



INSTITUTO POLITÉCNICO  
NACIONAL



ESCUELA SUPERIOR DE CÓMPUTO

ADMINISTRACIÓN DE SERVICIOS EN RED

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## Práctica 4 - EIGRP

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## 1. Introducción.

En el presente documento se plasma a detalle la manera de implementar el protocolo de enrutamiento EIGRP además de modificar diferentes aspectos de éste.

Es un protocolo de encaminamiento híbrido, ofrece lo mejor de algoritmos de vector de distancias y del estado enlace. Fue desarrollado por Cisco Systems en el año de 1986. Se considera un protocolo avanzado que se basa en las características normalmente asociadas con los protocolos del estado de enlace. Es un protocolo fácil de configurar, el cual mejora las propiedades de convergencia.

El protocolo de routing de gateway interior mejorado (EIGRP) es un protocolo de routing vector distancia avanzado desarrollado por Cisco Systems. Como lo sugiere el nombre, EIGRP es una mejora de otro protocolo de routing de Cisco: el protocolo de routing de gateway interior (IGRP). IGRP es un protocolo de routing vector distancia con clase anterior, que quedó obsoleto a partir del IOS 12.3

EIGRP es un protocolo de routing vector distancia que incluye características propias de los protocolos de routing de estado de enlace. EIGRP es apto para numerosas topologías y medios diferentes. EIGRP puede escalar para incluir varias topologías y puede proporcionar tiempos de convergencia extremadamente rápidos con un mínimo tráfico de red.

En este documento se presenta EIGRP y se proporcionan comandos básicos de configuración para habilitarlo en un router de CISCO.

## 2. Objetivo general.

Aprender la manera en que se implementa EIGRP.

## 3. Objetivos específicos.

1. Conectar una red de acuerdo con el Diagrama de topología.
2. Realizar tareas de configuración básicas en un router.
3. Configurar y activar interfaces.
4. Configurar el enrutamiento EIGRP en todos los routers.
5. Verificar que el enrutamiento EIGRP utilice comandos show.
6. Desactive la sumarización automática.
7. Configurar el resumen manual.
8. Configurar una ruta estática por defecto.
9. Propagar la ruta por defecto a los EIGRP vecinos.

## 4. Escenario.

En esta actividad de laboratorio, aprenderá a configurar el protocolo de enrutamiento EIGRP a través de una red que se muestra en el Diagrama de topología. Se usará una dirección loopback en el router R2 para simular una conexión con un ISP, en el cual se enviará todo el tráfico que no tiene como destino la red local. Algunos segmentos de la red han sido divididos en subredes con VLSM. EIGRP es un protocolo de enrutamiento sin clase que puede utilizar para proporcionar información de máscara de subred en las actualizaciones de enrutamiento. Esto permitirá que se propague la información de red a través de la red de subred VLSM

5. Desarrollo.

Implementar la siguiente topología de acuerdo a las características que se indican a lo largo del documento

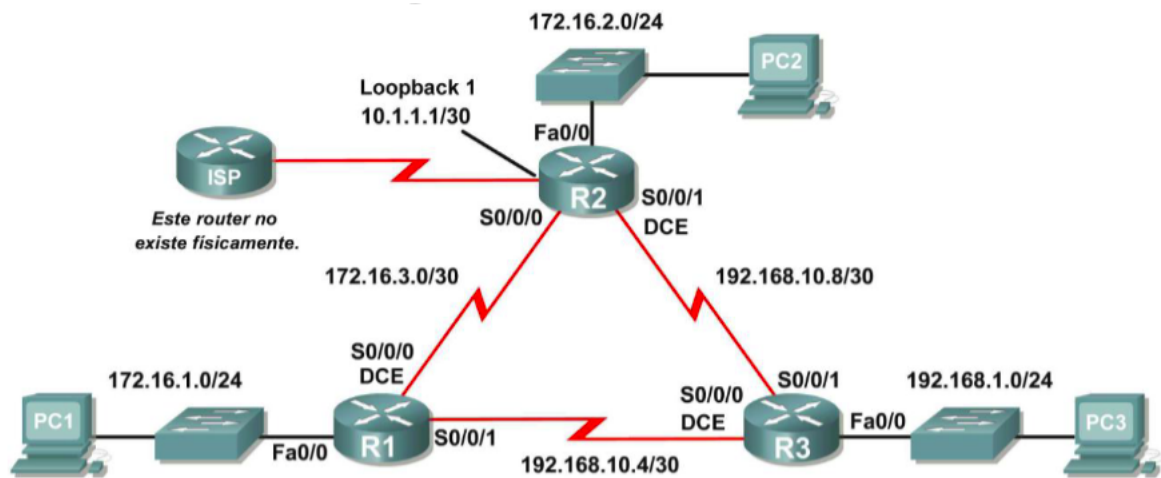


Figura 1: Tabla de direccionamiento

Dispositivo	Interfaz	Dirección IP	Máscara de subred	Gateway por defecto
R1	Fa0/0	172.16.1.1	255.255.255.0	No aplicable
	S0/0/0	172.16.3.1	255.255.255.252	No aplicable
	S0/0/1	192.168.10.5	255.255.255.252	No aplicable
R2	Fa0/0	172.16.2.1	255.255.255.0	No aplicable
	S0/0/0	172.16.3.2	255.255.255.252	No aplicable
	S0/0/1	192.168.10.9	255.255.255.252	No aplicable
	Lo1	10.1.1.1	255.255.255.252	No aplicable
R3	Fa0/0	192.168.1.1	255.255.255.0	No aplicable
	S0/0/0	192.168.10.6	255.255.255.252	No aplicable
	S0/0/1	192.168.10.10	255.255.255.252	No aplicable
PC1	NIC	172.16.1.10	255.255.255.0	172.16.1.1
PC2	NIC	172.16.2.10	255.255.255.0	172.16.2.1
PC3	NIC	192.168.1.10	255.255.255.0	192.168.1.1

