CASOS DE ESTUDIO DE CCNA1 Y CCNA2

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PALMIRA
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SOLUCIÓN DE DOS CASOS DE ESTUDIO, BAJO EL USO DE TECNOLOGÍA CISCO

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TABLA DE CONTENIDO

Pág.

INTRODUCCION

En el CCNA1, la práctica consiste en configurar tres routers ubicado en las ciudades de Bogotá, Bucaramanga y Pasto, cada una de estas ciudades representa una sede, cada una de las sedes consta de una distribución específica de acuerdo a los datos suministrados en la guía.

Para la realización de la práctica se debe tener en cuenta todo lo realizado en las prácticas y/o laboratorios anteriores para poder llevar a buen término la red, puntos como el subneteo, cables a utilizar, equipos de comunicación, etc., son de fundamental cuidado.

En lo que se refiere a CCNA2 se iniciará manifestando que para que un dispositivo de capa tres pueda determinar la ruta hacia un destino debe tener conocimiento de cómo hacerlo. Por eso se utilizarán:

Rutas estáticas: Aprendidas por el router a través del administrador, que establece dicha ruta manualmente, quien también debe actualizar cuando tenga lugar un cambio en la topología. Rutas dinámicas: Rutas aprendidas automáticamente por el router a través de la información enviada por otros routers, una vez que el administrador ha configurado un protocolo de enrutamiento que permite el aprendizaje dinámico de rutas.
Para poder enrutar paquetes de información un router debe conocer lo siguiente:

La información de enrutamiento que el router aprende desde sus fuentes de enrutamiento se coloca en su propia tabla de enrutamiento. La tabla de enrutamiento es la fuente principal de información del router acerca de las redes. Si la red de destino está conectada directamente, el router ya sabrá el puerto que debe usar para reenviar paquetes. Si las redes de destino no están conectados directamente, el router debe aprender y calcular la ruta más óptima a usar para reenviar paquetes a dichas redes. La tabla de enrutamiento se construye manualmente por medio del administrador de la red y/o procesos dinámicos que se ejecutan en la red.

En este contexto se dará solución a una empresa que cuenta con una sede principal en diferentes ciudades del país aplicando enrutamiento con clase y enrutamiento sin clase como lo explica la guía con diferentes tipos de enrutamiento con el fin de ejercitar y practicar los contenidos de todo el curso.

OBJETIVOS

OBJETIVOS GENERALES

- En CCNA1 diseñar y configurar por medio del packettracert una red que cumpla ciertos requerimientos y por supuesto halla conectividad en toda la red.
- Diseñar todo el esquema de enrutamiento para la topología acorde a las pautas establecidas en el documento Caso de estudio CCNA 2 exploración. Este diseño se debe realizar documentando cada uno de los pasos que se desarrollaron para alcanzar el objetivo.

OBJETIVOS ESPECÍFICOS

- Diseñar y documentar un esquema de direccionamiento según los requisitos.
- Aplicar una configuración básica a los dispositivos.
- Configurar una prioridad de Routers y RIP.
- Verificar la conectividad entre todos los dispositivos de la topología de la red.

1. CASO DE ESTUDIO CCNA1

Se analizará cada sede con el fin de tomar las decisiones y elegir la mejor la estructura de la red.

De acuerdo a la solicitud de la guía, se da inicio al estudio de las sedes en forma jerárquica, basándonos en el número de equipos (Host), quedando en su orden así.

Bucaramanga: Switch1: Biblioteca. Switch2: Administración
15 hosts

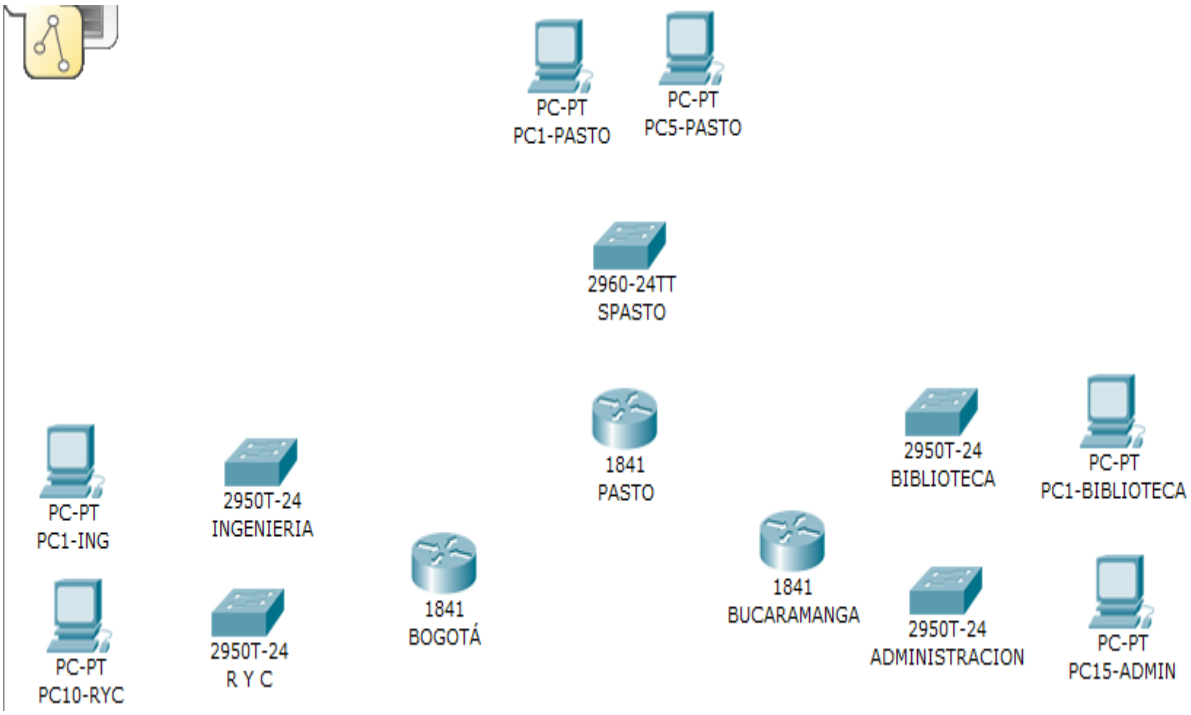
Bogotá: Switch1: Ingeniera, Switch2: RyC
10 hosts

Pasto: Switch1: Spasto
5 hosts

El router de Bogotá será quien maneje la sincronización (adicionar clockrate)

Se les adiciona a los tres routers el módulo WIC-2T para poder conectar los routers entre ellos.

1.1 DISPOSITIVOS A EMPLEAR



1.2 CONFIGURAR TOPOLOGÍA LÓGICA

Se inicia con la dirección ip 192.172.10.0 y se procede a realizar el subneteo dependiendo de la cantidad de hosts a utilizar por cada subred. Entonces como para Bucaramanga son 15 hosts se toma una máscara de subred /27 y el número máximo de hosts es de 30 es decir se podría en un futuro adicionar 15 equipos más por subred. En esta ciudad se pueden formar 8 subredes.

Para Bogotá son 10 hosts se toma una máscara de subred /28 y el número máximo de hosts es de 14 es decir se podría en un futuro adicionar 4 equipos más por subred. En esta ciudad se pueden formar 16 subredes.

Para Pasto son 5 hosts se toma una máscara de subred /29 y el número máximo de hosts es de 6 es decir se podría en un futuro adicionar 1 equipo más por subred. En esta ciudad se pueden formar 32 subredes.

Se tabulan los datos para una mejor lectura:

DESCRIPCION	B/MANGA - LAN 1 BIBLIOTECA	B/MANGA – LAN 2 ADMINISTRACIÓN	BOGOTA – LAN 1 INGENIERIAS	BOGOTA – LAN 2 – R Y C	PASTO - LAN
Dirección R	192.172.10.0	192.172.10.32	192. 172.10.64	192. 172.10.96	192. 172.10.96
Gateway	192.172.10.29	192. 172.10.61	192. 172.10.77	192. 172.10.93	192. 172.10.101
IP PC1	192.172.10.1	192. 172.10.33	192. 172.10.65	192. 172.10.81	192. 172.10.97
IP ultimo PC	192.172.10.30	192. 172.10.62	192. 172.10.78	192. 172.10.94	192. 172.10.102
Dirección broadcast	192.172.10.31	192. 172.10.63	192. 172.10.79	192. 172.10.95	192. 172.10.103
Mascara de subred	255.255.255.224	255.255.255.224	255.255.255.240	255.255.255.240	255.255.255.248

TABLA DE DIRECCIONAMIENTO LAN

TABLA DE DIRECCIONAMIENTO WAN BOGOTÁ – BUCARAMANGA

DESCRIPCION	ENLACE B/GOTA-B/MANGA
Dirección de red	192.172.10.104
Serial Ser 0/0/1 (BOGOTA)	192.172.10.105
Serial Ser 0/1/1 (B/MANGA)	192.172.10.106
Dirección broadcast	192.172.10.107
Mascara de subred	255.255.255.252

TABLA DE DIRECCIONAMIENTO WAN BOGOTÁ – PASTO

DESCRIPCION	ENLACE PASTO-B7GOTA
Dirección de red	192.172.10.112
Serial Ser 0/0/0 (BOGOTÁ)	192.172.10.113
Serial Ser 0/0/0 (PASTO)	192.172.10.114
Dirección broadcast	192.172.10.115
Mascara de subred	255.255.255.252

DISPOSITIVO	Puertos	IP	Máscara subred	Gateway
PC1-ING	Fast Ethernet	192.172.10.65	255.255.255.240	192.172.10.77
PC10-RYC	Fast Ethernet	192.172.10.94	255.255.255.240	192.172.10.93
SWITCH-INGENIERIA	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
SWITCH-RYC	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
ROUTER	Fa 0/1 (RYC)	192. 172.10.93	255.255.255.240	No aplica
	Fa 0/0 (ING)	192. 172.10.77	255.255.255.240	No aplica

TABLA DE DIRECCIONAMIENTO WAN PASTO – BUCARAMANGA

DESCRIPCION	ENLACE B/MANGA-PASTO
Dirección de red	192.172.10.108
Serial Ser 0/0/1 (PASTO)	192.172.10.109
Serial Ser 0/1/0 (B/MANGA)	192.172.10.110
Dirección broadcast	192.172.10.111
Mascara de subred	255.255.255.252

