

PRUEBA DE HABILIDADES PRÁCTICAS CCNA

**DIPLOMADO DE PROFUNDIZACIÓN CISCO (DISEÑO E IMPLEMENTACIÓN DE
SOLUCIONES INTEGRADAS LAN / WAN)**

GABY YAJAIRA MORALES ISAZA

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA ESCUELA DE CIENCIAS
BÁSICAS TECNOLOGÍA E INGENIERÍA**

**PROGRAMA INGENIERÍA DE INGENIERIA DE SISTEMAS
DIPLOMADO DE PROFUNDIZACIÓN CISCO
PUERTO CARREÑO
ENERO DE 2020**

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SOLUCIONES INTEGRADAS LAN / WAN)**

ESTUDIANTE

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**TRABAJO ESCRITO PARA OPTAR POR EL TÍTULO DE:
INGENIERO DE INGENIERO DE SISTEMAS**

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Resumen

En el diplomado se aprende lo relacionado a las redes, la implementación y cómo se ejecuta, en el cual se obtuvo un apoyo en CISCO y la plataforma de la Universidad Unad, manejando dos módulos en la plataforma Fundamentos De Networking y Principios De Enrutamiento para conocimiento de estos dos módulos se trabajaron los casos estudio.

La evaluación denominada “Prueba de habilidades prácticas”, forma parte de las actividades evaluativas del Diplomado de Profundización CCNA, y busca identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del diplomado. Lo esencial es poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

Abstrac

In the diploma you learn about networks, implementation and how it is executed, in which it gained support in CISCO and the Platform of Unad University, managing two modules in the platform Networking Fundamentals and Routing Principles for knowledge of these two modules were worked on the case studies.

The evaluation called "Practical Skills Test" is part of the evaluation activities of the CCNA Deepening Diploma and seeks to identify the degree of skills and skills that were acquired throughout the diploma. The essential thing is to test the levels of understanding and troubleshooting related to various aspects of Networking.

Introducción

En el siguiente trabajo denominado examen final de habilidades prácticas, perteneciente al Diplomado de profundización CISCO, diseño e implementación de soluciones integradas LAN / WLAN. Se dará solución a dos escenarios propuestos, se abordarán las respectivas técnicas para la comprensión y solución de problemas relacionados con diversos aspectos de Networking. Tales como inicialización de dispositivos de red, configuración básica de Routers, Servidores, Switches, seguridad en dispositivos de comunicación, aplicación de routing, Vlans, configuración OSPF, implementación DHCP, NAT estática y de sobrecarga, configuración y verificación de ACL y se redactara el informe de solución del caso estudio, evidenciando el paso a paso del desarrollo de dicho problema.

Objetivos

Objetivo General

Implementar todas las habilidades prácticas y teóricas aprendidas en la Universidad Nacional Abierta y a Distancia, para identificar y aplicar una solución a dos escenarios propuestos de problema de Networking.

Objetivos específicos

Cumplir con los siguientes objetivos específicos, para la adquisición de competencias y habilidades ante problemas típicos de Networking.

- Identificar que dispositivos utilizar para la construcción de una topología de red.
- Inicializar dispositivos de Networking
- Realizar configuración básica a dispositivos de comunicación como Routers, Switch, Servidores.
- Implementar seguridad en Switch, elaboración de Vlans e inter Vlan Routing.
- Determinar la configuración necesaria para la implementación de OSPFv2, protocolo dinámico de Routing.
- Implementar de DHCP y NAT en dispositivos de comunicación.
- Configurar y verificar listas de control de acceso ACL.
- Verificar conectividad entre los dispositivos de una topología.

Descripción del escenario propuesto para la prueba de habilidades

Escenario 1

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

Topología de red

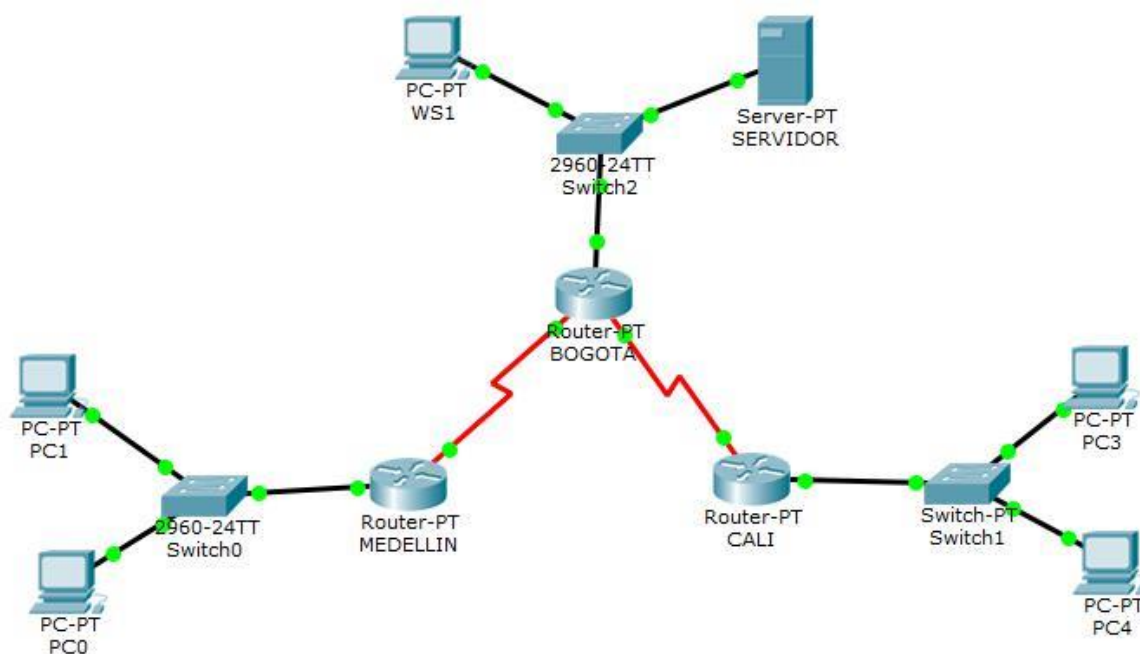


Ilustración 1 Escenario 1

Configuración Básica.

En esta primera parte configuramos cada router con su configuración básica y su protocolo de enrutamiento EIGRP y la Configuración de las listas de Control de Acceso.

Configuración Básica.

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

Configuramos el enrutamiento.

- Le asignamos un nombre a cada router por medio del comando hostname.
- Asignamos las ip a los routers y puertos correspondientes.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#interface s0/0/0
R1(config-if)#ip address 192.168.1.99 255.255.255.224
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.1.33 255.255.255.224
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

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

Copy Paste

Router2

Physical Config CLI

IOS Command Line Interface

```
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interface se2/0
R2(config-if)#ip address 192.168.1.98 255.255.255.224
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
R2(config-if)#exit
R2(config)#interface se3/0
R2(config-if)#ip address 192.168.1.130 255.255.255.224
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
R2(config-if)#exit
R2(config)#interface f0/0
R2(config-if)#ip address 192.168.1.1 255.255.255.224
R2(config-if)#no shutdown

R2(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
```

Copy Paste

Ilustración 2 Configuración Básica.

```

Router1
Physical Config CLI
IOS Command Line Interface
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#interface se2/0
R3(config-if)#ip address 192.168.1.131 255.255.255.224
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

R3(config-if)#exit
R3(config)#interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

% Incomplete command.
R3(config)#interface f0/0
R3(config-if)#ip address 192.168.1.65 255.255.255.224
R3(config-if)#no shutdown

R3(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

```

Ilustración 3 Configuración Básica.

- Miramos la tabla de enrutamiento router Medellín por medio del comando ip route.

```

MEDELLIN
Physical Config CLI
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
R1(config-if)#ip address 192.168.1.33 255.255.255.224
R1(config-if)#no shutdown

R1(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

R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

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

Gateway of last resort is not set

      192.168.1.0/27 is subnetted, 2 subnets
C       192.168.1.32 is directly connected, FastEthernet0/0
C       192.168.1.96 is directly connected, Serial2/0
R1#

```

Ilustración 4 Configuración Básica.