Figura 2: Topología a implementar

## 5.1. Preparación de la red

Conecte una red que sea similar a la siguiente:

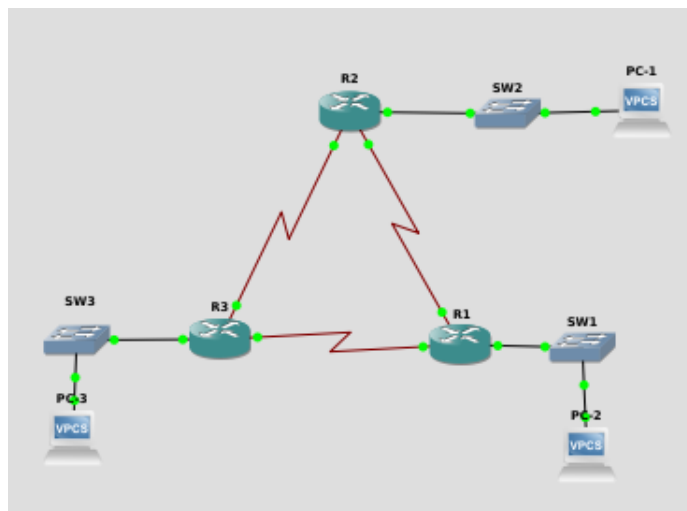
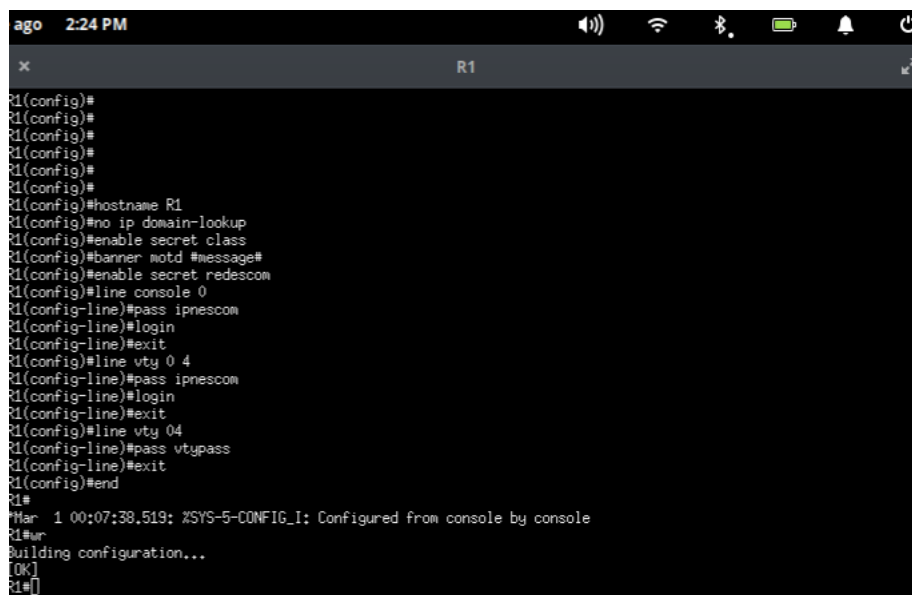


Figura 3: VLSM

## 5.2. Configuración básica de los router

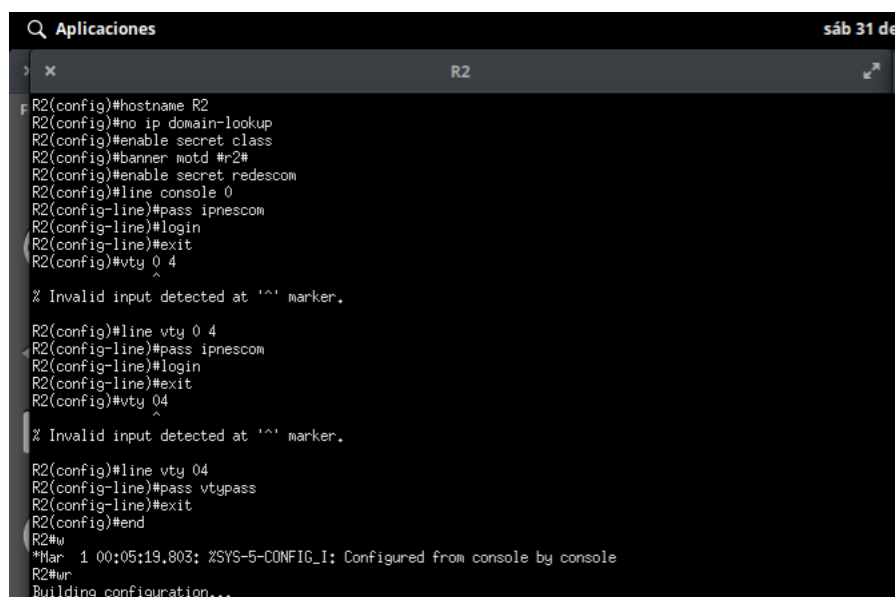
Realice las configuraciones básicas de los routers R1, R2 y R3 de acuerdo con las siguientes pautas generales:

1. Configure el nombre de host del router.
2. Desactive la búsqueda DNS.
3. Configure una contraseña de modo EXEC.
4. Configure un mensaje del día.
5. Configure una contraseña para las conexiones de la consola.
6. Configure una contraseña para las conexiones de VTY.



```
ago 2:24 PM
R1
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)#hostname R1
R1(config)#no ip domain-lookup
R1(config)#enable secret class
R1(config)#banner motd #message#
R1(config)#enable secret redescom
R1(config)#line console 0
R1(config-line)#pass ipnescom
R1(config-line)#login
R1(config-line)#exit
R1(config)#line vty 0 4
R1(config-line)#pass ipnescom
R1(config-line)#login
R1(config-line)#exit
R1(config)#line vty 04
R1(config-line)#pass vtypass
R1(config-line)#exit
R1(config)#end
R1#
*Mar 1 00:07:38.519: %SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#[]
```