TABLA DE DIRECCIONAMIENTO DE PUERTOS – BOGOTÁ
Dirección SubRed: (INGENIERÍAS) 192.172.10.64/28 y (R y C)192.172.10.96/28

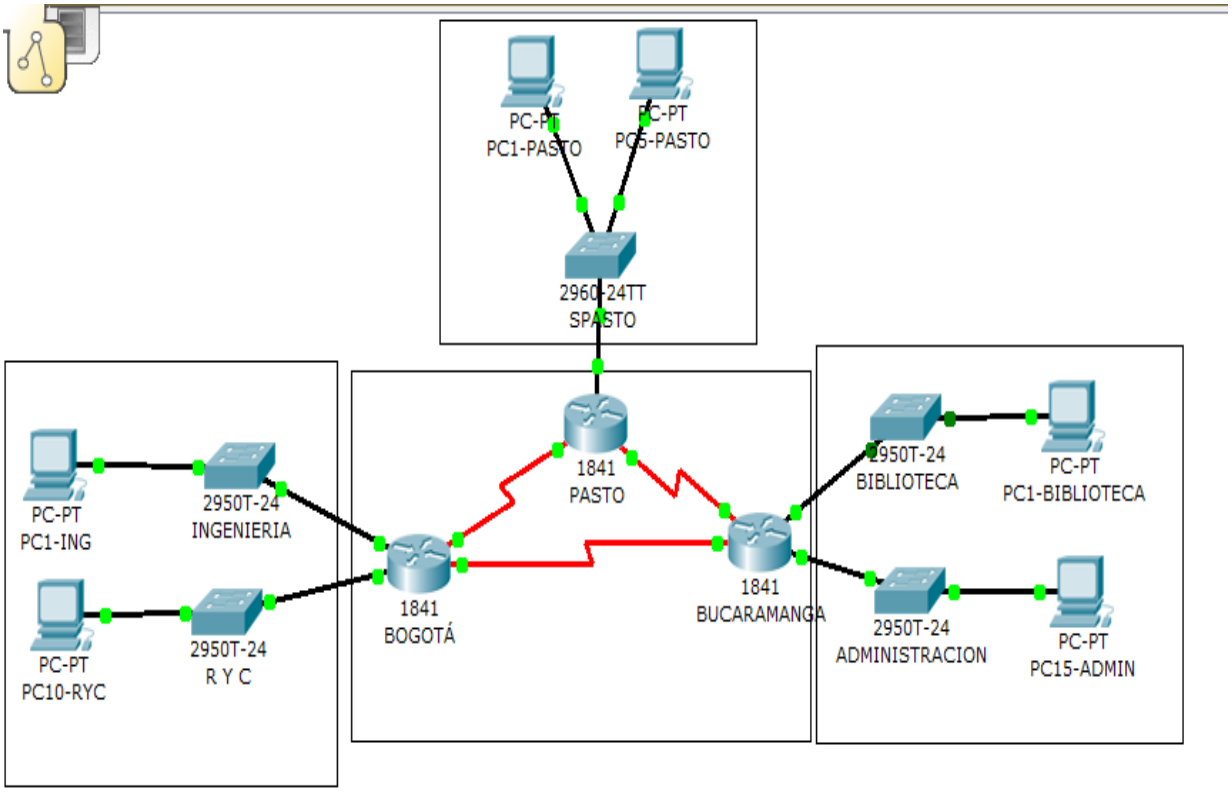
TABLA DE DIRECCIONAMIENTO DE PUERTOS – BUCARAMANGA
Dirección SubRed: (BIBLIOTECA) 192.172.10.0/27 y (ADMINISTRACIÓN)192.172.10.32/27

DISPOSITIVO	Puertos	IP	Máscara subred	Gateway
PC1-BIBLIOTECA	Fast Ethernet	192. 172.10.1	255.255.255.224	192. 172.10.29
PC15-ADMIN	Fast Ethernet	192. 172.10.62	255.255.255.224	192. 172.10.61
SWITCH-BIBLIOTECA	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
SWITCH-ADMIN	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
ROUTER	Fa 0/0 (BIBLIOTECA)	192. 172.10.29	255.255.255.224	No aplica
	Fa 0/1 (ADMIN)	192. 172.10.61	255.255.255.224	No aplica

TABLA DE DIRECCIONAMIENTO DE PUERTOS – PASTO
Dirección SubRed: (PASTO) 192.172.10.96/29

DISPOSITIVO	Puertos	IP	Máscara subred	Gateway
PC1-ING	Fast Ethernet	192.172.10.65	255.255.255.240	192.172.10.77
PC10-RYC	Fast Ethernet	192.172.10.94	255.255.255.240	192.172.10.93
SWITCH-INGENIERIA	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
SWITCH-RYC	Fa 0/2	No aplica	No aplica	No aplica
	Fa 0/1	No aplica	No aplica	No aplica
ROUTER	Fa 0/1 (RYC)	192. 172.10.93	255.255.255.240	No aplica
	Fa 0/0 (ING)	192. 172.10.77	255.255.255.240	No aplica

1.3 CONFIGURAR TOPOLOGÍA FÍSICA



Cables utilizados.

- Cable de conexión directa
- Cable serial DCE

1.4 CONFIGURACION DE LOS ROUTERS

1.4.1 Router Bogotá

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#ip address 192.172.10.77 255.255.255.240
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 192.172.10.93 255.255.255.240
Router(config)#interface Serial0/0/1
Router(config-if)#ip address 192.172.10.105 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#clock rate 9600
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.172.10.113 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#clock rate 9600
Router(config-if)#exit
Router(config)#hostname BOGOTA
```

```
BOGOTA(config)#enable secret CISCO
BOGOTA(config)#line con 0
BOGOTA(config-line)#password CISCO
BOGOTA(config-line)#login
BOGOTA(config-line)#line vty 0 4
BOGOTA(config-line)#password CISCO
BOGOTA(config-line)#login
BOGOTA(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
ROUTER-BOGOTA %
BOGOTA(config)#interface fa0/0
BOGOTA(config-if)#description INTERFACE DE CONEXION CON LA RED DE INGENIERIA
BOGOTA(config-if)#exit
BOGOTA(config)#interface fa0/1
BOGOTA(config-if)#description INTERFACE DE CONEXION CON LA RED DE REGISTRO Y CONTROL
BOGOTA(config-if)#exit
BOGOTA(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
BOGOTA#show interface fa0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0004.9a8c.b101 (bia 0004.9a8c.b101)
Description: INTERFACE DE CONEXION CON LA RED DE INGENIERIA
Internet address is 192.172.10.77/28
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
```

0 output errors, 0 collisions, 1 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
BOGOTA#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
Hardware is Lance, address is 0004.9a8c.b102 (bia 0004.9a8c.b102)
Description: INTERFACE DE CONEXION CON LA RED DE REGISTRO Y CONTROL
Internet address is 192.172.10.93/28
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set
ARP type: ARPA, ARP Timeout 04:00:00,
Last input 00:00:08, output 00:00:05, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue :0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 input packets with dribble condition detected
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 1 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
BOGOTA#showip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	192.172.10.77	YES	manual	up	up
FastEthernet0/1	192.172.10.93	YES	manual	up	up
Serial0/0/0	192.172.10.113	YES	manual	up	up
Serial0/0/1	192.172.10.105	YES	manual	up	up

```
Vlan1              unassigned      YES manual administratively down down
BOGOTA#
BOGOTA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
BOGOTA#
BOGOTA#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
BOGOTA(config)#
BOGOTA(config)#interface Serial0/0/0
BOGOTA(config-if)#description WAN BOGOTA-PASTO
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#exit
BOGOTA(config)#interface Serial0/0/1
BOGOTA(config-if)#description WAN BOGOTA-BUCARAMANGA
BOGOTA(config-if)#NO SHUTDOWN
BOGOTA(config-if)#interface fa0/0
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#interface fa0/1
BOGOTA(config-if)#no shutdown
BOGOTA(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
BOGOTA#
```

1.4.2 Router Bucaramanga

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
Router(config-if)#ip address 192.172.10.29 255.255.255.224
Router(config-if)#
```

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#ip address 192.172.10.61 255.255.255.224
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to upno shutdown
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to upip address 192.172.10.106 255.255.255.224
Router(config-if)#ip address 192.172.10.106 255.255.255.252
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 192.172.10.110 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router(config)#hostname BUCARAMANGA
BUCARAMANGA(config)#enablesecret CISCO
BUCARAMANGA(config)#line con 0
BUCARAMANGA(config-line)#password CISCO
BUCARAMANGA(config-line)#login

```
BUCARAMANGA(config-line)#line vty 0 4
BUCARAMANGA(config-line)#password CISCO
BUCARAMANGA(config-line)#login
BUCARAMANGA(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
ROUTER-BMANGA%
BUCARAMANGA(config)#interface fa0/0
BUCARAMANGA(config-if)#description INTERFACE DE CONEXION CON LA RED DE BIBLIOTECA
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#exit
BUCARAMANGA(config)#interface fa0/1
BUCARAMANGA(config-if)#description INTERFACE DE CONEXION CON LA RED DE ADMINISTRACION
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#exit
BUCARAMANGA(config)#interface serial0/0/1
%Invalid interface type and number
BUCARAMANGA(config)#interface serial0/1/1
BUCARAMANGA(config-if)#description WAN BUCARAMANGA-BOGOTA
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#exit
BUCARAMANGA(config)#interface serial0/1/0
BUCARAMANGA(config-if)#description WAN BUCARAMANGA-PASTO
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#
BUCARAMANGA(config-if)#exit
BUCARAMANGA(config)#
%SYS-5-CONFIG_I: Configured from console by console
BUCARAMANGA#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0002.4aec.be02 (bia 0002.4aec.be02)
Description: INTERFACE DE CONEXION CON LA RED DE ADMINISTRACION
Internet address is 192.172.10.61/27
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
```

```
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
BUCARAMANGA#show interface fa0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0002.4aec.be01 (bia 0002.4aec.be01)
Description: INTERFACE DE CONEXION CON LA RED DE BIBLIOTECA
Internet address is 192.172.10.29/27
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
BUCARAMANGA#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol
```

```
FastEthernet0/0        192.172.10.29   YES manual up                    up

FastEthernet0/1        192.172.10.61   YES manual up                    up

Serial0/1/0            192.172.10.110  YES manual up                    down

Serial0/1/1            192.172.10.106  YES manual up                    up

Vlan1                  unassigned      YES manual administratively down down
BUCARAMANGA#show interface serial0/1/1
Serial0/1/1 is up, line protocol is up (connected)
  Hardware is HD64570
  Description: WAN BUCARAMANGA-BOGOTA
  Internet address is 192.172.10.106/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
BUCARAMANGA#show interface serial0/1/0
Serial0/1/0 is up, line protocol is down (disabled)
  Hardware is HD64570
  Description: WAN BUCARAMANGA-PASTO
  Internet address is 192.172.10.110/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
```

```
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
BUCARAMANGA#
```