- Miramos la tabla de enrutamiento router Cali por medio del comando ip route.

```

R3#(config)#interface #0/0
R3(config-if)#ip address 192.168.1.65 255.255.255.224
R3(config-if)#no shutdown

R3(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

R3(config-if)#EXIT
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      192.168.1.0/27 is subnetted, 2 subnets
C       192.168.1.64 is directly connected, FastEthernet0/0
C       192.168.1.128 is directly connected, Serial2/0
R3#

```

Ilustración 5 tabla de enrutamiento router

- Miramos la tabla de enrutamiento router Bogotá por medio del comando ip route.

```

R2>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      192.168.1.0/27 is subnetted, 3 subnets
C       192.168.1.0 is directly connected, FastEthernet0/0
C       192.168.1.96 is directly connected, Serial2/0
C       192.168.1.128 is directly connected, Serial3/0
R2>

```

Ilustración 6 tabla de enrutamiento router

- Rectificamos el balanceo de carga del router Medellín.

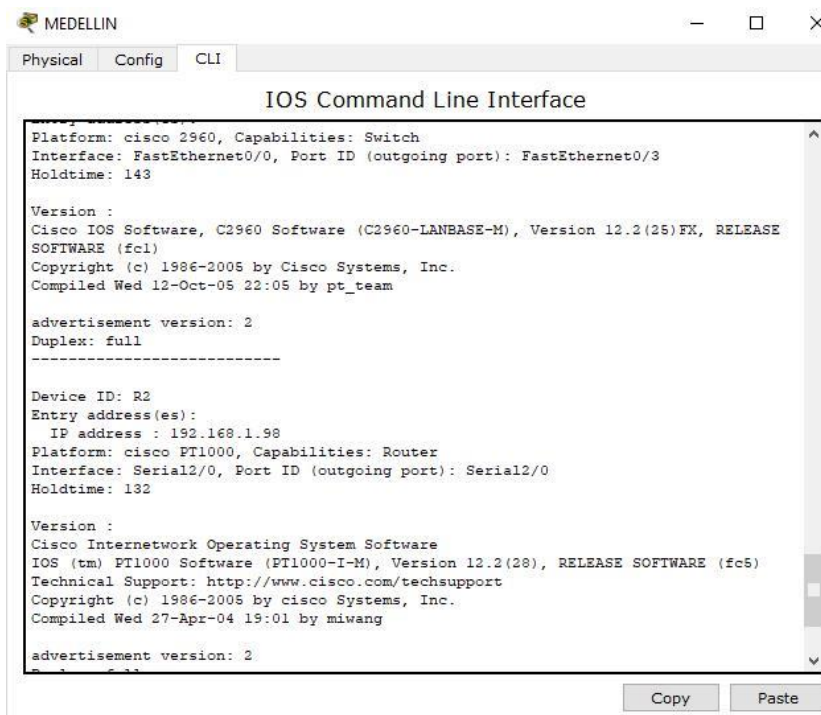


Ilustración 7 balanceo de carga del router

- Rectificamos el balanceo de carga del router Bogotá.

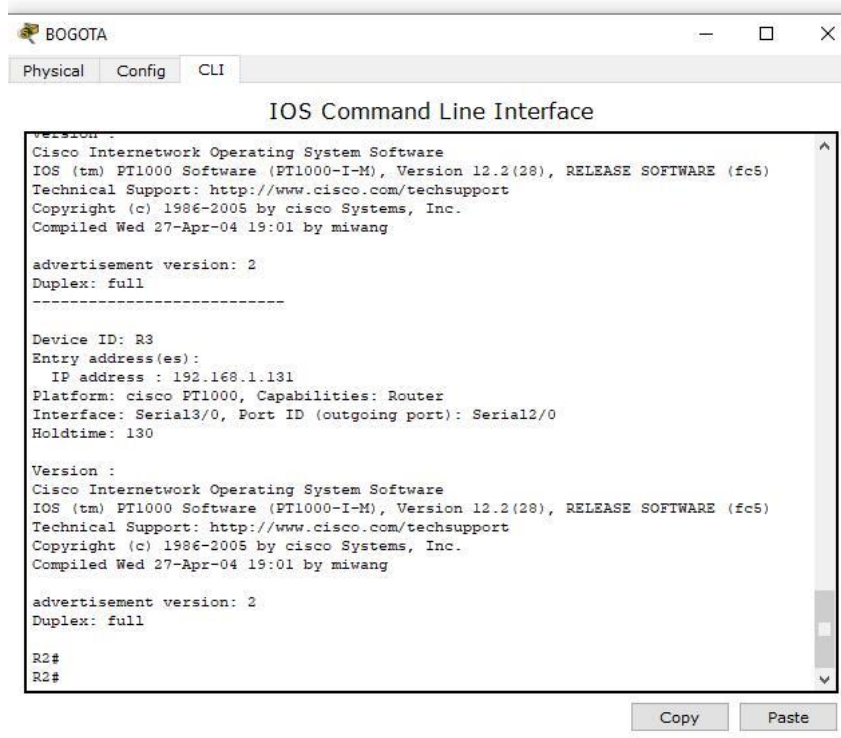


Ilustración 8 balanceo de carga del router

- Rectificamos el balanceo de carga del router Cali.

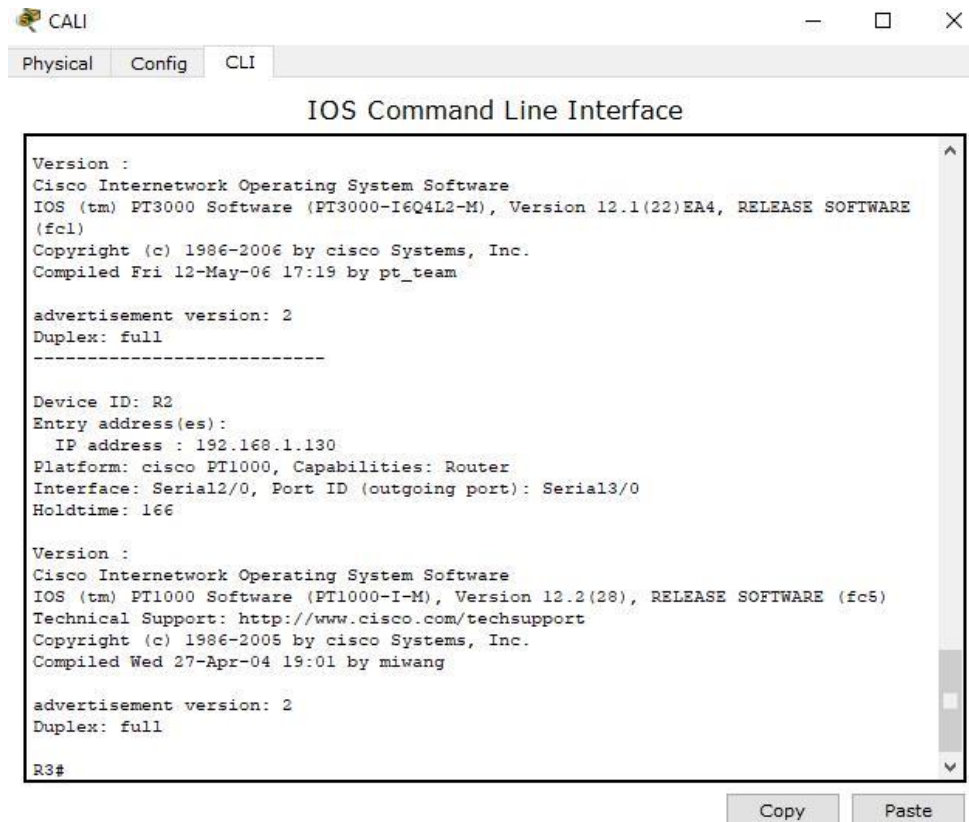


Ilustración 9 Rectificamos el balanceo de carga del router

- Hacemos ping para probar la conexión.

