

4.1 Configuración por RIPv1

En este ejercicio se realizará una conexión mediante RIPv1 en la topología presentada

4.1.1. Configuración básica de enrutadores

R1

```
R1#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.f028 (bia a0ec.f9fb.f028)
  Internet address is 192.168.10.3/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:53, output 00:00:03, 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
    10 packets input, 3591 bytes, 0 no buffer
    Received 10 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 9 multicast, 0 pause input
    57 packets output, 6709 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
```

```
R1#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.f029 (bia a0ec.f9fb.f029)
  Internet address is 192.168.20.3/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 100Mbps, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:01, output 00:00:07, 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
    113 packets input, 58721 bytes, 0 no buffer
    Received 113 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 26 multicast, 0 pause input
    57 packets output, 6727 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    15 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out
```

R2

```
R2#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
    Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.eee8 (bia a0ec.f9fb.eee8)
    Internet address is 192.168.10.4/24
    MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
        reliability 255/255, txload 1/255, rxload 1/255
    Encapsulation ARPA, loopback not set
    Keepalive set (10 sec)
    Full Duplex, 1Gbps, media type is RJ45
    output flow-control is XON, input flow-control is XON
    ARP type: ARPA, ARP Timeout 04:00:00
    Last input 00:00:15, output 00:00:06, 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
        12 packets input, 4321 bytes, 0 no buffer
        Received 12 broadcasts (0 IP multicasts)
        0 runts, 0 giants, 0 throttles
        0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
        0 watchdog, 11 multicast, 0 pause input
        63 packets output, 7439 bytes, 0 underruns
        0 output errors, 0 collisions, 1 interface resets
        0 unknown protocol drops
        0 babbles, 0 late collision, 0 deferred
        1 lost carrier, 0 no carrier, 0 pause output
        0 output buffer failures, 0 output buffers swapped out
```

```
R2#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
    Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.eee9 (bia a0ec.f9fb.eee9)
    Internet address is 192.168.30.1/24
    MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
        reliability 255/255, txload 1/255, rxload 1/255
    Encapsulation ARPA, loopback not set
    Keepalive set (10 sec)
    Full Duplex, 1Gbps, media type is RJ45
    output flow-control is XON, input flow-control is XON
    ARP type: ARPA, ARP Timeout 04:00:00
    Last input 00:00:20, 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
        11 packets input, 3990 bytes, 0 no buffer
        Received 11 broadcasts (0 IP multicasts)
        0 runts, 0 giants, 0 throttles
        0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
        0 watchdog, 10 multicast, 0 pause input
        58 packets output, 6837 bytes, 0 underruns
        0 output errors, 0 collisions, 1 interface resets
        0 unknown protocol drops
        0 babbles, 0 late collision, 0 deferred
        1 lost carrier, 0 no carrier, 0 pause output
        0 output buffer failures, 0 output buffers swapped out
```

R2#

```
R2#show interface Loopback 2
Loopback2 is up, line protocol is up
    Hardware is Loopback
    Internet address is 172.16.1.3/16
    MTU 1514 bytes, BW 8000000 Kbit/sec, DLY 5000 usec,
        reliability 255/255, txload 1/255, rxload 1/255
    Encapsulation LOOPBACK, loopback not set
    Keepalive set (10 sec)
    Last input never, output never, output hang never
    Last clearing of "show interface" counters never
    Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
    Queueing strategy: fifo
    Output queue: 0/0 (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 IP multicasts)
        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, 0 interface resets
        0 unknown protocol drops
        0 output buffer failures, 0 output buffers swapped out
```

R2#

R3

```
R3#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is d46d.5094.cb70 (bia d46d.5094.cb70)
)
  Internet address is 192.168.20.4/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:25, output 00:00:08, 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
    5 packets input, 1636 bytes, 0 no buffer
    Received 5 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 4 multicast, 0 pause input
    19 packets output, 2466 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out
```

```
R3#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is d46d.5094.cb71 (bia d46d.5094.cb71)
  Internet address is 192.168.40.1/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 100Mbps, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:00, output 00:00:00, 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
    313 packets input, 99905 bytes, 0 no buffer
    Received 161 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
--More-- █
```

```
R3#show interface Loopback 3
Loopback3 is up, line protocol is up
  Hardware is Loopback
  Internet address is 172.17.1.3/16
  MTU 1514 bytes, BW 8000000 Kbit/sec, DLY 5000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation LOOPBACK, loopback not set
  Keepalive set (10 sec)
  Last input 00:40:37, output never, 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: 0/0 (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 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    24 packets output, 1236 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
no"
```

Pruebas de conectividad

Ping de R2 a R1

```
R2#ping 192.168.10.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Ping de R3 a R1

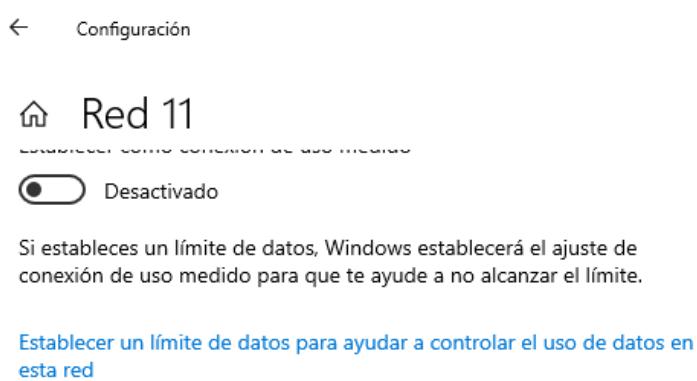
```
R3#ping 192.168.20.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Ping de R2 a R3

```
R2#ping 192.168.20.4
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

4.1.2. Configuración del protocolo de enrutamiento

Configuración IP PC1



Configuración de IP

Asignación de IP:	Manual
Dirección IPv4:	192.168.30.31
Longitud del prefijo de subred IPv4	24
Puerta de enlace de IPv4:	192.168.30.1
Servidores DNS IPv4:	0.0.0.0

[Editar](#)

Propiedades

Velocidad de vínculo (recepción/transmisión):	100/100 (Mbps)
Dirección IPv4:	192.168.30.31
Fabricante:	Intel
Descripción:	Intel(R) Ethernet Connection I217-LM

Configuración IP PC2

Red e Internet > Ethernet

El dispositivo no se puede detectar en la red. Úselo en la mayoría de los casos: cuando está conectado a una red en casa, en el trabajo o en un lugar público.

Red privada

El dispositivo es reconocible en la red. Seleccione esta opción si necesita compartir archivos o usar aplicaciones que se comunican a través de esta red. Deberías conocer y confiar en los usuarios y dispositivos de la red.

Establecer la configuración de firewall y seguridad

Configuración de autenticación

Editar

Conexión de uso medido

Es posible que algunas aplicaciones funcionen de forma diferente para reducir el uso de datos cuando estés conectado a esta red

Desactivado 

Establecer un límite de datos para ayudar a controlar el uso de datos en esta red

Asignación de IP:	Manual
Dirección IPv4:	192.168.40.31
Máscara IPv4:	255.255.255.0
Puerta de enlace de IPv4:	192.168.40.1

Asignación de servidor DNS: Manual
Servidores DNS IPv4: 0.0.0.0 (sin cifrar)

Velocidad de vínculo (recepción/transmisión):	100/100 (Mbps)
Dirección IPv6 local de vínculo:	fe80::ff39:5b62:ea00:54ae%44
Dirección IPv4:	192.168.40.31
Fabricante:	Realtek

Configuración RIP R1

Configuración RIP R2

```
R2>enable
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#network 192.168.10.4
R2(config-router)#network 192.168.30.1
R2(config-router)#network 172.16.3.1
R2(config-router)#version 1
R2(config-router)#{^Z
```

Configuración RIP R3

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#network 192.168.20.4
R3(config-router)#network 192.168.40.1
R3(config-router)#network 172.17.1.3
R3(config-router)#version 1
R3(config-router)#{^Z
R3#
*Mon 31-Aug-15 14:09:45.547: CONSOLE T: Configured from console by
```

Show IP route

R1

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      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, H - NHRP, l - LISP
      a - application route
      + - replicated route, % - next hop override

Gateway of last resort is not set

R    172.16.0.0/16 [120/1] via 192.168.10.4, 00:00:04, GigabitEthernet0/0
R    172.17.0.0/16 [120/1] via 192.168.20.4, 00:00:12, GigabitEthernet0/1
      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.10.0/24 is directly connected, GigabitEthernet0/0
L      192.168.10.3/32 is directly connected, GigabitEthernet0/0
      192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.20.0/24 is directly connected, GigabitEthernet0/1
L      192.168.20.3/32 is directly connected, GigabitEthernet0/1
R    192.168.30.0/24 [120/1] via 192.168.10.4, 00:00:04, GigabitEthernet0/0
R    192.168.40.0/24 [120/1] via 192.168.20.4, 00:00:12, GigabitEthernet0/1
R1#
```

R2

```
R2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      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, H - NHRP, l - LISP
      a - application route
      + - replicated route, % - next hop override

Gateway of last resort is not set

      172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.16.0.0/16 is directly connected, Loopback2
L        172.16.1.3/32 is directly connected, Loopback2
R    172.17.0.0/16 [120/2] via 192.168.10.3, 00:00:07, GigabitEthernet0/0
      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.10.0/24 is directly connected, GigabitEthernet0/0
L        192.168.10.4/32 is directly connected, GigabitEthernet0/0
R    192.168.20.0/24 [120/1] via 192.168.10.3, 00:00:07, GigabitEthernet0/0
      192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.30.0/24 is directly connected, GigabitEthernet0/1
L        192.168.30.1/32 is directly connected, GigabitEthernet0/1
R    192.168.40.0/24 [120/2] via 192.168.10.3, 00:00:07, GigabitEthernet0/0
```

R3

```
R3#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      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, H - NHRP, 1 - LIS
      a - application route
      + - replicated route, % - next hop override