Figura 4: Configuración básica de R1



```
Q Aplicaciones
sáb 31 de
R2
R2(config)#hostname R2
R2(config)#no ip domain-lookup
R2(config)#enable secret class
R2(config)#banner motd #r2#
R2(config)#enable secret redescom
R2(config)#line console 0
R2(config-line)#pass ipnescom
R2(config-line)#login
R2(config-line)#exit
R2(config)#vty 0 4
R2(config)#vty 04
R2(config)#vty 04
R2(config-line)#pass ipnescom
R2(config-line)#login
R2(config-line)#exit
R2(config)#vty 04
R2(config)#vty 04
R2(config-line)#pass vtypass
R2(config-line)#exit
R2(config)#end
R2#wr
*Mar 1 00:05:19.803: %SYS-5-CONFIG_I: Configured from console by console
R2#wr
Building configuration...
```

Figura 5: Configuración básica de R2

```

R3(config)#hostname R3
R3(config)#no ip domain-lookup
R3(config)#enable secret class
R3(config)#banner motd #R3#
R3(config)#enable secret redescom
R3(config)#line console 0
R3(config-line)#pass ipnescom
R3(config-line)#login
R3(config-line)#exit
R3(config)#vty 04
R3(config)#^
% Invalid input detected at '^' marker.
R3(config)#line vty 04
R3(config-line)#pass vtypass
R3(config-line)#exit
R3(config)#end
R3#wr
Building configuration...
*Mar  1 00:10:41.707: %SYS-5-CONFIG_I: Configured from console by console[OK]
R3#

```

Figura 6: Configuración básica de R3

### 5.3. Verificar el direccionamiento IP y las interfaces

```

R1
C 192.168.10.4/30 is directly connected, Serial1/1
  172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D 172.16.0.0/16 is a summary, 00:06:56, Null0
C 172.16.1.0/24 is directly connected, FastEthernet0/0
D 172.16.2.0/24 [90/2195456] via 172.16.3.2, 00:04:24, Serial1/0
C 172.16.3.0/30 is directly connected, Serial1/0
D 192.168.1.0/24 [90/2195456] via 192.168.10.6, 00:02:10, Serial1/1
R1#t
R1#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Prot
FastEthernet0/0	172.16.1.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial1/0	172.16.3.1	YES	manual	up	up
Serial1/1	192.168.10.5	YES	manual	up	up
Serial1/2	unassigned	YES	unset	administratively down	down
Serial1/3	unassigned	YES	unset	administratively down	down

Figura 7: Direccionamiento e interfaces de R1

```

R2
R2(config-router)#end
R2#
*Mar  1 02:12:51.447: %SYS-5-CONFIG_I: Configured from console by console
R2#wr
Building configuration...
[OK]
R2#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Prot
FastEthernet0/0	172.16.2.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial1/0	172.16.3.2	YES	manual	up	up
Serial1/1	192.168.10.9	YES	manual	up	up
Serial1/2	unassigned	YES	unset	administratively down	down
Serial1/3	unassigned	YES	unset	administratively down	down
Loopback0	10.1.1.1	YES	manual	up	up

Figura 8: Direccionamiento e interfaces de R2



```

R1
C 192.168.10.4/30 is directly connected, Serial1/1
D 172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D 172.16.0.0/16 is a summary, 00:06:56, Null0
C 172.16.1.0/24 is directly connected, FastEthernet0/0
D 172.16.2.0/24 [90/2195456] via 172.16.3.2, 00:04:24, Serial1/0
C 172.16.3.0/30 is directly connected, Serial1/0
D 192.168.1.0/24 [90/2195456] via 192.168.10.6, 00:02:10, Serial1/1
R1#)t
R1#show ip interface brief
Interface      IP-Address      OK? Method Status      Prot
ocol
FastEthernet0/0 172.16.1.1      YES manual up          up
FastEthernet0/1 unassigned      YES unset  administratively down down
Serial1/0       172.16.3.1      YES manual up          up
Serial1/1       192.168.10.5    YES manual up          up
Serial1/2       unassigned      YES unset  administratively down down
Serial1/3       unassigned      YES unset  administratively down down
R1#

```

Figura 9: Configuración básica de R3

#### 5.4. Configurar las interfaces Ethernet de las PC1, PC2 y PC3

```

PC-1>
PC-1> show
NAME IP/MASK GATEWAY MAC LPORT RHOST:PO
RT
PC-1 172.16.1.10/24 172.16.1.1 00:50:79:66:68:00 10038 127.0.0.1
1:10039
fe80::250:79ff:fe66:6800/64
PC-1>

```

Figura 10: Configuración de PC1

```

PC-2> show
NAME IP/MASK GATEWAY MAC LPORT RHOST:PO
RT
PC-2 172.16.2.10/24 172.16.2.1 00:50:79:66:68:01 10040 127.0.0.1
1:10041
fe80::250:79ff:fe66:6801/64
PC-2>

```

Figura 11: Configuración de PC2

```

PC-3>
PC-3> show
NAME IP/MASK GATEWAY MAC LPORT RHOST:PO
RT
PC-3 192.168.1.10/24 192.168.1.1 00:50:79:66:68:02 10036 127.0.0.1
1:10037
fe80::250:79ff:fe66:6802/64
PC-3>