1.4.3 Router Pasto

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
Router(config-if)#ip address 192.172.10.101 255.255.255.248
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.172.10.114 255.255.255.252
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to upno shutdown
Router(config-if)#
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#ip address 192.172.10.109 255.255.255.252
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to upno shutdown
Router(config-if)#exit
Router(config)#hostname PASTO
PASTO(config)#enable secret CISCO
PASTO(config)#line con 0
PASTO(config-line)#password CISCO
PASTO(config-line)#login
PASTO(config-line)#line vty 0 4
PASTO(config-line)#password CISCO
PASTO(config-line)#login
PASTO(config-line)#banner motd %
Enter TEXT message. End with the character '%'.
ROUTER-PASTO %
PASTO(config)#interface fa0/0
PASTO(config-if)#description INTERFACE DE CONEXION CON LA LAN DE PASTO
PASTO(config-if)#no shutdown
PASTO(config-if)#exit
PASTO(config)#interface serial0/0/1
PASTO(config-if)#description WAN PASTO-BUCARAMANGA
PASTO(config-if)#no shutdown
PASTO(config-if)#exit
PASTO(config)#interface serial0/0/0
PASTO(config-if)#description WAN PASTO-BOGOTA
PASTO(config-if)#no shutdown
PASTO(config-if)#EXIT
PASTO(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
PASTO#show interface fa0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0006.2ac4.8201 (bia 0006.2ac4.8201)
Description: INTERFACE DE CONEXION CON LA LAN DE PASTO
Internet address is 192.172.10.101/29

```
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
PASTO#show interface serial0/0/1
Serial0/0/1 is up, line protocol is down (disabled)
  Hardware is HD64570
  Description: WAN PASTO-BUCARAMANGA
  Internet address is 192.172.10.109/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
```

```
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
PASTO#show interface serial0/0/0
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Description: WAN PASTO-BOGOTA
  Internet address is 192.172.10.114/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
PASTO#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol

FastEthernet0/0        192.172.10.101  YES manual up                    up

FastEthernet0/1        unassigned      YES manual administratively down down

Serial0/0/0            192.172.10.114  YES manual up                    up

Serial0/0/1            192.172.10.109  YES manual up                    down

Vlan1                  unassigned      YES manual administratively down down
```

PASTO#

1.5 CONFIGURACIÓN DE SWITCHES BOGOTÁ

1.5.1 Switch – Ingeniería

```
Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname INGENIERIA
INGENIERIA(config)#enablesecret CISCO
INGENIERIA(config)#line con 0
INGENIERIA(config-line)#password CISCO
INGENIERIA(config-line)#login
INGENIERIA(config-line)#line vty 0 4
INGENIERIA(config-line)#password CISCO
INGENIERIA(config-line)#login
INGENIERIA(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
LAN-INGENIERIA %
INGENIERIA(config)#INTERFACE fa0/2
INGENIERIA(config-if)#description INGENIERIA-HOST1
INGENIERIA(config-if)#no shutdown
INGENIERIA(config-if)#exit
INGENIERIA(config)#INTERFACE fa0/1
INGENIERIA(config-if)#description INGENIERIA-ROUTER
INGENIERIA(config-if)#NO SHUTDOWN
INGENIERIA(config-if)#exit
INGENIERIA(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
INGENIERIA#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol

FastEthernet0/1        unassigned      YES manual up                    up
FastEthernet0/2        unassigned      YES manual up                    up
FastEthernet0/3        unassigned      YES manual down                  down
```

```
FastEthernet0/4       unassigned      YES manual down                  down
FastEthernet0/5       unassigned      YES manual down                  down

FastEthernet0/6       unassigned      YES manual down                  down
FastEthernet0/7       unassigned      YES manual down                  down
FastEthernet0/8       unassigned      YES manual down                  down
FastEthernet0/9       unassigned      YES manual down                  down
FastEthernet0/10      unassigned      YES manual down                  down
FastEthernet0/11      unassigned      YES manual down                  down
FastEthernet0/12      unassigned      YES manual down                  down
FastEthernet0/13      unassigned      YES manual down                  down
FastEthernet0/14      unassigned      YES manual down                  down
FastEthernet0/15      unassigned      YES manual down                  down
FastEthernet0/16      unassigned      YES manual down                  down
FastEthernet0/17      unassigned      YES manual down                  down
FastEthernet0/18      unassigned      YES manual down                  down
FastEthernet0/19      unassigned      YES manual down                  down
FastEthernet0/20      unassigned      YES manual down                  down
FastEthernet0/21      unassigned      YES manual down                  down
FastEthernet0/22      unassigned      YES manual down                  down
FastEthernet0/23      unassigned      YES manual down                  down
FastEthernet0/24      unassigned      YES manual down                  down
GigabitEthernet1/1    unassigned      YES manual down                  down
GigabitEthernet1/2    unassigned      YES manual down                  down
Vlan1                 unassigned      YES manual administratively down down
INGENIERIA#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 00d0.5835.3101 (bia 00d0.5835.3101)
  Description: INGENIERIA-ROUTER
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
```

Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
INGENIERIA#
INGENIERIA#show interface fa0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 00d0.5835.3102 (bia 00d0.5835.3102)
  Description: INGENIERIA-HOST1
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns

```
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
INGENIERIA#
```

1.5.2 Switch –R y C

```
Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname RYC
RYC(config)#enable secret CISCO
RYC(config)#line con 0
RYC(config-line)#password CISCO
RYC(config-line)#login
RYC(config-line)#line vty 0 4
RYC(config-line)#password CISCO
RYC(config-line)#login
RYC(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
LAN-RYC %
RYC(config)#INTERFACE fa0/1
RYC(config-if)#descriptio RYC-ROUTER
RYC(config-if)#no shutdown
RYC(config-if)#exit
RYC(config)#INTERFACE fa0/2
RYC(config-if)#descriptio RYC-HOST10
RYC(config-if)#no shutdown
RYC(config-if)#exit
RYC(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
RYC#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES manual up                    up
FastEthernet0/2        unassigned      YES manual up                    up
FastEthernet0/3        unassigned      YES manual down                  down
```

FastEthernet0/4 unassigned YES manual down down
FastEthernet0/5 unassigned YES manual down down
FastEthernet0/6 unassigned YES manual down down
FastEthernet0/7 unassigned YES manual down down
FastEthernet0/8 unassigned YES manual down down
FastEthernet0/9 unassigned YES manual down down
FastEthernet0/10 unassigned YES manual down down
FastEthernet0/11 unassigned YES manual down down
FastEthernet0/12 unassigned YES manual down down
FastEthernet0/13 unassigned YES manual down down
FastEthernet0/14 unassigned YES manual down down
FastEthernet0/15 unassigned YES manual down down

FastEthernet0/16 unassigned YES manual down down
FastEthernet0/17 unassigned YES manual down down
FastEthernet0/18 unassigned YES manual down down
FastEthernet0/19 unassigned YES manual down down
FastEthernet0/20 unassigned YES manual down down
FastEthernet0/21 unassigned YES manual down down
FastEthernet0/22 unassigned YES manual down down
FastEthernet0/23 unassigned YES manual down down
FastEthernet0/24 unassigned YES manual down down
GigabitEthernet1/1 unassigned YES manual down down
GigabitEthernet1/2 unassigned YES manual down down
Vlan1 unassigned YES manual administratively down down
RYC#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0010.1190.6401 (bia 0010.1190.6401)
  Description: RYC-ROUTER
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

```
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
   Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
RYC#
RYC#show interface fa0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 0010.1190.6402 (bia 0010.1190.6402)
  Description: RYC-HOST10
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
```

0 output errors, 0 collisions, 10 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
RYC#

1.6 CONFIGURACIÓN DE SWITCHES BUCARAMANGA

1.6.1 Switch – Biblioteca

```
Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname BIBLIOTECA
BIBLIOTECA(config)#enable secret CISCO
BIBLIOTECA(config)#line con 0
BIBLIOTECA(config-line)#password CISCO
BIBLIOTECA(config-line)#login
BIBLIOTECA(config-line)#line vty 0 4
BIBLIOTECA(config-line)#password CISCO
BIBLIOTECA(config-line)#login
BIBLIOTECA(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
LAN-BIBLIOTECA %
BIBLIOTECA(config)#interface fa0/1
BIBLIOTECA(config-if)#description BIBLIOTECA-ROUTER
BIBLIOTECA(config-if)#no shutdown
BIBLIOTECA(config-if)#exit
BIBLIOTECA(config)#interface fa0/2
BIBLIOTECA(config-if)#description BIBLIOTECA-HOST1
BIBLIOTECA(config-if)#no shutdown
BIBLIOTECA(config-if)#exit
BIBLIOTECA(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
BIBLIOTECA#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol
```

```
FastEthernet0/1       unassigned      YES manual up                    up
FastEthernet0/2       unassigned      YES manual up                    up
FastEthernet0/3       unassigned      YES manual down                  down
FastEthernet0/4       unassigned      YES manual down                  down
FastEthernet0/5       unassigned      YES manual down                  down
FastEthernet0/6       unassigned      YES manual down                  down
FastEthernet0/7       unassigned      YES manual down                  down
FastEthernet0/8       unassigned      YES manual down                  down
FastEthernet0/9       unassigned      YES manual down                  down
FastEthernet0/10      unassigned      YES manual down                  down
FastEthernet0/11      unassigned      YES manual down                  down
FastEthernet0/12      unassigned      YES manual down                  down
FastEthernet0/13      unassigned      YES manual down                  down
FastEthernet0/14      unassigned      YES manual down                  down
FastEthernet0/15      unassigned      YES manual down                  down
FastEthernet0/16      unassigned      YES manual down                  down
FastEthernet0/17      unassigned      YES manual down                  down
FastEthernet0/18      unassigned      YES manual down                  down
FastEthernet0/19      unassigned      YES manual down                  down
FastEthernet0/20      unassigned      YES manual down                  down
FastEthernet0/21      unassigned      YES manual down                  down
FastEthernet0/22      unassigned      YES manual down                  down
FastEthernet0/23      unassigned      YES manual down                  down
FastEthernet0/24      unassigned      YES manual down                  down
GigabitEthernet1/1    unassigned      YES manual down                  down

GigabitEthernet1/2    unassigned      YES manual down                  down
 Vlan1                unassigned      YES manual administratively down down
BIBLIOTECA#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0000.0ccb.ae01 (bia 0000.0ccb.ae01)
  Description: BIBLIOTECA-ROUTER
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
```

```
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out

BIBLIOTECA#
BIBLIOTECA#show interface fa0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 0000.0ccb.ae02 (bia 0000.0ccb.ae02)
  Description: BIBLIOTECA-HOST1
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
```

