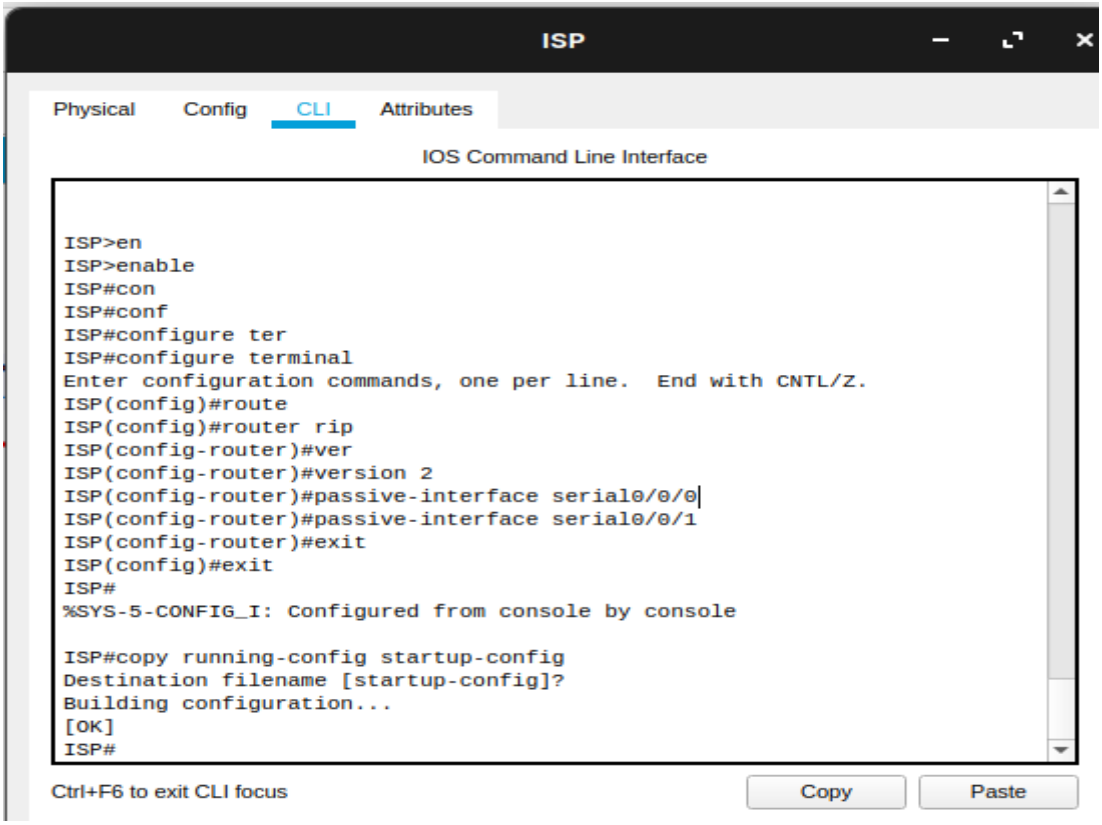


Ilustración 66. Deshabilitar propagación del protocolo RIP router ISP

1.1.4 Parte 4: Verificación del protocolo RIP.

A. Verificar y documentar las opciones de enrutamiento configuradas en los routers, como el passive interface para la conexión hacia el ISP, la versión de RIP y las interfaces que participan de la publicación entre otros datos.

B. Verificar y documentar la base de datos de RIP de cada router, donde se informa de manera detallada de todas las rutas hacia cada red.

- **Ejecutamos el comando “showipprotocol” en el router MEDELLIN1:**

```
MEDELLIN1>en
MEDELLIN1>enable
MEDELLIN1#show ip pro
MEDELLIN1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/1 2 2
Serial0/1/1 2 2
Serial0/1/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
  209.17.220.0
Passive Interface(s):
  Serial0/0/0
Routing Information Sources:
  Gateway Distance Last Update
  172.29.6.2 120 00:00:22
  172.29.6.10 120 00:00:01
  172.29.6.14 120 00:00:01
Distance: (default is 120)
```

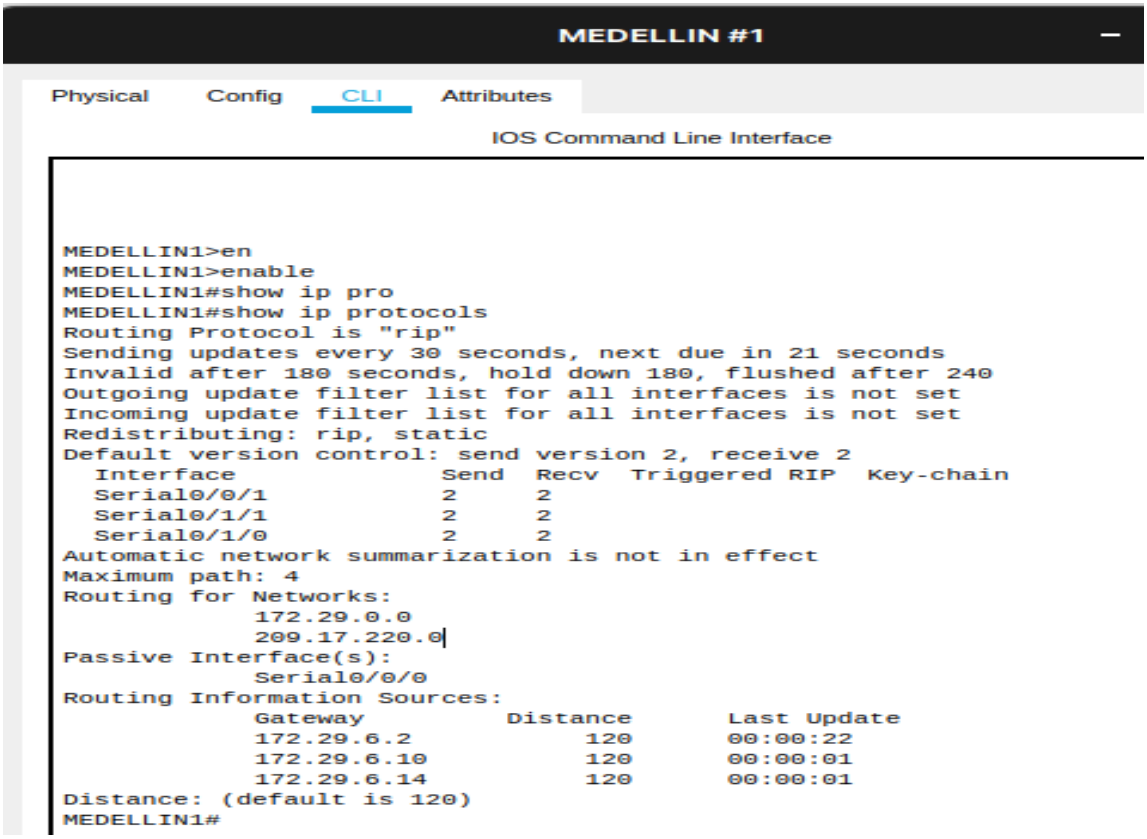


Ilustración 67. Verificar protocolo RIP router MEDELLIN1

- **Ejecutamos el comando "show ip protocol" en el router MEDELLIN2:**

MEDELLIN2>en

MEDELLIN2>enable

MEDELLIN2#show ip protocol

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 25 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/0/1 2 2

Serial0/0/0 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

  172.29.0.0

Passive Interface(s):

  FastEthernet0/0

Routing Information Sources:

  Gateway Distance Last Update

  172.29.6.6 120 00:00:21

Distance: (default is 120)

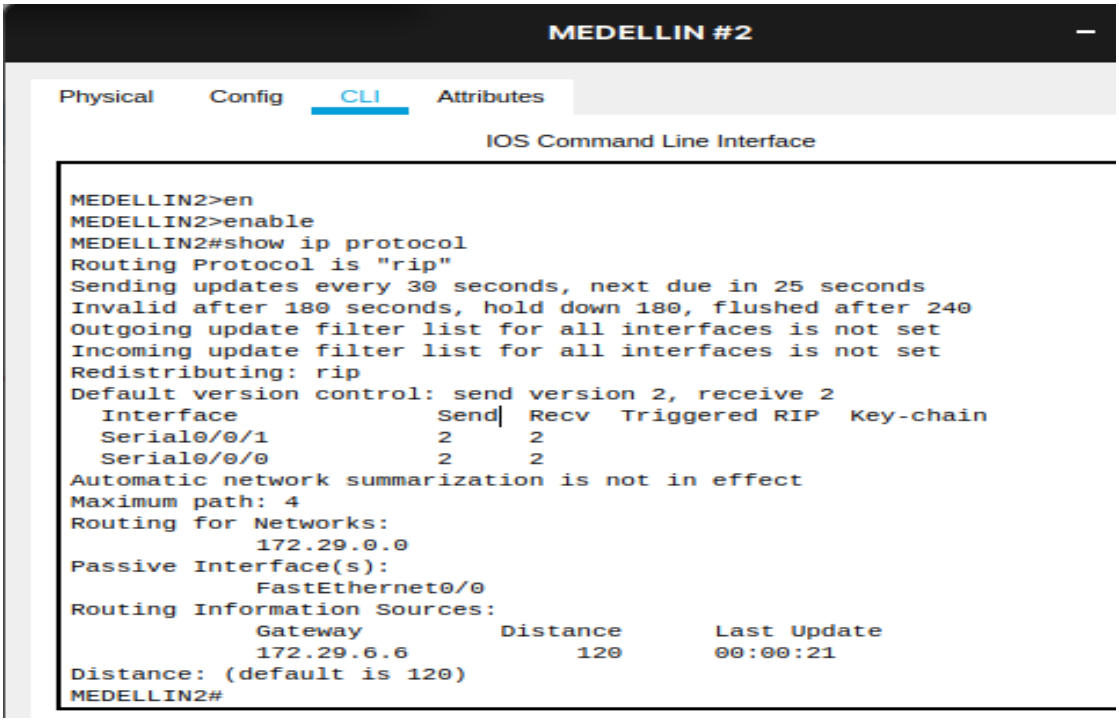


Ilustración 68. Verificar protocolo RIP router MEDELLIN2

- **Ejecutamos el comando “show ip protocol” en el router MEDELLIN3:**

```
MEDELLIN3>ena
MEDELLIN3>enable
MEDELLIN3#show ip protocol
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 9 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/1/0 2 2
Serial0/0/1 2 2
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway Distance Last Update
  172.29.6.9 120 00:00:10
  172.29.6.13 120 00:00:10
  172.29.6.5 120 00:00:24
Distance: (default is 120)
```

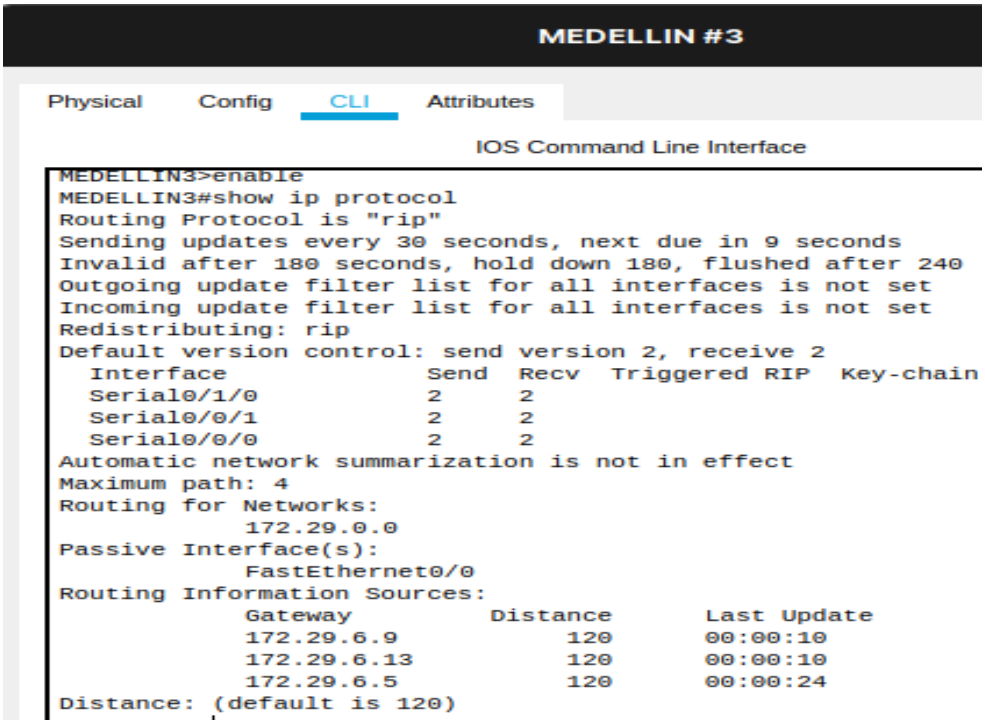


Ilustración 69. Verificar protocolo RIP router MEDELLIN3

- **Ejecutamos el comando "showipprotocol" en el router BOGOTA1:**

BOGOTA1>show ip protocol

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 4 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip, static

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/1/0 2 2

Serial0/0/1 2 2

Serial0/1/1 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

172.29.0.0

209.17.220.0

Passive Interface(s):

Serial0/0/0

Routing Information Sources:

Gateway Distance Last Update

172.29.3.6 120 00:00:05

172.29.3.2 120 00:00:05

172.29.3.10 120 00:00:13

Distance: (default is 120)

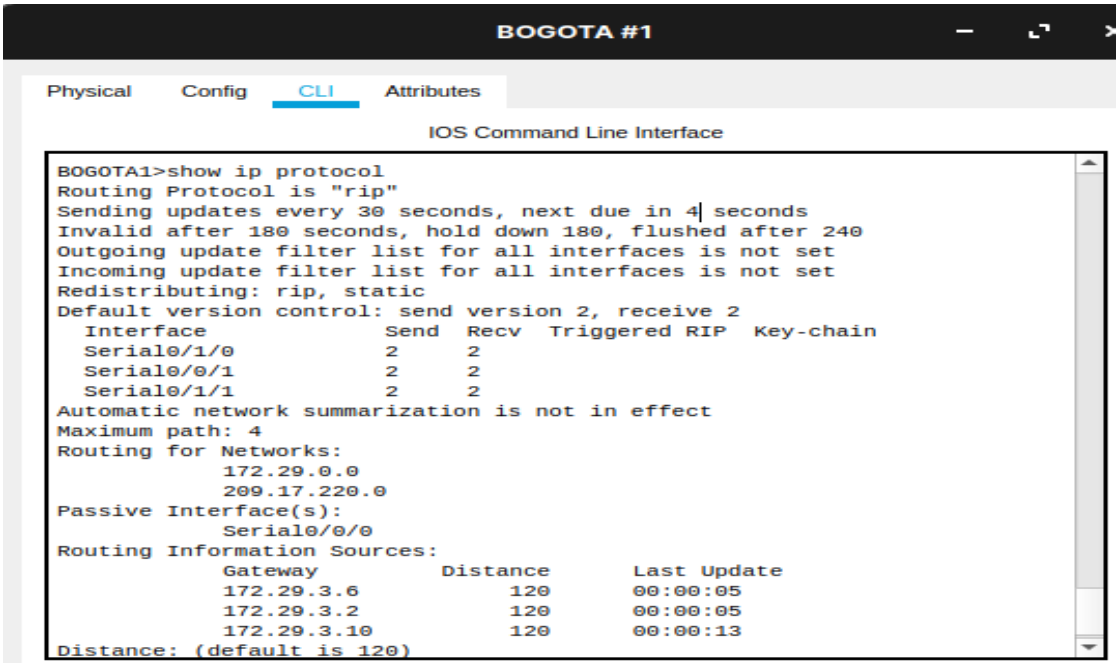


Ilustración 70. Verificar protocolo RIP router BOGOTA1

- **Ejecutamos el comando “show ip protocol” en el router BOGOTA2:**

BOGOTA2>en

BOGOTA2>enable

BOGOTA2#show ip protocol

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 28 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Redistributing: rip

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/0/1 2 2

Serial0/0/0 2 2

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

172.29.0.0

Passive Interface(s):

FastEthernet0/0

Routing Information Sources:

Gateway Distance Last Update

172.29.3.9 120 00:00:13

172.29.3.14 120 00:00:21

Distance: (default is 120)

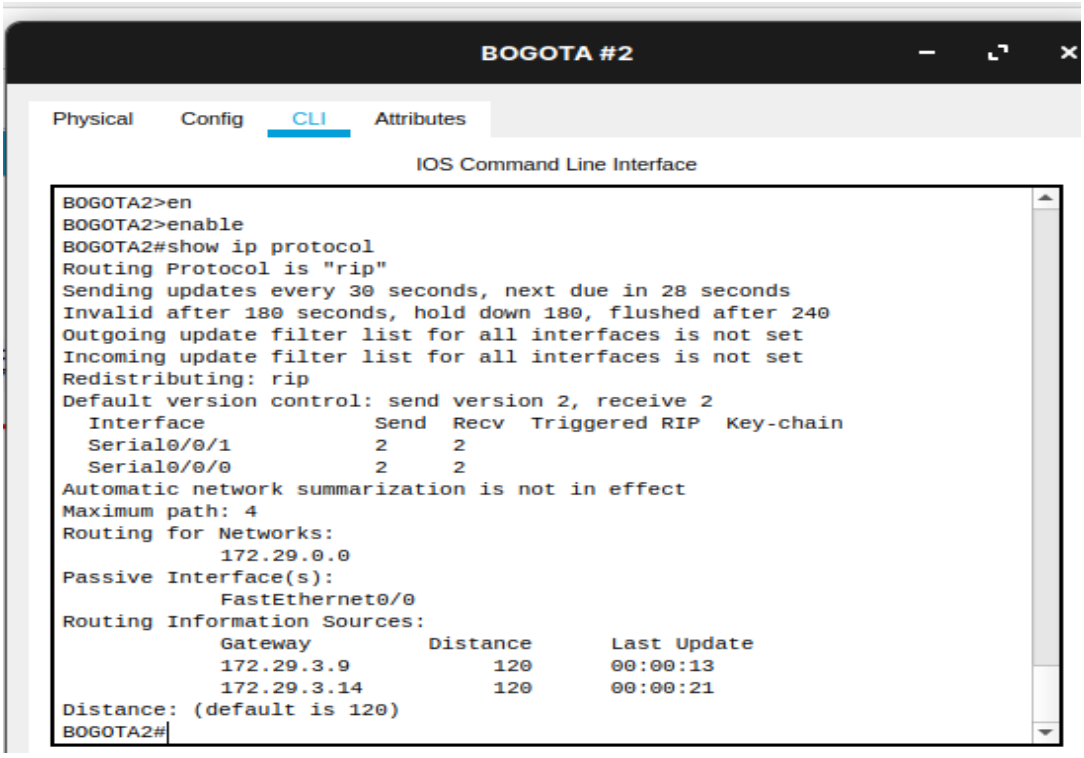


Ilustración 71. Verificar protocolo RIP router BOGOTA2

- **Ejecutamos el comando “show ip protocol” en el router BOGOTA3:**

```
BOGOTA3#show ip protocol
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 6 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/1 2 2
Serial0/1/0 2 2
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway Distance Last Update
  172.29.3.5 120 00:00:17
  172.29.3.1 120 00:00:17
  172.29.3.13 120 00:00:25
Distance: (default is 120)
```