Gateway of last resort is not set

R    172.16.0.0/16 [120/2] via 192.168.20.3, 00:00:11, GigabitEthernet0/0
      172.17.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.17.0.0/16 is directly connected, Loopback3
L        172.17.1.3/32 is directly connected, Loopback3
R    192.168.10.0/24 [120/1] via 192.168.20.3, 00:00:11, GigabitEthernet0/0
      192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.20.0/24 is directly connected, GigabitEthernet0/0
L        192.168.20.4/32 is directly connected, GigabitEthernet0/0
R    192.168.30.0/24 [120/2] via 192.168.20.3, 00:00:11, GigabitEthernet0/0
      192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.40.0/24 is directly connected, GigabitEthernet0/1
L        192.168.40.1/32 is directly connected, GigabitEthernet0/1
```

Show IP protocols

R1

```
R1#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
  Routing Information Sources:
    Gateway          Distance      Last Update
    Distance: (default is 4)

Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 14 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 1, receive version 1
    Interface          Send  Recv Triggered RIP  Key-chain
    GigabitEthernet0/0    1      1
    GigabitEthernet0/1    1      1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    192.168.10.0
    192.168.20.0
  Routing Information Sources:
    Gateway          Distance      Last Update
```

R2

```
R2#show ip protocol
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
    Routing Information Sources:
      Gateway          Distance      Last Update
      Distance: (default is 4)

Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 8 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 1, receive version 1
    Interface          Send   Recv Triggered RIP  Key-chain
    GigabitEthernet0/0    1       1
    GigabitEthernet0/1    1       1
    Loopback2            1       1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.16.0.0
    192.168.10.0
    192.168.30.0
  Routing Information Sources:
    Gateway          Distance      Last Update
    192.168.10.3        120      00:00:13
  Distance: (default is 120)
```

R3

```
R3#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
    Routing Information Sources:
      Gateway          Distance      Last Update
      Distance: (default is 4)

Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 24 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 1, receive version 1
    Interface          Send   Recv Triggered RIP  Key-chain
    GigabitEthernet0/0    1       1
    GigabitEthernet0/1    1       1
    Loopback3            1       1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.17.0.0
    192.168.20.0
    192.168.40.0
  Routing Information Sources:
    Gateway          Distance      Last Update
```

4.1.3. Simulación de topología RIPV1

Prueba de conectividad

PC 1 a R2

```
Microsoft Windows [Versión 10.0.19043.2130]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\n(segura>ping 192.168.30.1

Haciendo ping a 192.168.30.1 con 32 bytes de datos:
Respuesta desde 192.168.30.1: bytes=32 tiempo<1ms TTL=255
Respuesta desde 192.168.30.1: bytes=32 tiempo=1ms TTL=255
Respuesta desde 192.168.30.1: bytes=32 tiempo=1ms TTL=255
Respuesta desde 192.168.30.1: bytes=32 tiempo=1ms TTL=255

Estadísticas de ping para 192.168.30.1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 0ms, Máximo = 1ms, Media = 0ms
```

PC 2 a R3

```
Windows PowerShell
Copyright (C) Microsoft Corporation. Todos los derechos reservados.

Instale la versión más reciente de PowerShell para obtener nuevas caract
PS C:\Users\ElRey> ping 192.168.40.1

Haciendo ping a 192.168.40.1 con 32 bytes de datos:
Respuesta desde 192.168.40.1: bytes=32 tiempo=348ms TTL=255
Respuesta desde 192.168.40.1: bytes=32 tiempo=31ms TTL=255
Respuesta desde 192.168.40.1: bytes=32 tiempo=1ms TTL=255
Respuesta desde 192.168.40.1: bytes=32 tiempo=110ms TTL=255

Estadísticas de ping para 192.168.40.1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 1ms, Máximo = 348ms, Media = 122ms
PS C:\Users\ElRey> |
```

PC1 a PC2

```
C:\>ping 192.168.40.31

Pinging 192.168.40.31 with 32 bytes of data:

Request timed out.
Reply from 192.168.40.31: bytes=32 time<1ms TTL=125
Reply from 192.168.40.31: bytes=32 time<1ms TTL=125
Reply from 192.168.40.31: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.40.31:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC2 a PC1

```
C:\>ping 192.168.30.31

Pinging 192.168.30.31 with 32 bytes of data:

Reply from 192.168.30.31: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.30.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Wireshark filtrado RIP

*Ethernet 3

Archivo Edición Visualización Ir Captura Analizar Estadísticas Telefonía Wireless Herramientas Ayuda

Aplique un filtro de visualización ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
10	9.118654	Cisco_a1:c5:04	Spanning-tree-(for... STP	STP	60	Conf. Root = 32768/1/00:1b:d4:a1:c5:00 Cost = 0
11	9.531993	192.168.30.31	192.168.40.31	ICMP	74	Echo (ping) request id=0x0001, seq=6101/54551,
12	9.532123	192.168.40.31	192.168.30.31	ICMP	74	Echo (ping) reply id=0x0001, seq=6101/54551,
13	10.164418	192.168.40.1	255.255.255.255	RIPv1	146	Response
14	10.536966	192.168.30.31	192.168.40.31	ICMP	74	Echo (ping) request id=0x0001, seq=6102/54807,
15	10.547373	192.168.40.31	192.168.30.31	ICMP	74	Echo (ping) reply id=0x0001, seq=6102/54807,
16	11.014520	Cisco_a1:c5:04	Cisco_a1:c5:04	LOOP	60	Reply
17	11.124042	Cisco_a1:c5:04	Spanning-tree-(for... STP	STP	60	Conf. Root = 32768/1/00:1b:d4:a1:c5:00 Cost = 0
18	11.552646	192.168.30.31	192.168.40.31	ICMP	74	Echo (ping) request id=0x0001, seq=6103/55063,
19	11.552857	192.168.40.31	192.168.30.31	ICMP	74	Echo (ping) reply id=0x0001, seq=6103/55063,
20	12.568087	192.168.30.31	192.168.40.31	ICMP	74	Echo (ping) request id=0x0001, seq=6104/55319,
21	12.584214	192.168.40.31	192.168.30.31	ICMP	74	Echo (ping) reply id=0x0001, seq=6104/55319,
22	13.128813	Cisco_a1:c5:04	Spanning-tree-(for... STP	STP	60	Conf. Root = 32768/1/00:1b:d4:a1:c5:00 Cost = 0
23	14.274203	RealtekS_36:02:4d	Cisco_94:cb:71	ARP	42	Who has 192.168.40.1? Tell 192.168.40.31
24	14.974034	Cisco_94:cb:71	RealtekS_36:02:4d	ARP	60	192.168.40.1 is at d4:6d:50:94:cb:71

```
> Frame 13: 146 bytes on wire (1168 bits), 146 bytes captured (11168 bits)
> Ethernet II, Src: Cisco_94:cb:71 (d4:6d:50:94:cb:71), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 192.168.40.1, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 520, Dst Port: 520
> Routing Information Protocol
[Community ID: 1:4/rHJ7agxxPwvSRBKEVI3dcU/Qg=]
```

Hex	Text
0000	ff ff ff ff ff d4 6d 50 94 cb 71 08 00 45 c0
0010	00 84 00 00 00 00 02 11 cf 00 c0 a8 28 01 ff ff
0020	ff ff 02 08 02 08 00 70 3a 23 02 01 00 00 00 02
0030	00 00 ac 10 00 00 00 00 00 00 00 00 00 00 00 00
0040	00 03 00 02 00 00 ac 11 00 00 00 00 00 00 00 00
0050	00 00 00 00 00 01 00 02 00 00 c0 a8 0a 00 00 00
0060	00 00 00 00 00 00 01 00 02 00 00 c0 a8 0a 00 00 00
0070	14 00 00 00 00 00 00 00 00 00 00 00 02 00 00 c0 a8
0080	00 00 c0 a8 1e 00 00 00 00 00 00 00 00 00 00 00 00
0090	00 03

wireshark_Ethernet 3CYCV1.pcapng || Paquetes: 60 · Mostrado: 60 (100.0%) · Perdido: 0 (0.0%) || Perfil: Default

Capturando desde Ethernet 3

Archivo Edición Visualización Ir Captura Analizar Estadísticas Telefonía Wireless Herramientas Ayuda

rip

No.	Time	Source	Destination	Protocol	Length	Info
25	13.300479	192.168.40.1	255.255.255.255	RIPv1	146	Response
54	41.588725	192.168.40.1	255.255.255.255	RIPv1	146	Response

```
> Frame 54: 146 bytes on wire (1168 bits), 146 bytes captured (11168 bits)
> Ethernet II, Src: Cisco_94:cb:71 (d4:6d:50:94:cb:71), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 192.168.40.1, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 520, Dst Port: 520
> Routing Information Protocol
[Community ID: 1:4/rHJ7agxxPwvSRBKEVI3dcU/Qg=]
```

Hex	Text
0000	ff ff ff ff ff d4 6d 50 94 cb 71 08 00 45 c0
0010	00 84 00 00 00 00 02 11 cf 00 c0 a8 28 01 ff ff
0020	ff ff 02 08 02 08 00 70 3a 23 02 01 00 00 00 02
0030	00 00 ac 10 00 00 00 00 00 00 00 00 00 00 00 00
0040	00 03 00 02 00 00 ac 11 00 00 00 00 00 00 00 00
0050	00 00 00 00 00 01 00 02 00 00 c0 a8 0a 00 00 00
0060	00 00 00 00 00 00 00 00 00 00 00 00 02 00 00 c0 a8
0070	14 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0080	00 00 c0 a8 1e 00 00 00 00 00 00 00 00 00 00 00 00
0090	00 03

Ethernet 3: <live capture in progress> || Paquetes: 59 · Mostrado: 2 (3.4%) || Perfil: Default

Preguntas:

¿Por qué los enrutadores intercambian paquetes con información del protocolo?

Los routers intercambian información acerca de las redes a las cuales están conectadas para poder formar una tabla de enrutamiento con los otros enrutadores que tienen a su lado. Trabajan como si fuera un chisme, el R1 le cuenta al R2 a quiénes tiene a su lado, y el R2 le cuenta al R1 a qué otras redes está conectado. Intercambian estos paquetes para informar a sus vecinos y así poder establecer un enrutamiento correcto dentro de la misma red.

¿A qué se debe a que los computadores reciban tráfico RIP?

Los computadores reciben tráfico RIP debido a que los routers envían esta información a todos los dispositivos que se encuentran conectados a ellos (ya no saben qué tipo de máquinas tienen a su alrededor), pero como los computadores normales no los entienden, estos paquetes son sencillamente descartados. Por otro lado, si otro router configurado con RIP recibe este paquete, lo procesa, analiza y envía una respuesta al router original informando las redes de su parte.

4.2 Configuración enrutamiento por OSPF

En este ejercicio se realizará una conexión mediante OSPF en la topología presentada

Configuración de los Routers

R1