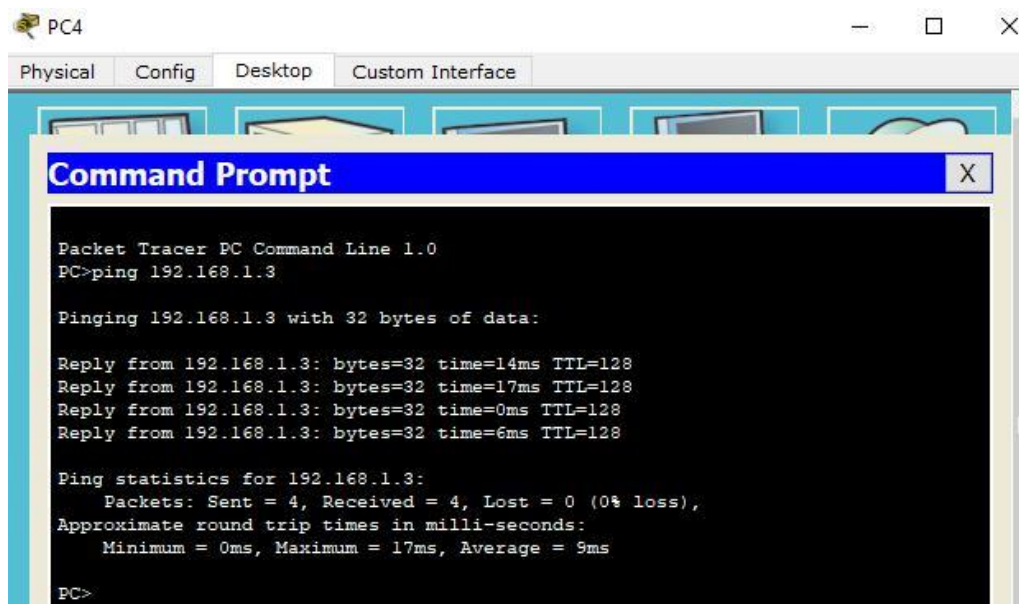
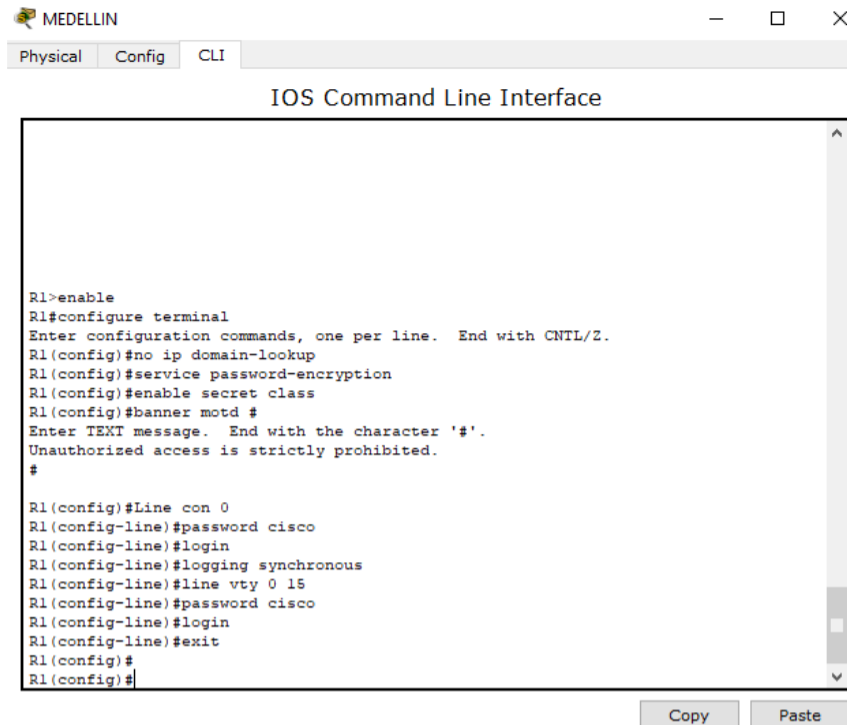


Ilustración 10 probar la conexión

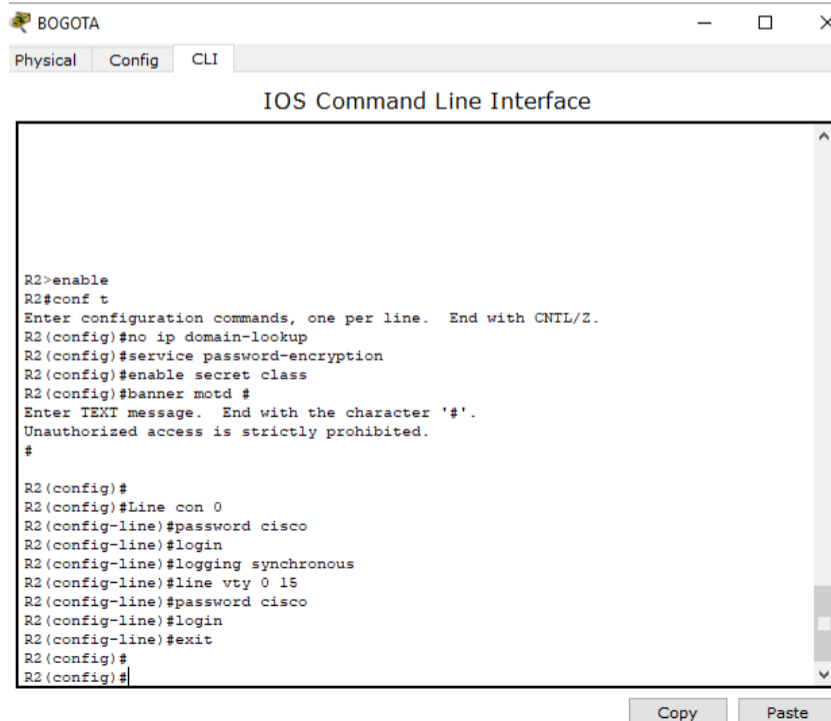
- Para dar más seguridad configuramos cada router para que tenga una contraseña.



```
MEDELLIN
Physical Config CLI
IOS Command Line Interface

R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#no ip domain-lookup
R1(config)#service password-encryption
R1(config)#enable secret class
R1(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is strictly prohibited.
#
R1(config)#Line con 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#logging synchronous
R1(config-line)#line vty 0 15
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#
R1(config)#
```

Copy Paste



```
BOGOTA
Physical Config CLI
IOS Command Line Interface

R2>enable
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip domain-lookup
R2(config)#service password-encryption
R2(config)#enable secret class
R2(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is strictly prohibited.
#
R2(config)#
R2(config)#Line con 0
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#logging synchronous
R2(config-line)#line vty 0 15
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#
R2(config)#
```

Copy Paste

Ilustración 11 Configuración de Seguridad

The screenshot shows the CALI CLI interface with tabs for Physical, Config, and CLI. The main window displays the IOS Command Line Interface for R3. The user has entered the following commands:

```
R3>enable
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#no ip domain-lookup
R3(config)#service password-encryption
R3(config)#enable secret class
R3(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is strictly prohibited.
#
R3(config)#Line con 0
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#logging synchronous
R3(config-line)#line vty 0 15
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#
R3(config)#
```

Buttons for Copy and Paste are visible at the bottom right of the terminal window.

Ilustración 12 Configuración de Seguridad

Configuración de las listas de Control de Acceso.

The screenshot shows the BOGOTA CLI interface with tabs for Physical, Config, and CLI. The main window displays the IOS Command Line Interface for R2. The user has entered the following commands:

```
R2>enable
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip domain-lookup
R2(config)#service password-encryption
R2(config)#enable secret class
R2(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is strictly prohibited.
#
R2(config)#
R2(config)#Line con 0
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#logging synchronous
R2(config-line)#line vty 0 15
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#
R2(config)#access-list 10 permit 192.168.146.0 0.0.1.255
R2(config)#
```

Buttons for Copy and Paste are visible at the bottom right of the terminal window.

Ilustración 13 Control de Acceso

- Comprobación de la red instalada.