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 watchdog, 0 multicast, 0 pause input
0 input packets with dribble condition detected
2357 packets output, 263570 bytes, 0 underruns
0 output errors, 0 collisions, 10 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
BIBLIOTECA#

1.6.2 Switch – Administración

```
Switch>ENABLE
Switch#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname ADMIN
ADMIN(config)#enable secret CISCO
ADMIN(config)#LINE CON 0
ADMIN(config-line)#password CISCO
ADMIN(config-line)#login
ADMIN(config-line)#line vty 0 4
ADMIN(config-line)#password CISCO
ADMIN(config-line)#login
ADMIN(config-line)#banner motd %
Enter TEXT message.  End with the character '%'.
LAN-ADMIN%
ADMIN(config)#interface fa0/1
ADMIN(config-if)#description ADMIN-ROUTER
ADMIN(config-if)#no shutdown
ADMIN(config-if)#exit
ADMIN(config)#interface fa0/2
ADMIN(config-if)#description ADMIN-HOST15
ADMIN(config-if)#no shutdown
ADMIN(config-if)#exit
ADMIN(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
ADMIN#showip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/1	unassigned	YES	manual	up	up
FastEthernet0/2	unassigned	YES	manual	up	up
FastEthernet0/3	unassigned	YES	manual	down	down
FastEthernet0/4	unassigned	YES	manual	down	down
FastEthernet0/5	unassigned	YES	manual	down	down
FastEthernet0/6	unassigned	YES	manual	down	down
FastEthernet0/7	unassigned	YES	manual	down	down
FastEthernet0/8	unassigned	YES	manual	down	down
FastEthernet0/9	unassigned	YES	manual	down	down
FastEthernet0/10	unassigned	YES	manual	down	down
FastEthernet0/11	unassigned	YES	manual	down	down
FastEthernet0/12	unassigned	YES	manual	down	down
FastEthernet0/13	unassigned	YES	manual	down	down
FastEthernet0/14	unassigned	YES	manual	down	down
FastEthernet0/15	unassigned	YES	manual	down	down
FastEthernet0/16	unassigned	YES	manual	down	down
FastEthernet0/17	unassigned	YES	manual	down	down
FastEthernet0/18	unassigned	YES	manual	down	down
FastEthernet0/19	unassigned	YES	manual	down	down
FastEthernet0/20	unassigned	YES	manual	down	down
FastEthernet0/21	unassigned	YES	manual	down	down
FastEthernet0/22	unassigned	YES	manual	down	down
FastEthernet0/23	unassigned	YES	manual	down	down
FastEthernet0/24	unassigned	YES	manual	down	down
GigabitEthernet1/1	unassigned	YES	manual	down	down
GigabitEthernet1/2	unassigned	YES	manual	down	down
Vlan1	unassigned	YES	manual	administratively down	down

ADMIN#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0002.16e8.2c01 (bia 0002.16e8.2c01)
  Description: ADMIN-ROUTER
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off

```
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
ADMIN#show interface fa0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 0002.16e8.2c02 (bia 0002.16e8.2c02)
  Description: ADMIN-HOST15
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
```

0 watchdog, 0 multicast, 0 pause input
0 input packets with dribble condition detected
2357 packets output, 263570 bytes, 0 underruns
0 output errors, 0 collisions, 10 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
ADMIN#

1.7 CONFIGURACIÓN DE SWITCH PASTO

1.7.1 Switch Pasto

Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SPASTO
SPASTO(config)#enable secret CISCO
SPASTO(config)#line con 0
SPASTO(config-line)#password CISCO
SPASTO(config-line)#login
SPASTO(config-line)#line vty 0 4
SPASTO(config-line)#password CISCO
SPASTO(config-line)#login
SPASTO(config-line)#banner motd %
Enter TEXT message. End with the character '%'.
LAN-SPASTO %
SPASTO(config)#INTERFACE fa0/1
SPASTO(config-if)#description SPASTO-ROUTER
SPASTO(config-if)#no shutdown
SPASTO(config-if)#exit
SPASTO(config)#INTERFACE fa0/2
SPASTO(config-if)#description SPASTO-HOST1
SPASTO(config-if)#no shutdown
SPASTO(config-if)#exit
SPASTO(config)#INTERFACE fa0/3
SPASTO(config-if)#description SPASTO-HOST5

```
SPASTO(config-if)#no shutdown
SPASTO(config-if)#exit
SPASTO(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
SPASTO#showip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES manual up                    up
FastEthernet0/2        unassigned      YES manual up                    up
FastEthernet0/3        unassigned      YES manual up                    up
FastEthernet0/4        unassigned      YES manual down                  down
FastEthernet0/5        unassigned      YES manual down                  down
FastEthernet0/6        unassigned      YES manual down                  down
FastEthernet0/7        unassigned      YES manual down                  down
FastEthernet0/8        unassigned      YES manual down                  down

FastEthernet0/9        unassigned      YES manual down                  down
FastEthernet0/10       unassigned      YES manual down                  down
FastEthernet0/11       unassigned      YES manual down                  down
FastEthernet0/12       unassigned      YES manual down                  down
FastEthernet0/13       unassigned      YES manual down                  down
FastEthernet0/14       unassigned      YES manual down                  down
FastEthernet0/15       unassigned      YES manual down                  down
FastEthernet0/16       unassigned      YES manual down                  down
FastEthernet0/17       unassigned      YES manual down                  down
FastEthernet0/18       unassigned      YES manual down                  down
FastEthernet0/19       unassigned      YES manual down                  down
FastEthernet0/20       unassigned      YES manual down                  down
FastEthernet0/21       unassigned      YES manual down                  down
FastEthernet0/22       unassigned      YES manual down                  down
FastEthernet0/23       unassigned      YES manual down                  down
FastEthernet0/24       unassigned      YES manual down                  down
GigabitEthernet1/1     unassigned      YES manual down                  down
GigabitEthernet1/2     unassigned      YES manual down                  down
Vlan1                  unassigned      YES manual administratively down down
SPASTO#show interface fa0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0001.c7e0.ed01 (bia 0001.c7e0.ed01)
  Description: SPASTO-ROUTER
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
```

reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
SPASTO#
SPASTO#show interface fa0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 0001.c7e0.ed02 (bia 0001.c7e0.ed02)
  Description: SPASTO-HOST1
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo

```
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
SPASTO#show interface fa0/3
FastEthernet0/3 is up, line protocol is up (connected)
  Hardware is Lance, address is 0001.c7e0.ed03 (bia 0001.c7e0.ed03)
  Description: SPASTO-HOST5
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
  Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     956 packets input, 193351 bytes, 0 no buffer
     Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     2357 packets output, 263570 bytes, 0 underruns
     0 output errors, 0 collisions, 10 interface resets
     0 babbles, 0 late collision, 0 deferred
```

0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
SPASTO#

1.8 CONFIGURACIÓN PROTOCOLO RIP EN TODOS LOS ROUTERS

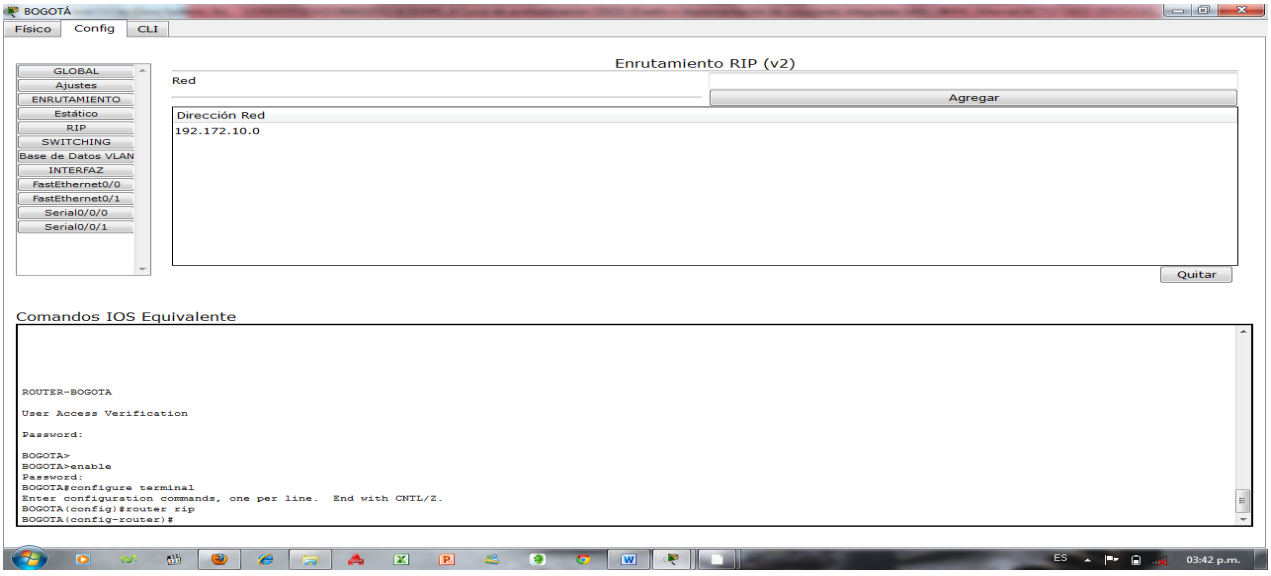
En todos los routers en el protocolo RIP se digita la dirección de red general que es 192.172.10.0.