```
R1#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.f028 (bia a0ec.f9fb.f028)
  Internet address is 192.168.10.3/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:53, output 00:00:03, 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
    10 packets input, 3591 bytes, 0 no buffer
    Received 10 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 9 multicast, 0 pause input
    57 packets output, 6709 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
```

```
R1#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.f029 (bia a0ec.f9fb.f029)
  Internet address is 192.168.20.3/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 100Mbps, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:01, output 00:00:07, 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
      113 packets input, 58721 bytes, 0 no buffer
      Received 113 broadcasts (0 IP multicasts)
      0 runts, 0 giants, 0 throttles
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
      0 watchdog, 26 multicast, 0 pause input
      57 packets output, 6727 bytes, 0 underruns
      0 output errors, 0 collisions, 1 interface resets
      15 unknown protocol drops
      0 babbles, 0 late collision, 0 deferred
      0 lost carrier, 0 no carrier, 0 pause output
      0 output buffer failures, 0 output buffers swapped out
```

R2

```
R2#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.eee8 (bia a0ec.f9fb.eee8)
  Internet address is 192.168.10.4/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:15, output 00:00:06, 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
      12 packets input, 4321 bytes, 0 no buffer
      Received 12 broadcasts (0 IP multicasts)
      0 runts, 0 giants, 0 throttles
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
      0 watchdog, 11 multicast, 0 pause input
      63 packets output, 7439 bytes, 0 underruns
      0 output errors, 0 collisions, 1 interface resets
      0 unknown protocol drops
      0 babbles, 0 late collision, 0 deferred
      1 lost carrier, 0 no carrier, 0 pause output
      0 output buffer failures, 0 output buffers swapped out
```

```

R2#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is a0ec.f9fb.eee9 (bia a0ec.f9fb.eee9)
  Internet address is 192.168.30.1/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:20, 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
    11 packets input, 3990 bytes, 0 no buffer
    Received 11 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 10 multicast, 0 pause input
    58 packets output, 6837 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    1 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out
R2#

```

```

R2#show interface Loopback 2
Loopback2 is up, line protocol is up
  Hardware is Loopback
  Internet address is 172.16.1.3/16
  MTU 1514 bytes, BW 8000000 Kbit/sec, DLY 5000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation LOOPBACK, loopback not set
  Keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/0 (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 IP multicasts)
    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, 0 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
R2#

```

R3

```

R3#show interface G0/0
GigabitEthernet0/0 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is d46d.5094.cb70 (bia d46d.5094.cb70
)
  Internet address is 192.168.20.4/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1Gbps, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:25, output 00:00:08, 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
    5 packets input, 1636 bytes, 0 no buffer
    Received 5 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 4 multicast, 0 pause input
    19 packets output, 2466 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 pause output
    0 output buffer failures, 0 output buffers swapped out

```

```
R3#show interface G0/1
GigabitEthernet0/1 is up, line protocol is up
  Hardware is CN Gigabit Ethernet, address is d46d.5094.cb71 (bia d46d.5094.cb71)
  Internet address is 192.168.40.1/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 100Mbps, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:00, output 00:00:00, 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
    313 packets input, 99905 bytes, 0 no buffer
    Received 161 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
--More--
```

```
R3#show interface Loopback 3
Loopback3 is up, line protocol is up
  Hardware is Loopback
  Internet address is 172.17.1.3/16
  MTU 1514 bytes, BW 8000000 Kbit/sec, DLY 5000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation LOOPBACK, loopback not set
  Keepalive set (10 sec)
  Last input 00:40:37, output never, 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: 0/0 (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 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    24 packets output, 1236 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 unknown protocol drops
    0 output buffer failures, 0 output buffers swapped out
```

Revisión de comunicación entre routers

Ping de R2 a R1

```
R2#ping 192.168.10.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Ping de R3 a R1

```
R3#ping 192.168.20.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Ping de R2 a R3

```
R2#ping 192.168.20.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Configuración OSPF

R1

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 192.168.10.3 0.0.0.255 area 0
R1(config-router)#network 192.168.20.3 0.0.0.255 area 0
R1(config-router)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console

00:35:29: %OSPF-5-ADJCHG: Process 1, Nbr 172.16.1.3 on GigabitEthernet0/0 from LOADING to
FULL, Loading Done
show ip protocol

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.20.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.10.0 0.0.0.255 area 0
    192.168.20.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway          Distance      Last Update
    172.16.1.3        110          00:00:04
    192.168.20.3      110          00:08:26
  Distance: (default is 110)

R1#
```

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

Gateway of last resort is not set

      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.10.0/24 is directly connected, GigabitEthernet0/0
L        192.168.10.3/32 is directly connected, GigabitEthernet0/0
      192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.20.0/24 is directly connected, GigabitEthernet0/1
L        192.168.20.3/32 is directly connected, GigabitEthernet0/1
O        192.168.30.0/24 [110/2] via 192.168.10.4, 00:01:04, GigabitEthernet0/0

R1#
```

R2

```
R2>enable
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#network 192.168.10.4 0.0.0.255 area 0
R2(config-router)#network 192.168.30.1 0.0.0.255 area 0
R2(config-router)#network 172.17.1.3 0.0.255.255 area 0
R2(config-router)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.16.1.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.10.0 0.0.0.255 area 0
    192.168.30.0 0.0.0.255 area 0
    172.17.0.0 0.0.255.255 area 0
  Routing Information Sources:
    Gateway          Distance      Last Update
    172.16.1.3        110          00:01:04
  Distance: (default is 110)

R2#
```

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

Gateway of last resort is not set

      172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.16.0.0/16 is directly connected, Loopback2
L        172.16.1.3/32 is directly connected, Loopback2
      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.10.0/24 is directly connected, GigabitEthernet0/0
L        192.168.10.4/32 is directly connected, GigabitEthernet0/0
      192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.30.0/24 is directly connected, GigabitEthernet0/1
L        192.168.30.1/32 is directly connected, GigabitEthernet0/1

R2#
```

R3

```
R3>enable
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 192.168.20.4 0.0.0.255 area 0
R3(config-router)#network 192.168.20.4 0.0.0.255 area 0
00:38:12: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.20.3 on GigabitEthernet0/
R3(config-router)#network 192.168.40.1 0.0.0.255 area 0
R3(config-router)#network 172.17.1.3 0.0.255.255 area 0
R3(config-router)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
show ip protocol

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.17.1.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.20.0 0.0.0.255 area 0
    192.168.40.0 0.0.0.255 area 0
    172.17.0.0 0.0.255.255 area 0
  Routing Information Sources:
    Gateway          Distance      Last Update
    172.16.1.3        110          00:03:42
    172.17.1.3        110          00:00:10
    192.168.20.3      110          00:01:01
  Distance: (default is 110)
```

```

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

Gateway of last resort is not set

      172.17.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.17.1.0/24 is directly connected, Loopback3
L        172.17.1.3/32 is directly connected, Loopback3
O  192.168.10.0/24 [110/2] via 192.168.20.3, 00:01:33, GigabitEthernet0/0
    192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.20.0/24 is directly connected, GigabitEthernet0/0
L        192.168.20.4/32 is directly connected, GigabitEthernet0/0
O  192.168.30.0/24 [110/3] via 192.168.20.3, 00:01:33, GigabitEthernet0/0
    192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.40.0/24 is directly connected, GigabitEthernet0/1
L        192.168.40.1/32 is directly connected, GigabitEthernet0/1

R3#

```

Comprobación de conectividad entre computadores

PC1 a PC2

```

C:\>ping 192.168.40.31

Pinging 192.168.40.31 with 32 bytes of data:

Request timed out.
Reply from 192.168.40.31: bytes=32 time<lms TTL=125
Reply from 192.168.40.31: bytes=32 time<lms TTL=125
Reply from 192.168.40.31: bytes=32 time<lms TTL=125

Ping statistics for 192.168.40.31:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.40.31

Pinging 192.168.40.31 with 32 bytes of data:

Reply from 192.168.40.31: bytes=32 time<lms TTL=125
Reply from 192.168.40.31: bytes=32 time=lms TTL=125
Reply from 192.168.40.31: bytes=32 time<lms TTL=125
Reply from 192.168.40.31: bytes=32 time<lms TTL=125

Ping statistics for 192.168.40.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

```

PC2 a PC1

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.30.31

Pinging 192.168.30.31 with 32 bytes of data:

Reply from 192.168.30.31: bytes=32 time<lms TTL=125

Ping statistics for 192.168.30.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

4.2.3 Simulación de convergencia OSPF

Apagado de interfaces

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface G0/0
R1(config-if)#shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
interface G0/1
R1(config-if)#shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
00:47:07: %OSPF-5-ADJCHG: Process 1, Nbr 172.17.1.3 on GigabitEthernet0/1 from FULL to
DOWN, Neighbor Down: Interface down or detached
end
R1#
%SYS-5-CONFIG_I: Configured from console by console
clear ip route *
R1#
```

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface G0/0
R2(config-if)#shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to down
00:45:19: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.20.3 on GigabitEthernet0/0 from FULL to
DOWN, Neighbor Down: Interface down or detached
^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface G0/1
R2(config-if)#shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down