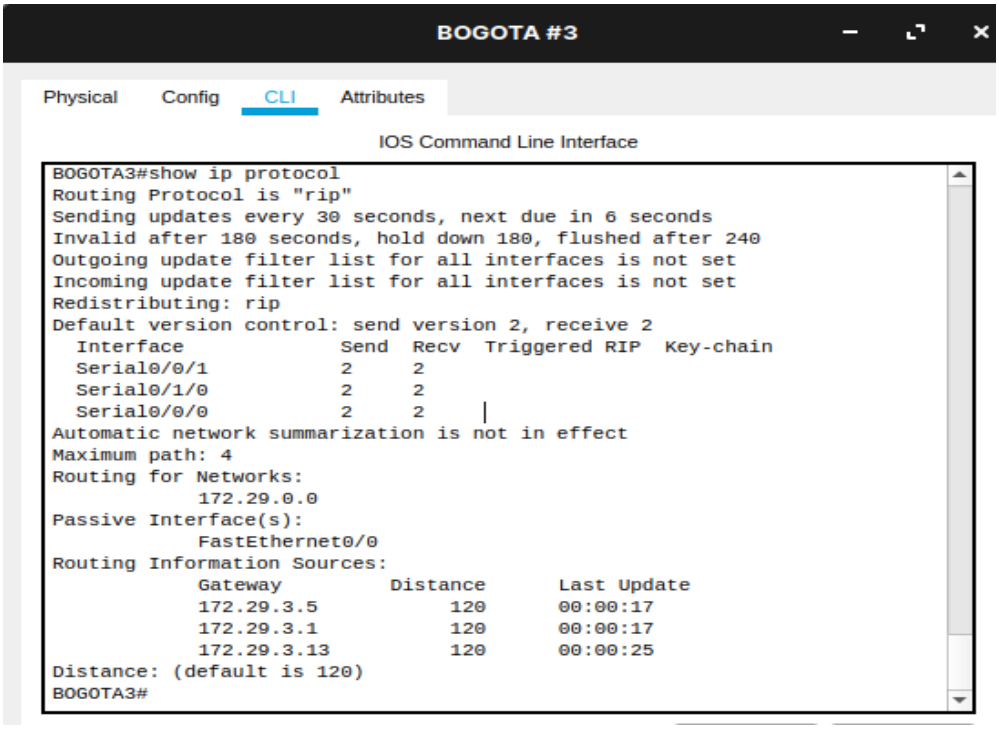


Ilustración 72. Verificar protocolo RIP router BOGOTA3

- **Ejecutamos el comando "show ip protocol" en el router ISP:**

ISP>show ip protocol
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 2 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
209.17.220.0
Passive Interface(s):
Serial0/0/0
Serial0/0/1
Routing Information Sources:
Gateway Distance Last Update
209.17.220.2 120 00:00:19

Distance: (default is 120)

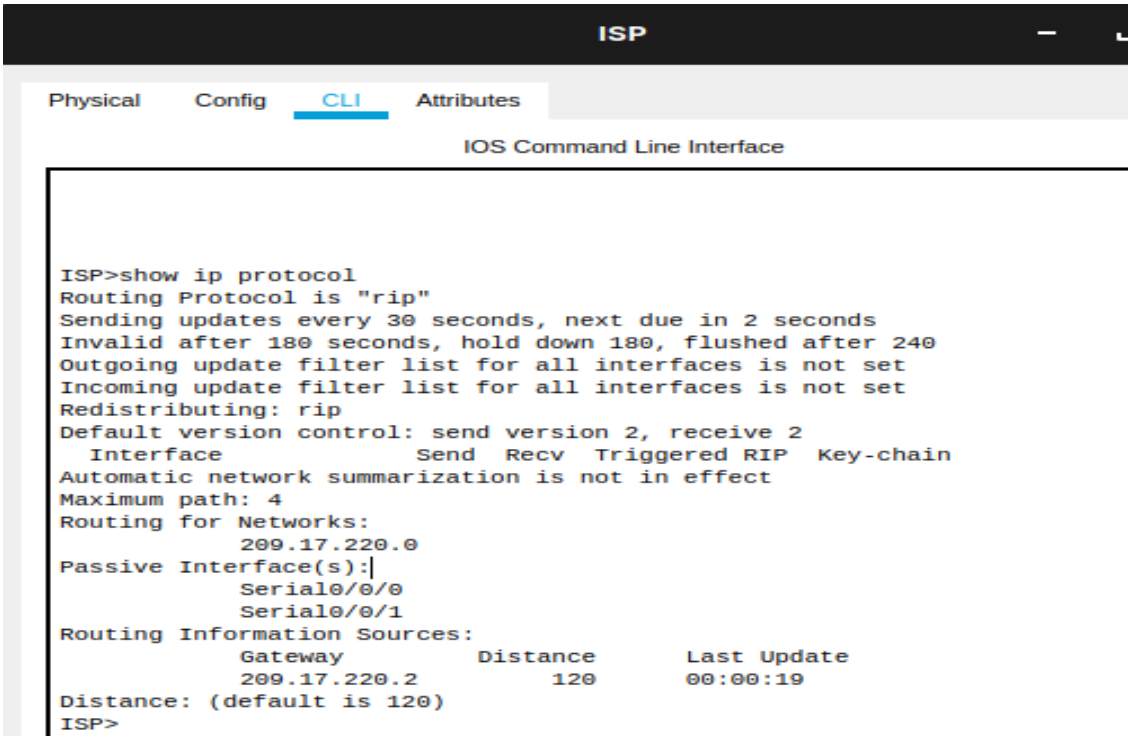


Ilustración 73. Verificar protocolo RIP router ISP

1.1.5 Parte 5: Configurar encapsulamiento y autenticación PPP.

A. Según la topología se requiere que el enlace Medellín1 con ISP sea configurado con autenticación PAT.

- **Realizamos el encapsulamiento de MEDELLIN1 e ISP S0/1/1:**

MEDELLIN1>en

MEDELLIN1>enable

MEDELLIN1#con

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#interface serial 0/1/1

MEDELLIN1(config-if)#ip address 209.17.220.2 255.255.255.252

MEDELLIN1(config-if)#encapsulation ppp
MEDELLIN1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to down

MEDELLIN1(config-if)#no shutdown
MEDELLIN1(config-if)#exit
MEDELLIN1(config)#exit
MEDELLIN1#
%SYS-5-CONFIG_I: Configured from console by console
MEDELLIN1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

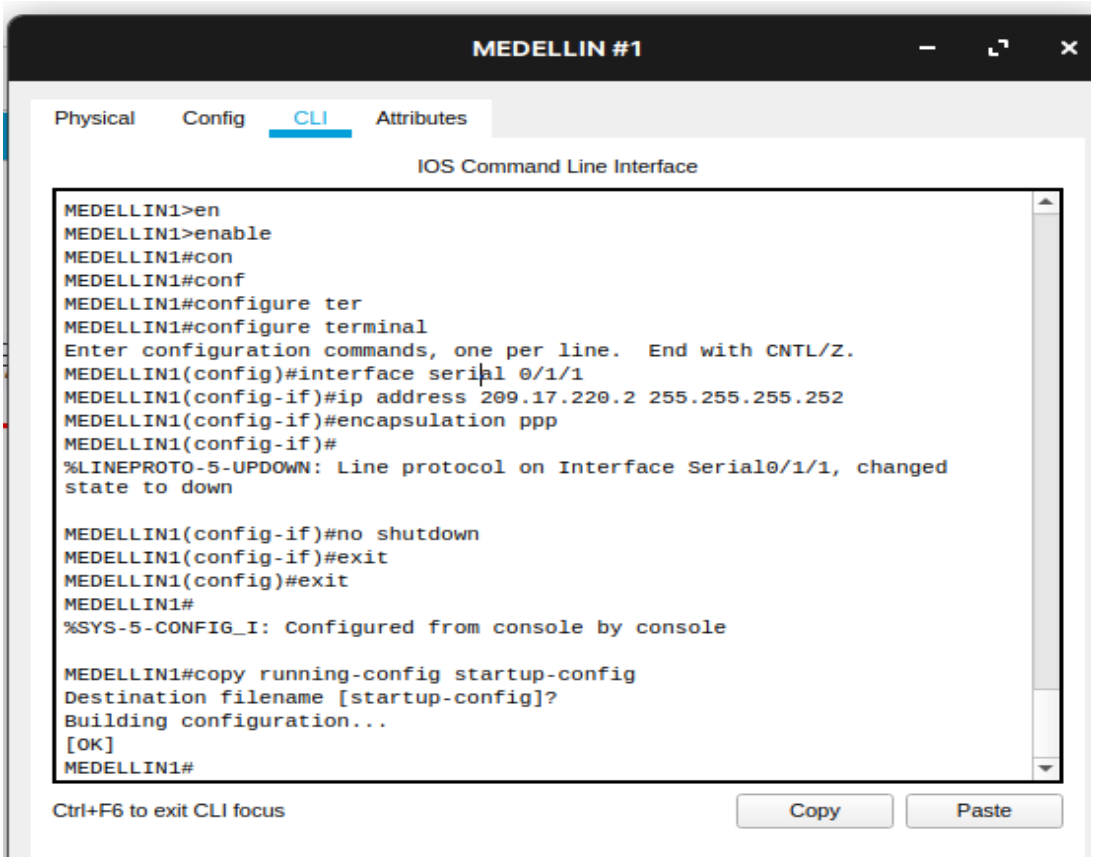


Ilustración 74. Encapsulamiento router MEDELLIN1

- **Realizamos la autenticación con PAP en MEDELLIN1 e ISP:**

MEDELLIN1>en

MEDELLIN1>enable

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#username ISP password ISP

MEDELLIN1(config)#interface serial 0/1/1

MEDELLIN1(config-if)#ppp authentication pap

MEDELLIN1(config-if)#EXIT

MEDELLIN1(config)#EXit

MEDELLIN1#

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

MEDELLIN1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

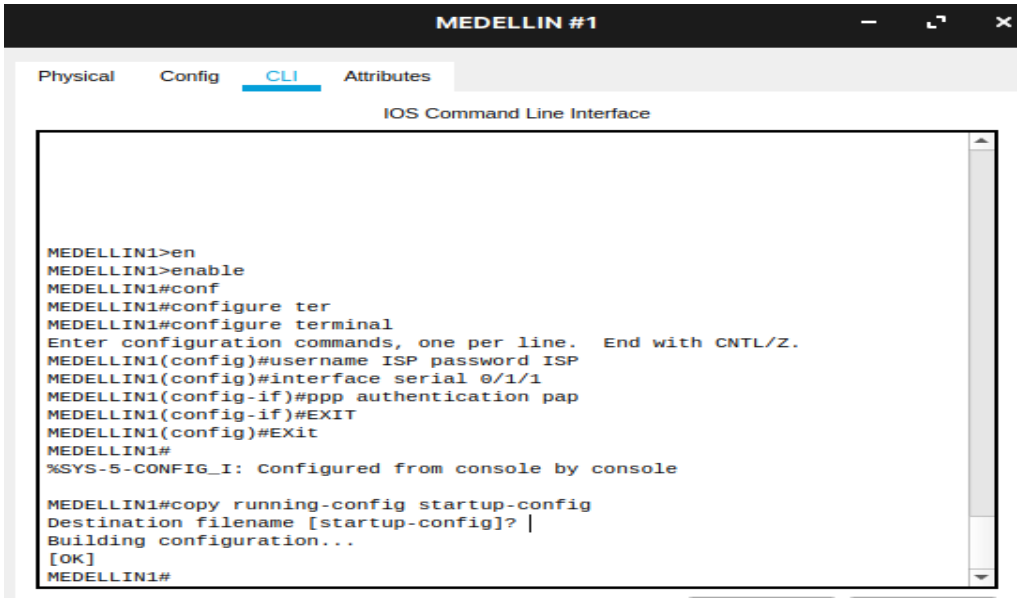


Ilustración 75. Autenticación PAP router MEDELLIN1

MEDELLIN1#conf

MEDELLIN1#configure ter

MEDELLIN1#configure terminal

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

MEDELLIN1(config)#interface serial 0/1/1

MEDELLIN1(config-if)#encapsulation ppp

MEDELLIN1(config-if)#ppp authentication pap

MEDELLIN1(config-if)#ppp pap sent-username ISP password 1234

MEDELLIN1(config-if)#exit

MEDELLIN1(config)#exit

MEDELLIN1#

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

MEDELLIN1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

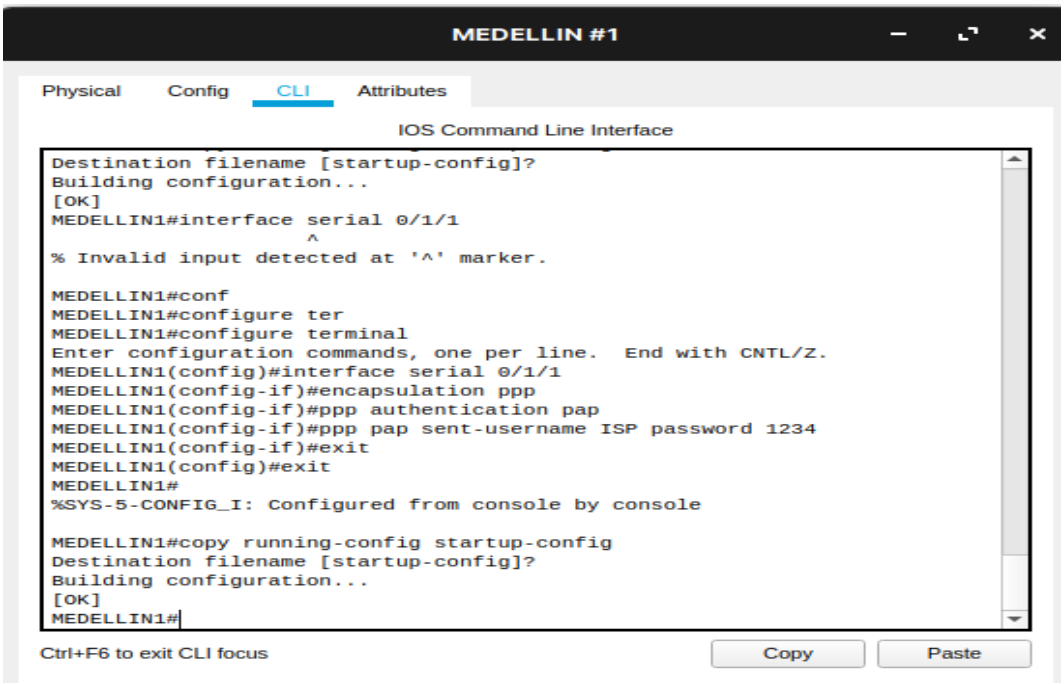


Ilustración 76. Envío datos autenticación router MEDELLIN1 a ISP

```
ISP>en
ISP>enable
ISP#conf
ISP#configure ter
ISP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username ISP password 1234
ISP(config)#interface serial 0/0/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#ppp authentication pap
ISP(config-if)#ppp pap?
pap
ISP(config-if)#ppp papppp pap ?
% Unrecognized command
ISP(config-if)#ppp pap ?
sent-username Set outbound PAP username
ISP(config-if)#ppp pap sent-isername ISP password 1234
^
% Invalid input detected at '^' marker.

ISP(config-if)#ppp pap sent-username ISP password 1234
PPP: Warning: You have chosen a username/password combination that
is valid for CHAP. This is a potential security hole.
ISP(config-if)#ppp pap sent-username ISP password ISP
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed
state to up
```

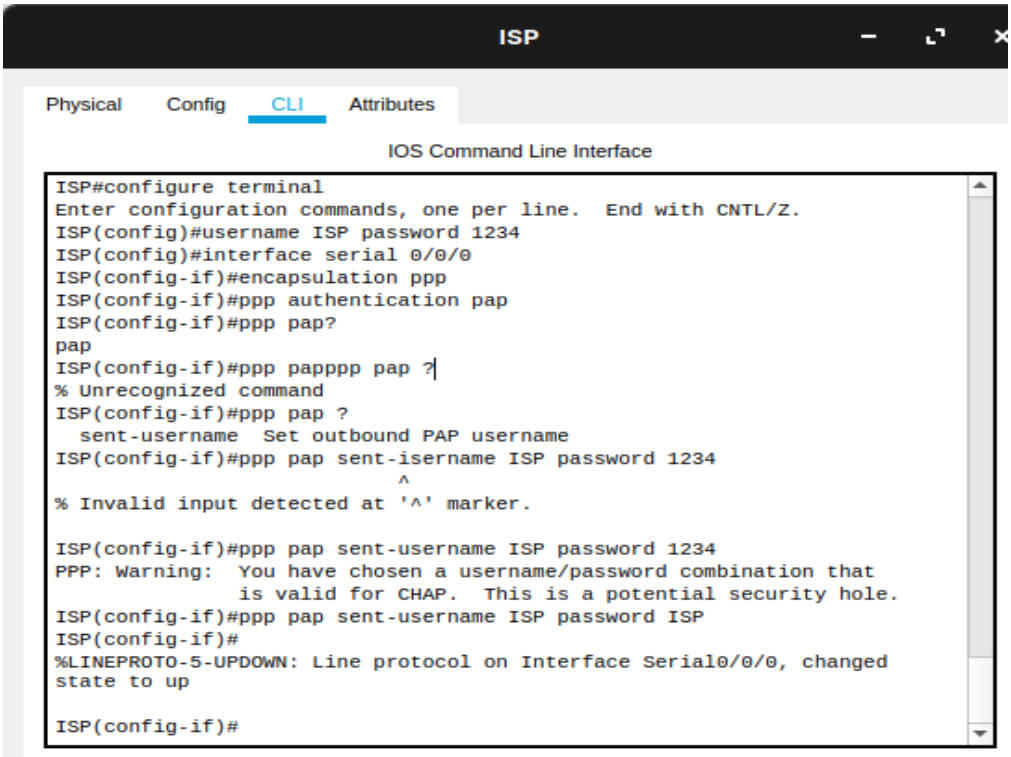


Ilustración 77. Encapsulamiento router ISP

- **Comprobamos realizando un PING desde MEDELLIN1 a ISP:**

MEDELLIN1#ping 209.17.220.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 209.17.220.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/10 ms

MEDELLIN1#

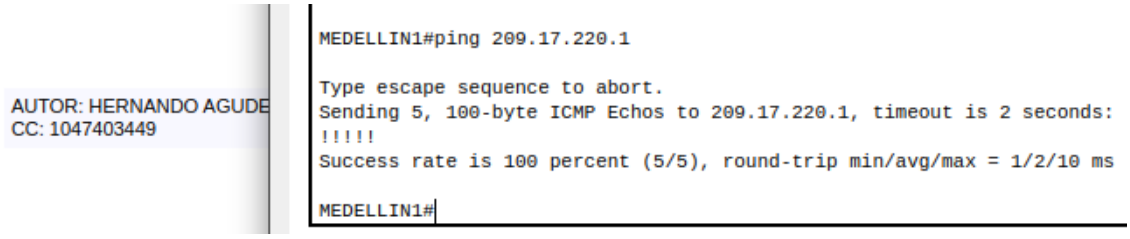


Ilustración 78. Ping desde router MEDELLIN1 a router ISP

B. El enlace Bogotá1 con ISP se debe configurar con autenticación CHAT.

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#username BOGO password 1234

BOGOTA1(config)#interface serial 0/0/0

BOGOTA1(config-if)#ppp authentication chap

Must set encapsulation to PPP before using PPP subcommands

BOGOTA1(config-if)#exit

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

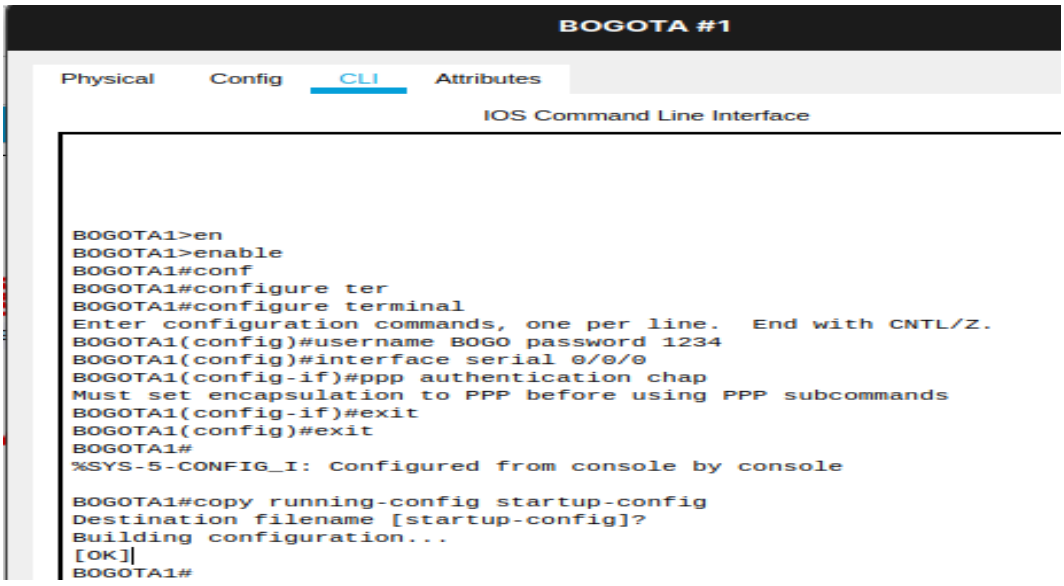


Ilustración 79. Autenticación CHAP router BOGOTA1

- **Hacemos PING de ISP a BOGOTA1:**

ISP>en
ISP>enable
ISP#ping 209.17.220.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.6, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/9 ms

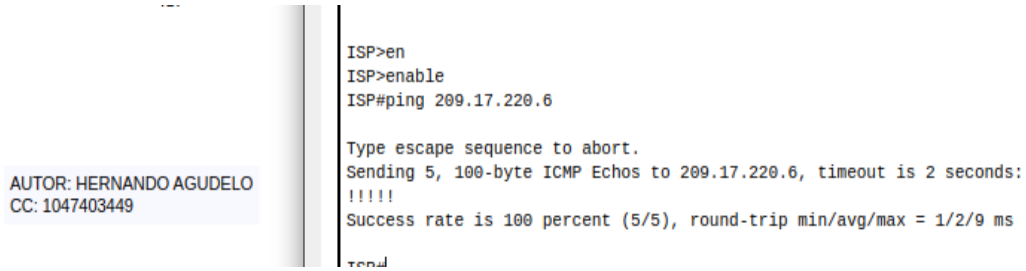


Ilustración 80. PING de router ISP a BOGOTA1

1.1.6 Parte 6: Configuración de PAT.

A. En la topología, si se activa NAT en cada equipo de salida (Bogotá1 y Medellín1), los routers internos de una ciudad no podrán llegar hasta los routers internos en el otro extremo, sólo existirá comunicación hasta los routers Bogotá1, ISP y Medellín1.