```

Figura 12: Configuración de PC3

## 5.5. Configuración de EIGRP

```

x                                     R1
FastEthernet0/1      unassigned      YES unset administratively down down
Serial1/0            172.16.3.1      YES manual up up
Serial1/1            192.168.10.5     YES manual up up
Serial1/2            unassigned      YES unset administratively down down
Serial1/3            unassigned      YES unset administratively down down

R1#
R1#
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router eigrp 1
R1(config-router)#network 172.16.0.0
R1(config-router)#network 192.168.10.4 0.0.0.3
R1(config-router)#end
R1#
*Mar 1 02:21:19.747: %SYS-5-CONFIG_I: Configured from console by console
R1#ur
Building configuration...
[OK]
R1#

```

Figura 13: Configuración de EIGRP en R1

```

Serial1/1            192.168.10.9     YES manual up up
Serial1/2            unassigned      YES unset administratively down down
Serial1/3            unassigned      YES unset administratively down down
Loopback0            10.1.1.1        YES manual up up

R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router eigrp 1
R2(config-router)#network 172.16.0.0
R2(config-router)#
*Mar 1 02:12:16.231: %DUAL-5-NBCHANGE: IP-EIGRP(0) 1: Neighbor 172.16.3.1 (Ser
ial1/0) is up: new adjacency
R2(config-router)#network 192.168.10.8 0.0.0.3
R2(config-router)#end
R2#
*Mar 1 02:12:51.447: %SYS-5-CONFIG_I: Configured from console by console
R2#ur
Building configuration...
[OK]
R2#

```

Figura 14: Configuración de EIGRP en R2

```

R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router eigrp 1
R3(config-router)#network 192.168.1.0
R3(config-router)#network 192.168.10.4 0.0.0.3
R3(config-router)#
*Mar 1 02:06:37.707: %DUAL-5-NBCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.10.5 (S
erial1/0) is up: new adjacency
R3(config-router)#

```

Figura 15: Configuración de EIGRP en R3

## 5.6. Configuración de la interfaz virtual en R2

```

R2(config-if)#interface lo0
R2(config-if)#ip address 10.1.1.1 255.255.255.252
R2(config-if)#no shut
R2(config-if)#no shutdown
R2(config-if)#end
R2#
Building configuration...

*Mar  1 01:24:12.911: %SYS-5-CONFIG_I: Configured from console by console[OK]
R2#

```

Figura 16: Configuración de EIGRP en R3

## 5.7. Verificar las operaciones de EIGRP

```

R1#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                Interface      Hold Uptime    SRTT   RTT  Q  Seq
  Address                Interface      (sec)          (ms)          Cnt Num
1   192.168.10.6           Se1/1         14 01:28:23    18     300  0  3
0   172.16.3.2             Se1/0         14 01:30:38    20     200  0  7
R1#

```

Figura 17: Vecinos de

```

x                                     R1
R1#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address                Interface      Hold Uptime    SRTT   RTT  Q  Seq
  Address                Interface      (sec)          (ms)          Cnt Num
1   192.168.10.6           Se1/1         14 01:28:23    18     300  0  3
0   172.16.3.2             Se1/0         14 01:30:38    20     200  0  7
R1#
R1#show ip protocols
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is in effect
  Automatic address summarization:
    192.168.10.0/24 for FastEthernet0/0, Serial1/0
      Summarizing with metric 2169856
    172.16.0.0/16 for Serial1/1
      Summarizing with metric 281600
  Maximum path: 4
  Routing for Networks:
    172.16.0.0
    192.168.10.4/30
  Routing Information Sources:
    Gateway         Distance      Last Update
    (this router)    90           01:39:03
--More--

```

Figura 18: Información sobre el protocolo de enrutamiento

## 5.8. Examinar las rutas EIGRP en las tablas de enrutamiento

```

R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
D       192.168.10.0/24 is a summary, 01:44:36, Null0
C       192.168.10.4/30 is directly connected, Serial1/1
D       172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D       172.16.0.0/16 is a summary, 01:47:39, Null0
C       172.16.1.0/24 is directly connected, FastEthernet0/0
D       172.16.2.0/24 [90/2195456] via 172.16.3.2, 01:45:07, Serial1/0
C       172.16.3.0/30 is directly connected, Serial1/0
D       192.168.1.0/24 [90/2195456] via 192.168.10.6, 01:42:53, Serial1/1
R1#

```

Figura 19: Rutas EIGRP

## 5.9. Visualice la tabla de enrutamiento en el router R3

```

x                                     R3                                     ↗
Serial1/2                            unassigned    YES unset  administratively down down
Serial1/3                            unassigned    YES unset  administratively down down

R3#}t
R3#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D       192.168.10.0/24 is a summary, 01:46:57, Null0
C       192.168.10.4/30 is directly connected, Serial1/0
C       192.168.10.8/30 is directly connected, Serial1/1
D       172.16.0.0/16 [90/2195456] via 192.168.10.5, 01:46:57, Serial1/0
C       192.168.1.0/24 is directly connected, FastEthernet0/0
R3#

```

Figura 20: Tabla de enrutamiento en R3

## 5.10. Configurar las métricas EIGRP

```

x                                     R1
R1#show interface serial0/0
^
% Invalid input detected at '^' marker.
R1#show interface serial1/0
Serial1/0 is up, line protocol is up
  Hardware is M4T
  Internet address is 172.16.3.1/30
  MTU 1500 bytes, BW 1544 Kbit/sec, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Restart-Delay is 0 secs
  Last input 00:00:02, output 00:00:01, 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: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
    Available Bandwidth 1158 kilobits/sec
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    2747 packets input, 181284 bytes, 0 no buffer
    Received 1267 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    3021 packets output, 190029 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
    3 carrier transitions      DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
R1#