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

Escenario 2

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

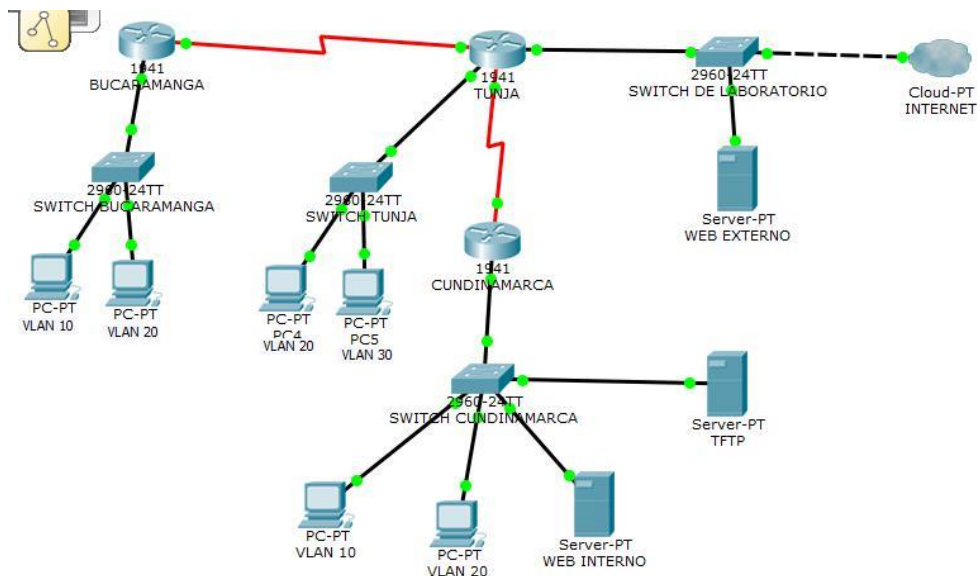


Ilustración 14 Grafico escenario 2

- **Inicio de Configuración Inicial**
- Configuración para enable secret para darle seguridad a los routers.
- Configuración básica

BUCARAMANGA

Physical Config CLI

IOS Command Line Interface

```

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line con 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

Copy Paste

Scenario 0

TUNJA

Physical Config CLI

IOS Command Line Interface

```

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line con 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

Copy

Ilustración 15 Configuración básica.

The screenshot shows the IOS Command Line Interface with three tabs: Physical, Config, and CLI. The main window displays the following text:

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret class
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line con 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 15
^
% Invalid input detected at '^' marker.

Router(config)#line vty 0 15
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

At the bottom right of the window, there are two buttons: "Copy" and "P".

Ilustración 16 Configuración básica.

- Configuramos el enrutamiento, asignándole las ip a los puertos correspondientes.

The screenshot shows the IOS Command Line Interface with three tabs: Physical, Config, and CLI. The main window displays the following text:

```
TUNJA#config t
Enter configuration commands, one per line. End with CNTL/Z.
TUNJA(config)#interface s0/0/1
TUNJA(config-if)#ip address 172.31.2.37 255.255.255.252
TUNJA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
TUNJA(config-if)#exit
TUNJA(config)#interface se0/0/0
TUNJA(config-if)#ip address 172.31.3.33 255.255.255.252
TUNJA(config-if)#no shutdown
TUNJA(config-if)#exit
TUNJA(config)#interface g0/0
TUNJA(config-if)#ip address 172.3.2.9 255.255.255.248
TUNJA(config-if)#no shutdown

TUNJA(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

TUNJA(config-if)#exit
TUNJA(config)#interface g0/1
TUNJA(config-if)#ip address 209.17.220.1 255.255.255.192
TUNJA(config-if)#no shutdown

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

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

Ilustración 17 Configuramos el enrutamiento

CUNDINAMARCA

Physical Config CLI

IOS Command Line Interface

```
User Access Verification
Password:

Router>enable
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface s0/0/0
Router(config-if)#ip address 172.31.2.38 255.255.255.252
Router(config-if)#no shutdown

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

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

Router(config)#interface g0/0
Router(config-if)#ip address 172.31.2.9 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

Copy Paste

BUCARAMANGA

Physical Config CLI

IOS Command Line Interface

```
User Access Verification
Password:

Router>enable
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface s0/0/0
Router(config-if)#ip address 172.31.2.33 255.255.255.252
Router(config-if)#no shutdown

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

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

Router(config)#interface g0/0
Router(config-if)#ip address 172.31.2.1 255.255.255.248
Router(config-if)#no shutdown

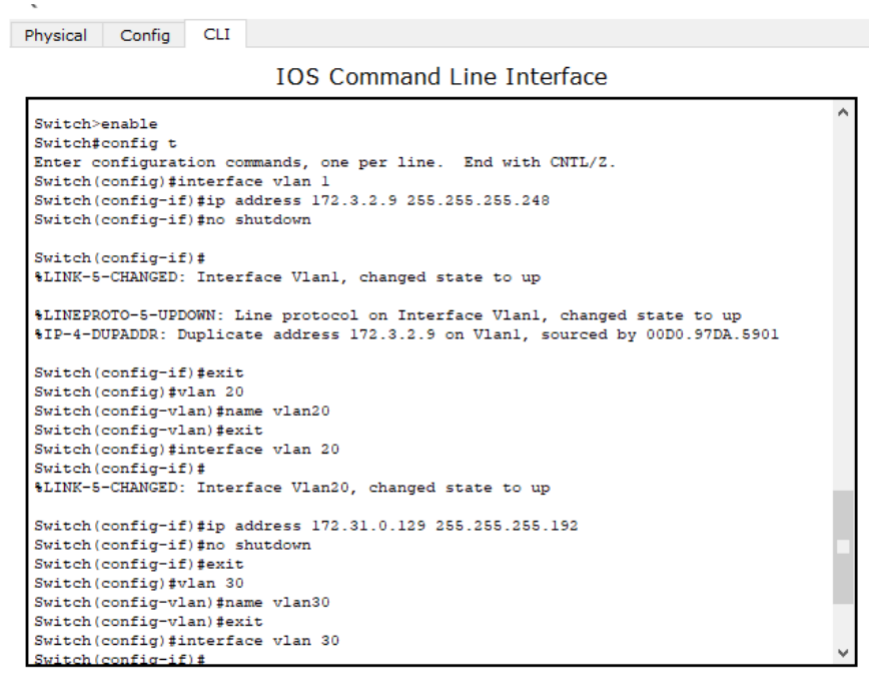
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state
to up
Router(config-if)#
```

Copy Paste

Ilustración 18 Configuramos el enrutamiento

Configuración básica de los Switches

- Asignamos nombres a las vlan.
- Asignamos las ip a los puertos correspondientes.

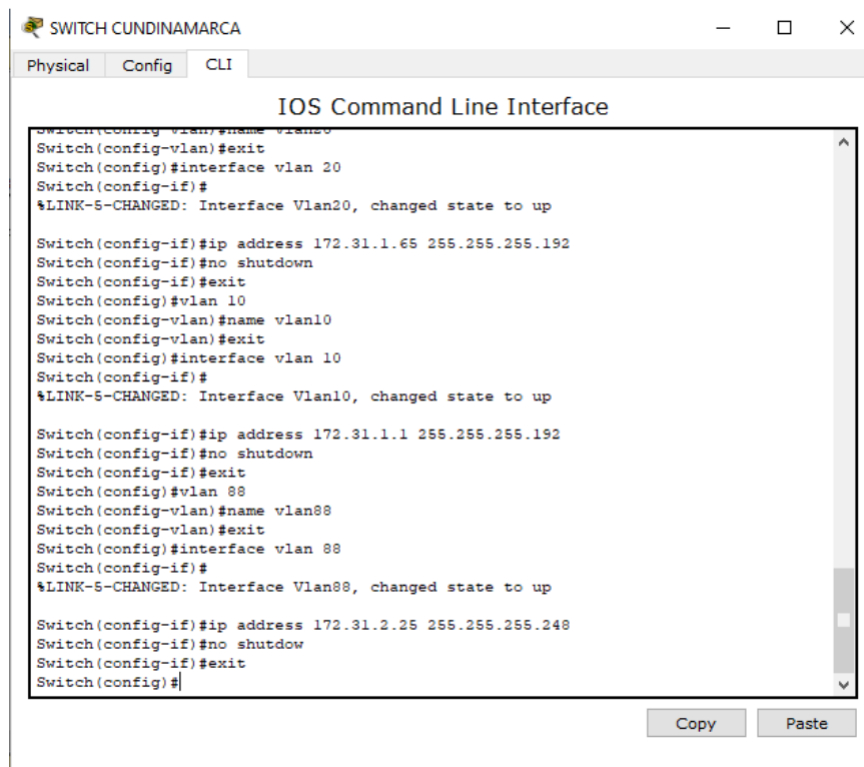


```
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface vlan 1
Switch(config-if)#ip address 172.3.2.9 255.255.255.248
Switch(config-if)#no shutdown

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%IP-4-DUPADDR: Duplicate address 172.3.2.9 on Vlan1, sourced by 00D0.97DA.5901

Switch(config-if)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name vlan20
Switch(config-vlan)#exit
Switch(config)#interface vlan 20
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up

Switch(config-if)#ip address 172.31.0.129 255.255.255.192
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name vlan30
Switch(config-vlan)#exit
Switch(config)#interface vlan 30
Switch(config-if)#
```



```
SWITCH CUNDINAMARCA
Physical Config CLI
IOS Command Line Interface

Switch(config-vlan)#name vlan20
Switch(config-vlan)#exit
Switch(config)#interface vlan 20
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up

Switch(config-if)#ip address 172.31.1.65 255.255.255.192
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#vlan 10
Switch(config-vlan)#name vlan10
Switch(config-vlan)#exit
Switch(config)#interface vlan 10
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

Switch(config-if)#ip address 172.31.1.1 255.255.255.192
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#vlan 88
Switch(config-vlan)#name vlan88
Switch(config-vlan)#exit
Switch(config)#interface vlan 88
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan88, changed state to up

Switch(config-if)#ip address 172.31.2.25 255.255.255.248
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
```