Al activar NAT este un mecanismo utilizado por los routers para intercambiar paquetes entre dos redes que tienen distintas direcciones.

B. Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín1.

Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Medellín1, cómo diferente puerto.

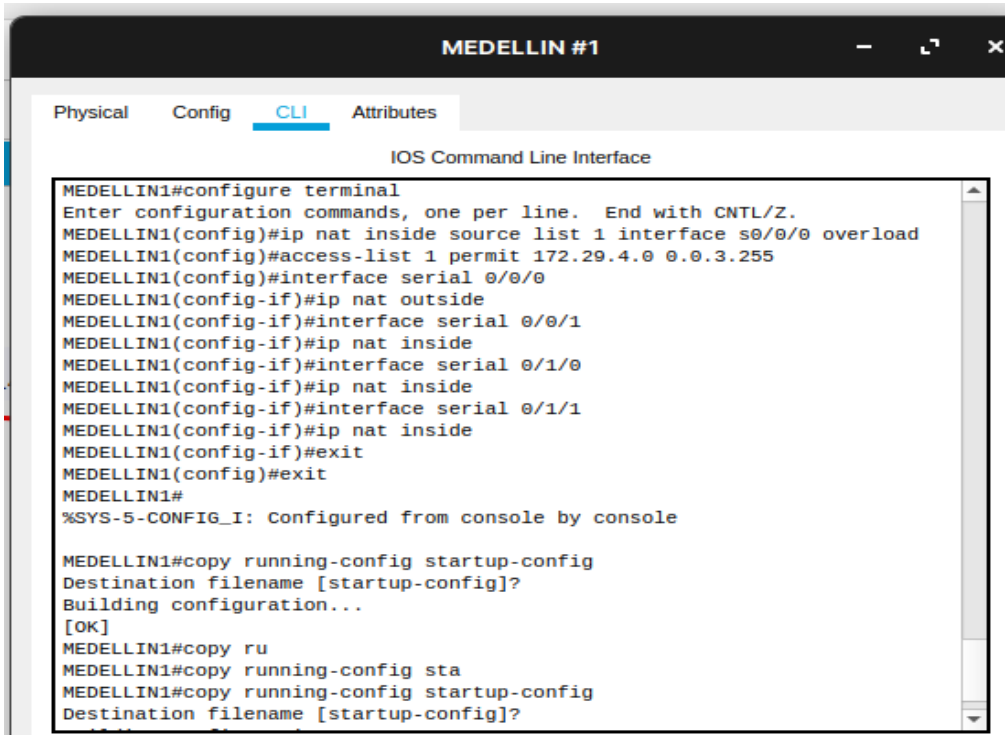


Ilustración 81. Configuración NAT router MEDELLIN1

C. Proceda a configurar el NAT en el router Bogotá1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Bogotá1, cómo diferente puerto.

BOGOTA1>en

BOGOTA1>enable

BOGOTA1#cof

BOGOTA1#conf

BOGOTA1#configure ter

BOGOTA1#configure terminal

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

BOGOTA1(config)#ip nat inside source list 1 interface s0/0/0 overload

BOGOTA1(config)#access-list 1 permit 172.29.0.0 0.0.3.255

BOGOTA1(config)#interface serial 0/0/0

BOGOTA1(config-if)#ip nat outside

BOGOTA1(config-if)#interface serial 0/0/1

BOGOTA1(config-if)#ip nat inside

BOGOTA1(config-if)#interface serial 0/1/0

BOGOTA1(config-if)#ip nat inside

BOGOTA1(config-if)#interface serial 0/1/1

BOGOTA1(config-if)#ip nat inside

BOGOTA1(config-if)#exit

BOGOTA1(config)#exit

BOGOTA1#

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

BOGOTA1#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

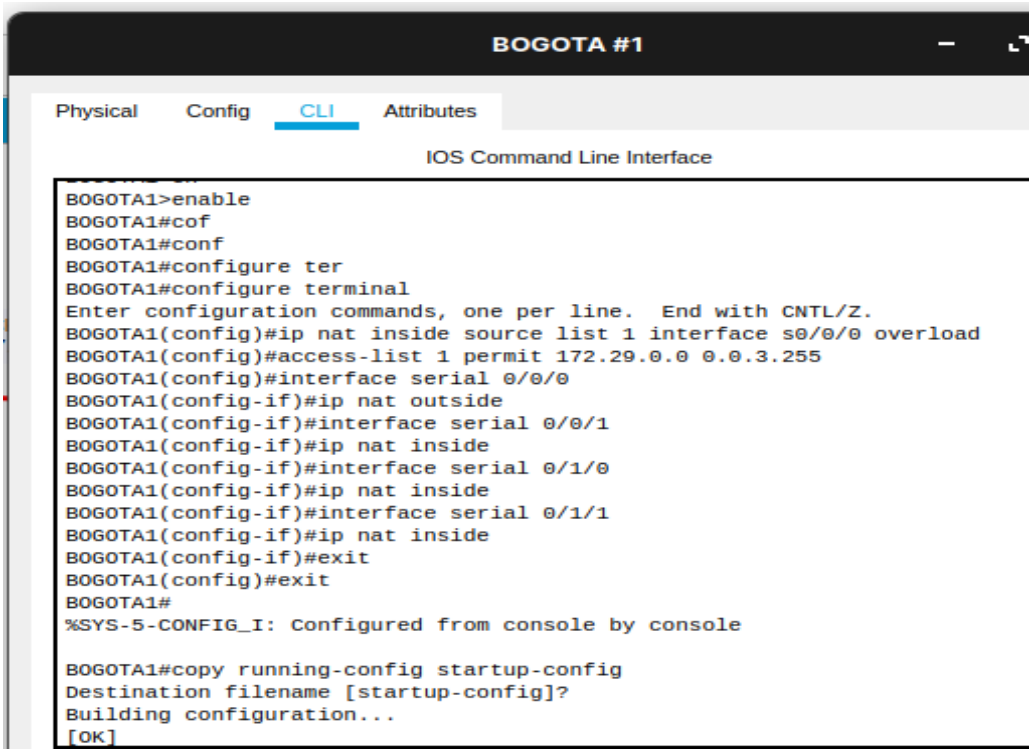


Ilustración 82.Configuración NAT router BOGOTA1

- **Verificamos haciendo PING desde la PC-150 HOST hasta el Router ISP.**

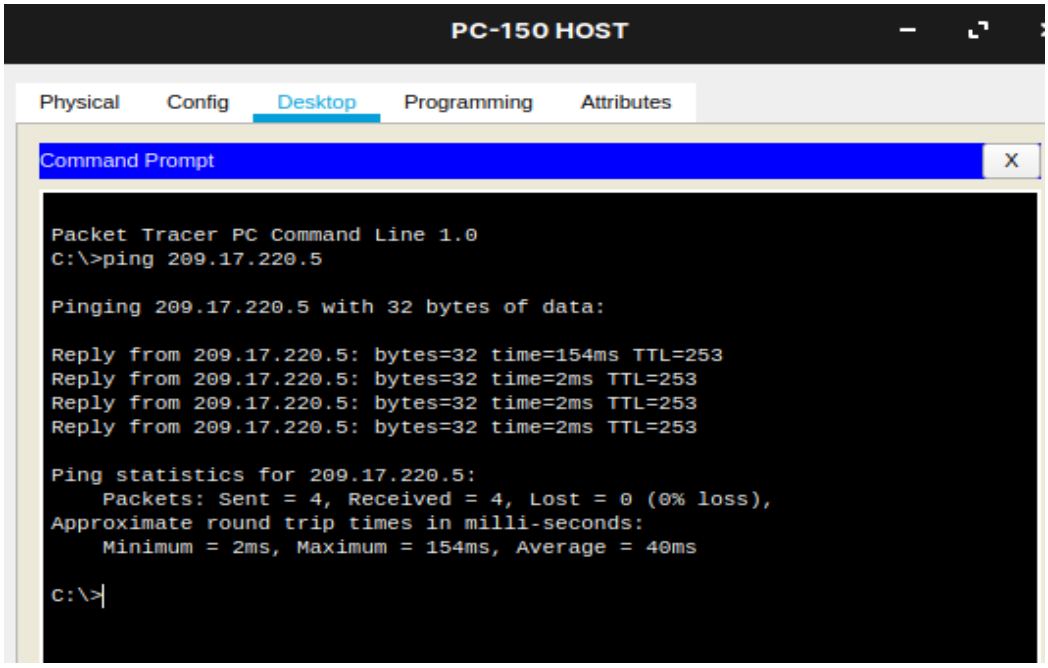


Ilustración 83. Ping desde PC-150 HOST al router ISP

1.1.7 Parte 7: Configuración del servicio DHCP.

A. Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes Lan.

La configuración de un servidor de DHCP conlleva definir un conjunto de direcciones para asignar. Un servidor DHSC (DHCP Server) es un equipo en una red que está corriendo un servicio DHCP. Dicho servicio se mantiene a la escucha de peticiones broadcast DHCP. Cuando una de estas peticiones es escuchada, el servidor responde con una dirección IP y opcionalmente con información adicional. El comando ip dhcp pool NOMBRE crea un conjunto de ip's con el nombre elegido y provoca que el router entre en el modo de configuración de DHCP, que se identifica con la identificación Router(dhcp-config)#.

- **Configuramos DHCP en MEDELLIN2.**

```
MEDELLIN2>EN
MEDELLIN2>ENable
MEDELLIN2#conf
MEDELLIN2#configure ter
MEDELLIN2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN2(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.5
MEDELLIN2(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.132
MEDELLIN2(config)#ip dhcp pool MEDELLIN
MEDELLIN2(dhcp-config)#network 172.29.4.1 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.1
MEDELLIN2(dhcp-config)#dns-server 8.8.8.8
MEDELLIN2(dhcp-config)#exit
MEDELLIN2(config)#ip dhcp pool MEDELLIN1
MEDELLIN2(dhcp-config)#network 172.29.4.128 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.129
MEDELLIN2(dhcp-config)#dns-server 8.8.8.8
MEDELLIN2(dhcp-config)#exit
```

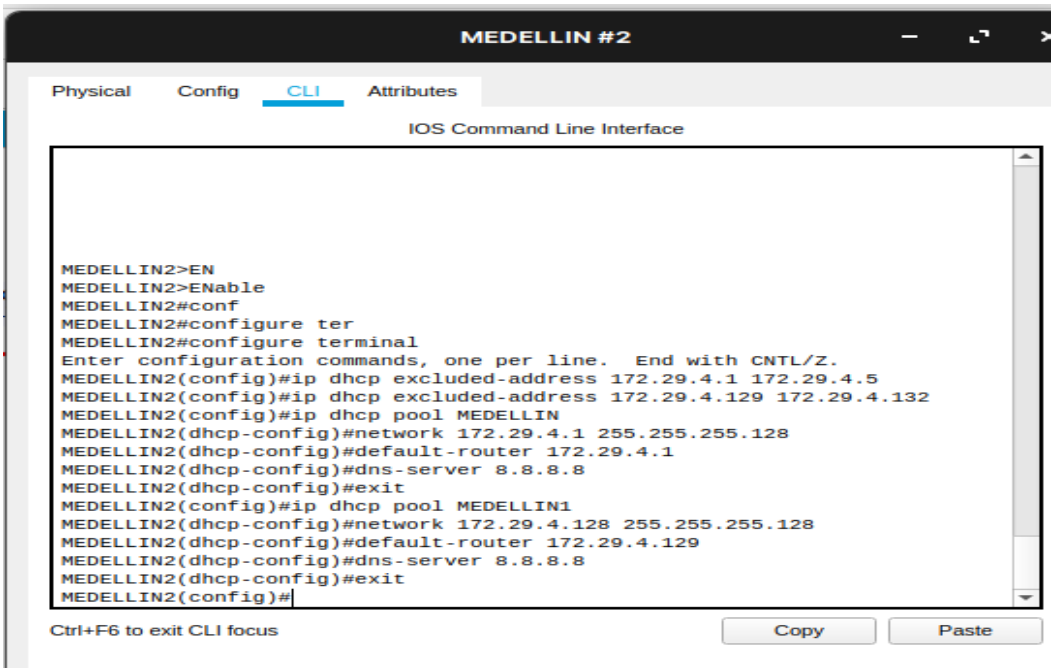


Ilustración 84. Configurar DHCP en router MEDELLIN2

B. El router Medellín3 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín2.

- **Configuramos la IP en el PC-50 HOST que está directamente conectado al router de MEDELLIN2:**

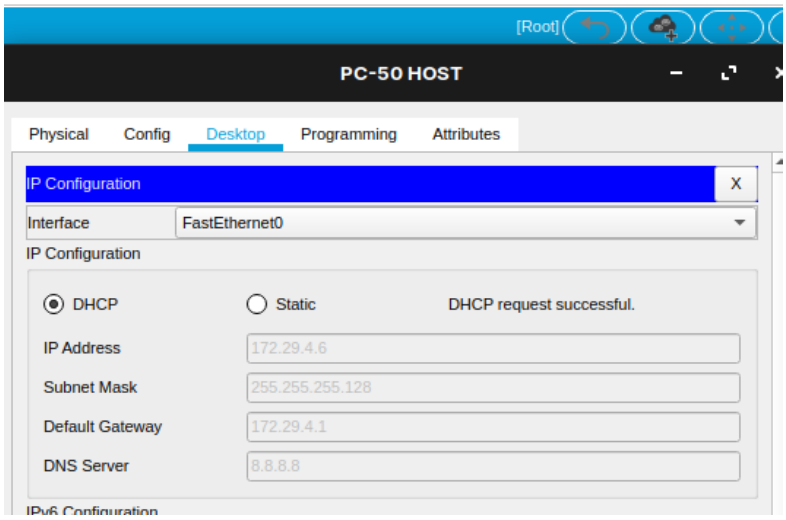


Ilustración 85. DHCP equipo PC-50 HOST

Con la IP, la máscara y puerta de enlace, realizamos la configuración del redireccionamiento para que MEDELLIN2 se pueda conectar con DHCP:

MEDELLIN3>en

MEDELLIN3>enable

MEDELLIN3#conf

MEDELLIN3#configure ter

MEDELLIN3#configure terminal

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

MEDELLIN3(config)#int

MEDELLIN3(config)#interface f0/0

MEDELLIN3(config-if)#ip helper-address 172.29.6.5

MEDELLIN3(config-if)#exit

MEDELLIN3(config)#exit

MEDELLIN3#

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

MEDELLIN3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

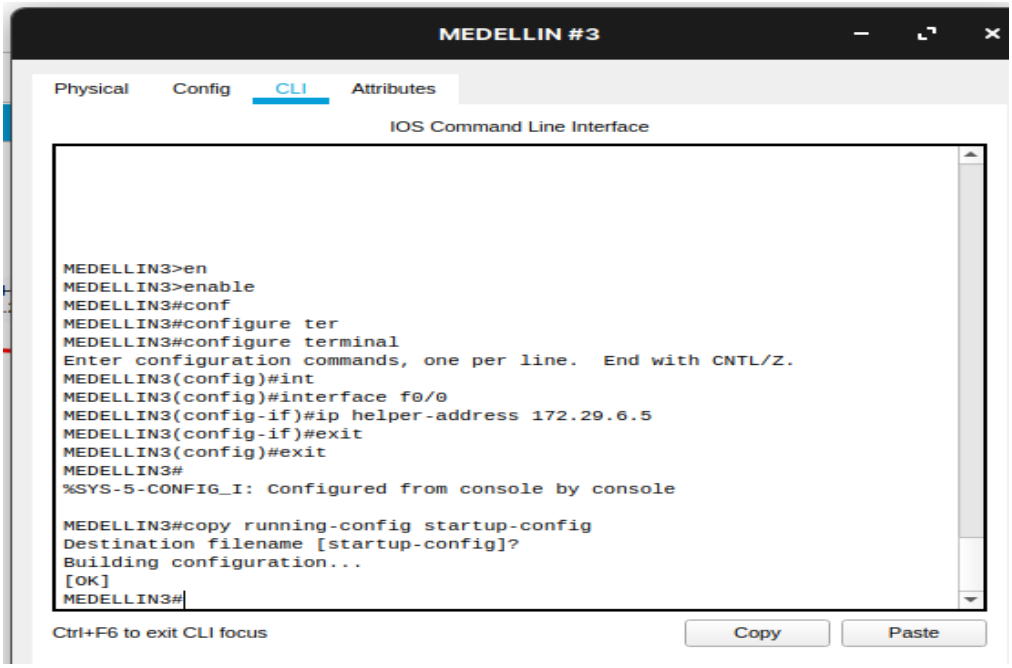


Ilustración 86. Redireccionamiento router MEDELLIN2

C. Configurar la red Bogotá2 y Bogotá3 donde el router Bogota2 debe ser el servidor DHCP para ambas redes Lan.

```
BOGOTA2>en
BOGOTA2>enable
BOGOTA2#conf
BOGOTA2#configure ter
BOGOTA2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA2(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5
BOGOTA2(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5
BOGOTA2(config)#ip dhcp pool BOGOTA
BOGOTA2(dhcp-config)#network 172.29.1.0 255.255.255.0
BOGOTA2(dhcp-config)#default-router 172.29.1.1
BOGOTA2(dhcp-config)#dns-server 8.8.8.8
BOGOTA2(dhcp-config)#ip dhcp pool BOGOTA1
BOGOTA2(dhcp-config)#network 172.29.0.0 255.255.255.0
BOGOTA2(dhcp-config)#default-router 172.29.0.1
BOGOTA2(dhcp-config)#dns-server 8.8.8.8
BOGOTA2(dhcp-config)#exit
BOGOTA2(config)#exit
BOGOTA2#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA2#cop
BOGOTA2#copy ru
BOGOTA2#copy running-config s
BOGOTA2#copy running-config st
BOGOTA2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

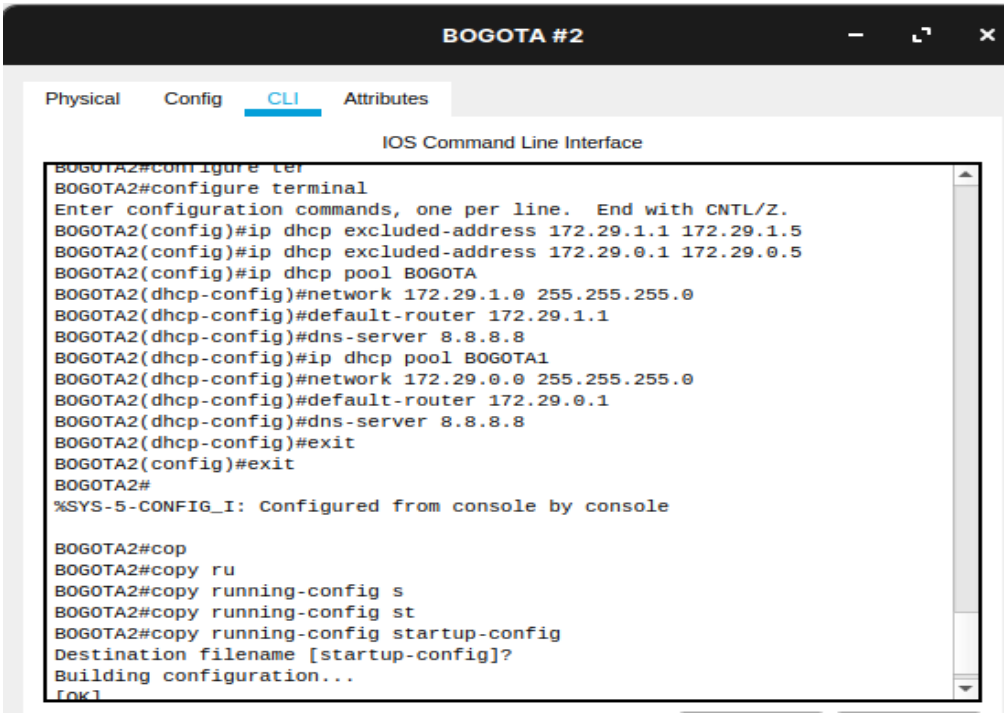


Ilustración 87. Servidor DHCP del router BOGOTA2

D. Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

- **En BOGOTA3 se solicita la conectividad por medio de la interface F0/0 a la PC-150HOST:**

BOGOTA3>en
BOGOTA3>enable
BOGOTA3#conf
BOGOTA3#configure ter
BOGOTA3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA3(config)#int
BOGOTA3(config)#interface f0/0
BOGOTA3(config-if)#ip helper-address 172.29.3.13
BOGOTA3(config-if)#exit
BOGOTA3(config)#exit

BOGOTA3#

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

BOGOTA3#copy

BOGOTA3#copy ru

BOGOTA3#copy running-config st

BOGOTA3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

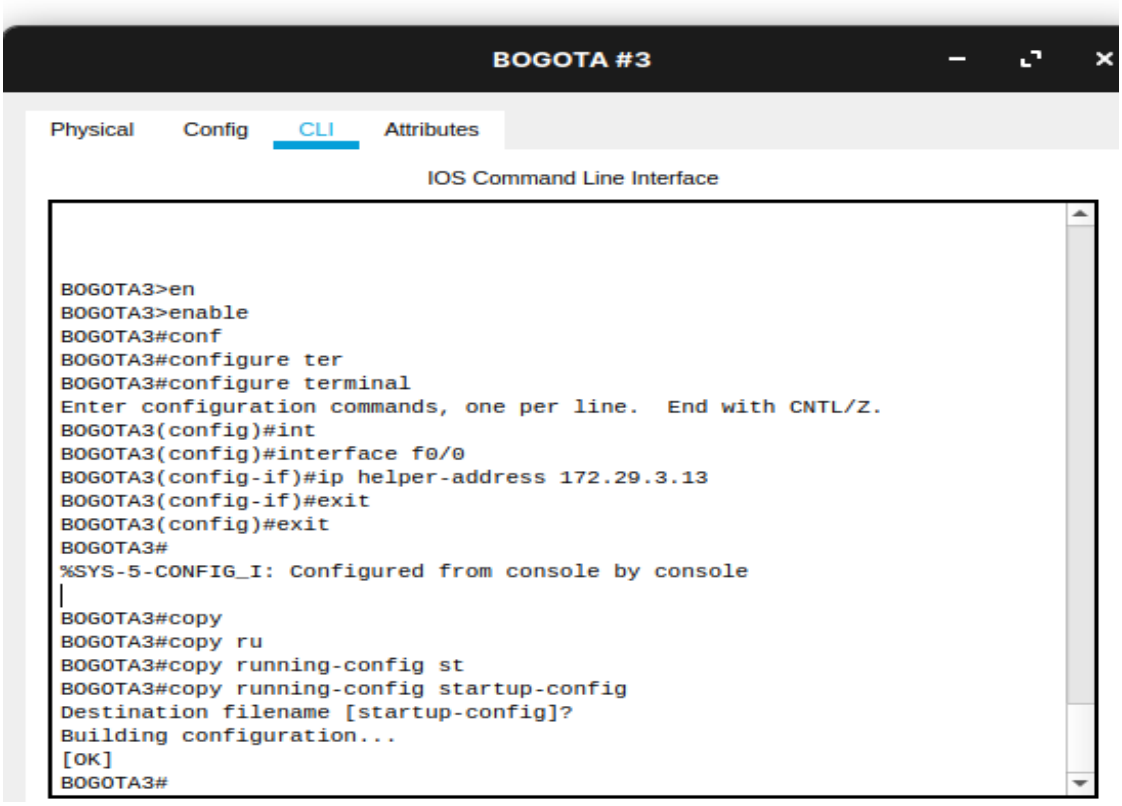


Ilustración 88. Paso de mensajes Broadcast hacia la IP del router BOGOTA2

- **Configuramos la ip en el PC-150 HOST que está directamente conectado al router de BOGOTA3:**

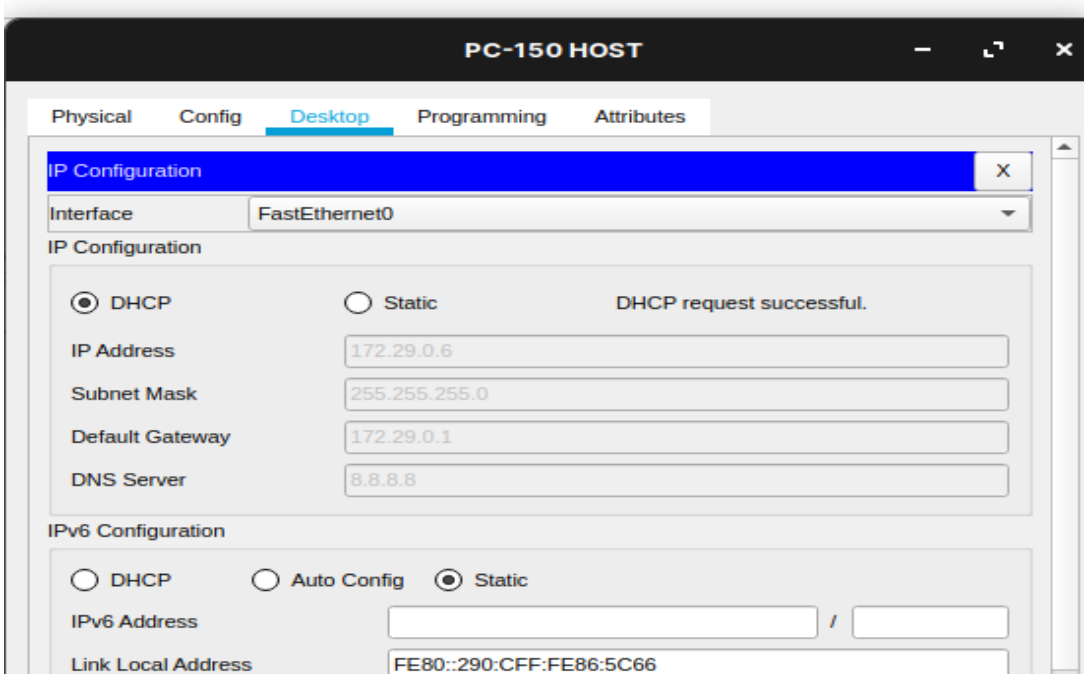


Ilustración 89. DHCP equipo PC-150 HOST

- **Verificamos haciendo Ping desde la PC-150 HOST a la PC-200HOST. Exitoso:**

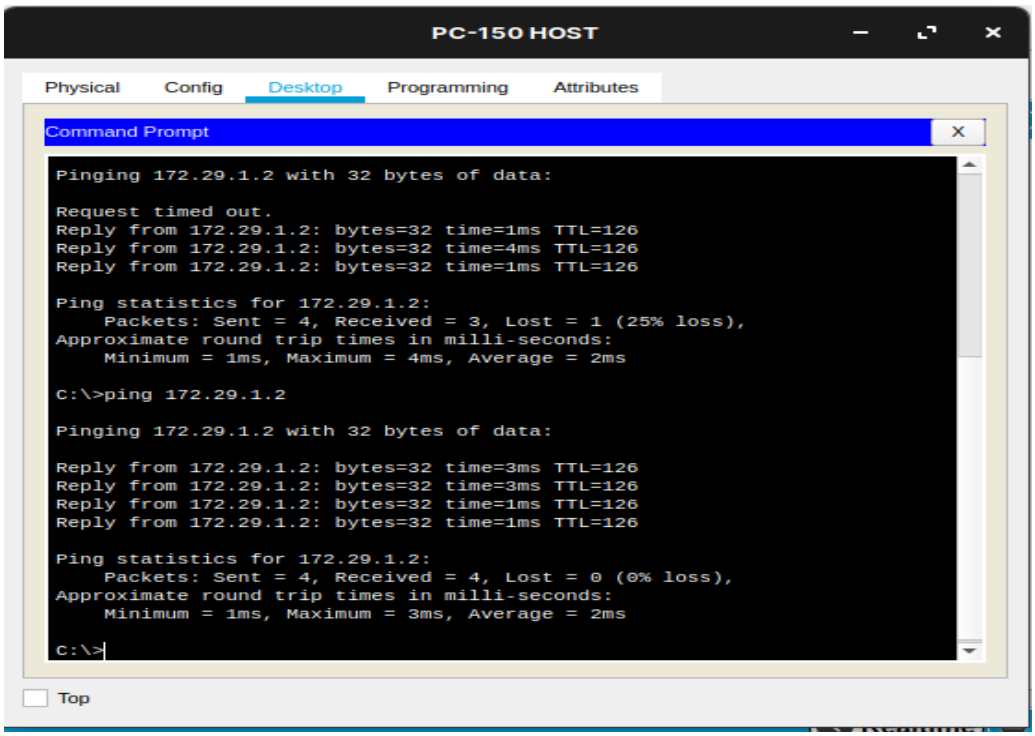


Ilustración 90. Ping entre equipos 150 HOST a 200 HOST

- **Verificamos haciendo Ping desde la PC-200 HOST a la PC-150HOST. Exitoso:**

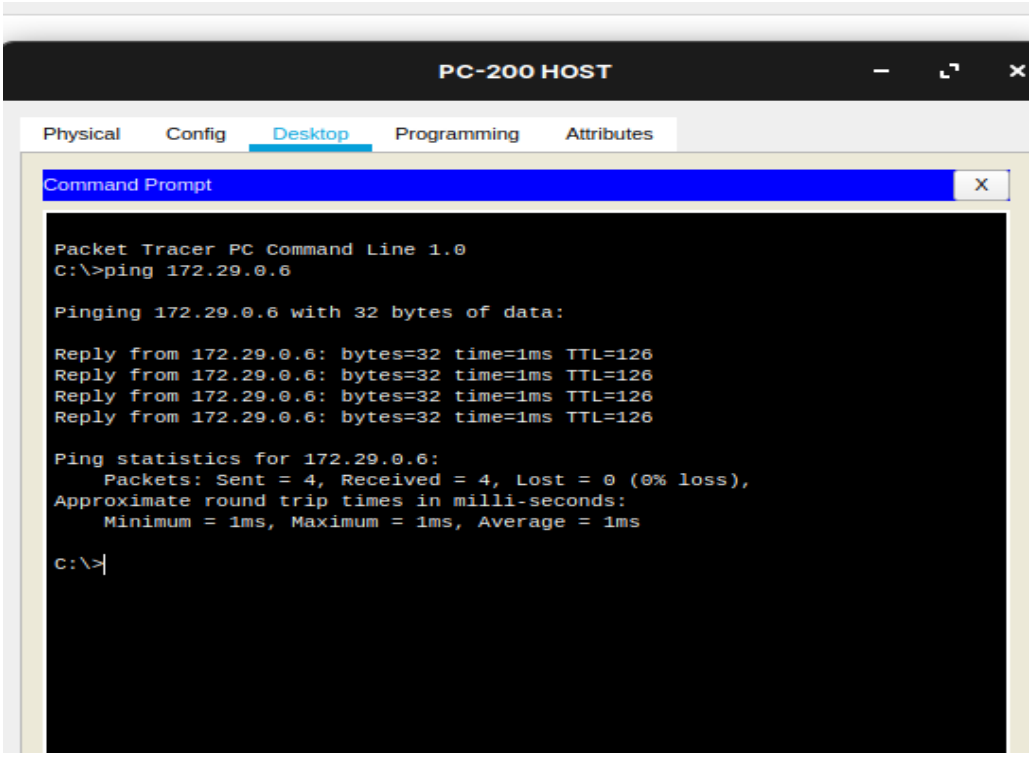


Ilustración 91. Ping entre equipos 200 HOST a 150 HOST

1.2 ESCENARIO 2

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.

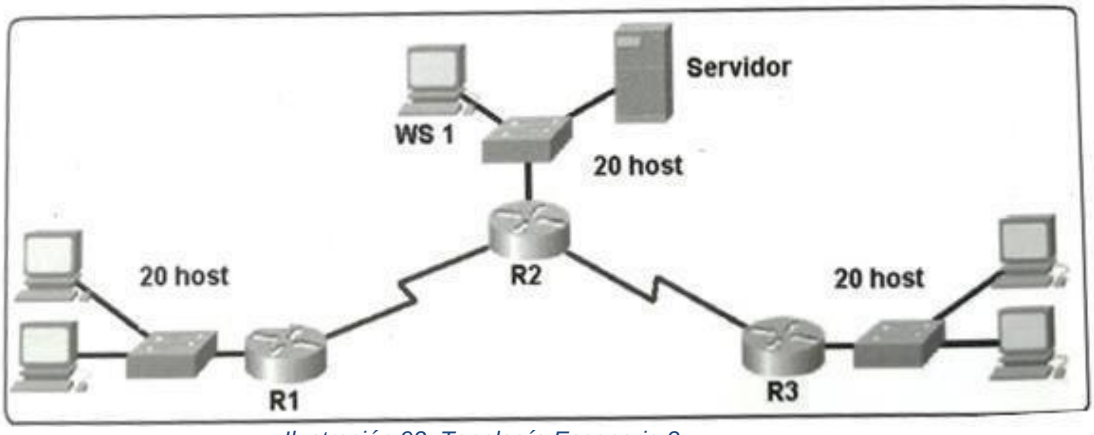
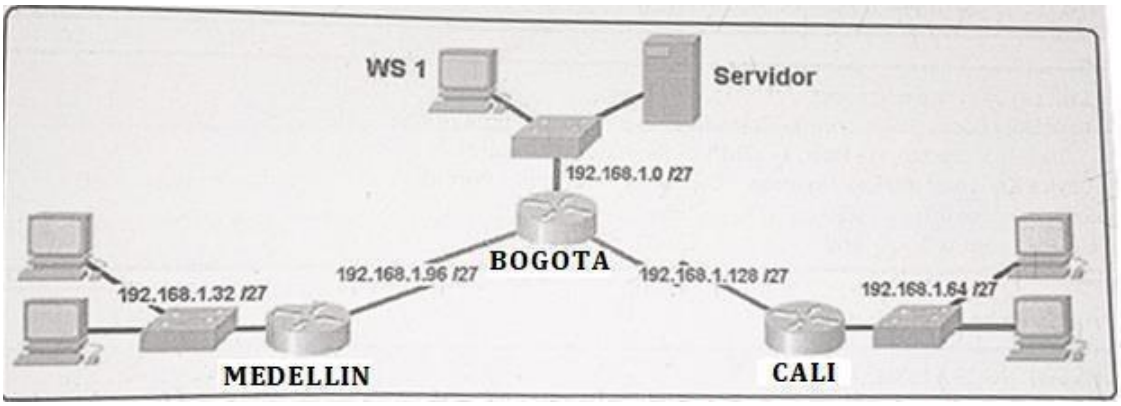


Ilustración 92. Topología Escenario 2