```
BOGOTA(config)#
BOGOTA(config)#router rip
BOGOTA(config-router)#network 192.172.10.0
BOGOTA(config-router)#version 2
BOGOTA(config-router)#
```

```
PASTO(config)#
PASTO(config)#router rip
PASTO(config-router)#network 192.172.10.0
PASTO(config-router)#network 192.172.10.0
PASTO(config-router)#version 2
PASTO(config-router)#
```

```
BUCARAMANGA(config)#router rip
BUCARAMANGA(config-router)#
BUCARAMANGA(config-router)#exit
BUCARAMANGA(config)#router rip
BUCARAMANGA(config-router)#network 192.172.10.0
BUCARAMANGA(config-router)#version 2
BUCARAMANGA(config-router)#
```


BUCARAMANGA
Físico
Config
CLI
GLOBAL
Ajustes
ENRUTAMIENTO
Estático
RIP
SWITCHING
Base de Datos VLAN
INTERFAZ
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
Enrutamiento RIP (v2)
Red
Agregar
Dirección Red
192.172.10.0
Quitar
Comandos IOS Equivalente
ROUTER-BMANGA
User Access Verification
Password:
BUCARAMANGA>enable
Password:
BUCARAMANGA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BUCARAMANGA(config)#router rip
BUCARAMANGA(config-router)#
ES
03:45 p.m.


BOGOTÁ
Físico
Config
CLI
GLOBAL
Ajustes
ENRUTAMIENTO
Estático
RIP
SWITCHING
Base de Datos VLAN
INTERFAZ
FastEthernet0/0
FastEthernet0/1
Serial0/0/0
Serial0/0/1
Enrutamiento RIP (v2)
Red
Agregar
Dirección Red
192.172.10.0
Quitar
Comandos IOS Equivalente
ROUTER-BOGOTA
User Access Verification
Password:
BOGOTA>
BOGOTA>enable
Password:
BOGOTA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#router rip
BOGOTA(config-router)#
ES
03:42 p.m.

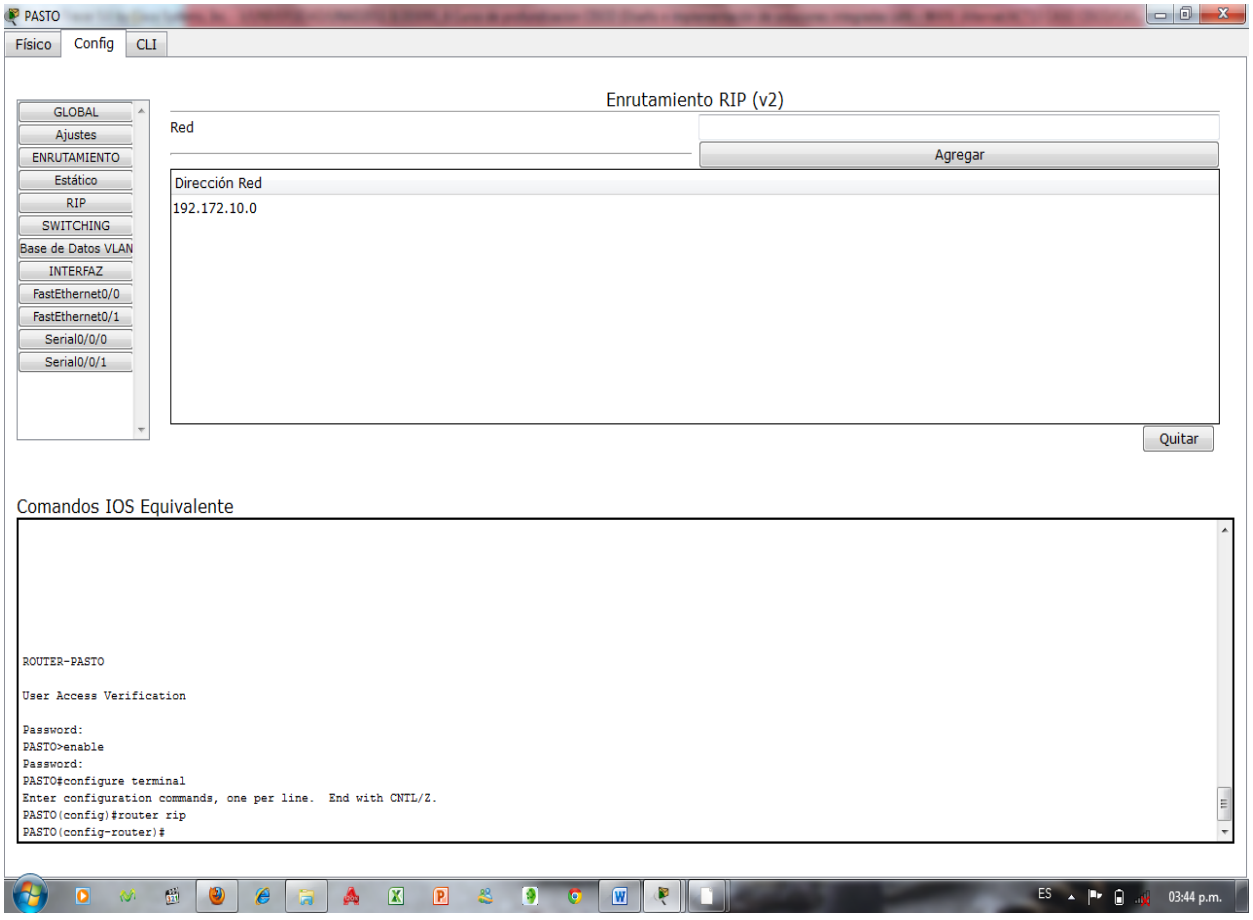

PASTO
Físico
Config
CLI
GLOBAL
Ajustes
ENRUTAMIENTO
Estático
RIP
SWITCHING
Base de Datos VLAN
INTERFAZ
FastEthernet0/0
FastEthernet0/1
Serial0/0/0
Serial0/0/1
Enrutamiento RIP (v2)
Red
Agregar
Dirección Red
192.172.10.0
Quitar
Comandos IOS Equivalente
ROUTER-PASTO
User Access Verification
Password:
PASTO>enable
Password:
PASTO#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
PASTO(config)#router rip
PASTO(config-router)#
ES
03:44 p.m.

Ilustración 1

1.9 PRUEBAS DE CONECTIVIDAD DE LA RED

1.9.1 Prueba de envío de mensajes

Ilustración 2

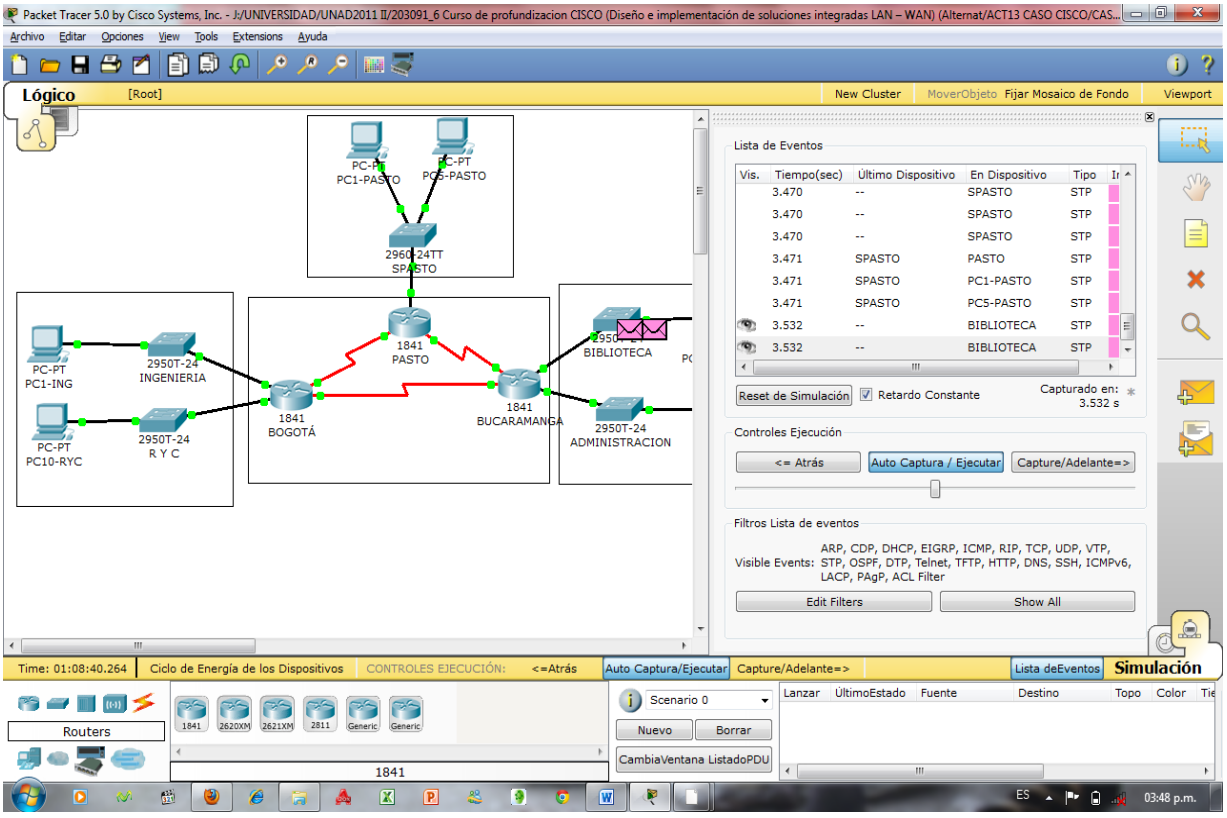
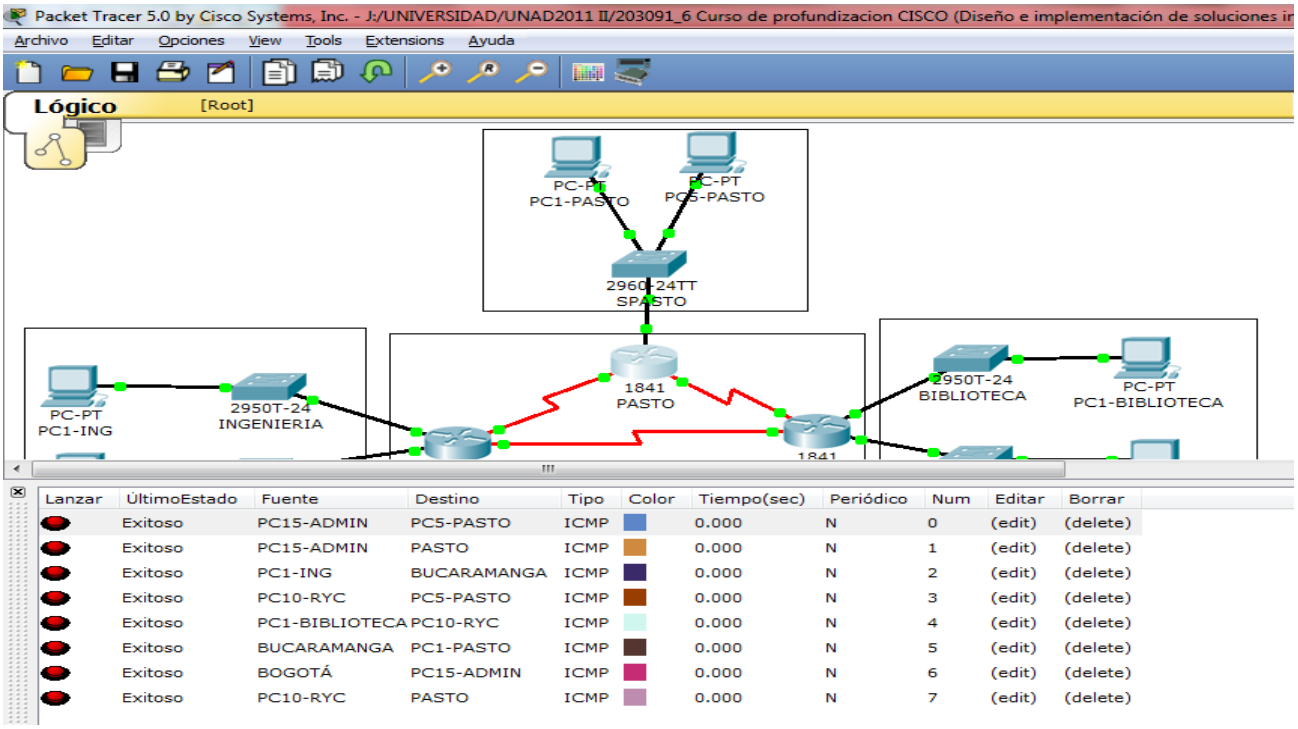


Ilustración 3



Lanzar	ÚltimoEstado	Fuente	Destino	Tipo	Color	Tiempo(sec)	Periódico	Num	Editar	Borrar
	Exitoso	PC15-ADMIN	PC5-PASTO	ICMP		0.000	N	0	(edit)	(delete)
	Exitoso	PC15-ADMIN	PASTO	ICMP		0.000	N	1	(edit)	(delete)
	Exitoso	PC1-ING	BUCARAMANGA	ICMP		0.000	N	2	(edit)	(delete)
	Exitoso	PC10-RYC	PC5-PASTO	ICMP		0.000	N	3	(edit)	(delete)
	Exitoso	PC1-BIBLIOTECA	PC10-RYC	ICMP		0.000	N	4	(edit)	(delete)
	Exitoso	BUCARAMANGA	PC1-PASTO	ICMP		0.000	N	5	(edit)	(delete)
	Exitoso	BOGOTÁ	PC15-ADMIN	ICMP		0.000	N	6	(edit)	(delete)
	Exitoso	PC10-RYC	PASTO	ICMP		0.000	N	7	(edit)	(delete)

A través de ping. Los siguientes son algunos de los pantallazos donde se prueba la conectividad de la red.

De PC1-PASTO a PC1-ING (PASTO – BOGOTA)