```

Figura 21: Métricas de EIGRP

```

R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface Serial1/0
R1(config-if)#bandwidth 64
R1(config-if)#end
R1#wr
Building configuration...

*Mar  1 04:23:47.886: %SYS-5-CONFIG_I: Configured from console by console[OK]
R1#

```

Figura 22: Modificación del ancho de banda en R1

```

R2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface serial1/0
R2(config-if)#bandwidth 64
R2(config-if)#end
R2#wr
*Mar  1 04:14:12.478: %SYS-5-CONFIG_I: Configured from console by console
R2#wr
Building configuration...
[OK]
R2#

```

Figura 23: Modificación del ancho de banda en R2

```
*Mar  1 04:23:47.886: %SYS-5-CONFIG_I: Configured from console by console[OK]
R1#show interface serial1/0
Serial1/0 is up, line protocol is up
  Hardware is M4T
  Internet address is 172.16.3.1/30
  MTU 1500 bytes, BW 64 Kbit/sec, DLY 20000 usec,
```

Figura 24: Ancho de banda modificado

```

x                                     R2
[OK]
R2#show interface serial1/0
Serial1/0 is up, line protocol is up
  Hardware is M4T
  Internet address is 172.16.3.2/30
  MTU 1500 bytes, BW 64 Kbit/sec, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback 0
  Keepalive time 10 sec, 45 seconds between keepalives
```

Figura 25: Ancho de banda modificado

### 5.11. Examinar sucesores y distancias factibles

```
10.0.0.0/30 is subnetted, 1 subnets
C 10.1.1.0 is directly connected, Loopback1
172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D 172.16.0.0/16 is a summary, 00:00:52, Null0
D 172.16.1.0/24 [90/40514560] via 172.16.3.1, 00:00:52, Serial0/0/0
C 172.16.2.0/24 is directly connected, FastEthernet0/0
C 172.16.3.0/30 is directly connected, Serial0/0/0
D 192.168.1.0/24 [90/3014400] via 192.168.10.10, 00:00:11, Serial0/0/1
192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D 192.168.10.0/24 is a summary, 00:00:11, Null0
D 192.168.10.4/30 [90/3523840] via 192.168.10.10, 00:00:11, Serial0/0/1
C 192.168.10.8/30 is directly connected, Serial0/0/1
R2#
```

Figura 26: Tabla de enrutamiento de R2

1. ¿Cuál es la mejor ruta hacia PC1?

172.16.1.0/24 [90/40514560] via 172.16.3.1, 00:00:52, Serial1/0

Un sucesor es un router vecino que está siendo utilizado actualmente para el reenvío de paquetes.

Un sucesor es la ruta de menor costo hacia la red de destino. La dirección IP de un sucesor se muestra en una tabla de enrutamiento a continuación de la palabra "via"

2. ¿Cuál es la dirección IP y el nombre del router sucesor en esta ruta?

Es el router uno con dirección ip 172.16.3.1

Distancia factible (ED) es la métrica más baja calculada para llegar a ese destino. FD es la métrica enumerada en la entrada de la tabla de enrutamiento como el seguro número dentro del paréntesis.

3. ¿Cuál es la distancia factible hacia la red en la que se encuentra PC1?

40514560

### 5.12. Determinar si R1 es un sucesor factible para la ruta desde R2 hacia la red 192.168.1.0

Un sucesor factible es un vecino que tiene una ruta de respaldo viable hacia la misma red que el sucesor. Para ser un sucesor factible, R1 debe satisfacer la condición de factibilidad. La condición de factibilidad (FC) se cumple cuando la distancia notificada (RD) de un vecino hacia una red es menor que la distancia factible del router local hacia la misma red de destino.

```
172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D 172.16.0.0/16 is a summary, 00:42:59, Null0
C 172.16.1.0/24 is directly connected, FastEthernet0/0
D 172.16.2.0/24 [90/40514560] via 172.16.3.2, 00:43:00, Serial0/0/0
C 172.16.3.0/30 is directly connected, Serial0/0/0
D 192.168.1.0/24 [90/2172416] via 192.168.10.6, 00:42:26, Serial0/0/1
192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D 192.168.10.0/24 is a summary, 00:42:20, Null0
C 192.168.10.4/30 is directly connected, Serial0/0/1
D 192.168.10.8/30 [90/3523840] via 192.168.10.6, 00:42:20,
Serial0/0/1
R1#
```

Figura 27: Tabla de enrutamiento de R1

1. ¿Cuál es la distancia notificada hacia la red 192.168.1.0?  
2172416
2. ¿Cuál es la distancia factible hacia la red 192.168.1.0?  
3014400
3. ¿R2 consideraría que R1 es un sucesor factible para la red 192.168.1.0?  
Sí

### 5.13. Examinar la tabla de topologia EIGRP

```

x                                     R2
C    172.16.3.0/30 is directly connected, Serial1/0
    10.0.0.0/30 is subnetted, 1 subnets
C    10.1.1.0 is directly connected, Loopback0
D    192.168.1.0/24 [90/41049600] via 172.16.3.1, 00:44:04, Serial1/0
R2#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(10.1.1.1)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status

P 192.168.10.0/24, 1 successors, FD is 2169856
   via Summary (2169856/0), Null0
P 192.168.1.0/24, 1 successors, FD is 2707456
   via 172.16.3.1 (41049600/2195456), Serial1/0
P 192.168.10.8/30, 1 successors, FD is 2169856
   via Connected, Serial1/1
P 172.16.0.0/16, 1 successors, FD is 281600
   via Summary (281600/0), Null0
P 172.16.1.0/24, 1 successors, FD is 2195456
   via 172.16.3.1 (40537600/281600), Serial1/0
P 172.16.2.0/24, 1 successors, FD is 281600
   via Connected, FastEthernet0/0
P 172.16.3.0/30, 1 successors, FD is 40512000
   via Connected, Serial1/0
R2#