- **Como trabajo inicial se debe realizar lo siguiente.**

Realizar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc.). Realizar la conexión física de los equipos con base en la topología de red Configurar la topología de red, de acuerdo con las siguientes especificaciones.

1.2.1 Parte 1: Asignación de direcciones IP:

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

F. Asignar una dirección IP a la red.

Respuesta:

Datos

Direccion ip

192.168.1.0

Subred

255.255.255.2

24/27

Pertenece a la clase C donde se pueden conectar hasta 30 host 256-224=32 **Son los saltos de red**

2^5-2=30

8 Subredes Posibles

Dirección de red	Rango de host utilizable	Broadcast Address
192.168.1.0	192.168.1.1 - 192.168.1.30	192.168.1.31
192.168.1.32	192.168.1.33 - 192.168.1.62	192.168.1.63
192.168.1.64	192.168.1.65 - 192.168.1.94	192.168.1.95
192.168.1.96	192.168.1.97 - 192.168.1.126	192.168.1.127
192.168.1.128	192.168.1.129 - 192.168.1.158	192.168.1.159
192.168.1.160	192.168.1.161 - 192.168.1.190	192.168.1.191
192.168.1.192	192.168.1.193 - 192.168.1.222	192.168.1.223
192.168.1.224	192.168.1.225 - 192.168.1.254	192.168.1.255

Tabla 2. Dirección IP

Dirección asignada a la red: 192.168.1.0

Se configura el router utilizando el módulo WIC-1T que contiene los puertos necesarios para utilizar en la simulación.

El puerto fast ethernet para conexión con los switch y el puerto serial para el enrutamiento entre routers

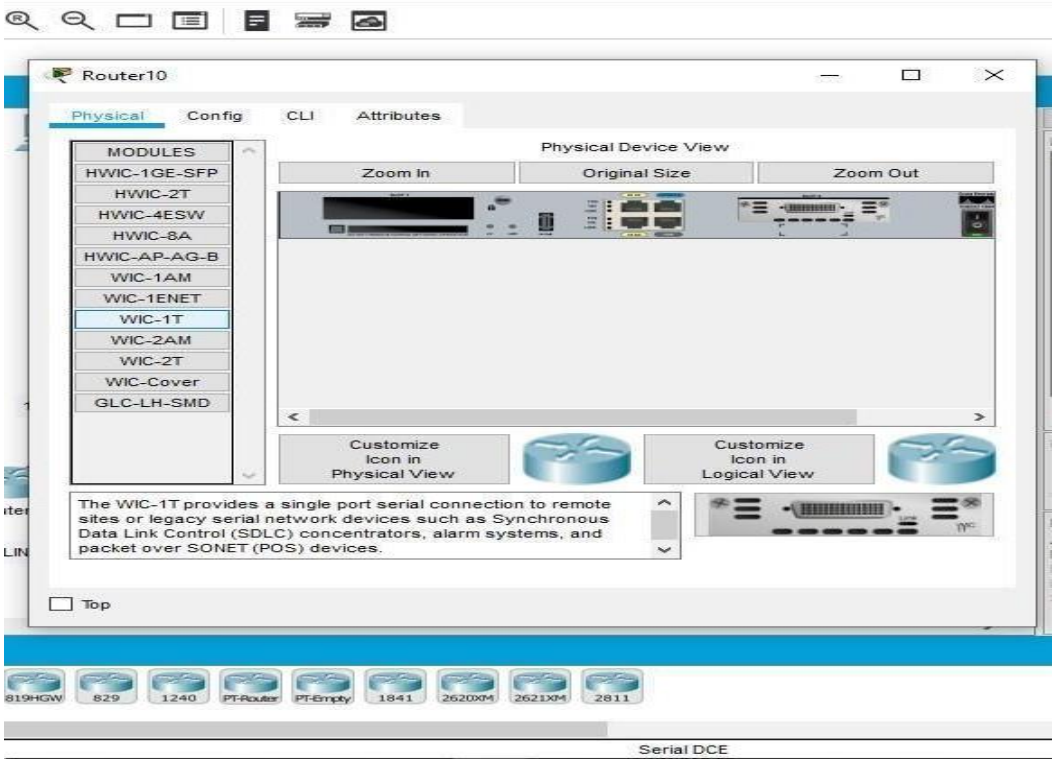


Ilustración 93. Topología desarrollada escenario 2

Se configura las direcciones IP de cada uno de los computadores. Para cada subred en un primer PC contendrá la dirección IP correspondiente al primer Host y el PC restante contendrá la dirección IP correspondiente al veinteavo host.

ROUTE MEDELLIN

Configuramos el Router de Medellín con las direcciones IP para las interfaces fastEthernet 0/0 y serial 0/1/0

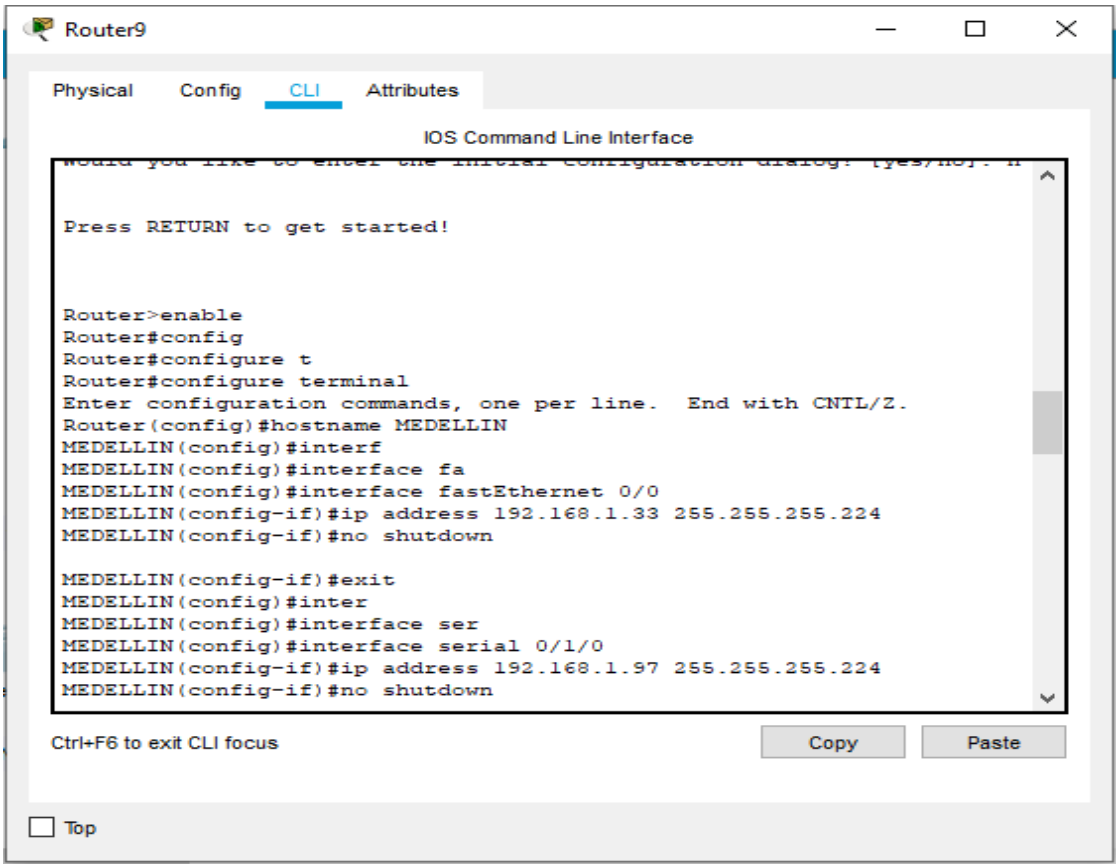


Ilustración 94. Configuración router Medellín

Configuramos el ruteo estático con el comando ip route, elegimos la red que queremos llegar que en este caso son Bogotá y Cali con las siguientes direcciones: 192.68.1.0 192.168.1.128 y 192.168.1.64

ROUTE BOGOTA

Configuramos el Router de Bogotá con las direcciones IP para las interfaces fastEthernet 0/0 y serial 0/0/0.

Activamos con el comando shutdown

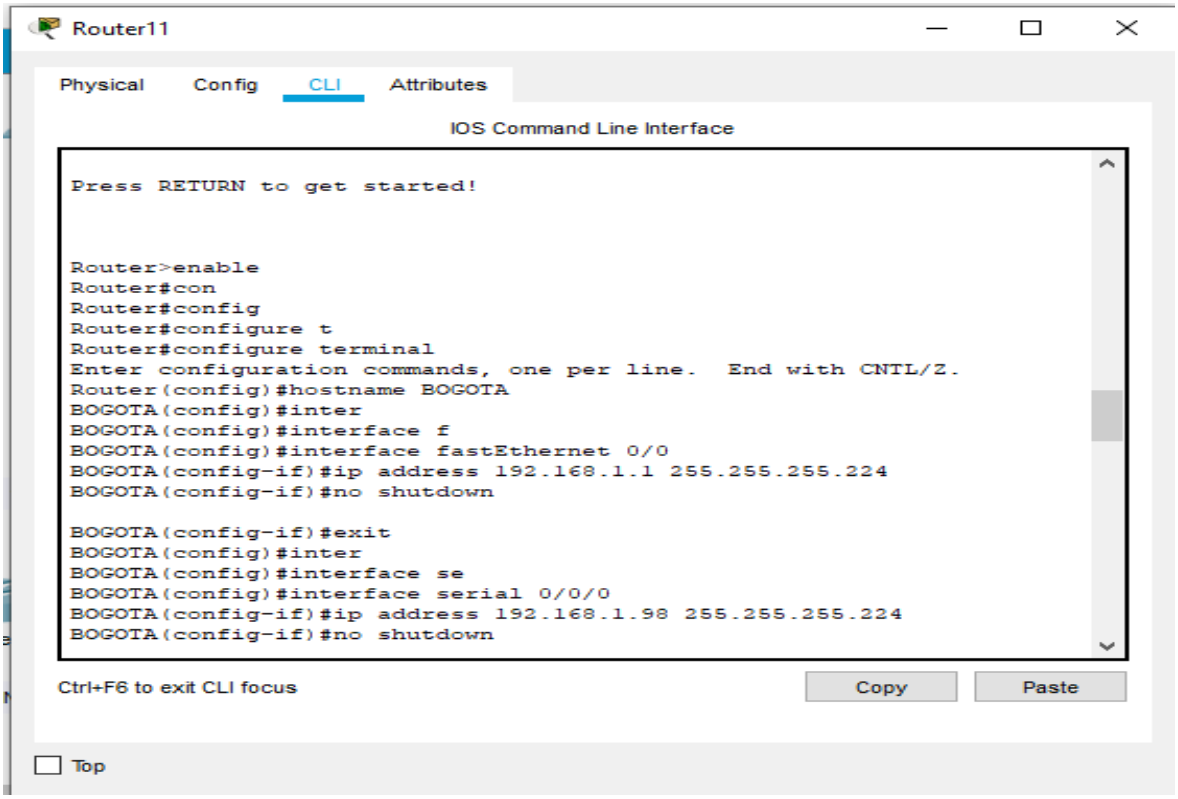


Ilustración 95. Configuración route Bogotá

Configuramos el Router de Bogotá con las direcciones IP para las interfaces fastEthernet 0/0 y serial 0/0/0.

Activamos con el comando shutdown.

Configuramos el ruteo estático con el comando ip route, elegimos la red que queremos conocer en este caso es Medellín y Cali con las siguientes direcciones: 192.168.1.32 y 192.168.1.64.

Y con las siguientes direcciones que se asignaron a los puertos seriales 192.168.1.97 192.168.1.129

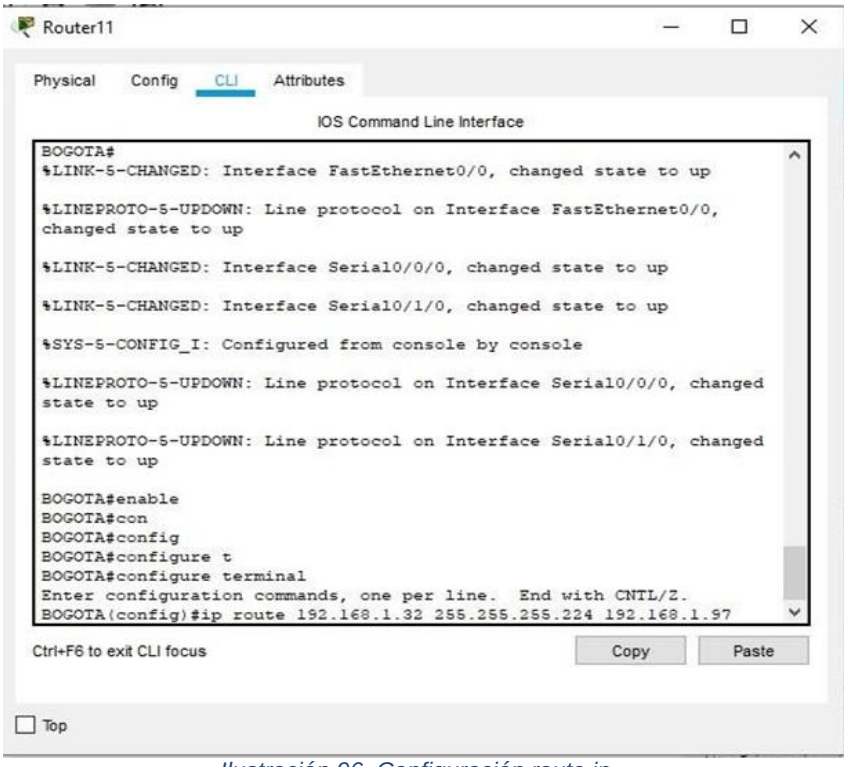


Ilustración 96. Configuración route ip

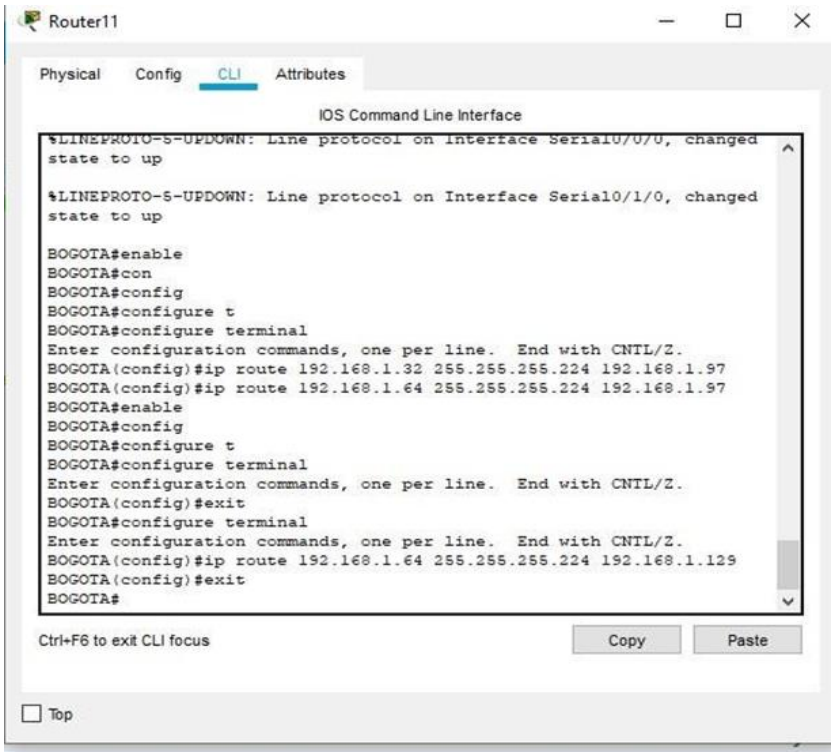


Ilustración 97. Configuración route ip

ROUTE CALI