Copy Paste

Ilustración 19 Configuración básica de los Switches

```
Switch(config)#interface vlan 1
Switch(config-if)#ip address 172.31.2.1 255.255.255.248
Switch(config-if)#no shutdown

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%IP-4-DUPADDR: Duplicate address 172.31.2.1 on Vlan1, sourced by 00D0.58C0.9701

Switch(config-if)#exit
Switch(config)#vlan 10
Switch(config-vlan)#name valn10
Switch(config-vlan)#exit
Switch(config)#interface vlan 10
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

Switch(config-if)#ip address 172.31.0.1 255.255.255.192
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name vlan30
Switch(config-vlan)#exit
Switch(config)#interface vlan 30
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan30, changed state to up

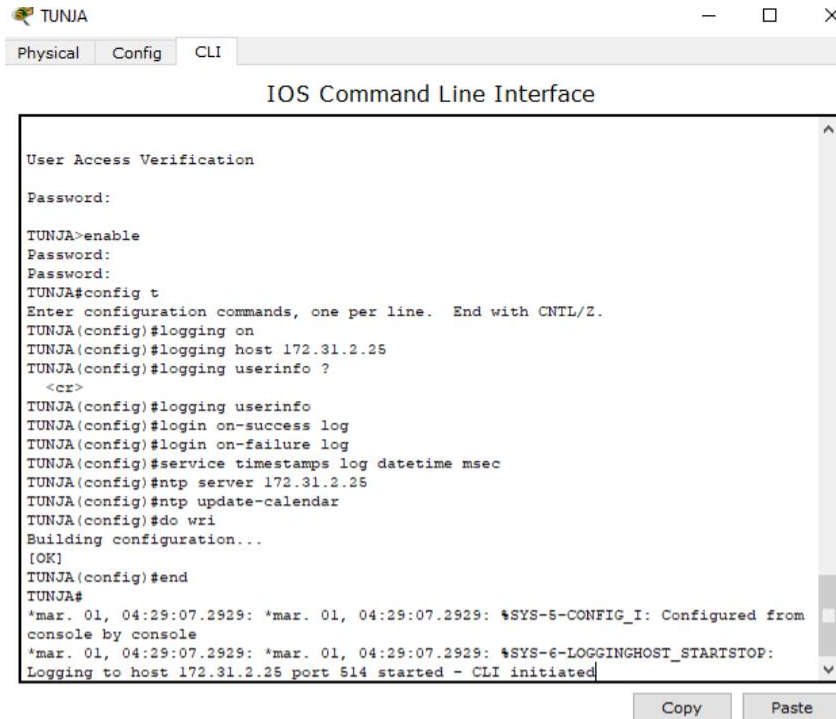
Switch(config-if)#ip address 172.31.0.65 255.255.255.192
Switch(config-if)#no shutdown
```

Ilustración 20 Configuración básica de los Switches

Configuramos el servicio Syslog.

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging on
Router(config)#logging host 172.31.2.25
Router(config)#logging userinfo ?
<cr>
Router(config)#logging userinfo
Router(config)#login on-success log
Router(config)#login on-failure log
Router(config)#service timestamps log datetime msec
Router(config)#ntp server 172.31.2.25
Router(config)#ntp update-calendar
Router(config)#do wri
Building configuration...
[OK]
Router(config)#end
Router#
*mar. 01, 03:55:14.5555: *mar. 01, 03:55:14.5555: %SYS-5-CONFIG_I: Configured from
console by console
*mar. 01, 04:25:58.2525: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0/0/0, changed state to down
*mar. 01, 04:25:58.2525: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0/0/0, changed state to up
Router#
Router#
Router#
Router#
Router#
```

Ilustración 21 servicio Syslog.



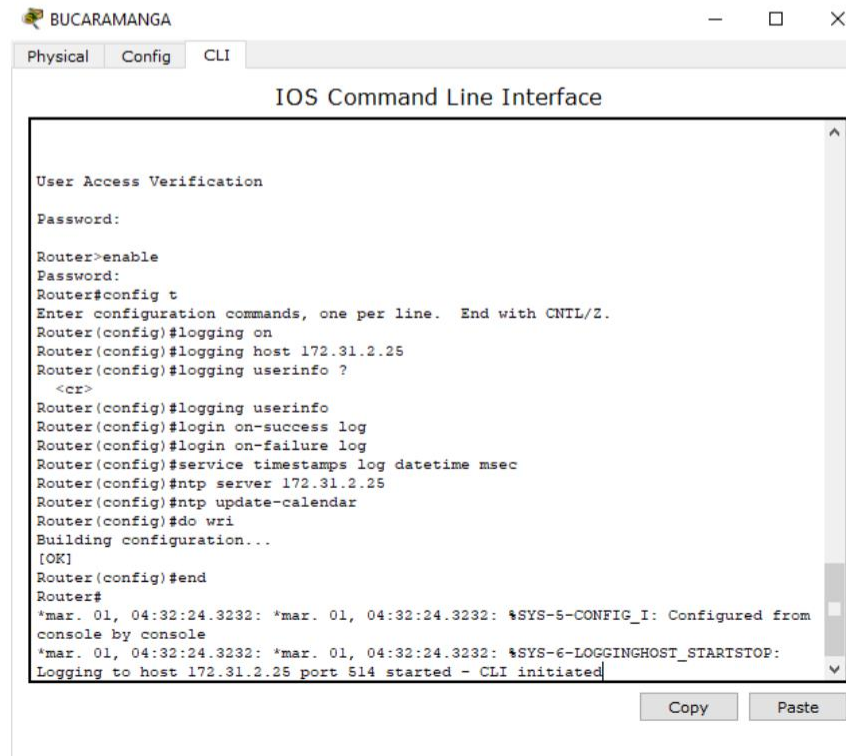
The screenshot shows a window titled 'TUNJA' with tabs for 'Physical', 'Config', and 'CLI'. The main content is the 'IOS Command Line Interface' showing a configuration session. The user enters 'enable' and then 'config t'. The configuration includes logging on, logging host 172.31.2.25, logging userinfo, login on-success and on-failure logs, service timestamps, ntp server 172.31.2.25, and ntp update-calendar. The session ends with 'end', and the system displays configuration logs and the start of Syslog logging.