```

Figura 28: topologia de EIGRP

### 5.14. Visualice la información de topologia EIGRP detallada

```

R2#show ip eigrp topology 192.168.1.0
IP-EIGRP (AS 1): Topology entry for 192.168.1.0/24
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 2707456
  Routing Descriptor Blocks:
    172.16.3.1 (Serial1/0), from 172.16.3.1, Send flag is 0x0
      Composite metric is (41049600/2195456), Route is Internal
      Vector metric:
        Minimum bandwidth is 64 Kbit
        Total delay is 41000 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
R2#

```

Figura 29: Información de EIGRP

1. ¿Cuántos sucesores hay para esta red?  
1
2. ¿Cuál es la distancia factible hacia esta red?  
3014400
3. ¿Cuál es la dirección IP del sucesor factible?  
172.16.3.1
4. ¿Cuál es la distancia notificada para 192.168.1.0 desde el sucesor factible?  
2172416
5. ¿Cuál sería la distancia factible hacia 192.168.1.0 si R1 fuera el sucesor?  
41026560



### 5.15. Desactivar el resumen automática EIGRP

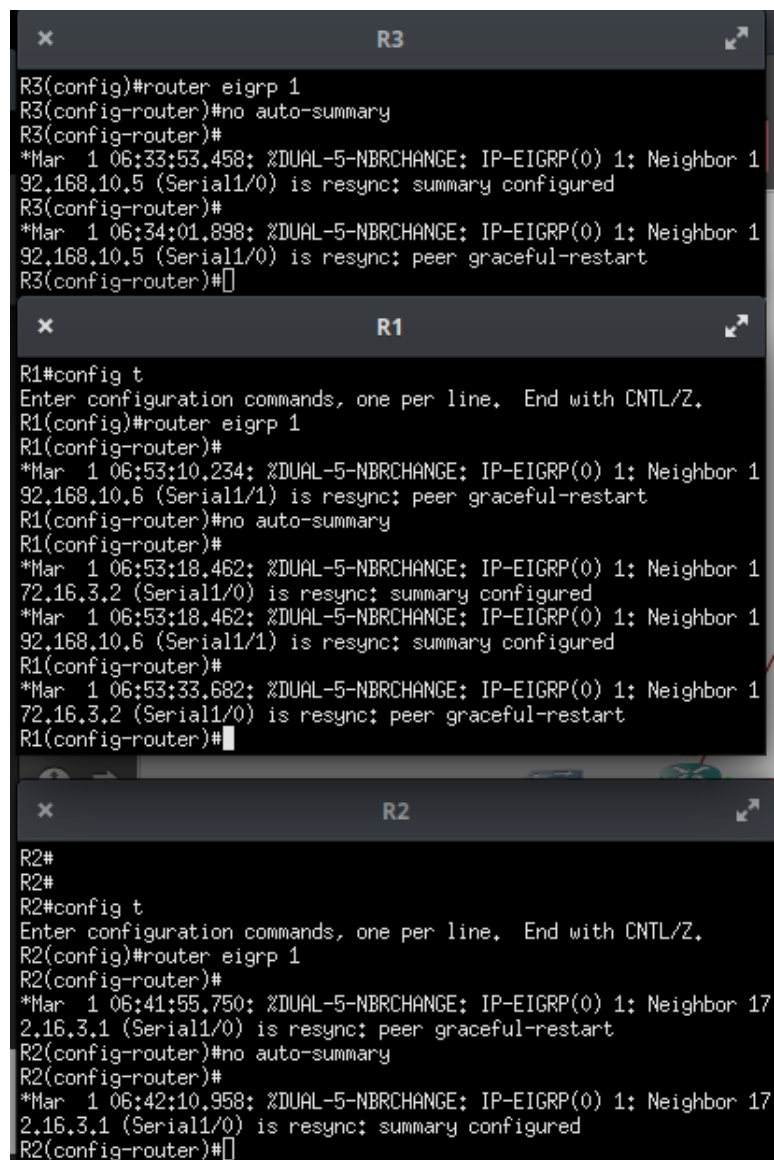
Observe que R3 no recibe rutas individuales para las subredes 172.16.1.0/24, 172.16.2.0/24 y 172.16.3.0/24. En cambio, la tabla de enrutamiento sólo tiene una ruta de resumen hacia la dirección de red con clase de 172.16.0.0/16 a través del router R1 en lugar de ser enviados directamente hacia el router R2.

Observe que la distancia notificada desde R2 es mayor que la distancia factible desde R1

```
R3#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(192.168.10.10)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status

P 192.168.10.0/24, 1 successors, FD is 2169856
   via Summary (2169856/0), Null0
P 192.168.10.4/30, 1 successors, FD is 2169856
   via Connected, Serial1/0
P 192.168.1.0/24, 1 successors, FD is 281600
   via Connected, FastEthernet0/0
P 172.16.0.0/16, 1 successors, FD is 2195456
   via 192.168.10.5 (2195456/281600), Serial1/0
R3#
```