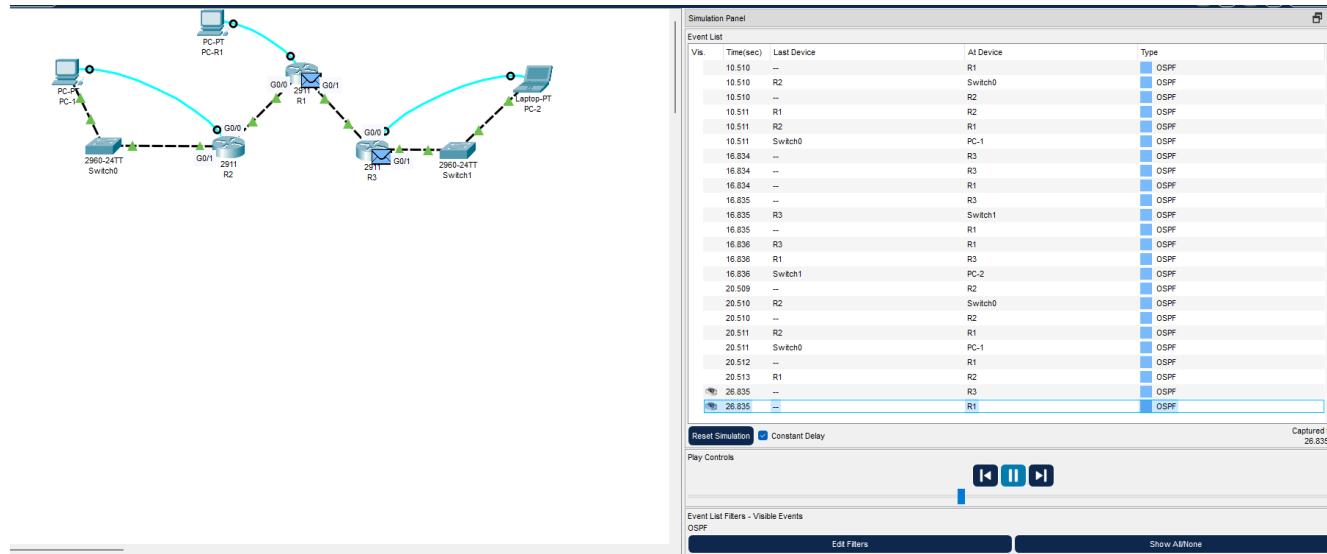
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
end
R2#
%SYS-5-CONFIG_I: Configured from console by console
clear ip route
% Incomplete command.
R2#clear ip route *
R2#
```

```
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface G0/0
R3(config-if)#shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
end
R3#
%SYS-5-CONFIG_I: Configured from console by console
clear ip route *}^
% Invalid input detected at '^' marker.

R3#clear ip route *
R3#
```

Muestra de la simulación



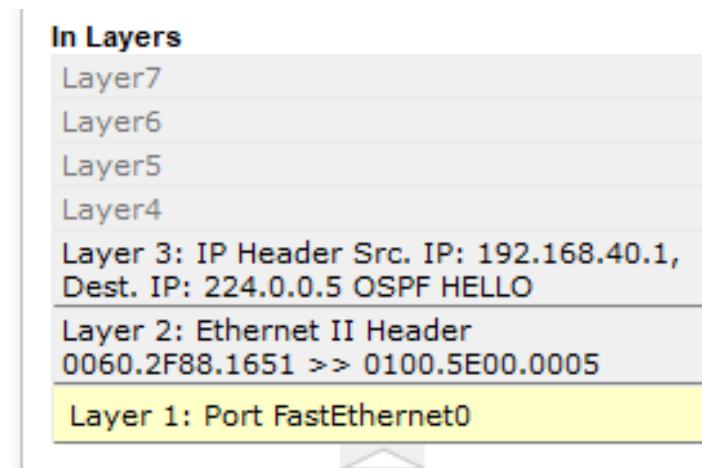
Preguntas 4.2

¿Qué información puede identificar en la simulación?

En la simulación se puede ver, al principio que los routers mandan paquetes OSPF, pero no llegan a ningún lado debido a que las interfaces están apagadas. Una vez encendidas, cada router se queda enviando estos paquetes a los dispositivos circundantes. Adicionalmente, se puede ver que solo los routers pueden entender los paquetes OSPF, cuando llegan a uno, aparece un check de recibido, pero cuando llegan a un computador, se puede ver que el paquete es rechazado.

¿Cómo son los paquetes OSPF?, realice una breve descripción del mismo

Los paquetes OSPF tienen una capa con la información de direcciones IP origen, IP destino y el mensaje que suele ser OSPF HELLO, luego tiene otras dos capas una con el nivel de red físico y otra el puerto de la interfaz a la que llega.



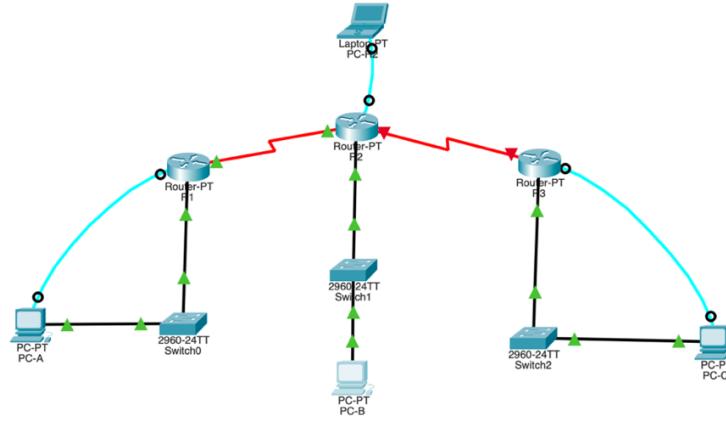
¿Cuál es el propósito del intercambio de información de enrutamiento?

El propósito del intercambio de paquetes OSPF es un descubrimiento interno de qué otros routers existen a mi alrededor y a los cuales puedo estar conectado, de esta manera cada router identifica cómo es la red interna y así pobla sus tablas de redirecciónamiento.

4.3 Configuración protocolo enrutamiento RIP versión 2

En este ejercicio se realizará una conexión mediante RIPv2 en la topología presentada

4.3.1 Creación de topología de red



4.3.2 Configuración básica de enrutadores y estaciones de trabajo

R1

```
R1#show interface F0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0060.476c.a057 (bia 0060.476c.a057)
  Internet address is 172.30.15.254/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 100Mb/s, media type is RJ45
  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 (size/max/drops); 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
    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

R1#show interface S2/0
Serial2/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 10.1.1.3/27
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 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)
    Available Bandwidth 96 kilobits/sec
  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, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

R2

```
0 output errors, 0 collisions, 2 interface resets
0 output buffer failures, 0 output buffers swapped out

R2#show interface F0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 00d0.973a.4423 (bia 00d0.973a.4423)
  Internet address is 209.165.101.254/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 100Mb/s, media type is RJ45
  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 (size/max/drops); 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
    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

R2#show interface S2/0
Serial2/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 10.1.1.4/27
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 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)
    Available Bandwidth 96 kilobits/sec
  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, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out

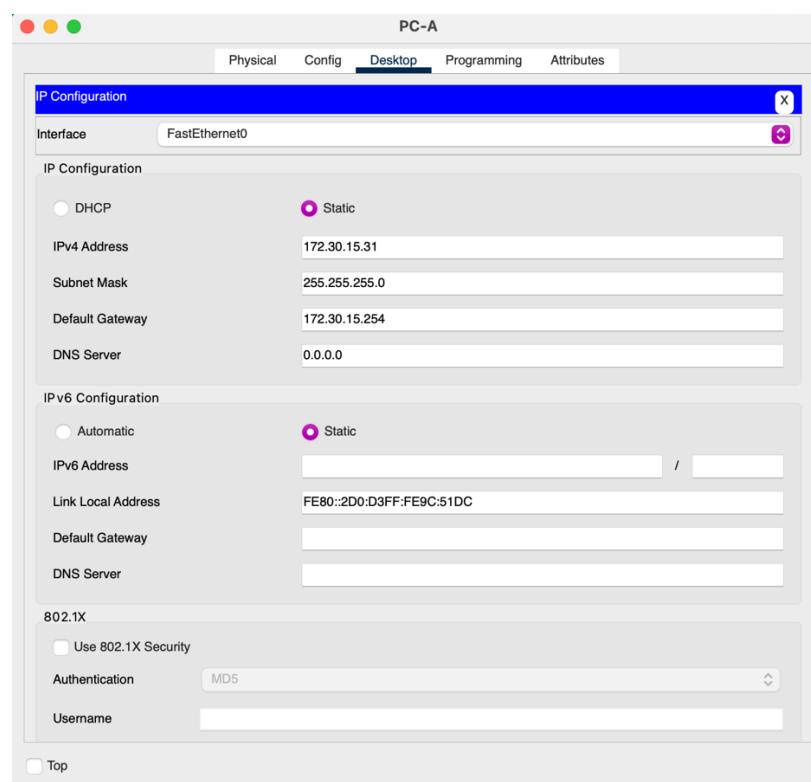
R2#show interface S3/0
Serial3/0 is administratively down, line protocol is down (disabled)
  Hardware is HD64570
  Internet address is 10.2.2.4/27
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set, keepalive set (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)
    Available Bandwidth 96 kilobits/sec
  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, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

R3

```
R3#show interface F0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 0003.e442.bd71 (bia 0003.e442.bd71)
  Internet address is 172.30.35.254/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 100Mb/s, media type is RJ45
  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 (size/max/drops); 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
    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

R3#show interface S3/0
Serial3/0 is down, line protocol is down (disabled)
  Hardware is HD64570
  Internet address is 10.2.2.3/27
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 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)
    Available Bandwidth 96 kilobits/sec
  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, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

PC A



PC B

PC-B

Physical Config Desktop **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP Static