Configuramos el Router de Cali con las direcciones IP para las interfaces fastEthernet 0/0 y serial 0/0/0.

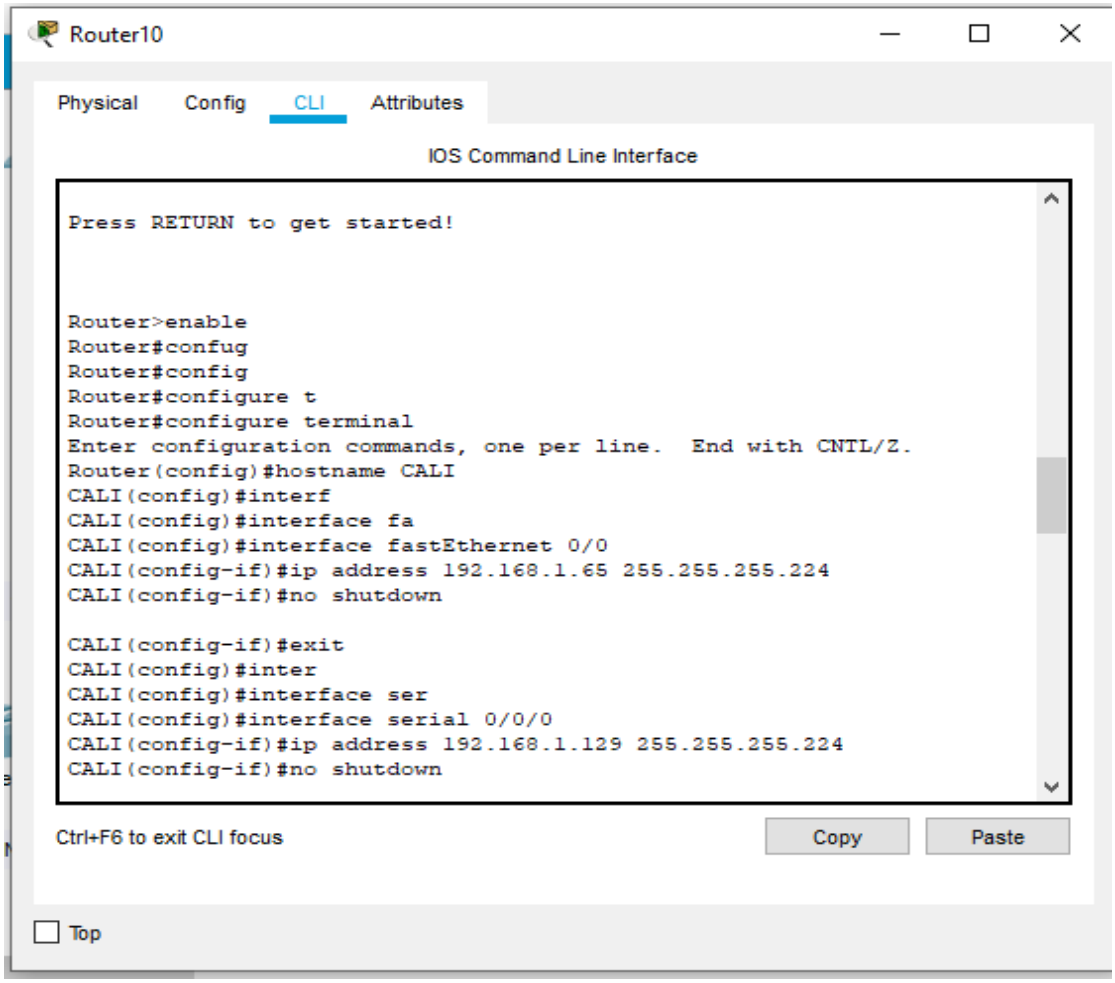


Ilustración 98. Configuración router Cali

Configuramos el ruteo estático con el comando ip route, elegimos la red que queremos conocer en este caso es Bogotá y Medellín con las siguientes direcciones: 192.168.1.0, 192.168.1.96 y 192.168.1.32

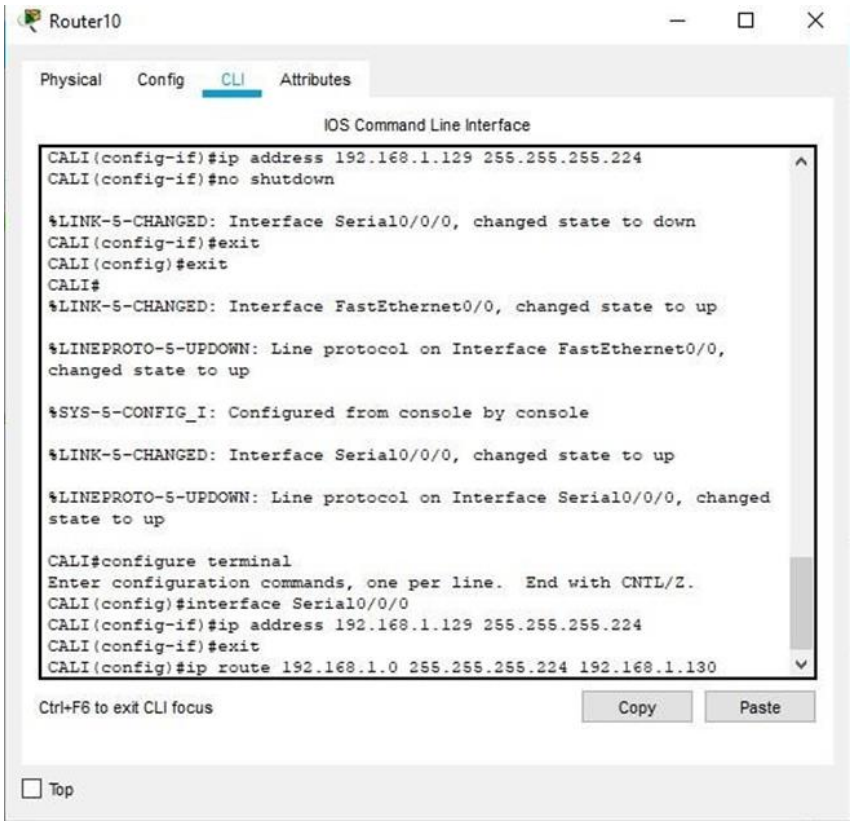


Ilustración 99. Configuración route ip

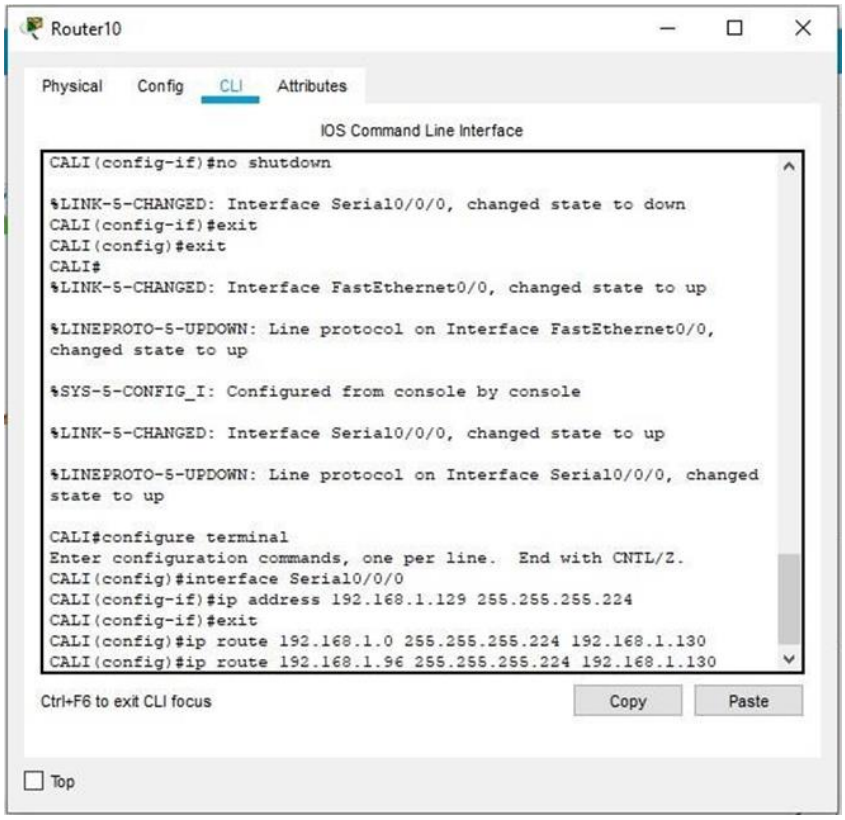


Ilustración 100. Configuración route ip

Diagrama completado con las direcciones IP, conexiones seriales y fast ethernet

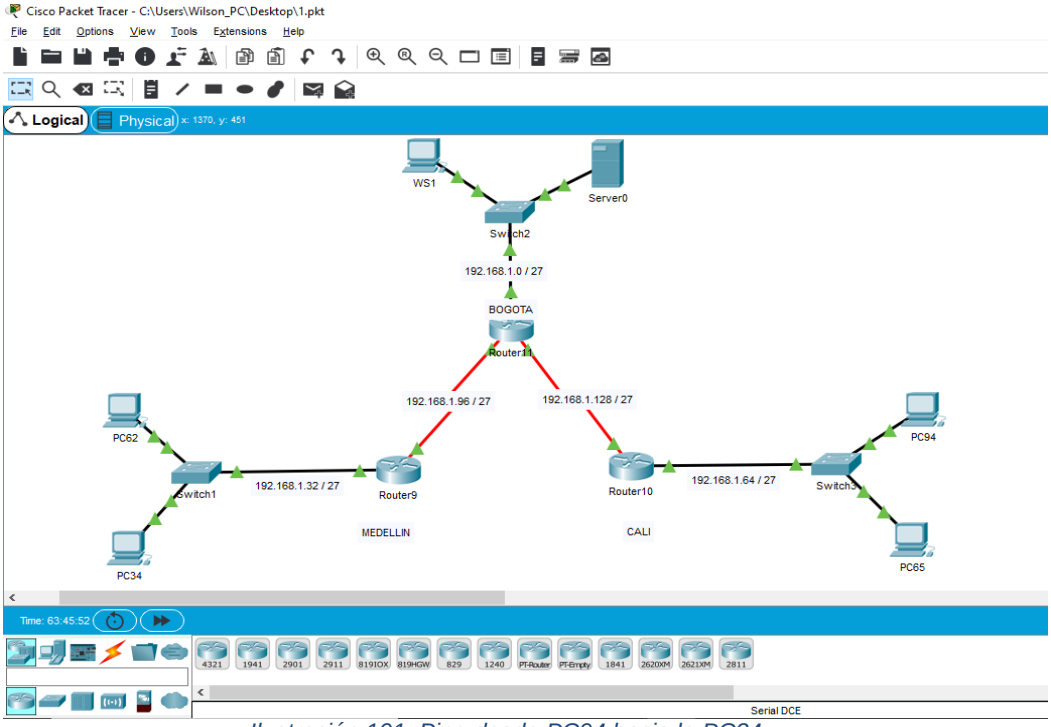


Ilustración 101. Ping desde PC94 hacia la PC34

Realizamos un ping desde la PC94 hacia la PC34

1.2.1 Parte 2: Configuración Básica.

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

	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	192.168.1.97	192.168.1.130	192.168.1.129
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

Tabla 3. Configuración básica router

H. 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.

Dispositivo	Interfaz	Dirección IP	Mascara de Subred	Gateway predeterminado
R1	Serial 0/0	192.168.1.99	255.255.255.224	N/A
	Serial 0/1	192.168.1.97	255.255.255.224	N/A
	Interfaz FA	192.168.1.33	255.255.255.224	N/A
R2	Serial 0/0	192.168.1.98	255.255.255.224	N/A
	Serial 0/1	192.168.1.130	255.255.255.224	N/A
	Interfaz FA	192.168.1.1	255.255.255.224	N/A
R3	Serial 0/0	192.168.1.131	255.255.255.224	N/A
	Serial 0/1	192.168.1.129	255.255.255.224	N/A
	Interfaz FA	192.168.1.65	255.255.255.224	N/A
PC Host-Bogotá	NIC	192.168.1.0	255.255.255.0	
PC Host-Medellín	NIC	192.168.1.32	255.255.255.0	
PC Host-Cali	NIC	192.168.1.64	255.255.255.0	

Tabla 4. Tabla de enrutamiento

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

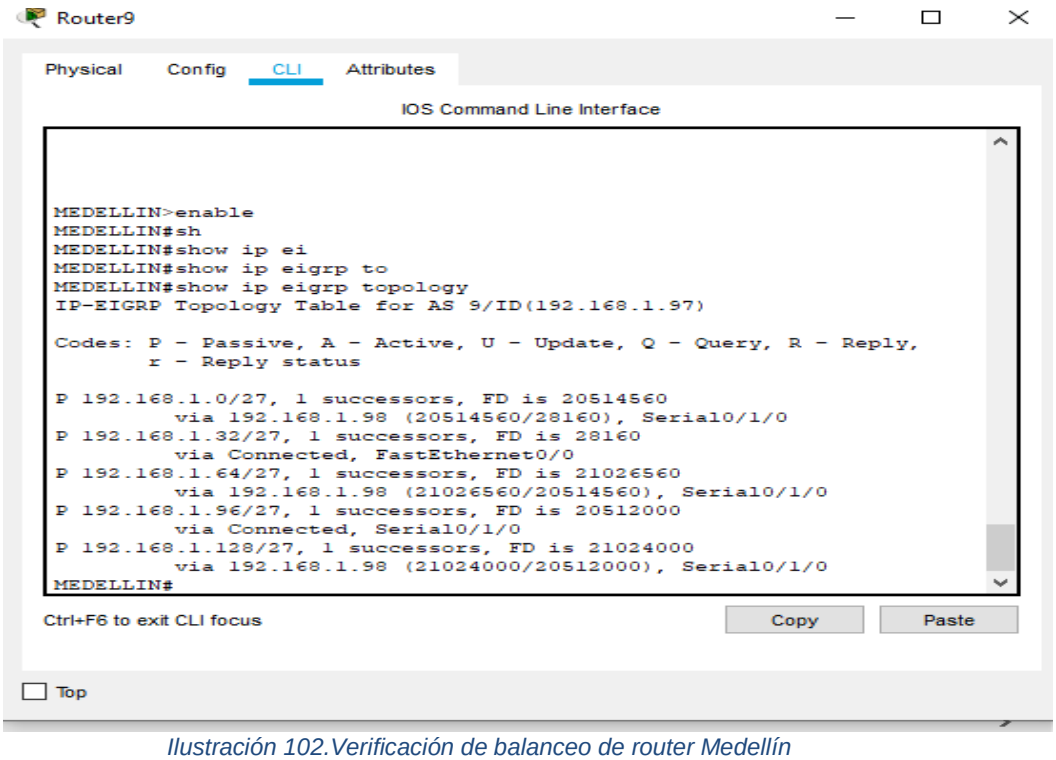


Ilustración 102.Verificación de balanceo de router Medellín

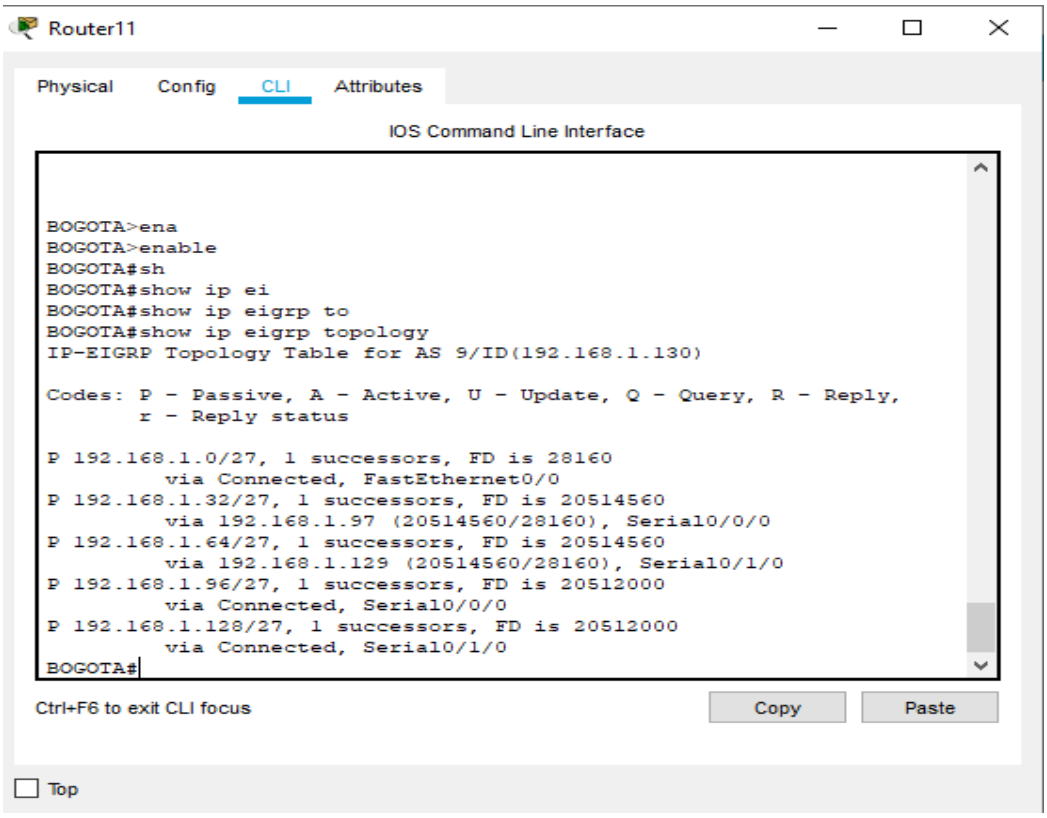


Ilustración 103. Verificación de balanceo de router Bogotá

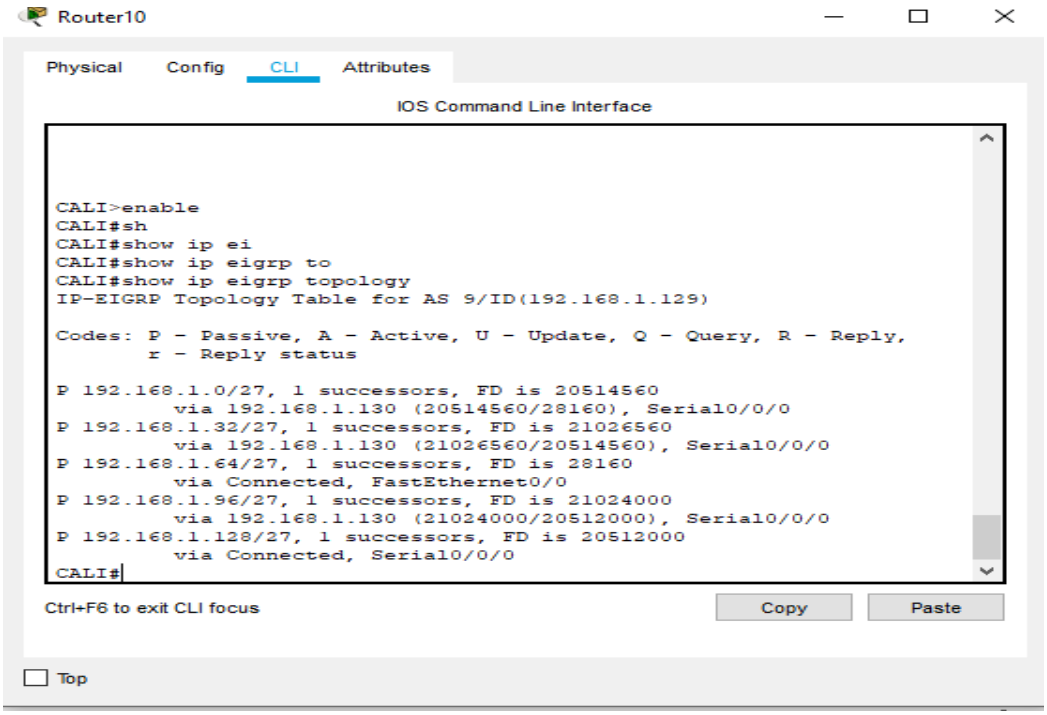


Ilustración 104. Verificación de balanceo de router Cali

J. Realizar un diagnóstico de vecinos cuando el comando cdp.

EL protocolo CDP se utiliza para obtener información de router y switches que están conectados localmente. El CDP es un protocolo propietario de Cisco, destinado al descubrimiento de vecinos y es independiente de los medios y del protocolo de enrutamiento. Aunque el CDP solamente mostrará información sobre los vecinos conectados de forma directa, este constituye una herramienta de gran utilidad.

utiliza el comando **Show cdp neighbors** en cada uno de los Routers

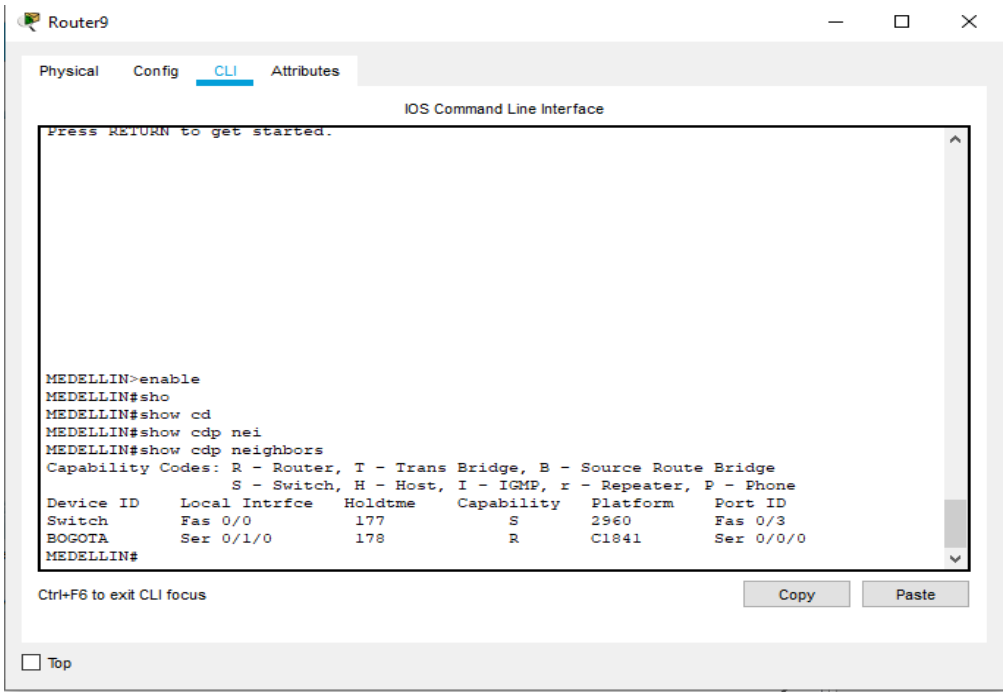


Ilustración 105. Protocolo CDP Medellín

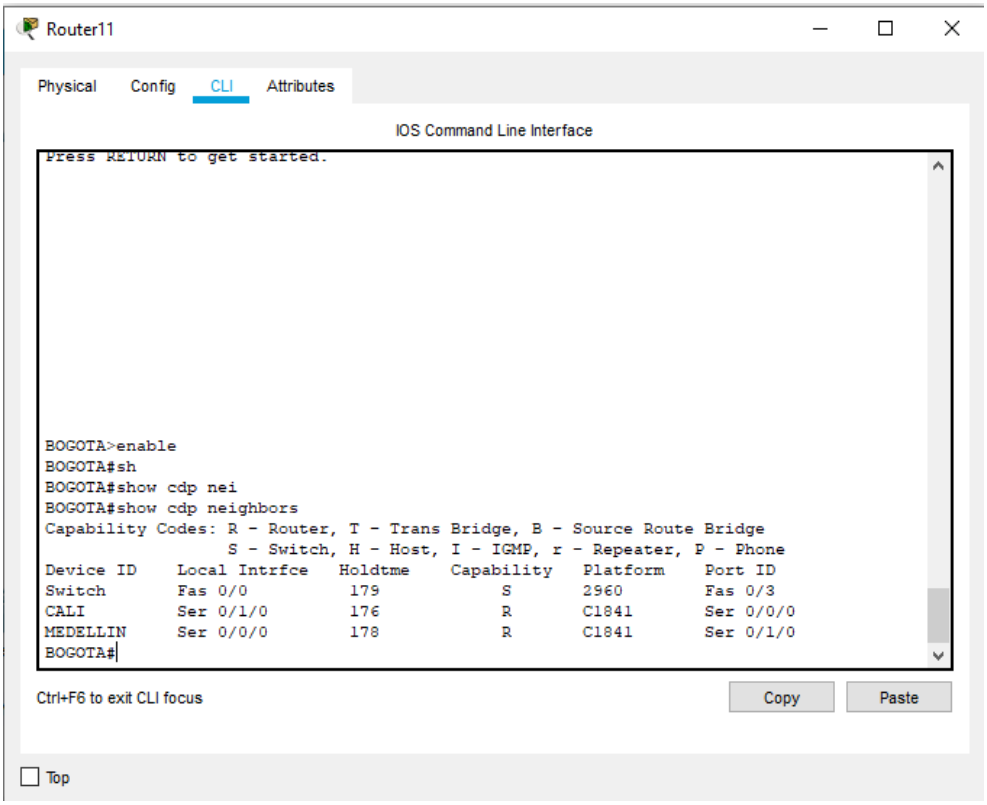


Ilustración 106. Protocolo CDP Bogotá

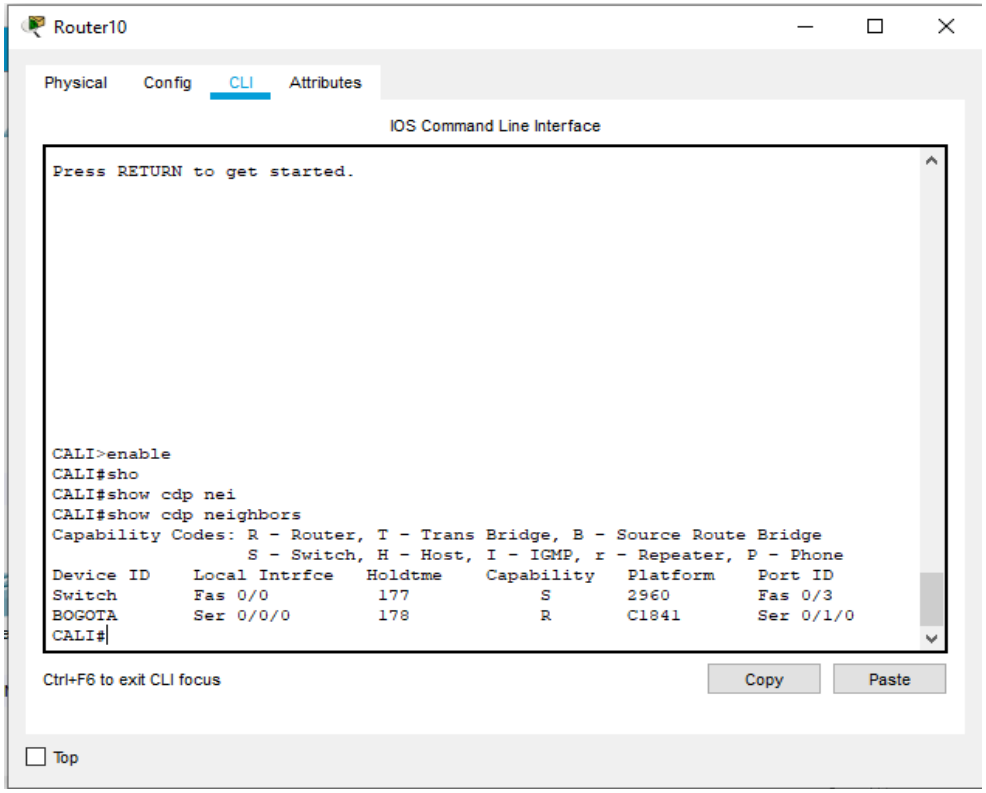


Ilustración 107. Protocolo CDP Cali

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

1.2.3 Parte 3: Configuración de Enrutamiento.

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

Configuramos el EIGRP en cada router.