```
PC>ping 192.172.10.65

Pinging 192.172.10.65 with 32 bytes of data:

Reply from 192.172.10.65: bytes=32 time=87ms TTL=126
Reply from 192.172.10.65: bytes=32 time=39ms TTL=126
Reply from 192.172.10.65: bytes=32 time=44ms TTL=126
Reply from 192.172.10.65: bytes=32 time=38ms TTL=126

Ping statistics for 192.172.10.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 38ms, Maximum = 87ms, Average = 52ms
```

De PC5-PASTO a PC1-BIBLIOTECA (PASTO – BUCARAMANGA)

```
PC>ping 192.172.10.1

Pinging 192.172.10.1 with 32 bytes of data:

Reply from 192.172.10.1: bytes=32 time=72ms TTL=125
Reply from 192.172.10.1: bytes=32 time=41ms TTL=125
Reply from 192.172.10.1: bytes=32 time=54ms TTL=125
Reply from 192.172.10.1: bytes=32 time=35ms TTL=125

Ping statistics for 192.172.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 35ms, Maximum = 72ms, Average = 50ms
```

De PC10-RYC a PC15-ADMIN (BOGOTA – BUCARAMANGA)

```
PC>ping 192.172.10.62

Pinging 192.172.10.62 with 32 bytes of data:

Reply from 192.172.10.62: bytes=32 time=32ms TTL=126
Reply from 192.172.10.62: bytes=32 time=22ms TTL=126
Reply from 192.172.10.62: bytes=32 time=48ms TTL=126
Reply from 192.172.10.62: bytes=32 time=31ms TTL=126

Ping statistics for 192.172.10.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 48ms, Average = 33ms
```

De PC1-BIBLIOTECA a PC1-PASTO (BUCARAMANGA – PASTO)

```
PC>ping 192.172.10.97

Pinging 192.172.10.97 with 32 bytes of data:

Reply from 192.172.10.97: bytes=32 time=57ms TTL=125
Reply from 192.172.10.97: bytes=32 time=61ms TTL=125
Reply from 192.172.10.97: bytes=32 time=46ms TTL=125
Reply from 192.172.10.97: bytes=32 time=57ms TTL=125

Ping statistics for 192.172.10.97:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 46ms, Maximum = 61ms, Average = 55ms
```

De PC1-BIBLIOTECA a ROUTER PASTO (BUCARAMANGA – PASTO)

```
PC>ping 192.172.10.101

Pinging 192.172.10.101 with 32 bytes of data:

Reply from 192.172.10.101: bytes=32 time=69ms TTL=253
Reply from 192.172.10.101: bytes=32 time=38ms TTL=253
Reply from 192.172.10.101: bytes=32 time=49ms TTL=253
Reply from 192.172.10.101: bytes=32 time=55ms TTL=253

Ping statistics for 192.172.10.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 38ms, Maximum = 69ms, Average = 52ms
```

A través de tracert. A continuación se muestran algunos pantallazos.
De PC10-RYC a ROUTER-BUCARAMANGA (BOGOTÁ – BUCARAMANGA)

```
PC>tracert 192.172.10.29

Tracing route to 192.172.10.29 over a maximum of 30 hops:

  1    59 ms     8 ms      8 ms      192.172.10.93
  2    10 ms     13 ms     17 ms     192.172.10.29

Trace complete.
```

De PC1-ING a PC1-BIBLIOTECA (BOGOTA – BUCARAMANGA)

```
PC>tracert 192.172.10.1

Tracing route to 192.172.10.1 over a maximum of 30 hops:

  1    21 ms     9 ms      6 ms      192.172.10.77
  2    13 ms     12 ms     19 ms     192.172.10.106
  3    18 ms     18 ms     26 ms     192.172.10.1