IPv4 Address 209.165.101.31

Subnet Mask 255.255.255.0

Default Gateway 209.165.101.254

DNS Server 0.0.0.0

IPv6 Configuration

Automatic Static

IPv6 Address /

Link Local Address FE80::250:FFF:FE3D:3D3

Default Gateway

DNS Server

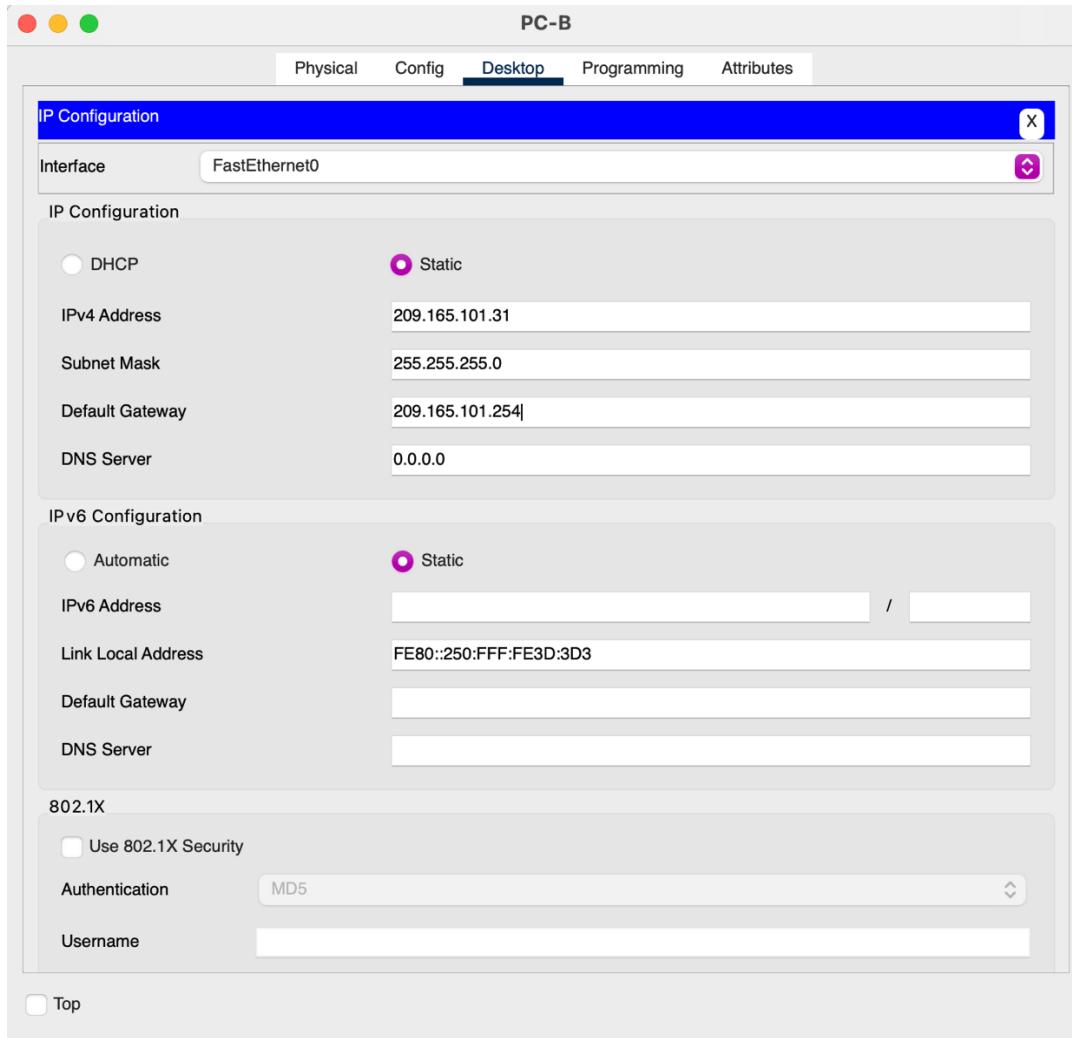
802.1X

Use 802.1X Security

Authentication MD5

Username

Top



This screenshot shows the desktop configuration interface for PC-B. The interface has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. A blue header bar indicates the window title 'PC-B'. Below the header, there's a section for 'IP Configuration' with an 'Interface' dropdown set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' radio button is selected. The IP address is set to '209.165.101.31', the subnet mask to '255.255.255.0', and the default gateway to '209.165.101.254'. There are also fields for DNS server and IPv6 configuration. The 'IPv6 Address' field contains a placeholder '/'. The 'Link Local Address' is set to 'FE80::250:FFF:FE3D:3D3'. The '802.1X' section includes options for security, authentication (set to 'MD5'), and a username field. A 'Top' checkbox is located at the bottom left.

PC C

PC-C

Physical Config Desktop **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP Static

IPv4 Address 172.30.35.31

Subnet Mask 255.255.255.0

Default Gateway 172.30.35.254

DNS Server 0.0.0.0

IPv6 Configuration

Automatic Static

IPv6 Address /

Link Local Address FE80::202:4AFF:FE1B:6D31

Default Gateway

DNS Server

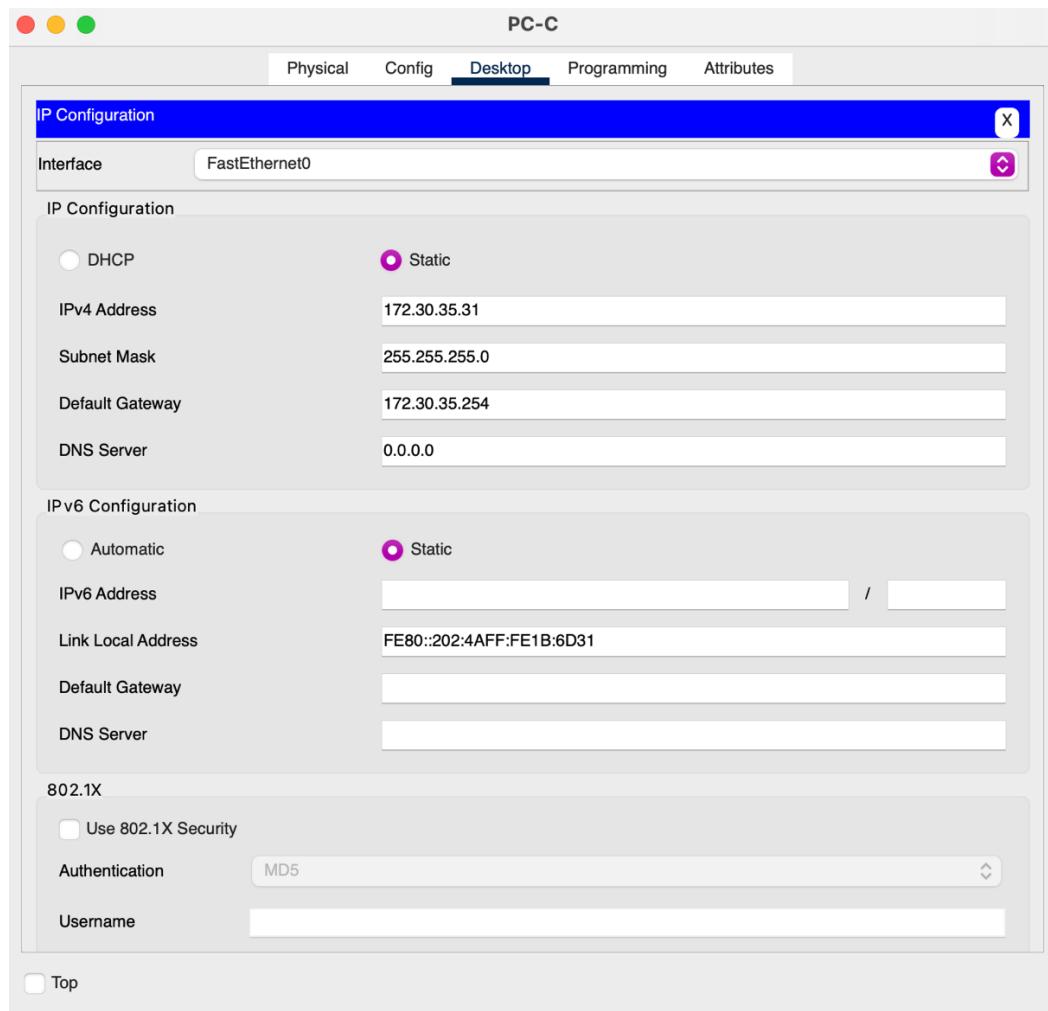
802.1X

Use 802.1X Security

Authentication MD5

Username

Top



This screenshot shows the desktop configuration interface for PC-C. The layout is identical to PC-B, with tabs for Physical, Config, Desktop (selected), Programming, and Attributes. The window title 'PC-C' is visible at the top. The 'IP Configuration' section shows 'FastEthernet0' as the interface. Under 'IP Configuration', the 'Static' radio button is selected. The IP address is '172.30.35.31', the subnet mask is '255.255.255.0', and the default gateway is '172.30.35.254'. The DNS server field is empty. The 'IPv6 Configuration' section includes a placeholder for the IPv6 address and a link local address 'FE80::202:4AFF:FE1B:6D31'. The '802.1X' section includes options for security, authentication (set to 'MD5'), and a username field. A 'Top' checkbox is located at the bottom left.

Pruebas de conectividad

PC A a R1

PC-A

Physical Config Desktop **Programm**

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.30.15.254

Pinging 172.30.15.254 with 32 bytes of data:

Reply from 172.30.15.254: bytes=32 time<1ms TTL=255

Ping statistics for 172.30.15.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

PC B a R2

PC-B

Physical Config Desktop **Programm**

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 209.165.101.254

Pinging 209.165.101.254 with 32 bytes of data:

Reply from 209.165.101.254: bytes=32 time=2ms TTL=255
Reply from 209.165.101.254: bytes=32 time<1ms TTL=255
Reply from 209.165.101.254: bytes=32 time<1ms TTL=255
Reply from 209.165.101.254: bytes=32 time<1ms TTL=255

Ping statistics for 209.165.101.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>
```

PC C a R3

PC-C

Physical Config Desktop **Programm**

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.30.35.254

Pinging 172.30.35.254 with 32 bytes of data:

Reply from 172.30.35.254: bytes=32 time<1ms TTL=255

Ping statistics for 172.30.35.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

R2 a R1

```
R2>ping 10.1.1.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/17/29 ms
```

R2 a R3

```
R2#ping 10.2.2.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.2.3, timeout is 2 seconds:
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/3/4 ms
```

4.3.3 Configuración del protocolo de enrutamiento RIPv2

R1

```
router rip
  version 2
  network 10.0.0.0
  network 172.30.0.0
!
```

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

Gateway of last resort is not set

  10.0.0.0/27 is subnetted, 2 subnets
C        10.1.1.0 is directly connected, Serial2/0
R        10.2.2.0 [120/1] via 10.1.1.4, 00:00:13, Serial2/0
      172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks
R          172.30.0.0/16 [120/2] via 10.1.1.4, 00:02:28, Serial2/0
C          172.30.15.0/24 is directly connected, FastEthernet0/0
R          209.165.101.0/24 [120/1] via 10.1.1.4, 00:00:13, Serial2/0
```

```
R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 17 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv   Triggered RIP  Key-chain
    FastEthernet0/0     22
    Serial2/0          22
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    172.30.0.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.1.1.4          120          00:00:19
  Distance: (default is 120)
```