```
R1(config)#router
eigrp 12345
R1(config-router)#no
auto-summary
R1(config-router)#net 192.168.1.33 255.255.255.0

R2(config)#router
eigrp 12345
R2(config-router)#no
auto-summary
R2(config-router)#net 192.168.1.1 255.255.255.0

R3(config)#router
eigrp 12345
R3(config-router)#no
auto-summary
R3(config-router)#net 192.168.1.65 255.255.255.0
```

Para los terminales donde haya reloj se debe configurarlo

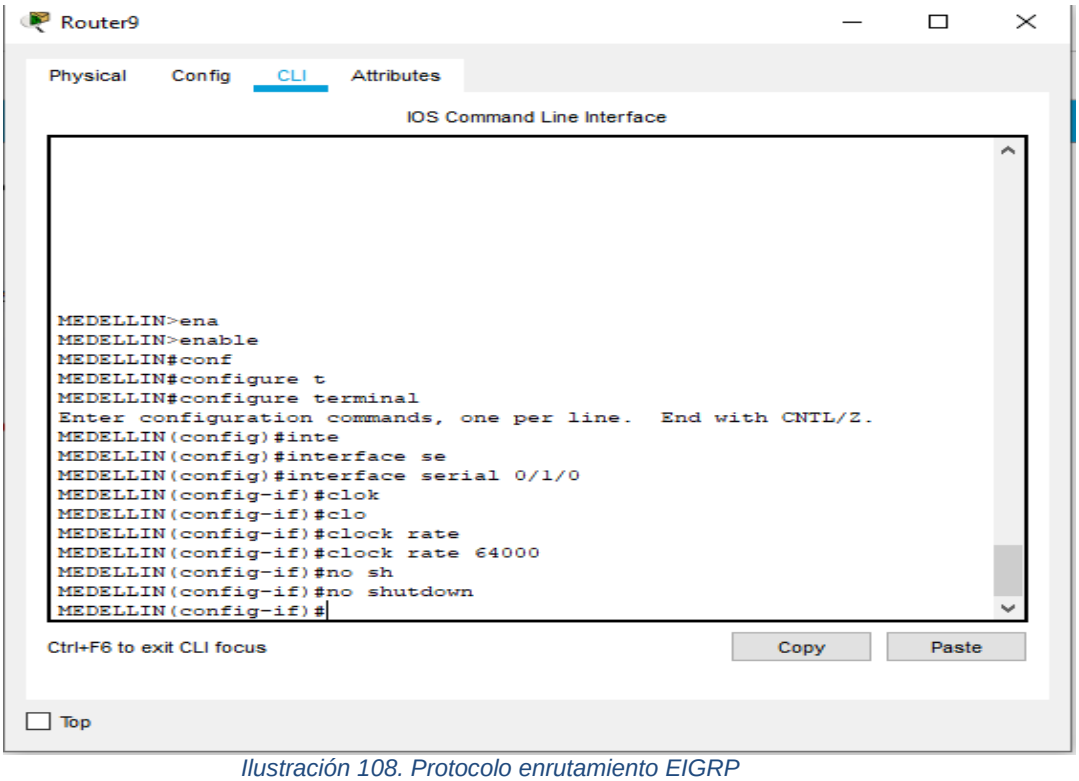


Ilustración 108. Protocolo enrutamiento EIGRP

La configuración del protocolo de enrutamiento EIGRP es obligatoria para el proceso de enrutamiento IP. El comando network es requerido porque permite que el proceso de enrutamiento determine cuáles interfaces participarán en el intercambio (envío y recepción) de las actualizaciones de enrutamiento (routing updates).

El campo network-number especifica una o varias redes que se encuentran directamente conectadas al encaminador, este campo está basado en los números de red classful, no en números de subred o en direcciones IP individuales.

En las siguientes imágenes se muestran los comandos utilizados para configurar el EIGRP de los routers de Medellín, Cali y Bogotá.

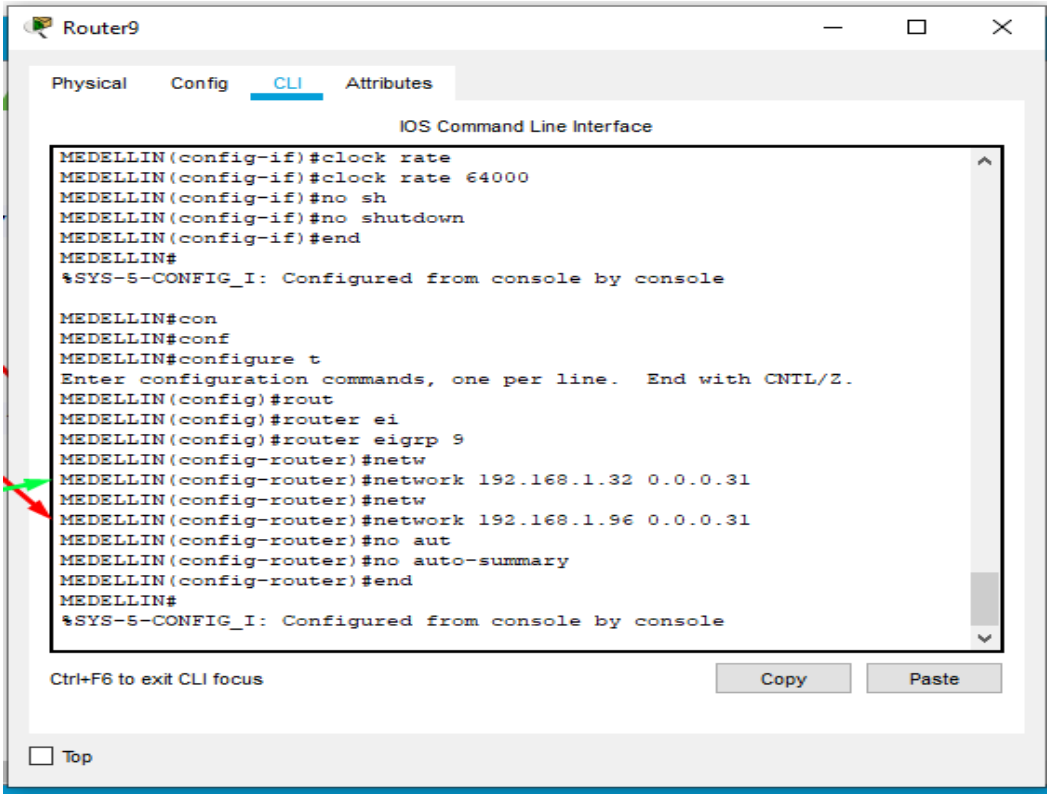


Ilustración 109. configurar el EIGRP de router de Medellín

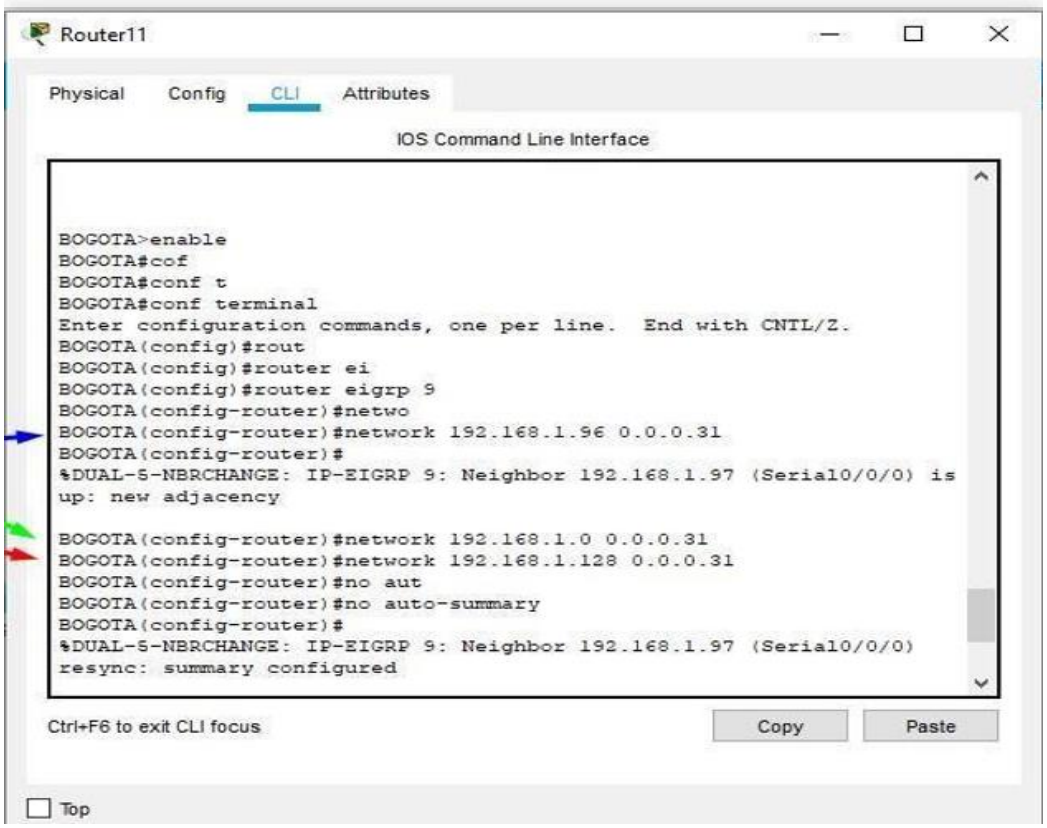


Ilustración 110. configurar el EIGRP de router de Bogotá

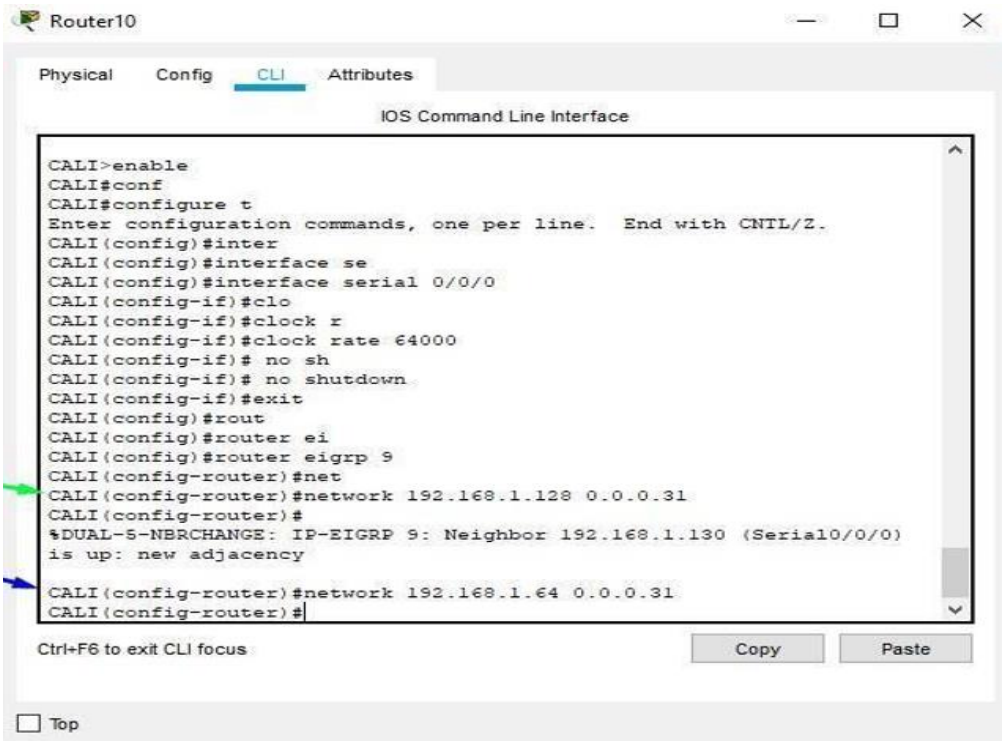


Ilustración 111. configurar el EIGRP de router de Cali

realizamos un ping desde la computadora PC34 Hacia La PC94

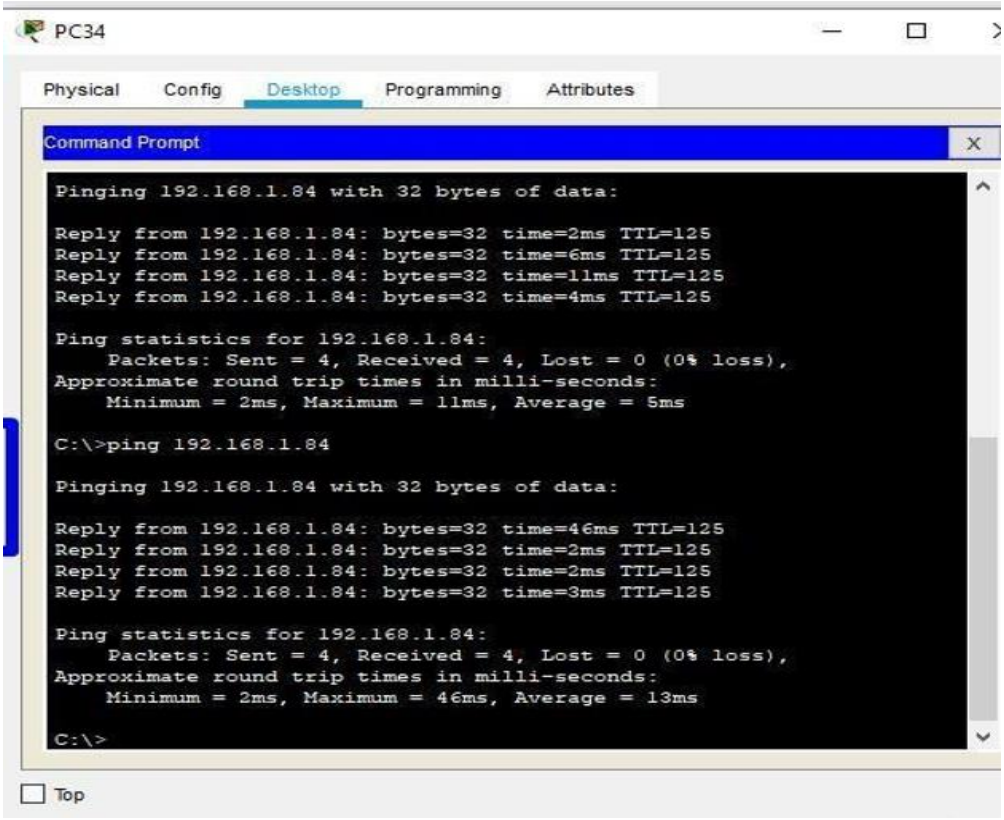


Ilustración 112. ping PC34 Hacia La PC94

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

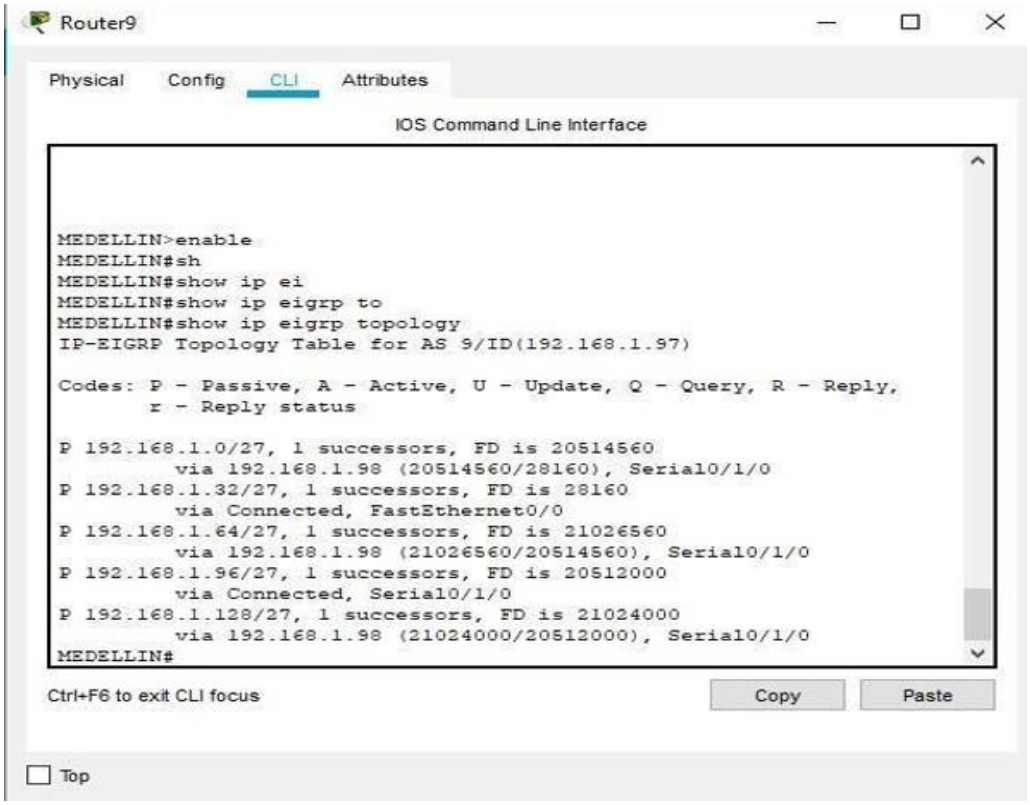


Ilustración 113. Verificar router configurado con EIGRP Medellín

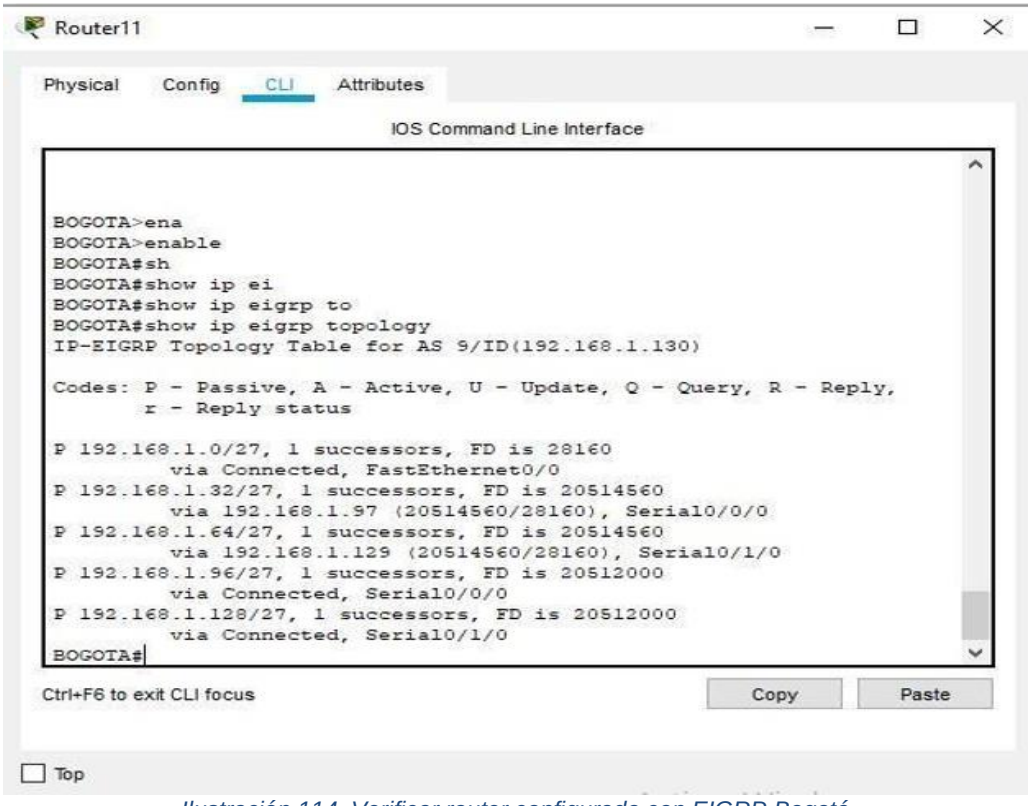


Ilustración 114. Verificar router configurado con EIGRP Bogotá

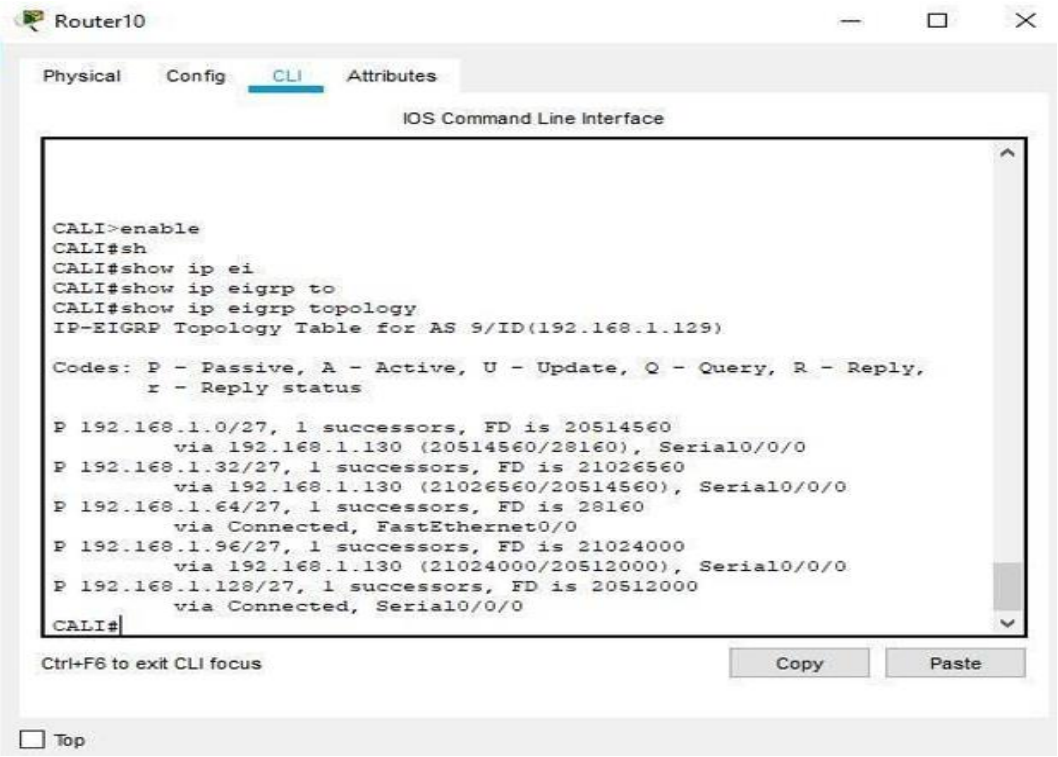


Ilustración 115. Verificar router configurado con EIGRP Cali

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

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.

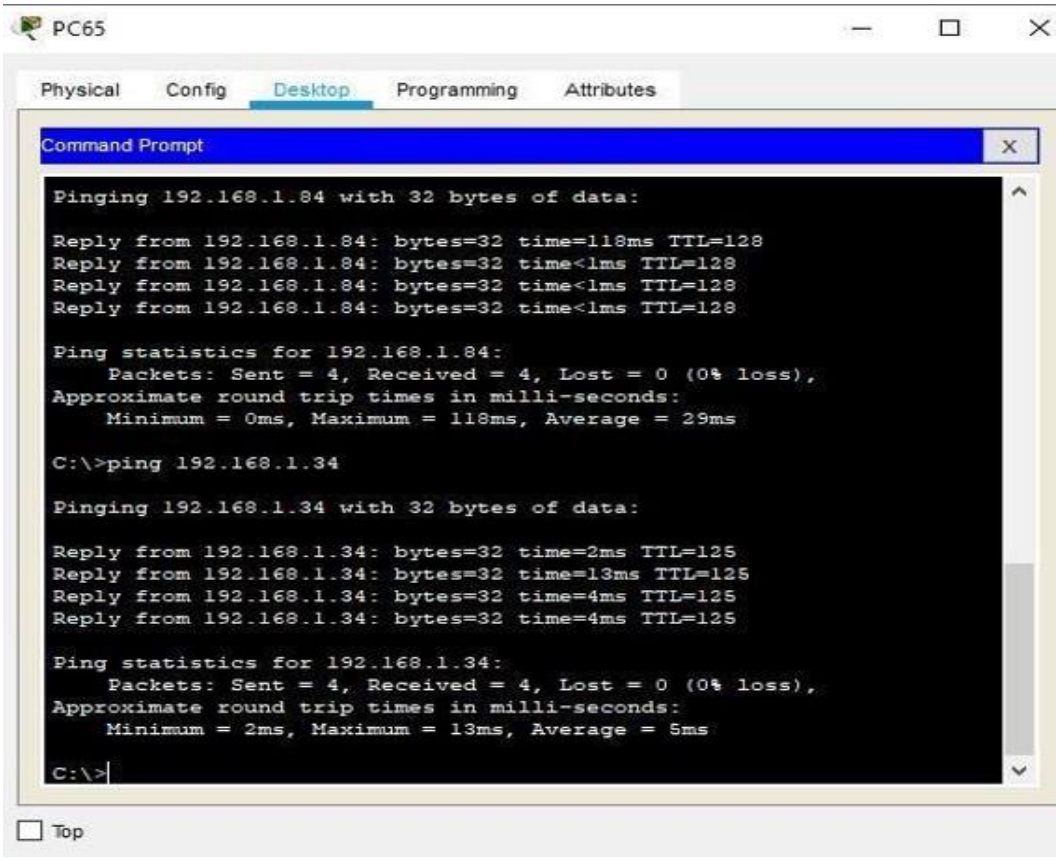


Ilustración 116. Prueba de conexión con el comando ping

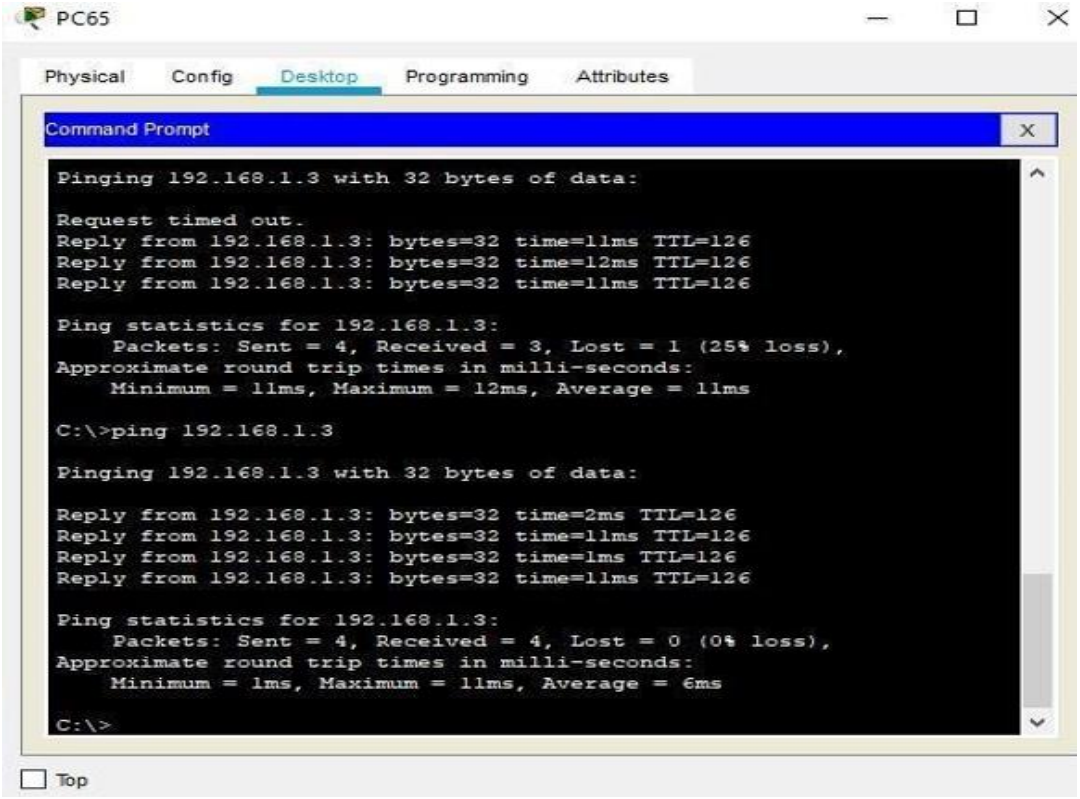


Ilustración 117. Prueba de conexión con el comando ping

1.2.4 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:

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