```
User Access Verification

Password:

TUNJA>enable
Password:
TUNJA#config t
Enter configuration commands, one per line. End with CNTL/Z.
TUNJA(config)#logging on
TUNJA(config)#logging host 172.31.2.25
TUNJA(config)#logging userinfo ?
<cr>
TUNJA(config)#logging userinfo
TUNJA(config)#login on-success log
TUNJA(config)#login on-failure log
TUNJA(config)#service timestamps log datetime msec
TUNJA(config)#ntp server 172.31.2.25
TUNJA(config)#ntp update-calendar
TUNJA(config)#do wri
Building configuration...
[OK]
TUNJA(config)#end
TUNJA#
*mar. 01, 04:29:07.2929: *mar. 01, 04:29:07.2929: %SYS-5-CONFIG_I: Configured from
console by console
*mar. 01, 04:29:07.2929: *mar. 01, 04:29:07.2929: %SYS-6-LOGGINGHOST_STARTSTOP:
Logging to host 172.31.2.25 port 514 started - CLI initiated
```

Copy Paste



The screenshot shows a window titled 'BUCARAMANGA' with tabs for 'Physical', 'Config', and 'CLI'. The main content is the 'IOS Command Line Interface' showing a configuration session. The user enters 'enable' and then 'config t'. The configuration includes logging on, logging host 172.31.2.25, logging userinfo, login on-success and on-failure logs, service timestamps, ntp server 172.31.2.25, and ntp update-calendar. The session ends with 'end', and the system displays configuration logs and the start of Syslog logging.

```
User Access Verification

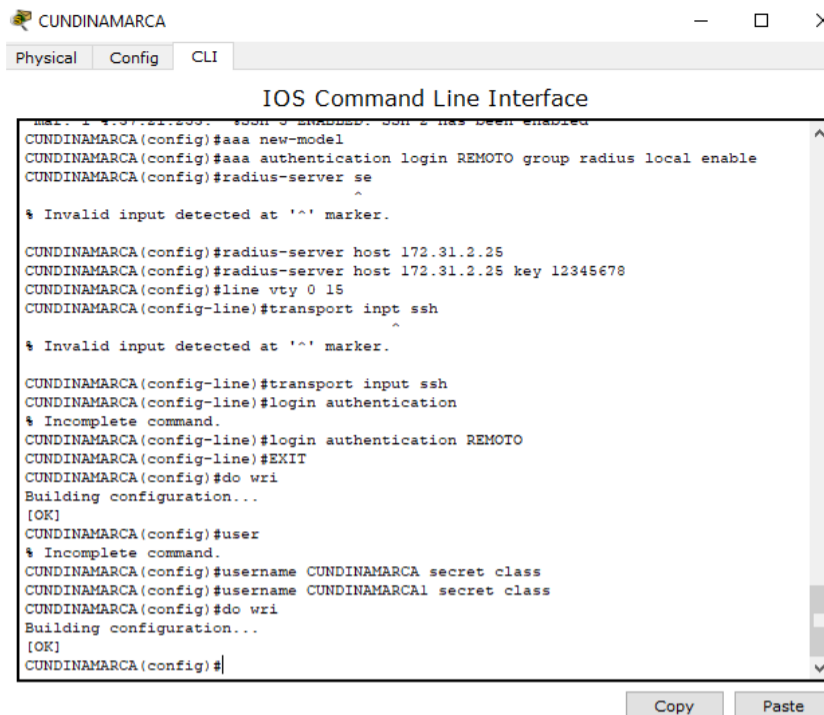
Password:

Router>enable
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging on
Router(config)#logging host 172.31.2.25
Router(config)#logging userinfo ?
<cr>
Router(config)#logging userinfo
Router(config)#login on-success log
Router(config)#login on-failure log
Router(config)#service timestamps log datetime msec
Router(config)#ntp server 172.31.2.25
Router(config)#ntp update-calendar
Router(config)#do wri
Building configuration...
[OK]
Router(config)#end
Router#
*mar. 01, 04:32:24.3232: *mar. 01, 04:32:24.3232: %SYS-5-CONFIG_I: Configured from
console by console
*mar. 01, 04:32:24.3232: *mar. 01, 04:32:24.3232: %SYS-6-LOGGINGHOST_STARTSTOP:
Logging to host 172.31.2.25 port 514 started - CLI initiated
```

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Ilustración 22 servicio Syslog.

Autenticación local con AAA.

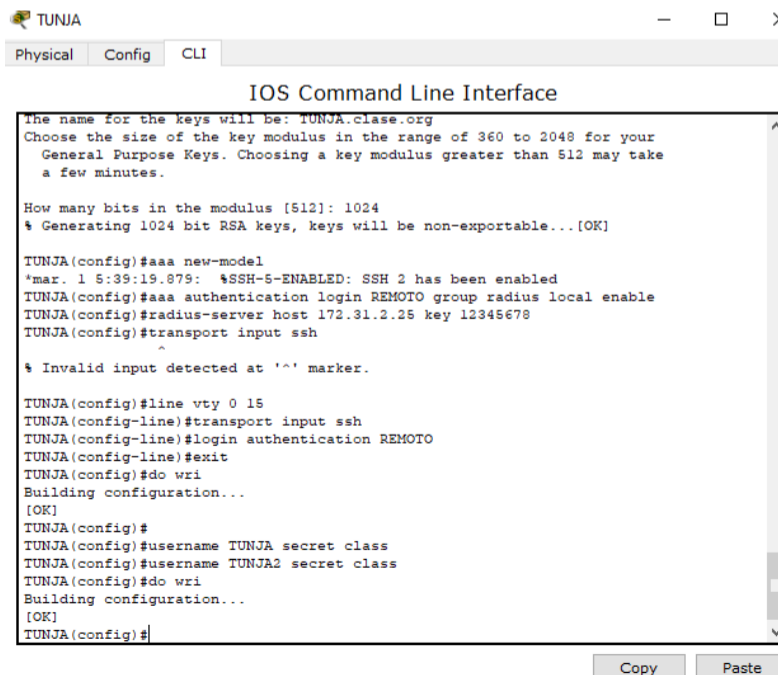


```
mar. 1 5:39:19.879: %SSH-5-ENABLED: SSH 2 has been enabled
CUNDINAMARCA(config)#aaa new-model
CUNDINAMARCA(config)#aaa authentication login REMOTO group radius local enable
CUNDINAMARCA(config)#radius-server se
^
% Invalid input detected at '^' marker.

CUNDINAMARCA(config)#radius-server host 172.31.2.25
CUNDINAMARCA(config)#radius-server host 172.31.2.25 key 12345678
CUNDINAMARCA(config)#line vty 0 15
CUNDINAMARCA(config-line)#transport inpt ssh
^
% Invalid input detected at '^' marker.

CUNDINAMARCA(config-line)#transport input ssh
CUNDINAMARCA(config-line)#login authentication
% Incomplete command.
CUNDINAMARCA(config-line)#login authentication REMOTO
CUNDINAMARCA(config-line)#EXIT
CUNDINAMARCA(config)#do wri
Building configuration...
[OK]
CUNDINAMARCA(config)#user
% Incomplete command.
CUNDINAMARCA(config)#username CUNDINAMARCA secret class
CUNDINAMARCA(config)#username CUNDINAMARCA1 secret class
CUNDINAMARCA(config)#do wri
Building configuration...
[OK]
CUNDINAMARCA(config)#
```

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```
The name for the keys will be: TUNJA.class.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

TUNJA(config)#aaa new-model
*mar. 1 5:39:19.879: %SSH-5-ENABLED: SSH 2 has been enabled
TUNJA(config)#aaa authentication login REMOTO group radius local enable
TUNJA(config)#radius-server host 172.31.2.25 key 12345678
TUNJA(config)#transport input ssh
^
% Invalid input detected at '^' marker.

TUNJA(config)#line vty 0 15
TUNJA(config-line)#transport input ssh
TUNJA(config-line)#login authentication REMOTO
TUNJA(config-line)#exit
TUNJA(config)#do wri
Building configuration...
[OK]
TUNJA(config)#
TUNJA(config)#username TUNJA secret class
TUNJA(config)#username TUNJA2 secret class
TUNJA(config)#do wri
Building configuration...
[OK]
TUNJA(config)#
```

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Ilustración 23 Autenticación local con AAA.

```

Router(config)#ip domain name clase.org
Router(config)#ip ssh version 2
Please create RSA keys (of at least 768 bits size) to enable SSH v2.
Router(config)#hostname BUCARAMANGA
BUCARAMANGA(config)#crypto key generate rsa
The name for the keys will be: BUCARAMANGA.clase.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

BUCARAMANGA(config)#aaa new-model
*mar. 1 5:49:48.489: %SSH-5-ENABLED: SSH 2 has been enabled
BUCARAMANGA(config)#aaa authentication login REMOTO group radius local enable
BUCARAMANGA(config)#radius-server host 172.31.2.25 key 12345678
BUCARAMANGA(config)#line vty 0 15
BUCARAMANGA(config-line)#transport input ssh
BUCARAMANGA(config-line)#login authentication REMOTO
BUCARAMANGA(config-line)#exit
BUCARAMANGA(config)#do wri
Building configuration...
[OK]
BUCARAMANGA(config)#username BUCARAMANGA secret class
BUCARAMANGA(config)#username BUCARAMANGA1 secret class
BUCARAMANGA(config)#do wri
Building configuration...
[OK]
BUCARAMANGA(config)#

```

Copy Paste

Ilustración 24 Autenticación local con AAA.