Trace complete.
```

2. CASO DE ESTUDIO CCNA2

Una empresa con varias sucursales en diferentes ciudades del país desea modernizar el manejo de la red de datos que actualmente tiene y se describe a continuación:

Nombre empresa: CHALVER

Objeto social: Empresa dedicada a la exportación e importación de equipos de cómputo.

Sedes:
*Principal: Pasto

Sucursales
• Bogotá
• Medellín
• Pereira
• Cali
• Cartagena
• Ibagué
• Cúcuta
• Bucaramanga
• Barranquilla
• Villavicencio

Descripción Sede Principal:

Se cuenta con un edificio que tiene 3 pisos, en el primero están los cuartos de equipos que permiten la conexión con todo el país, allí se tiene:

• 3 Enrutadores CISCO principales, uno para el enlace nacional, otro para la administración de la red interna en los pisos 1 y 2 y otro para el tercer piso.

• 3 SwitchesCatalyst CISCO, uno para cada piso del edificio con soporte de 24 equipos cada uno, actualmente se está al 95% de la capacidad.

• Un canal dedicado con tecnología ATM que se ha contratado con ISP nacional de capacidad de 2048 Kbps.

• El direccionamiento a nivel local es clase C. Se cuenta con 70 equipos en tres pisos, se tiene las oficinas de Sistemas (15 equipos, primer piso), Gerencia (5 Equipos, primer

piso), Ventas (30 equipos, segundo piso), Importaciones (10 Equipos, tercer piso), Mercadeo (5 Equipos, tercer piso) y Contabilidad (5 Equipos, tercer piso)

• El direccionamiento a nivel nacional es Clase A privada, se tiene un IP pública al ISP para el servicio de Internet la cual es: 200.21.85.93 Mascara: 255.255.240.0.

• Actualmente el Enrutamiento se hace con RIP versión 1, tanto para la parte local como para la parte nacional.
Descripción de sucursales:

Cada sucursal se compone de oficinas arrendadas en un piso de un edificio y compone de los siguientes elementos:

• Dos Routers por sucursal: Uno para el enlace nacional y otro para la administración de la red interna.

• Un SwitchCatalyst para 24 equipos, actualmente se utilizan 20 puertos.

• Los 20 equipos se utilizan así: 10 para ventas, 5 para sistemas, 2 para importaciones y 3 para contabilidad.

• Un canal dedicado con tecnología ATM para conectarse a la sede principal de 512Kbps.

• El direccionamiento a nivel local es Clase C privado y a nivel nacional B como se había dicho en la descripción de la sede principal.

• El enrutamiento también es RIP.

Entonces:

1. Realizar el diseño de la sede principal y sucursales con las especificaciones actuales, un archivo PKT para la sede principal y para una sucursal.
2. Realizar un diseño a nivel de Routers y Switch para todo el país con PacketTracert.
3. Aplicar el direccionamiento especificado en el diseño del punto anterior.
4. Aplicar el enrutamiento actual en el diseño del punto 2.
5. Cambiar las especificaciones de direccionamiento y enrutamiento según las siguientes condiciones:

• Aplicar VLSM en la sede principal y sucursales, para la conexión nacional
• Aplicar Enrutamiento OSPF en la conexión Nacional, EIGRP para la conexión interna en la sede principal
• Aplicar Enrutamiento RIPv2 para todas las sucursales,

2.1 DISEÑO CON ESPECIFICACIONES ACTUALES

SEDE PRINCIPAL PASTO,

Subred direccionamiento nacional 10.0.0.0
Subred direccionamiento local 192.168.0.0

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
R NACIONAL	S0/0/0	200.21.85.93	255.255.240.0	N/A
	S0/0/1	192.168.3.98	255.255.255.224	N/A
	S0/1/0	10.3.0.1	255.255.0.0	N/A
	S0/1/1	10.4.0.1	255.255.0.0	N/A
	S0/2/0	10.1.0.1	255.255.0.0	N/A
	S0/2/1	10.2.0.1	255.255.0.0	N/A
	S0/3/0	10.5.0.1	255.255.0.0	N/A
	S0/3/1	10.6.0.1	255.255.0.0	N/A
	S1/0/0	10.7.0.1	255.255.0.0	N/A
	S1/0/1	10.8.0.1	255.255.0.0	N/A
	S1/1/0	10.9.0.1	255.255.0.0	N/A
	S1/1/1	10.10.0.1	255.255.0.0	N/A
	Fa0/1	192.168.3.130	255.255.255.224	N/A
R PISO 1 Y 2	Fa0/0	192.168.3.33	255.255.255.224	N/A
	Fa0/1	192.168.3.1	255.255.255.224	N/A
	S0/0/0	192.168.3.97	255.255.255.224	N/A
R PISO 3.	Fa0/0	192.168.3.65	255.255.255.224	N/A
	S0/0/1	192.168.3.129	255.255.255.224	N/A
Rango 15 PC Sistemas	NIC	192.168.3.2-192.168.3.16	255.255.255.224	192.168.3.1
Rango 5 PC Gerencia	NIC	192.168.3.17-192.168.3.21	255.255.255.224	192.168.3.1
Rango 24 PC Ventas	NIC	192.168.3.34-192.168.3.57	255.255.255.224	192.168.3.33
Rango 6 PC ventas	NIC	192.168.3.22-192.168.3.27	255.255.255.224	192.168.3.1
Rango PC piso 3	NIC	192.168.3.66-192.168.3.85	255.255.255.224	192.168.3.65

SEDE BOGOTA

Subred nacional 10.1.0.0
Subred local 192.168.4.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RBTA	S0/0/0	10.1.0.2	255.255.0.0	N/A
	S0/0/1	192.168.4.34	255.255.255.224	N/A
RLBTA	S0/0/0	192.168.4.33	255.255.255.224	N/A
	Fa0/0	192.168.4.1	255.255.255.224	N/A

SEDE MEDELLIN

Subred nacional 10.2.0.0
Subred local 192.168.5.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RMED	S0/0/0	10.2.0.2	255.255.0.0	N/A
	S0/0/1	192.168.5.34	255.255.255.224	N/A
RLMED	S0/0/0	192.168.5.33	255.255.255.224	N/A
	Fa0/0	192.168.5.1	255.255.255.224	N/A

SEDE PEREIRA

Subred nacional 10.3.0.0
Subred local 192.168.6.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RPEREIRA	S0/0/0	10.3.0.2	255.255.0.0	N/A
	S0/0/1	192.168.6.34	255.255.255.224	N/A
RLPEREIRA	S0/0/0	192.168.6.33	255.255.255.224	N/A
	Fa0/0	192.168.6.1	255.255.255.224	N/A

SEDE CALI

Subred nacional 10.4.0.0
Subred local 192.168.7.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RCALI	S0/0/0	10.4.0.2	255.255.0.0	N/A
	S0/0/1	192.168.7.34	255.255.255.224	N/A
RLCALI	S0/0/0	192.168.7.33	255.255.255.224	N/A
	Fa0/0	192.168.7.1	255.255.255.224	N/A

SEDE CARTAGENA

Subred nacional 10.5.0.0
Subred local 192.168.8.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RCARTAGENA	S0/0/0	10.5.0.2	255.255.0.0	N/A
	S0/0/1	192.168.8.34	255.255.255.224	N/A
RLCARTAGENA	S0/0/0	192.168.8.33	255.255.255.224	N/A
	Fa0/0	192.168.8.1	255.255.255.224	N/A

SEDE IBAGUE

Subred nacional 10.6.0.0
Subred local 192.168.9.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RIBAGUE	S0/0/0	10.6.0.2	255.255.0.0	N/A
	S0/0/1	192.168.9.34	255.255.255.224	N/A
RLIBAGUE	S0/0/0	192.168.9.33	255.255.255.224	N/A
	Fa0/0	192.168.9.1	255.255.255.224	N/A

SEDE CUCUTA

Subred nacional 10.7.0.0
Subred local 192.168.10.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RCUCUTA	S0/0/0	10.7.0.2	255.255.0.0	N/A
	S0/0/1	192.168.10.34	255.255.255.224	N/A
RCUCUTA	S0/0/0	192.168.10.33	255.255.255.224	N/A
	Fa0/0	192.168.10.1	255.255.255.224	N/A

SEDE BUCARAMANGA

Subred nacional 10.8.0.0
Subred local 192.168.11.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RBMANGA	S0/0/0	10.8.0.2	255.255.0.0	N/A
	S0/0/1	192.168.11.34	255.255.255.224	N/A
RLBUMANGA	S0/0/0	192.168.11.33	255.255.255.224	N/A
	Fa0/0	192.168.11.1	255.255.255.224	N/A

SEDE BARRANQUILLA
Subred nacional 10.9.0.0
Subred local 192.168.12.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RBQUILLA	S0/0/0	10.9.0.2	255.255.0.0	N/A
	S0/0/1	192.168.12.34	255.255.255.224	N/A
RLBQUILLA	S0/0/0	192.168.12.33	255.255.255.224	N/A
	Fa0/0	192.168.12.1	255.255.255.224	N/A

SEDE VILLAVICENCIO
Subred nacional 10.10.0.0
Subred local 192.168.13.0

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RVICENCIO	S0/0/0	10.10.0.2	255.255.0.0	N/A
	S0/0/1	192.168.13.34	255.255.255.224	N/A
RLVICENCIO	S0/0/0	192.168.13.33	255.255.255.224	N/A
	Fa0/0	192.168.13.1	255.255.255.224	N/A

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
R NACIONAL	S0/0/0	200.21.85.93	255.255.240.0	N/A
	S0/0/1	192.168.3.98	255.255.255.252	N/A
	S0/1/0	10.1.0.9	255.255.255.252	N/A
	S0/1/1	10.1.0.13	255.255.255.252	N/A
	S0/2/0	10.1.0.1	255.255.255.252	N/A
	S0/2/1	10.1.0.5	255.255.255.252	N/A
	S0/3/0	10.1.0.17	255.255.255.252	N/A
	S0/3/1	10.1.0.21	255.255.255.252	N/A
	S1/0/0	10.1.0.25	255.255.255.252	N/A
	S1/0/1	10.1.0.29	255.255.255.252	N/A
	S1/1/0	10.1.0.33	255.255.255.252	N/A
	S1/1/1	10.1.0.37	255.255.255.252	N/A
	Fa0/1	192.168.2.34	255.255.255.252	N/A
R PISO 1 Y 2	Fa0/0	192.168.3.1	255.255.255.192	N/A
	Fa0/1	192.168.3.65	255.255.255.224	N/A
	S0/0/0	192.168.3.97	255.255.255.252	N/A
R PISO 3.	Fa0/0	192.168.2.1	255.255.255.224	N/A
	S0/0/1	192.168.3.33	255.255.255.252	N/A

2.2 DIRECCIONAMIENTO CON VLSM

SEDE PRINCIPAL PASTO

SUBRED DIRECCIONAMIENTO NACIONAL 10.0.0.0
SUBRED DIRECCIONAMIENTO LOCAL 192.168.0.0

SEDE BOGOTA

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RBTA	S0/0/0	10.1.0.2	255.255.255.252	N/A
	S0/0/1	192.168.4.34	255.255.255.252	N/A
RLBTA	S0/0/0	192.168.4.33	255.255.255.252	N/A
	Fa0/0	192.168.4.1	255.255.255.224	N/A

SEDE MEDELLIN

ProtocolRip V1	Interfaz	Direccion IP	Mascara de subred	Gateway por defecto
RMED	**S0/0/0**	**10.1.0.6**	**255.255.255.252**	N/A
	S0/0/1	**192.168.5.34**	**255.255.255.252**	N/A
RLMED	**S0/0/0**	**192.168.5.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.5.1**	**255.255.255.224**	N/A

SEDE PEREIRA

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RPEREIRA	**S0/0/0**	**10.1.0.10**	**255.255.255.252**	N/A
	S0/0/1	**192.168.6.34**	**255.255.255.252**	N/A
RLPEREIRA	**S0/0/0**	**192.168.6.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.6.1**	**255.255.255.224**	N/A

SEDE CALI

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RCALI	**S0/0/0**	**10.1.0.14**	**255.255.255.252**	N/A
	S0/0/1	**192.168.7.34**	**255.255.255.252**	N/A
RLCALI	**S0/0/0**	**192.168.7.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.7.1**	**255.255.255.224**	N/A

SEDE CARTAGENA

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RCARTAGENA	**S0/0/0**	**10.1.0.18**	**255.255.255.252**	N/A
	S0/0/1	**192.168.8.34**	**255.255.255.252**	N/A
RLCARTAGENA	**S0/0/0**	**192.168.8.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.8.1**	**255.255.255.224**	N/A

SEDE IBAGUE

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RIBAGUE	**S0/0/0**	**10.1.0.22**	**255.255.255.252**	N/A
	S0/0/1	**192.168.9.34**	**255.255.255.252**	N/A

RLIBAGUE	**S0/0/0**	**192.168.9.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.9.1**	**255.255.255.224**	N/A

SEDE CUCUTA

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RCUCUTA	**S0/0/0**	**10.1.0.26**	**255.255.255.252**	N/A
	S0/0/1	**192.168.10.34**	**255.255.255.252**	N/A
RCUCUTA	**S0/0/0**	**192.168.10.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.10.1**	**255.255.255.224**	N/A

SEDE BUCARAMANGA

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RBMANGA	**S0/0/0**	**10.1.0.30**	**255.255.255.252**	N/A
	S0/0/1	**192.168.11.34**	**255.255.255.252**	N/A
RLBUMANGA	**S0/0/0**	**192.168.11.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.11.1**	**255.255.255.224**	N/A

SEDE BARRANQUILLA

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RBQUILLA	**S0/0/0**	**10.1.0.34**	**255.255.255.252**	N/A
	S0/0/1	**192.168.12.34**	**255.255.255.252**	N/A
RLBQUILLA	**S0/0/0**	**192.168.12.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.12.1**	**255.255.255.224**	N/A

SEDE VILLAVICENCIO

Protocolo Rip V1	Interfaz	Dirección IP	Mascara de subred	Gateway por defecto
RVICENCIO	**S0/0/0**	**10.1.0.38**	**255.255.255.252**	N/A
	S0/0/1	**192.168.13.34**	**255.255.255.252**	N/A
RLVICENCIO	**S0/0/0**	**192.168.13.33**	**255.255.255.252**	N/A
	Fa0/0	**192.168.13.1**	**255.255.255.224**	N/A

2.3 CONFIGURACION DE LOS ROUTERS

Para presentar la configuración de los routers, se tendrá en cuenta de conexión nacional de la sede principal y los routers de la sede de Bogotá.

2.3.1 Configuración para sistema actual

Router Nacional Pasto