F. 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.

G. 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.

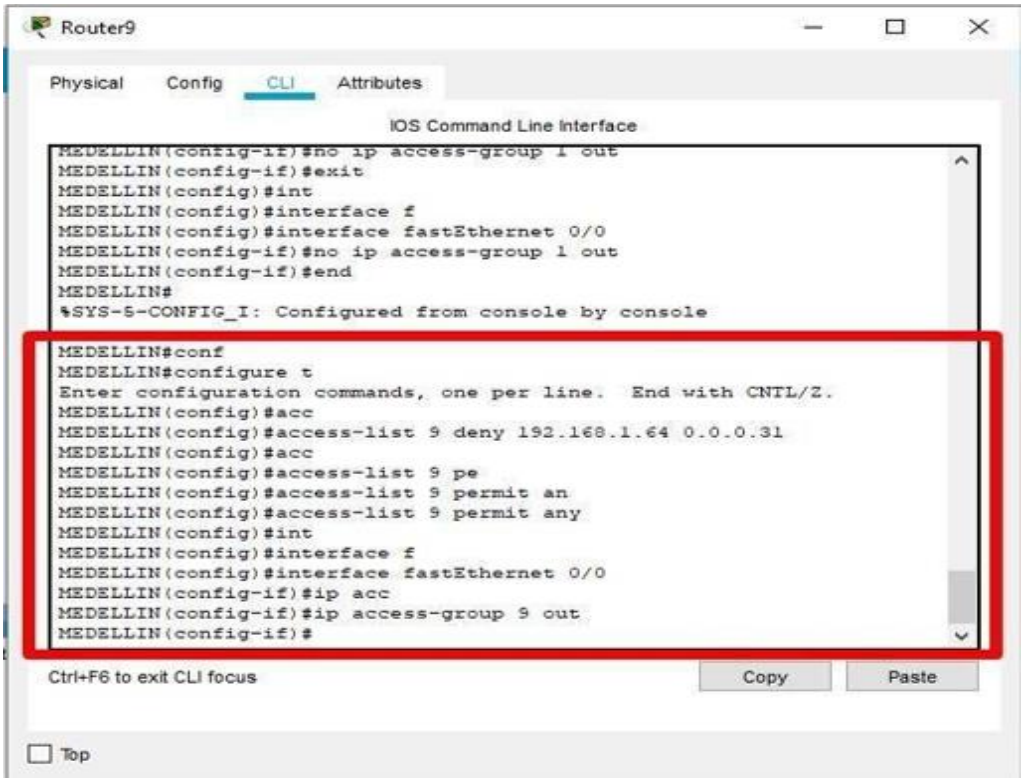


Ilustración 118. Configuración denegación de acceso Medellín

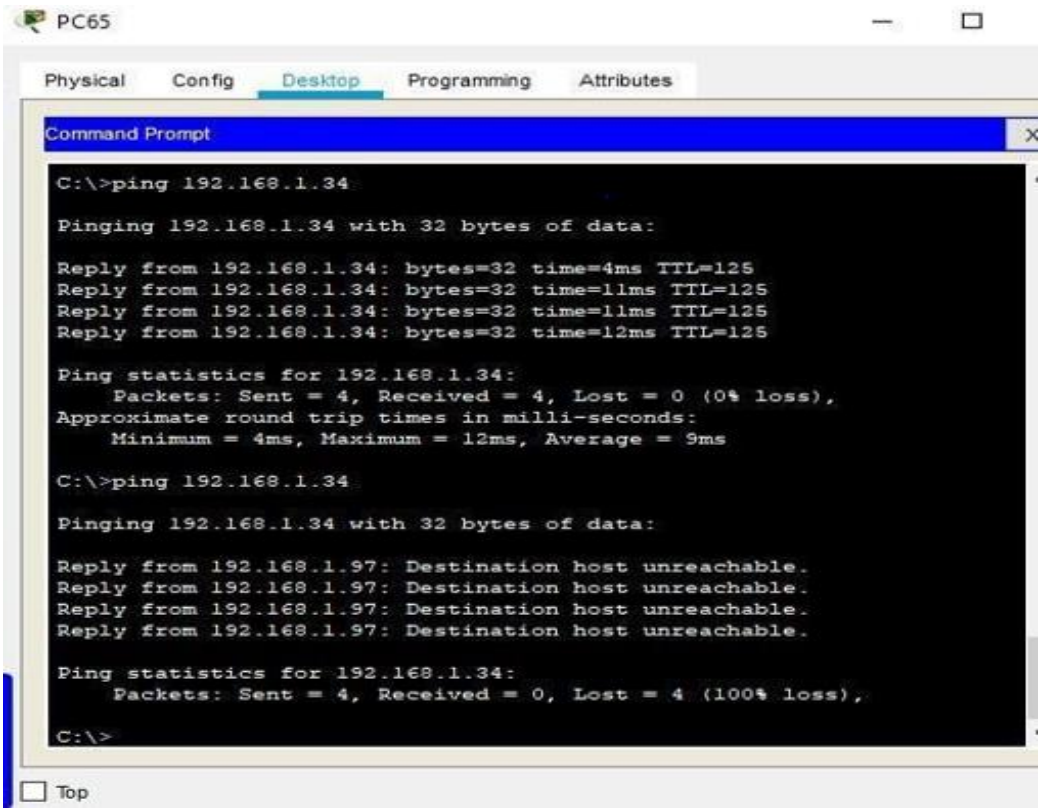


Ilustración 119. Prueba de acceso Medellín

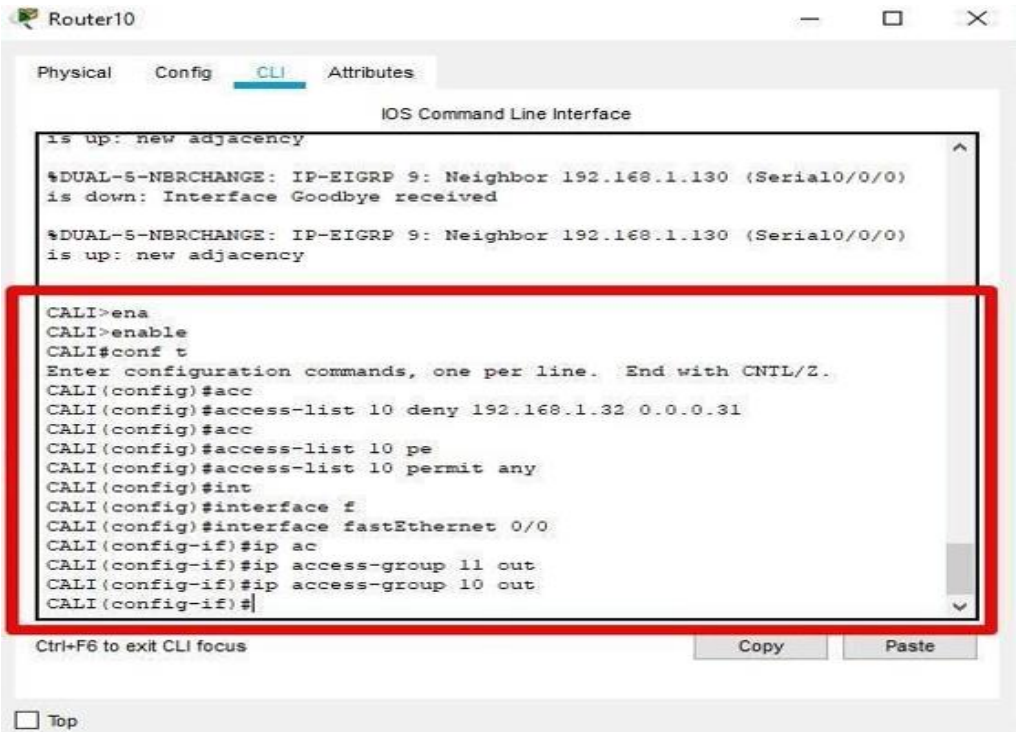


Ilustración 120. Ilustración 118. Configuración denegación de acceso Cali

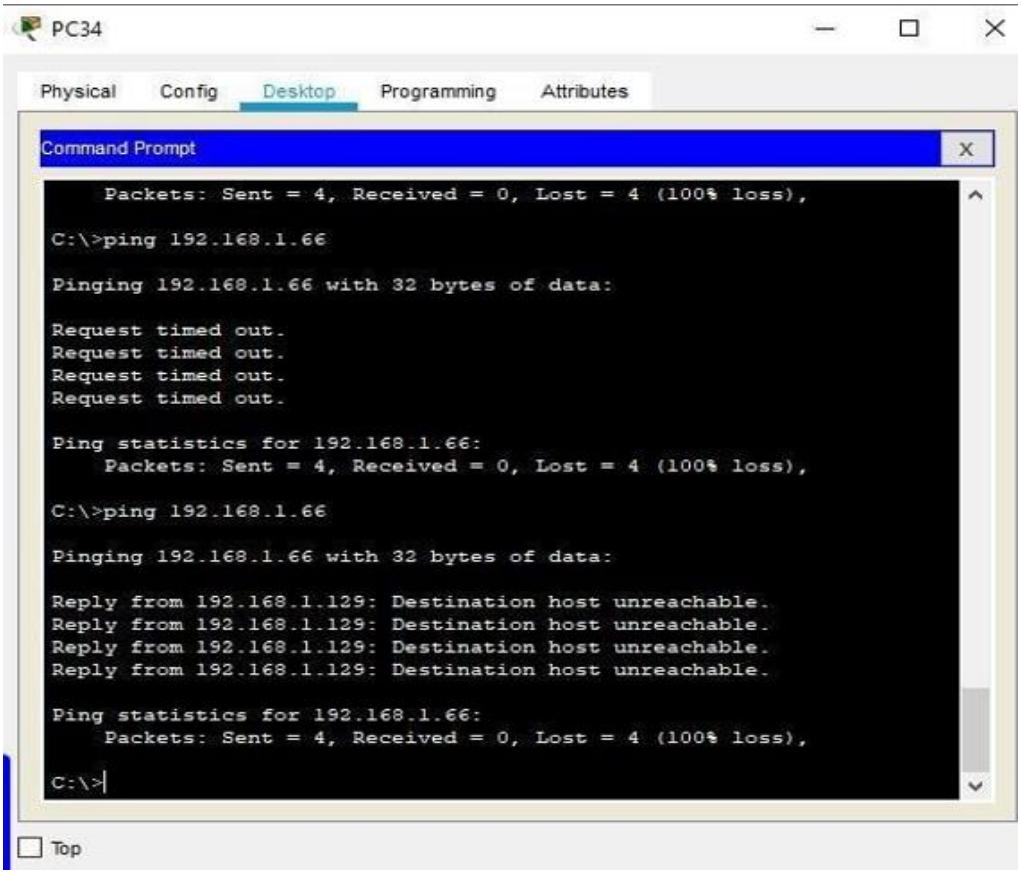


Ilustración 121. Ilustración 119. Prueba de acceso Cali

1.2.5 Parte 5: Comprobación de la red instalada.

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

D. 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	Fallo
	WS_1	Router BOGOTA	Funciono
	Servidor	Router CALI	fallo
	Servidor	Router MEDELLIN	fallo
TELNET	LAN del Router MEDELLIN	Router CALI	fallo
	LAN del Router CALI	Router CALI	funciono
PING	LAN del Router MEDELLIN	Router MEDELLIN	funciono
	LAN del Router CALI	Router MEDELLIN	fallo
	LAN del Router CALI	WS_1	
	LAN del Router MEDELLIN	WS_1	fallo
	LAN del Router MEDELLIN	LAN del Router CALI	fallo
	LAN del Router CALI	Servidor	fallo
PING	LAN del Router MEDELLIN	Servidor	fallo
	Servidor	LAN del Router MEDELLIN	fallo
	Servidor	LAN del Router CALI	fallo
	Router CALI	LAN del Router MEDELLIN	fallo
	Router MEDELLIN	LAN del Router CALI	fallo

Tabla 5. Resultado de prueba funcionamiento red.

CONCLUSIONES

Desarrollar los dos escenarios bajo Packet Tracer, garantizaron la apropiación de los temas propuestos en este diplomado de profundización.

Configurar y aplicar el enrutamiento de cada uno de los dispositivos y su puesta en marcha y verificación mediante los comandos.

A pesar de las adversidades se permitió cada uno de los conocimientos básicos y avanzados para llevar a cabo la elaboración de los diseños de red.

Aplicar las configuraciones NAT en el router mediante comandos, verificando dicha configuración sobre su aplicabilidad.

Definir el direccionamiento de las IP según los lineamientos establecidos.
Configurar las listas de control de acceso (ACL) para permitir el acceso de direcciones IP específicas, de esta manera se asegura que solo la computadora del administrador tenga permiso para acceder al router.

Implementar DHCP en los router correspondiente para que actúen como servidor el cual es el eje de la administración de las direcciones IP de la red.

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