R2

```
router rip
  version 2
  network 10.0.0.0
  network 209.165.101.0
!
```

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

Gateway of last resort is not set

      10.0.0.0/27 is subnetted, 2 subnets
C        10.1.1.0 is directly connected, Serial2/0
C        10.2.2.0 is directly connected, Serial3/0
R        172.30.0.0/16 [120/1] via 10.1.1.3, 00:00:18, Serial2/0
                  [120/1] via 10.2.2.3, 00:00:01, Serial3/0
C        209.165.101.0/24 is directly connected, FastEthernet0/0
```

```
R2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 26 seconds|
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv   Triggered RIP   Key-chain
    FastEthernet0/0      22
    Serial2/0            22
    Serial3/0            22
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    209.165.101.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.1.1.3           120          00:00:24
    10.2.2.3           120          00:00:09
  Distance: (default is 120)
```

R3

```
router rip
  version 2
  network 10.0.0.0
  network 172.30.0.0
!
```

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

Gateway of last resort is not set

      10.0.0.0/27 is subnetted, 2 subnets
R        10.1.1.0 [120/1] via 10.2.2.4, 00:00:17, Serial3/0
C        10.2.2.0 is directly connected, Serial3/0
      172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks
R          172.30.0.0/16 [120/2] via 10.2.2.4, 00:01:42, Serial3/0
C          172.30.35.0/24 is directly connected, FastEthernet0/0
R          209.165.101.0/24 [120/1] via 10.2.2.4, 00:00:17, Serial3/0
```

```

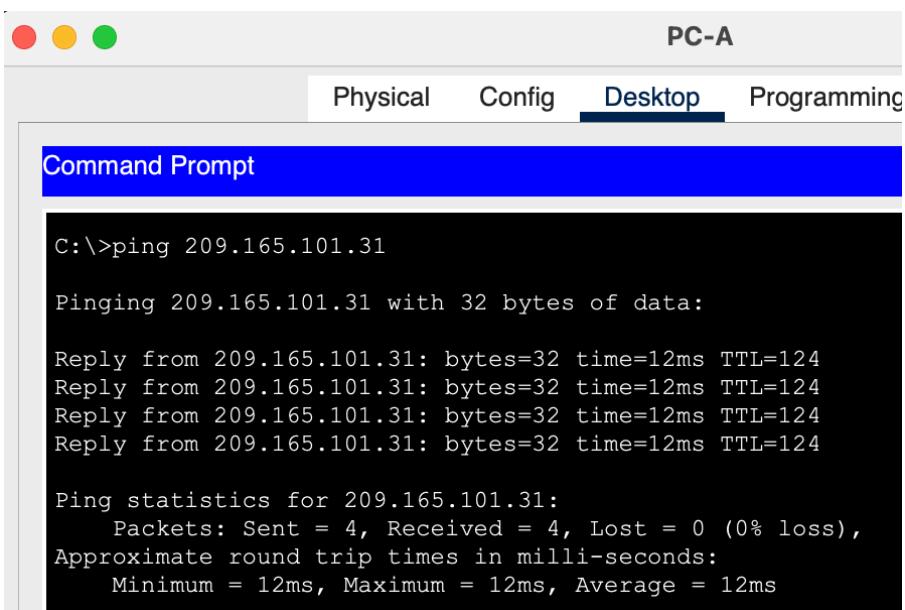
R3#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 12 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send Recv Triggered RIP Key-chain
      FastEthernet0/0     22
      Serial3/0          22
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    172.30.0.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
      10.2.2.4        120          00:00:07
  Distance: (default is 120)

```

Prueba de conectividad entre estaciones de trabajo

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic
Successful	PC-A	PC-B	IC...		0.000	N	
Successful	PC-C	PC-B	IC...		0.000	N	
Successful	PC-B	PC-A	IC...		0.000	N	
Successful	PC-B	PC-C	IC...		0.000	N	
Successful	PC-A	PC-C	IC...		0.000	N	
Successful	PC-C	PC-A	IC...		0.000	N	

PC A a PC B



PC-A

Physical Config Desktop Programming

Command Prompt

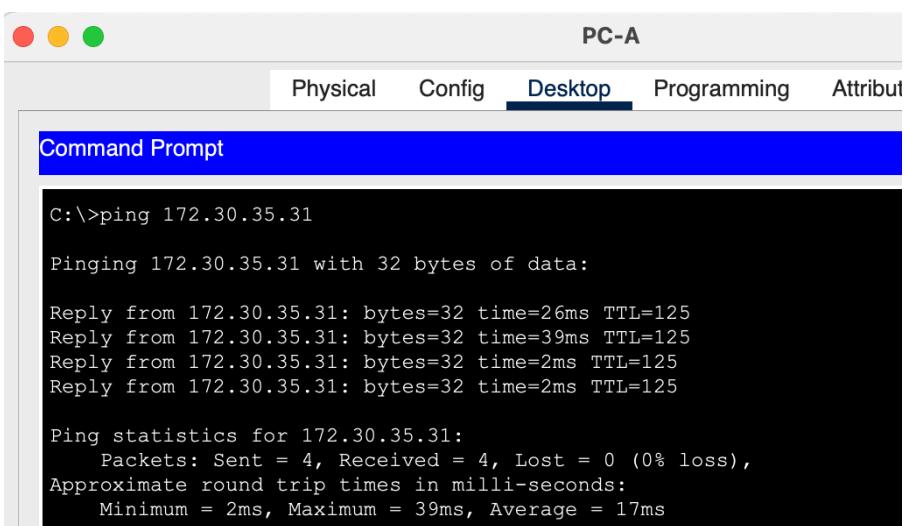
```
C:\>ping 209.165.101.31

Pinging 209.165.101.31 with 32 bytes of data:

Reply from 209.165.101.31: bytes=32 time=12ms TTL=124

Ping statistics for 209.165.101.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 12ms, Average = 12ms
```

PC A a PC C



PC-A

Physical Config Desktop Programming Attribut

Command Prompt

```
C:\>ping 172.30.35.31

Pinging 172.30.35.31 with 32 bytes of data:

Reply from 172.30.35.31: bytes=32 time=26ms TTL=125
Reply from 172.30.35.31: bytes=32 time=39ms TTL=125
Reply from 172.30.35.31: bytes=32 time=2ms TTL=125
Reply from 172.30.35.31: bytes=32 time=2ms TTL=125

Ping statistics for 172.30.35.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 39ms, Average = 17ms
```

PC B a PC A

The screenshot shows a window titled "PC-B" with a toolbar at the top featuring three colored circles (red, yellow, green) and a "Desktop" tab selected. Below the toolbar is a blue header bar with the text "Command Prompt". The main area contains the output of a ping command:

```
C:\>ping 172.30.15.31

Pinging 172.30.15.31 with 32 bytes of data:

Reply from 172.30.15.31: bytes=32 time=19ms TTL=126
Reply from 10.2.2.3: Destination host unreachable.
Reply from 172.30.15.31: bytes=32 time=17ms TTL=126
Reply from 10.2.2.3: Destination host unreachable.

Ping statistics for 172.30.15.31:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 19ms, Average = 19ms
```

PC B a PC C

The screenshot shows a window titled "PC-B" with a toolbar at the top featuring three colored circles (red, yellow, green) and a "Desktop" tab selected. Below the toolbar is a blue header bar with the text "Command Prompt". The main area contains the output of a ping command:

```
C:\>ping 172.30.35.31

Pinging 172.30.35.31 with 32 bytes of data:

Reply from 172.30.35.31: bytes=32 time=17ms TTL=126
Reply from 172.30.35.31: bytes=32 time=1ms TTL=126
Reply from 172.30.35.31: bytes=32 time=2ms TTL=126
Reply from 172.30.35.31: bytes=32 time=1ms TTL=126

Ping statistics for 172.30.35.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 17ms, Average = 5ms
```

PC C a PC A

The screenshot shows a window titled "PC-C" with a toolbar at the top featuring three colored circles (red, yellow, green) and a "Desktop" tab selected. Below the toolbar is a blue header bar with the text "Command Prompt". The main area contains the output of a ping command:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.30.15.31

Pinging 172.30.15.31 with 32 bytes of data:

Reply from 172.30.15.31: bytes=32 time=51ms TTL=125
Reply from 172.30.15.31: bytes=32 time=2ms TTL=125
Reply from 172.30.15.31: bytes=32 time=2ms TTL=125
Reply from 172.30.15.31: bytes=32 time=53ms TTL=125

Ping statistics for 172.30.15.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 53ms, Average = 27ms
```

PC C a PC B

The screenshot shows a terminal window titled "PC-C". The tabs at the top are "Physical", "Config", "Desktop" (which is selected), and "Programming". The title bar says "Command Prompt". The terminal output is as follows:

```
C:\>ping 209.165.101.31

Pinging 209.165.101.31 with 32 bytes of data:

Reply from 209.165.101.31: bytes=32 time=10ms TTL=126

Ping statistics for 209.165.101.31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 10ms, Average = 10ms
```

Pregunta

Al emitir el comando debug ip rip en el R2, ¿qué información se proporciona que confirma que RIPv2 está en ejecución?

R// Se proporcionan mensajes de testing que indican la versión de RIP utilizada durante la actualización.