- Vemos el servidor como queda la configuración de AAA

AAA

Service On Off Radius Port

Network Configuration

Client Name Client IP

Secret ServerType **Radius**

Client Name	Client IP	Server Type	Key	
1 TUNJA	172.31.2.37	Radius	12345678	Add
2 CUNDINAMAR...	172.31.2.9	Radius	12345678	Save
3 BUCARAMANGA	172.31.2.34	Radius	12345678	Remove

User Setup

Username Password

Username	Password	
1 CUNDINAMARCA	class	Add
2 CUNDINAMARCA1	class	Save
3 TUNJA	class	Remove

Ilustración 25 configuración de AAA

Configuramos el servicio TFTP.

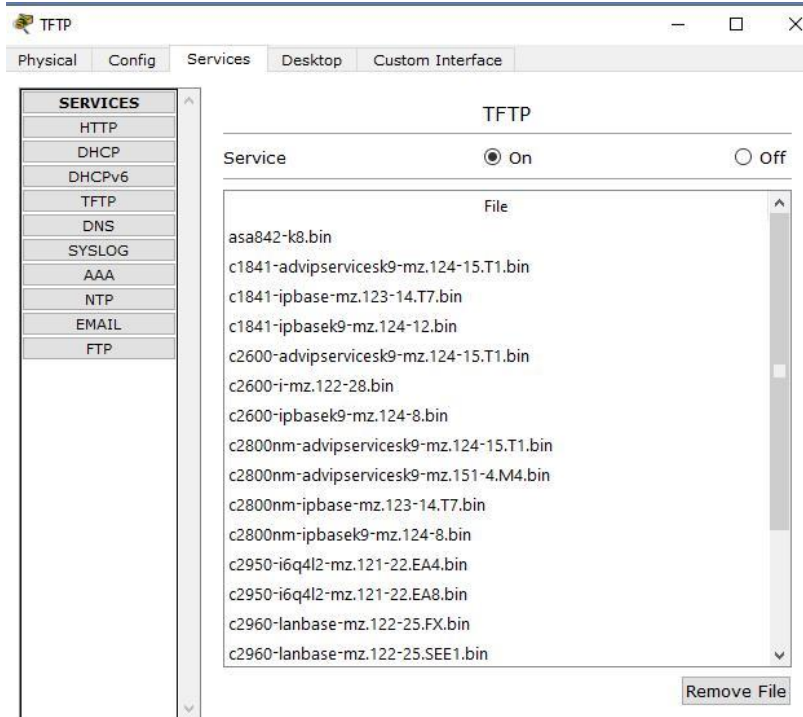


Ilustración 26 servicio TFTP

Configuramos el DHCP.

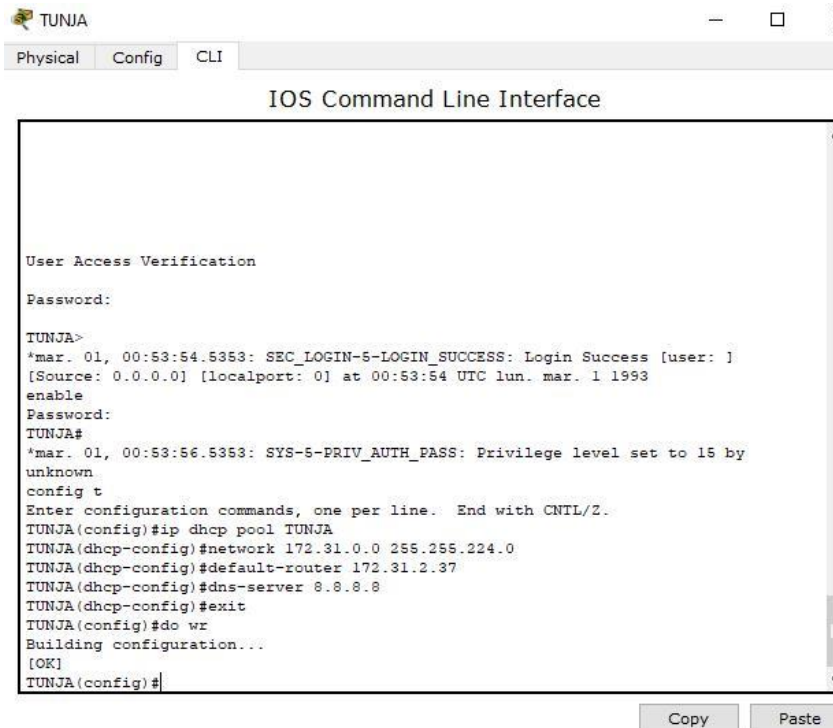
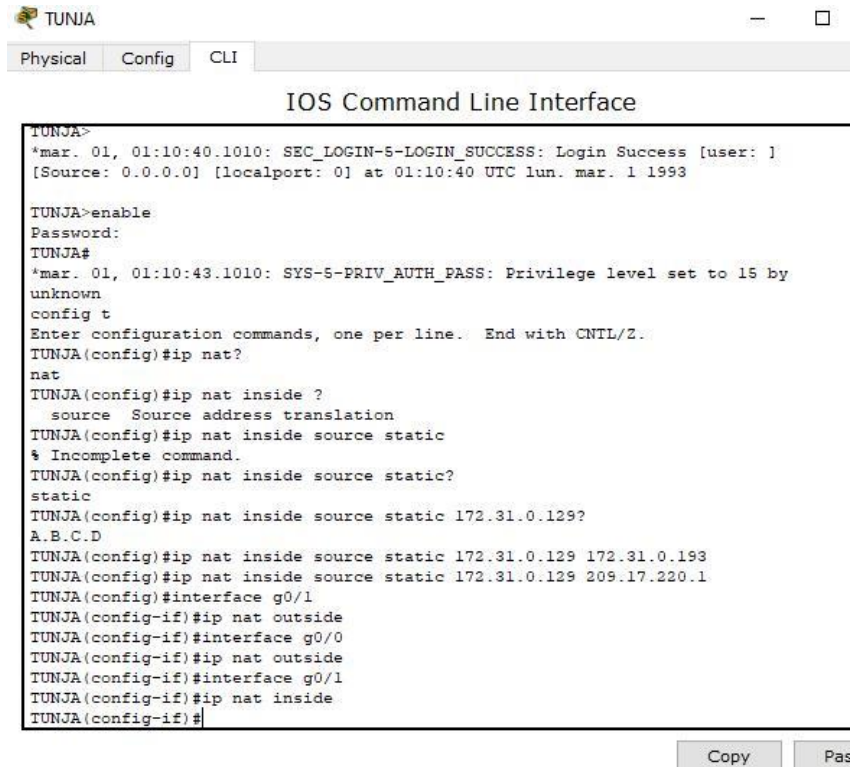


Ilustración 27 Configuramos el DHCP

Configuramos los NAT estático y de sobrecarga.