Figura 30: Tabla de R2



The image displays three terminal windows, each representing a different router in a network. The windows are titled 'R3', 'R1', and 'R2'. Each window shows the configuration of EIGRP (Enhanced Interior Gateway Routing Protocol) on the respective router. The configuration includes enabling EIGRP, disabling automatic summarization, and establishing neighbor relationships with specific IP addresses and interface names. The logs show the routers resyncing their configurations and successfully configuring the neighbors.

```
R3
R3(config)#router eigrp 1
R3(config-router)#no auto-summary
R3(config-router)#
*Mar 1 06:33:53.458: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
92.168.10.5 (Serial1/0) is resync: summary configured
R3(config-router)#
*Mar 1 06:34:01.898: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
92.168.10.5 (Serial1/0) is resync: peer graceful-restart
R3(config-router)#

R1
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router eigrp 1
R1(config-router)#
*Mar 1 06:53:10.234: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
92.168.10.6 (Serial1/1) is resync: peer graceful-restart
R1(config-router)#no auto-summary
R1(config-router)#
*Mar 1 06:53:18.462: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
72.16.3.2 (Serial1/0) is resync: summary configured
*Mar 1 06:53:18.462: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
92.168.10.6 (Serial1/1) is resync: summary configured
R1(config-router)#
*Mar 1 06:53:33.682: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 1
72.16.3.2 (Serial1/0) is resync: peer graceful-restart
R1(config-router)#

R2
R2#
R2#
R2#config t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router eigrp 1
R2(config-router)#
*Mar 1 06:41:55.750: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 17
2.16.3.1 (Serial1/0) is resync: peer graceful-restart
R2(config-router)#no auto-summary
R2(config-router)#
*Mar 1 06:42:10.958: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 17
2.16.3.1 (Serial1/0) is resync: summary configured
R2(config-router)#
```

Figura 31: Desactivando el resumen automático de los 3 routers

```

R3(config-router)#end
R3#show
*Mar 1 06:40:53.334: %SYS-5-CONFIG_I: Configured from console by
console
R3#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter a
rea
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external typ
e 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, 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

      192.168.10.0/30 is subnetted, 2 subnets
C       192.168.10.4 is directly connected, Serial1/0
C       192.168.10.8 is directly connected, Serial1/1
      172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
D       172.16.1.0/24 [90/2195456] via 192.168.10.5, 00:06:55, Ser
ial1/0
D       172.16.2.0/24 [90/41049600] via 192.168.10.5, 00:06:55, Se
rial1/0
D       172.16.3.0/30 [90/41024000] via 192.168.10.5, 00:06:55, Se
rial1/0
C       192.168.1.0/24 is directly connected, FastEthernet0/0
R3#

```

Figura 32: Tabla de enrutamiento de R3

## 5.16. Configurar el resumen manual

```

R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface loopback1
R3(config-if)#
*Mar 1 06:47:14.254: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to
up
R3(config-if)#ip address 192.168.2.1 255.255.255.0
R3(config-if)#interface loopback2
R3(config-if)#ip add
*Mar 1 06:47:41.038: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to
up
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#end
R3#confi
*Mar 1 06:48:24.946: %SYS-5-CONFIG_I: Configured from console by console
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router eigrp 1
R3(config-router)#network 192.168.2.0
R3(config-router)#network 192.168.3.0
R3(config-router)#

```

Figura 33: Agregando direccion loopback al router R3

```

R3#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/30 is subnetted, 2 subnets
C      192.168.10.4 is directly connected, Serial1/0
C      192.168.10.8 is directly connected, Serial1/1
    172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
D      172.16.1.0/24 [90/2195456] via 192.168.10.5, 00:18:21, Serial1/0
D      172.16.2.0/24 [90/41049600] via 192.168.10.5, 00:18:21, Serial1/0
D      172.16.3.0/30 [90/41024000] via 192.168.10.5, 00:18:21, Serial1/0
C      192.168.1.0/24 is directly connected, FastEthernet0/0
C      192.168.2.0/24 is directly connected, Loopback1
C      192.168.3.0/24 is directly connected, Loopback2
R3#

```

Figura 34: Verificando las nuevas rutas

```

R3#
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface serial1/0
R3(config-if)#ip summary-address eigrp 1 192.168.0.0 255.255.252.0
R3(config-if)#
*Mar 1 06:55:44.734: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.10.5 (Serial1/0) is resy
nc: summary configured
R3(config-if)#interface serial1/1
R3(config-if)#ip summary-address eigrp 192.168.0.0 255.255.252.0
^
% Invalid input detected at '^' marker.

R3(config-if)#ip summary-address eigrp 1 192.168.0.0 255.255.252.0
R3(config-if)#

```

Figura 35: Resumen manual a las interfaces salientes

```

R3#
R3#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/30 is subnetted, 2 subnets
C      192.168.10.4 is directly connected, Serial1/0
C      192.168.10.8 is directly connected, Serial1/1
    172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
D      172.16.1.0/24 [90/2195456] via 192.168.10.5, 00:27:24, Serial1/0
D      172.16.2.0/24 [90/41049600] via 192.168.10.5, 00:27:24, Serial1/0
D      172.16.3.0/30 [90/41024000] via 192.168.10.5, 00:27:24, Serial1/0
C      192.168.1.0/24 is directly connected, FastEthernet0/0
C      192.168.2.0/24 is directly connected, Loopback1
C      192.168.3.0/24 is directly connected, Loopback2
D      192.168.0.0/22 is a summary, 00:05:42, Null0
R3#

```

Figura 36: Tabla de enrutamiento de R3

## 5.17. Configurar y distribuir una ruta estática por defecto

```
R2#config t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback1
```

Figura 37: Incluyendo la ruta estática en las actualizaciones EIGRP

## 5.18. Documentación

### 5.18.1. Router uno

```
Building configuration...
*Mar 1 07:36:15.846: %SYS-5-CONFIG_I: Configured from console by console[OK]
R1#show running-config
Building configuration...

Current configuration : 1458 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$V9qz$ZSe0qM0HzJIbYZVpFLu701
!
no aaa new-model
memory-size iomem 5
no ip icmp rate-limit unreachable
ip cef
!
!
!
no ip domain lookup
ip auth-proxy max-nodata-conns 3
ip admission max-nodata-conns 3
!
```