```
PASTO#show running-config
Building configuration...

Current configuration : 1436 bytes
!
version 12.4
no service password-encryption
!
hostname PASTO
!
!
!
!
!
ipssh version 1
!
!
interface FastEthernet0/0
noip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.3.130 255.255.255.224
duplex auto
speed auto
!
interface Serial0/0/0
ip address 200.21.85.93 255.255.255.240
!
interface Serial0/0/1
```

```
ip address 192.168.3.98 255.255.255.224
clock rate 64000
!
interface Serial0/1/0
ip address 10.3.0.1 255.255.0.0
clock rate 64000
!
interface Serial0/1/1
ip address 10.4.0.1 255.255.0.0
clock rate 64000
!
interface Serial0/2/0
ip address 10.1.0.1 255.255.0.0
clock rate 64000
!
interface Serial0/2/1
ip address 10.2.0.1 255.255.0.0
clock rate 64000
!
interface Serial0/3/0
ip address 10.5.0.1 255.255.0.0
clock rate 64000
!
interface Serial0/3/1
ip address 10.6.0.1 255.255.0.0
clock rate 64000
!
interface Ethernet1/0
noip address
duplex auto
speed auto
shutdown
!
interface Serial1/0/0
ip address 10.7.0.1 255.255.0.0
clock rate 64000
!
interface Serial1/0/1
ip address 10.8.0.1 255.255.0.0
clock rate 64000
!
interface Serial1/1/0
```

ip address 10.9.0.1 255.255.0.0
clock rate 64000
!
interface Serial1/1/1
ip address 10.10.0.1 255.255.0.0
clock rate 64000
!
interface Vlan1
noip address
shutdown
!
router rip
network 10.0.0.0
network 192.168.3.0
!
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
!
!
!
!
!
line con 0
linevty 0 4
login
!
!
End

Router enlace nacional Bogotá

RBTA#show running-config
Building configuration...

Current configuration : 547 bytes
!
version 12.4
no service password-encryption
!
hostname RBTA
!
!

```
!
!
!
ipssh version 1
!
!
interface FastEthernet0/0
noip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
noip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 10.1.0.2 255.255.0.0
!
interface Serial0/0/1
ip address 192.168.4.34 255.255.255.224
clock rate 64000
!
interface Vlan1
noip address
shutdown
!
router rip
network 10.0.0.0
network 192.168.4.0
!
ip classless
!
!
!
!
!
line con 0
linevty 0 4
login
```

!
!
End

Router enlace local Bogotá

RLBTA#show running-config
Building configuration...

Current configuration : 519 bytes
!
version 12.4
no service password-encryption
!
hostname RLBTA
!
!
!
!
!
ipssh version 1
!
!
interface FastEthernet0/0
ip address 192.168.4.1 255.255.255.224
duplex auto
speed auto
!
interface FastEthernet0/1
noip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 192.168.4.33 255.255.255.224
!
interface Serial0/0/1
noip address
shutdown
!
interface Vlan1

noip address
shutdown
!
router rip
network 192.168.4.0
!
ip classless
!
!
!
!
!
line con 0
linevty 0 4
login
!
!
End

2.3.2 Configuración sistema con vlsm

Router Nacional Pasto

RPPAL# copy running-config star
RPPAL# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
RPPAL#showrunn
RPPAL#show running-config
Building configuration...

Current configuration : 2229 bytes
!
version 12.4
no service password-encryption
!
hostname RPPAL
!
!
!

```
!
!
ipssh version 1
!
!
interface FastEthernet0/0
noip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
ip address 192.168.2.34 255.255.255.252
duplex auto
speed auto
!
interface Serial0/0/0
ip address 200.21.85.93 255.255.240.0
!
interface Serial0/0/1
ip address 192.168.3.98 255.255.255.252
clock rate 64000
!
interface Serial0/1/0
ip address 10.1.0.9 255.255.255.252
clock rate 64000
!
interface Serial0/1/1
ip address 10.1.0.13 255.255.255.252
clock rate 64000
!
interface Serial0/2/0
ip address 10.1.0.1 255.255.255.252
clock rate 64000
!
interface Serial0/2/1
ip address 10.1.0.5 255.255.255.252
clock rate 64000
!
interface Serial0/3/0
ip address 10.1.0.17 255.255.255.252
clock rate 64000
```

```
!
interface Serial0/3/1
ip address 10.1.0.21 255.255.255.252
clock rate 64000
!
interface Ethernet1/0
noip address
duplex auto
speed auto
shutdown
!
interface Serial1/0/0
ip address 10.1.0.25 255.255.255.252
clock rate 64000
!
interface Serial1/0/1
ip address 10.1.0.29 255.255.255.252
clock rate 64000
!
interface Serial1/1/0
ip address 10.1.0.33 255.255.255.252
clock rate 64000
!
interface Serial1/1/1
ip address 10.1.0.37 255.255.255.252
clock rate 64000
!
interface Vlan1
noip address
shutdown
!
routereigrp 1
network 192.168.3.0
network 192.168.2.0
auto-summary
!
routerospf 1
log-adjacency-changes
network 10.1.0.8 0.0.0.3 area 0
network 10.1.0.12 0.0.0.3 area 0
network 10.1.0.0 0.0.0.3 area 0
network 10.1.0.4 0.0.0.3 area 0
```

network 10.1.0.16 0.0.0.3 area 0
network 10.1.0.20 0.0.0.3 area 0
network 10.1.0.24 0.0.0.3 area 0
network 10.1.0.28 0.0.0.3 area 0
network 10.1.0.32 0.0.0.3 area 0
network 10.1.0.36 0.0.0.3 area 0
default-information originate
!
router rip
version 2
network 192.168.0.0
network 192.168.1.0
network 192.168.2.0
network 192.168.3.0
network 192.168.4.0
network 192.168.5.0
network 192.168.6.0
network 192.168.7.0
network 192.168.8.0
network 192.168.9.0
network 192.168.10.0
network 192.168.11.0
network 192.168.12.0
network 192.168.13.0
!
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
!
!
!
!
!
line con 0
linevty 0 4
login
!
!
End

Router Nacional Bogotá

BTA#show running-config

```
Building configuration...

Current configuration : 615 bytes
!
version 12.4
no service password-encryption
!
hostname BTA
!
!
!
!
!
ipssh version 1
!
!
interface FastEthernet0/0
noip address
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
noip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 10.1.0.2 255.255.255.252
!
interface Serial0/0/1
ip address 192.168.4.34 255.255.255.252
clock rate 64000
!
interface Vlan1
noip address
shutdown
!
routerospf 1
log-adjacency-changes
network 10.1.0.0 0.0.0.3 area 0
```

!
router rip
version 2
network 192.168.4.0
!
ip classless
!
!
!
!
!
line con 0
linevty 0 4
login
!
!
end

Router Local Bogotá

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

Router con0 is now available

Press RETURN to get started.

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname RLBTA
RLBTA(config)#END
%SYS-5-CONFIG_I: Configured from console by console
RLBTA#copyrunn
RLBTA#copy running-config
% Incomplete command.

```
RLBTA#copy running-configst
RLBTA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
RLBTA#sowrunn
RLBTA#show run
RLBTA#show running-config
Building configuration...

Current configuration : 568 bytes
!
version 12.4
no service password-encryption
!
hostname RLBTA
!
!
!
!
!
ipssh version 1
!
!
interface FastEthernet0/0
ip address 192.168.4.1 255.255.255.224
duplex auto
speed auto
!
interface FastEthernet0/1
noip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 192.168.4.33 255.255.255.252
!
interface Serial0/0/1
noip address
shutdown
!
```

```
interface Vlan1
noip address
shutdown
!
router rip
version 2
network 192.168.4.0
!
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
!
!
!
!
!
line con 0
linevty 0 4
login
!
!
End
```

3. CONCLUSIONES

Con el desarrollo del caso de estudio de CCNA1 se adquirió muchas herramientas y conocimientos cuando se va a diseñar, implementar y estructurar alguna red. Teniendo en cuenta todos los imprevistos que se puedan presentar alcanzar su completa construcción con una conectividad eficiente. Hablando de imprevistos, si ellos suceden se hace necesario que se den en el diseño para poder hacer los cambios respectivos y no cuando ya la red este en funcionamiento, porque sería más complicado solucionarlo.

Gracias al desarrollo de las unidades de CCNA2, se complementó de manera específica una de las tantas ramas de la ingeniería de sistemas como lo es la comunicación de datos, a través de todos los procesos respectivos que ejecutan los equipos que la componen, para luego poder de una forma eficiente manipular la información de un lugar a otro a través de los respectivos enlaces. Todo el contenido de CCNA 2 nos dio las herramientas y conocimientos necesarios para saber la forma como se programan los principales equipos encargados del direccionamiento de los datos como lo son los routers.

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