```
R2#debug ip rip
RIP protocol debugging is on
R2#RIP: received v2 update from 10.2.2.3 on Serial3/0
    172.30.35.0/24 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via FastEthernet0/0 (209.165.101.254)
RIP: build update entries
    10.1.1.0/27 via 0.0.0.0, metric 1, tag 0
    10.2.2.0/27 via 0.0.0.0, metric 1, tag 0
    172.30.0.0/16 via 0.0.0.0, metric 16, tag 0
    172.30.35.0/24 via 0.0.0.0, metric 2, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial2/0 (10.1.1.4)
RIP: build update entries
    10.2.2.0/27 via 0.0.0.0, metric 1, tag 0
    172.30.35.0/24 via 0.0.0.0, metric 2, tag 0
    209.165.101.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial3/0 (10.2.2.4)
RIP: build update entries
    10.1.1.0/27 via 0.0.0.0, metric 1, tag 0
    209.165.101.0/24 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 10.2.2.3 on Serial3/0
    172.30.35.0/24 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via FastEthernet0/0 (209.165.101.254)
RIP: build update entries
    10.1.1.0/27 via 0.0.0.0, metric 1, tag 0
    10.2.2.0/27 via 0.0.0.0, metric 1, tag 0
    172.30.0.0/16 via 0.0.0.0, metric 16, tag 0
    172.30.35.0/24 via 0.0.0.0, metric 2, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial2/0 (10.1.1.4)
RIP: build update entries
    10.2.2.0/27 via 0.0.0.0, metric 1, tag 0
    172.30.35.0/24 via 0.0.0.0, metric 2, tag 0
    209.165.101.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial3/0 (10.2.2.4)
RIP: build update entries
```

4.3.4 Examinar la summarización automática de las rutas

R1

```
router rip
    version 2
    network 10.0.0.0
    network 172.130.0.0
    no auto-summary
!
```

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

Gateway of last resort is not set

      10.0.0.0/27 is subnetted, 2 subnets
C        10.1.1.0 is directly connected, Serial2/0
R        10.2.2.0 [120/1] via 10.1.1.4, 00:00:03, Serial2/0
      172.30.0.0/24 is subnetted, 2 subnets
C        172.30.15.0 is directly connected, FastEthernet0/0
R        172.30.35.0 [120/2] via 10.1.1.4, 00:00:03, Serial2/0
R        209.165.101.0/24 [120/1] via 10.1.1.4, 00:00:03, Serial2/0

R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 24 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv   Triggered RIP  Key-chain
    Serial2/0           22
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    172.130.0.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.1.1.4          120          00:00:03
  Distance: (default is 120)
!
```

R2

```
router rip
    version 2
    network 10.0.0.0
    network 209.165.101.0
    no auto-summary
!
```

```

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

Gateway of last resort is not set

  10.0.0.0/27 is subnetted, 2 subnets
C        10.1.1.0 is directly connected, Serial2/0
C        10.2.2.0 is directly connected, Serial3/0
  172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks
R          172.30.0.0/16 [120/1] via 10.1.1.3, 00:00:35, Serial2/0
                  [120/1] via 10.2.2.3, 00:00:35, Serial3/0
R          172.30.35.0/24 [120/1] via 10.2.2.3, 00:00:13, Serial3/0
C        209.165.101.0/24 is directly connected, FastEthernet0/0

R2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 12 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface           Send   Recv   Triggered   RIP   Key-chain
    FastEthernet0/0      22
    Serial2/0            22
    Serial3/0            22
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    209.165.101.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.1.1.3          120          00:00:35
    10.2.2.3          120          00:00:35
  Distance: (default is 120)

```

R3

```

router rip
  version 2
  network 10.0.0.0
  network 172.30.0.0
  no auto-summary
!
```

```

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

Gateway of last resort is not set

  10.0.0.0/27 is subnetted, 2 subnets
R        10.1.1.0 [120/1] via 10.2.2.4, 00:00:13, Serial3/0
C        10.2.2.0 is directly connected, Serial3/0
  172.30.0.0/24 is subnetted, 1 subnets
C        172.30.35.0 is directly connected, FastEthernet0/0
R        209.165.101.0/24 [120/1] via 10.2.2.4, 00:00:13, Serial3/0

R3#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 15 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface           Send   Recv   Triggered   RIP   Key-chain
    FastEthernet0/0      22
    Serial3/0            22
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    172.30.0.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.2.2.4          120          00:00:13
  Distance: (default is 120)

```

Preguntas

¿Qué rutas que se reciben del R3 se encuentran en las actualizaciones RIP?

R// Ahora se reciben todas las rutas específicas de las subredes desde el R3 en las actualizaciones RIP.

¿Se incluyen ahora las máscaras de las subredes en las actualizaciones de enrutamiento?

R// Sí, dado que al desactivar el auto-summary se llega específicamente a las subredes y no solo a la red. Antes, los mensajes se repartían entre los routers que tenían rutas similares por lo que los mensajes rebotaban y se perdían proporcionalmente a una equivalencia del número de bifurcaciones comunes. Mientras que ahora todos los mensajes a un destino, llegan exitosamente.

4.3.5 Creación de rutas por defecto

```
R2(config)#ip route 0.0.0.0 0.0.0.0 209.165.101.31  
R2(config)#router rip  
R2(config-router)#default-information originate
```

```
R1>show ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is 10.1.1.4 to network 0.0.0.0  
  
      10.0.0.0/27 is subnetted, 2 subnets  
C        10.1.1.0 is directly connected, Serial2/0  
R        10.2.2.0 [120/1] via 10.1.1.4, 00:00:11, Serial2/0  
          172.30.0.0/24 is subnetted, 2 subnets  
C          172.30.15.0 is directly connected, FastEthernet0/0  
R          172.30.35.0 [120/2] via 10.1.1.4, 00:00:11, Serial2/0  
R        209.165.101.0/24 [120/1] via 10.1.1.4, 00:00:11, Serial2/0  
R*        0.0.0.0/0 [120/1] via 10.1.1.4, 00:00:11, Serial2/0
```

```
R2#show ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is 209.165.101.31 to network 0.0.0.0  
  
      10.0.0.0/27 is subnetted, 2 subnets  
C        10.1.1.0 is directly connected, Serial2/0  
C        10.2.2.0 is directly connected, Serial3/0  
          172.30.0.0/24 is subnetted, 1 subnets  
R          172.30.35.0 [120/1] via 10.2.2.3, 00:00:12, Serial13/0  
C        209.165.101.0/24 is directly connected, FastEthernet0/0  
S*        0.0.0.0/0 [1/0] via 209.165.101.31
```

```
R3>show ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is 10.2.2.4 to network 0.0.0.0  
  
      10.0.0.0/27 is subnetted, 2 subnets  
R        10.1.1.0 [120/1] via 10.2.2.4, 00:00:06, Serial3/0  
C        10.2.2.0 is directly connected, Serial3/0  
          172.30.0.0/24 is subnetted, 1 subnets  
C          172.30.35.0 is directly connected, FastEthernet0/0  
R          209.165.101.0/24 [120/1] via 10.2.2.4, 00:00:06, Serial13/0  
R*        0.0.0.0/0 [120/1] via 10.2.2.4, 00:00:06, Serial3/0
```

¿Qué rutas que se reciben del enrutador R2 se encuentran en las actualizaciones RIP?

R// Se encuentra la ruta estática 0.0.0.0 que permite todas subredes posibles.

4.4 Configuración de RIPng (RIP con soporte IPv6)

En este ejercicio se realizará una conexión mediante RIPng, utilizando IPv6 en la topología presentada

4.4.1 Configuración básica de enrutadores

R1

```
R1#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:5CFF:FEB9:2ACD
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:ABCD:1435:A1::3, subnet is 2001:ABCD:1435:A1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:3
    FF02::1:FFB9:2ACD
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.

GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:2FFF:FE33:D375
  No Virtual link-local address(es):
  Global unicast address(es):
    2002:ABCD:1435:B1::3, subnet is 2002:ABCD:1435:B1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:3
    FF02::1:FF33:D375
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

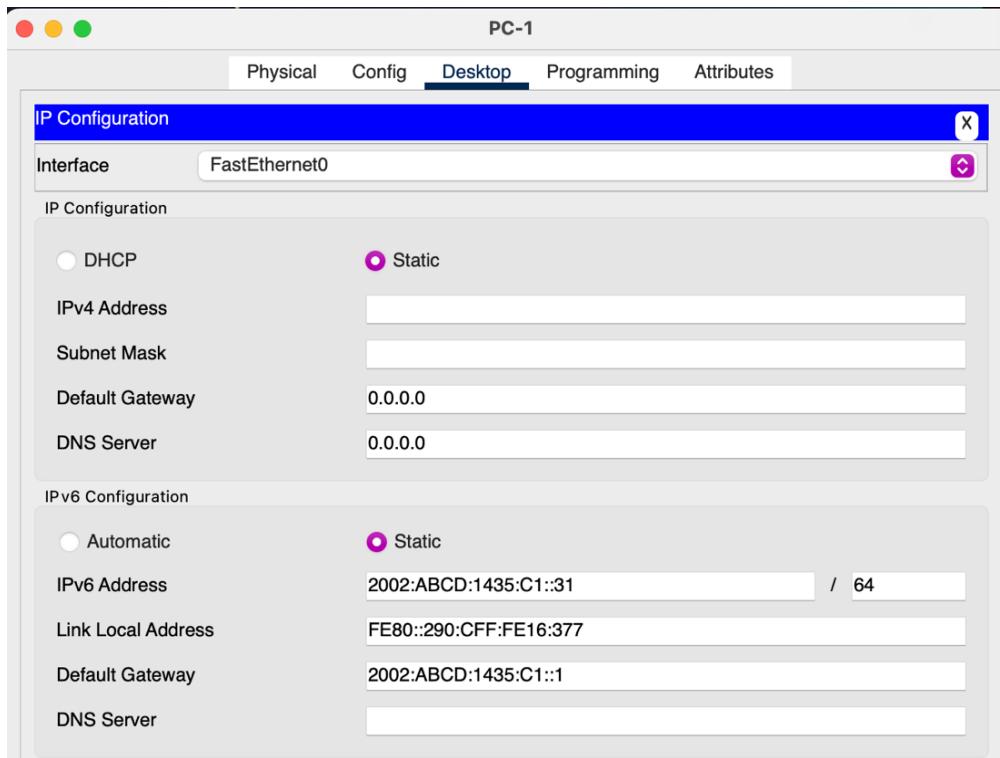
R2