Figura 38: Show running-config R1

```

R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/30 is subnetted, 2 subnets
C       192.168.10.4 is directly connected, Serial1/1
D       192.168.10.8 [90/41024000] via 172.16.3.2, 00:44:03, Serial1/0
    172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.16.1.0/24 is directly connected, FastEthernet0/0
D       172.16.2.0/24 [90/40537600] via 172.16.3.2, 03:13:42, Serial1/0
C       172.16.3.0/30 is directly connected, Serial1/0
D       192.168.0.0/22 [90/2297856] via 192.168.10.6, 00:22:35, Serial1/1
R1#

```

Figura 39: Show ip route R1

```

R1#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	172.16.1.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial1/0	172.16.3.1	YES	manual	up	up
Serial1/1	192.168.10.5	YES	manual	up	up
Serial1/2	unassigned	YES	unset	administratively down	down
Serial1/3	unassigned	YES	unset	administratively down	down

```

R1#

```

Figura 40: Show ip interface brief R1

```

R1#show ip protocols
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    172.16.0.0
    192.168.10.4/30
  Routing Information Sources:
    Gateway         Distance      Last Update
    (this router)    90           03:14:37
    192.168.10.6     90           00:23:30
    172.16.3.2       90           00:23:30
  Distance: internal 90 external 170
R1#

```

Figura 41: show ip protocols R1

### 5.18.2. Router dos

```
R2#show running-config
Building configuration...

Current configuration : 1512 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R2
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$hGya$wTD9DcMiOPgvGNBw2e5Qf0
!
no aaa new-model
memory-size iomem 5
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
!
--More--
```

Figura 42: Show running-config R2

```
R2#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, 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

    192.168.10.0/30 is subnetted, 2 subnets
D       192.168.10.4 [90/41024000] via 172.16.3.1, 00:37:34, Serial1/0
C       192.168.10.8 is directly connected, Serial1/1
    172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
D       172.16.1.0/24 [90/40537600] via 172.16.3.1, 03:05:30, Serial1/0
C       172.16.2.0/24 is directly connected, FastEthernet0/0
C       172.16.3.0/30 is directly connected, Serial1/0
    10.0.0.0/30 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, Loopback0
D       192.168.0.0/22 [90/41152000] via 172.16.3.1, 00:15:52, Serial1/0
R2#
```

Figura 43: Show ip route R2

```

R2#show ip interface brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 172.16.2.1      YES manual up          up
FastEthernet0/1 unassigned      YES unset   administratively down down
Serial1/0        172.16.3.2      YES manual up          up
Serial1/1        192.168.10.9    YES manual up          up
Serial1/2        unassigned      YES unset   administratively down down
Serial1/3        unassigned      YES unset   administratively down down
Loopback0       10.1.1.1        YES manual up          up
R2#

```

Figura 44: Show ip interface brief R2

```

R2#show ip protocols
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    172.16.0.0
    192.168.10.8/30
  Routing Information Sources:
    Gateway         Distance      Last Update
    (this router)    90            00:38:13
    172.16.3.1       90            00:16:30
  Distance: internal 90 external 170
R2#

```

Figura 45: show ip protocols R2



### 5.18.3. Router tres

```

R3#
R3#show running-config
Building configuration...

Current configuration : 1715 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$bAoS$CRBCNVzvL0nB9cYYtaFgm1
!
no aaa new-model
memory-size iomem 5
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
--More--

```

Figura 46: Show running-config R3

```

R3#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, 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

192.168.10.0/30 is subnetted, 2 subnets
C      192.168.10.4 is directly connected, Serial1/0
C      192.168.10.8 is directly connected, Serial1/1
172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
D      172.16.1.0/24 [90/2195456] via 192.168.10.5, 00:39:31, Serial1/0
D      172.16.2.0/24 [90/41049600] via 192.168.10.5, 00:39:31, Serial1/0
D      172.16.3.0/30 [90/41024000] via 192.168.10.5, 00:39:31, Serial1/0
C      192.168.1.0/24 is directly connected, FastEthernet0/0
C      192.168.2.0/24 is directly connected, Loopback1
C      192.168.3.0/24 is directly connected, Loopback2
D      192.168.0.0/22 is a summary, 00:17:50, Null0
R3#

```

Figura 47: Show ip route R3

```

R3#show ip interface brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 192.168.1.1     YES manual up          up
FastEthernet0/1 unassigned      YES unset  administratively down down
Serial1/0       192.168.10.6    YES manual up          up
Serial1/1       192.168.10.10   YES manual up          up
Serial1/2       unassigned      YES unset  administratively down down
Serial1/3       unassigned      YES unset  administratively down down
Loopback1       192.168.2.1     YES manual up          up
Loopback2       192.168.3.1     YES manual up          up
R3#

```

Figura 48: Show ip interface brief R3

```

R3#show ip protocols
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Address Summarization:
    192.168.0.0/22 for Serial1/0, Serial1/1
    Summarizing with metric 128256
  Maximum path: 4
  Routing for Networks:
    192.168.1.0
    192.168.2.0
    192.168.3.0
    192.168.10.4/30
  Routing Information Sources:
    Gateway         Distance      Last Update
    (this router)    90            00:18:35
    192.168.10.5     90            00:18:37
  Distance: internal 90 external 170

```

Figura 49: Show ip protocols R3

## 6. Conclusiones.

1. El protocolo EIGRP nos auxilia a que la confiabilidad en la red sea más segura
2. El protocolo EIGRP soporta diferentes tecnologías.
3. EIGRP se sencillo de configurar.
4. EIGRP utiliza un ancho de banda reducido.
5. EIGRP utiliza la misma métrica que IGRP, pero con un tamaño de 32 bits, permitiendo crecer a la red y permitiendo mayor granularidad.
6. EIGRP permite el balanceo de carga entre enlaces de coste diferente.

## 7. Referencias

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