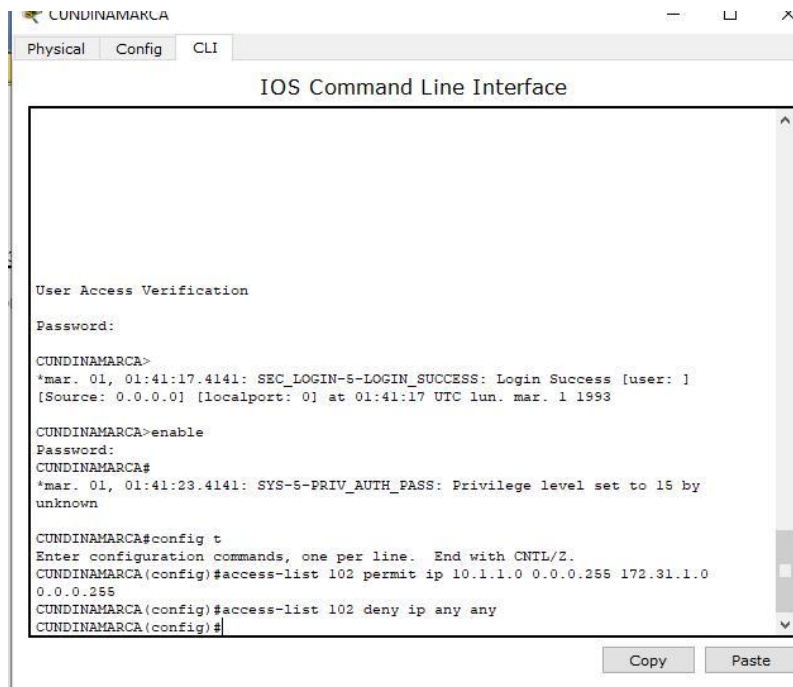


```
TUNJA>
*mar. 01, 01:10:40.1010: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ]
[Source: 0.0.0.0] [localport: 0] at 01:10:40 UTC lun. mar. 1 1993

TUNJA>enable
Password:
TUNJA#
*mar. 01, 01:10:43.1010: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by
unknown
TUNJA#config t
Enter configuration commands, one per line. End with CNTL/Z.
TUNJA(config)#ip nat?
nat
TUNJA(config)#ip nat inside ?
    source Source address translation
TUNJA(config)#ip nat inside source static
% Incomplete command.
TUNJA(config)#ip nat inside source static?
static
TUNJA(config)#ip nat inside source static 172.31.0.129?
A.B.C.D
TUNJA(config)#ip nat inside source static 172.31.0.129 172.31.0.193
TUNJA(config)#ip nat inside source static 172.31.0.129 209.17.220.1
TUNJA(config)#interface g0/1
TUNJA(config-if)#ip nat outside
TUNJA(config-if)#interface g0/0
TUNJA(config-if)#ip nat outside
TUNJA(config-if)#interface g0/1
TUNJA(config-if)#ip nat inside
TUNJA(config-if)#
```

Ilustración 28 NAT estático y de sobrecarga

Accesos de listas.



```
CUNDINAMARCA
Physical Config CLI
IOS Command Line Interface

User Access Verification

Password:
CUNDINAMARCA>
*mar. 01, 01:41:17.4141: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ]
[Source: 0.0.0.0] [localport: 0] at 01:41:17 UTC lun. mar. 1 1993

CUNDINAMARCA>enable
Password:
CUNDINAMARCA#
*mar. 01, 01:41:23.4141: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by
unknown

CUNDINAMARCA#config t
Enter configuration commands, one per line. End with CNTL/Z.
CUNDINAMARCA(config)#access-list 102 permit ip 10.1.1.0 0.0.0.255 172.31.1.0
0.0.0.255
CUNDINAMARCA(config)#access-list 102 deny ip any any
CUNDINAMARCA(config)#
```

Ilustración 29 Accesos de listas

```
CUNDINAMARCA
Physical Config CLI
IOS Command Line Interface

User Access Verification
Password:
CUNDINAMARCA>
*mar. 01, 01:41:17.4141: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ]
[Source: 0.0.0.0] [localport: 0] at 01:41:17 UTC lun. mar. 1 1993

CUNDINAMARCA>enable
Password:
CUNDINAMARCA#
*mar. 01, 01:41:23.4141: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by
unknown

CUNDINAMARCA#config t
Enter configuration commands, one per line. End with CNTL/Z.
CUNDINAMARCA(config)#access-list 102 permit ip 10.1.1.0 0.0.0.255 172.31.1.0
0.0.0.255
CUNDINAMARCA(config)#access-list 102 deny ip any any
CUNDINAMARCA(config)#
```

Copy Paste

Ilustración 30 Accesos de listas

- Enrutamiento OSPF con autenticación en cada router.

```
TUNJA
Physical Config CLI
IOS Command Line Interface

User Access Verification
Password:
TUNJA>
*mar. 01, 02:02:37.022: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ] [Source:
0.0.0.0] [localport: 0] at 02:02:37 UTC lun. mar. 1 1993
enabl
Password:
TUNJA#
*mar. 01, 02:02:41.022: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by unknown
config t
Enter configuration commands, one per line. End with CNTL/Z.
TUNJA(config)#router ospf 10
TUNJA(config-router)#router-id 2.2.2.2
TUNJA(config-router)#
*mar. 01, 02:03:03.033: eload or use "clear ip ospf process" command, for this to
take effect

TUNJA(config-router)#network 172.31.2.34 0.0.0.0 area 0
TUNJA(config-router)#network 172.31.2.1 0.0.0.0 area 0
TUNJA(config-router)#network 172.31.0.0 0.0.0.0 area 0
TUNJA(config-router)#end
TUNJA#
*mar. 01, 02:09:29.099: *mar. 01, 02:09:29.099: %SYS-5-CONFIG_I: Configured from
console by console
```

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Ilustración 31 Enrutamiento OSPF

BUCARAMANGA

Physical Config CLI

IOS Command Line Interface

```
User Access Verification

Password:

BUCARAMANGA>
*mar. 01, 02:18:37.1818: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ]
[Source: 0.0.0.0] [localport: 0] at 02:18:37 UTC lun. mar. 1 1993

BUCARAMANGA>enable
Password:
BUCARAMANGA#
*mar. 01, 02:18:41.1818: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by
unknown
config t
Enter configuration commands, one per line. End with CNTL/Z.
BUCARAMANGA(config)#router ospf 10
BUCARAMANGA(config-router)#router-id 1.1.1.1
BUCARAMANGA(config-router)#network 172.31.0.1 0.0.0.0 area 1
BUCARAMANGA(config-router)#network 172.31.0.65 0.0.0.0 area 1
BUCARAMANGA(config-router)#network 172.31.2.1 0.0.0.0 area 0
BUCARAMANGA(config-router)#
*mar. 01, 02:19:36.1919: 02:19:36: %OSPF-6-AREACHG: 172.31.2.1/0 changed from area
1 to area 0
BUCARAMANGA(config-router)#end
BUCARAMANGA#
*mar. 01, 02:19:46.1919: *mar. 01, 02:19:46.1919: %SYS-5-CONFIG_I: Configured from
console by console
```

Copy Paste

CUNDINAMARCA

Physical Config CLI

IOS Command Line Interface

```
User Access Verification

Password:

CUNDINAMARCA>
*mar. 01, 02:20:25.2020: SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: ]
[Source: 0.0.0.0] [localport: 0] at 02:20:25 UTC lun. mar. 1 1993

enable
Password:
CUNDINAMARCA#
*mar. 01, 02:20:29.2020: SYS-5-PRIV_AUTH_PASS: Privilege level set to 15 by
unknown
config t
Enter configuration commands, one per line. End with CNTL/Z.
CUNDINAMARCA(config)#router ospf 10
CUNDINAMARCA(config-router)#router-id 3.3.3.3
CUNDINAMARCA(config-router)#network 172.31.1.65 0.0.0.0 area 2
CUNDINAMARCA(config-router)#network 172.31.1.1 0.0.0.0 area 2
CUNDINAMARCA(config-router)#network 172.31.2.25 0.0.0.0 area 2
CUNDINAMARCA(config-router)#network 172.31.2.9 0.0.0.0 area 0
CUNDINAMARCA(config-router)#end
CUNDINAMARCA#
*mar. 01, 02:22:09.2222: *mar. 01, 02:22:09.2222: %SYS-5-CONFIG_I: Configured from
console by console
```

Copy Paste

Ilustración 32 Enrutamiento OSPF

Conclusiones

Con esta práctica final colocamos a prueba nuestros conocimientos adquiridos durante todo el semestre, donde mediante los dos escenarios propuestos se procedió a configurar su topología física, cumpliendo con direccionamiento adecuado que satisficiera las especificaciones de la problemática planteada. Todo lo anterior utilizando el software de simulación Packet Tracer, para el modelamiento y la conectividad LAN, comprobados con los comandos ping y tracer.

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