```
R2#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::207:ECFF:FE55:901
    No Virtual link-local address(es):
      Global unicast address(es):
        2001:ABCD:1435:A1::4, subnet is 2001:ABCD:1435:A1::/64
      Joined group address(es):
        FF02::1
        FF02::2
        FF02::1:FF00:4
        FF02::1:FF55:901
      MTU is 1500 bytes
      ICMP error messages limited to one every 100 milliseconds
      ICMP redirects are enabled
      ICMP unreachables are sent
      ND DAD is enabled, number of DAD attempts: 1
      ND reachable time is 30000 milliseconds
      ND advertised reachable time is 0 (unspecified)
      ND advertised retransmit interval is 0 (unspecified)
      ND router advertisements are sent every 200 seconds
      ND router advertisements live for 1800 seconds
      ND advertised default router preference is Medium
      Hosts use stateless autoconfig for addresses.
GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::207:ECFF:FE55:902
    No Virtual link-local address(es):
      Global unicast address(es):
        2002:ABCD:1435:C1::1, subnet is 2002:ABCD:1435:C1::/64
      Joined group address(es):
        FF02::1
        FF02::2
        FF02::1:FF00:1
        FF02::1:FF55:902
      MTU is 1500 bytes
      ICMP error messages limited to one every 100 milliseconds
      ICMP redirects are enabled
      ICMP unreachables are sent
      ND DAD is enabled, number of DAD attempts: 1
      ND reachable time is 30000 milliseconds
      ND advertised reachable time is 0 (unspecified)
      ND advertised retransmit interval is 0 (unspecified)
      ND router advertisements are sent every 200 seconds
      ND router advertisements live for 1800 seconds
      ND advertised default router preference is Medium
      Hosts use stateless autoconfig for addresses.
```

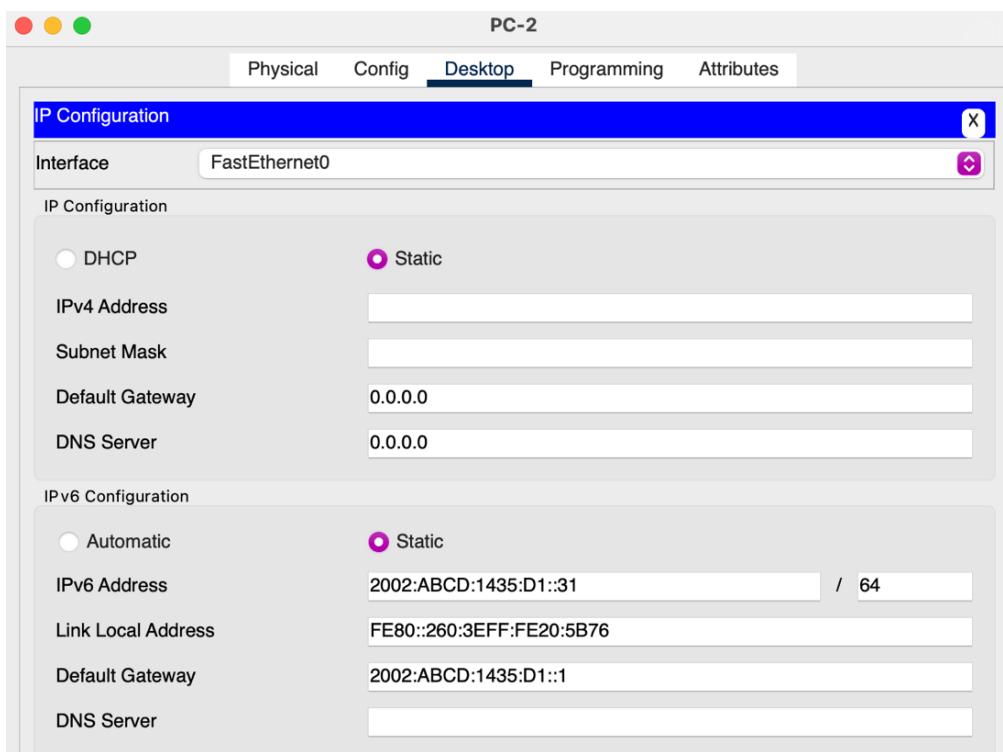
R3

```
R3#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::2E0:B0FF:FE91:D415
    No Virtual link-local address(es):
      Global unicast address(es):
        2002:ABCD:1435:B1::4, subnet is 2002:ABCD:1435:B1::/64
      Joined group address(es):
        FF02::1
        FF02::2
        FF02::1:FF00:4
        FF02::1:FF91:D415
      MTU is 1500 bytes
      ICMP error messages limited to one every 100 milliseconds
      ICMP redirects are enabled
      ICMP unreachables are sent
      ND DAD is enabled, number of DAD attempts: 1
      ND reachable time is 30000 milliseconds
      ND advertised reachable time is 0 (unspecified)
      ND advertised retransmit interval is 0 (unspecified)
      ND router advertisements are sent every 200 seconds
      ND router advertisements live for 1800 seconds
      ND advertised default router preference is Medium
      Hosts use stateless autoconfig for addresses.
GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::200:CFF:FE51:6B1
    No Virtual link-local address(es):
      Global unicast address(es):
        2002:ABCD:1435:D1::1, subnet is 2002:ABCD:1435:D1::/64
      Joined group address(es):
        FF02::1
        FF02::2
        FF02::1:FF00:1
        FF02::1:FF51:6B1
      MTU is 1500 bytes
      ICMP error messages limited to one every 100 milliseconds
      ICMP redirects are enabled
      ICMP unreachables are sent
      ND DAD is enabled, number of DAD attempts: 1
      ND reachable time is 30000 milliseconds
      ND advertised reachable time is 0 (unspecified)
      ND advertised retransmit interval is 0 (unspecified)
      ND router advertisements are sent every 200 seconds
      ND router advertisements live for 1800 seconds
      ND advertised default router preference is Medium
      Hosts use stateless autoconfig for addresses.
```

PC 1



PC 2



Pruebas de conectividad

PC1 a R2

```
C:\>ping 2002:ABCD:1435:C1::1

Pinging 2002:ABCD:1435:C1::1 with 32 bytes of data:

Reply from 2002:ABCD:1435:C1::1: bytes=32 time=1ms TTL=255
Reply from 2002:ABCD:1435:C1::1: bytes=32 time=1ms TTL=255
Reply from 2002:ABCD:1435:C1::1: bytes=32 time<1ms TTL=255
Reply from 2002:ABCD:1435:C1::1: bytes=32 time<1ms TTL=255

Ping statistics for 2002:ABCD:1435:C1::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC2 a R3

```
C:\>ping 2002:ABCD:1435:D1::1

Pinging 2002:ABCD:1435:D1::1 with 32 bytes of data:

Reply from 2002:ABCD:1435:D1::1: bytes=32 time<1ms TTL=255
Reply from 2002:ABCD:1435:D1::1: bytes=32 time=1ms TTL=255
Reply from 2002:ABCD:1435:D1::1: bytes=32 time<1ms TTL=255
Reply from 2002:ABCD:1435:D1::1: bytes=32 time<1ms TTL=255

Ping statistics for 2002:ABCD:1435:D1::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

R1 a R2

```
R1#ping 2001:ABCD:1435:A1::4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:ABCD:1435:A1::4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

R1 a R3

```
R1#ping 2002:ABCD:1435:B1::4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2002:ABCD:1435:B1::4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms
```

4.4.2 Configuración del protocolo del protocolo RIPng

R1 – Tabla de enrutamiento y configuración de protocolos

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ipv6 router rip infracom
R1(config-rtr)#interface g0/0
R1(config-if)#ipv6 rip infracom enable
R1(config-if)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
\
Translating "\...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ipv6 router rip infracom
R1(config-rtr)#interface g0/1
R1(config-if)#ipv6 rip infracom enable
R1(config-if)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
```

```

R1#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "rip infracom"
  Interfaces:
    GigabitEthernet0/0
    GigabitEthernet0/1
  Redistribution:
    None

R1#show ipv6 route
IPv6 Routing Table - 7 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
      U - Per-user Static route, M - MIPv6
      I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
      ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
      O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
      ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
      D - EIGRP, EX - EIGRP external
C  2001:ABCD:1435:A1::/64 [0/0]
  via GigabitEthernet0/0, directly connected
L  2001:ABCD:1435:A1::3/128 [0/0]
  via GigabitEthernet0/0, receive
C  2002:ABCD:1435:B1::/64 [0/0]
  via GigabitEthernet0/1, directly connected
L  2002:ABCD:1435:B1::3/128 [0/0]
  via GigabitEthernet0/1, receive
R  2002:ABCD:1435:C1::/64 [120/2]
  via FE80::207:ECFF:FE55:901, GigabitEthernet0/0
R  2002:ABCD:1435:D1::/64 [120/2]
  via FE80::2E0:B0FF:FE91:D415, GigabitEthernet0/1
L  FF00::/8 [0/0]
  via Null0, receive

```

R2 – Tabla de enrutamiento y configuración de protocolos

```

R2>enable
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ipv6 router rip infracom
R2(config-rtr)#interface g0/0
R2(config-if)#ipv6 rip infracom enable
R2(config-if)#interface g0/1
R2(config-if)#ipv6 rip infracom enable
R2(config-if)#
R2(config-if)#
R2(config-if)^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

```

```

R2#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "rip infracom"
  Interfaces:
    GigabitEthernet0/0
    GigabitEthernet0/1
  Redistribution:
    None

R2#show ipv6 route
IPv6 Routing Table - 7 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
      U - Per-user Static route, M - MIPv6
      I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
      ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
      O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
      ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
      D - EIGRP, EX - EIGRP external
C  2001:ABCD:1435:A1::/64 [0/0]
  via GigabitEthernet0/0, directly connected
L  2001:ABCD:1435:A1::4/128 [0/0]
  via GigabitEthernet0/0, receive
R  2002:ABCD:1435:B1::/64 [120/2]
  via FE80::260:5CFF:FE91:2ACD, GigabitEthernet0/0
C  2002:ABCD:1435:C1::/64 [0/0]
  via GigabitEthernet0/1, directly connected
L  2002:ABCD:1435:C1::1/128 [0/0]
  via GigabitEthernet0/1, receive
R  2002:ABCD:1435:D1::/64 [120/3]
  via FE80::260:5CFF:FE91:2ACD, GigabitEthernet0/0
L  FF00::/8 [0/0]
  via Null0, receive

```

R3 – Tabla de enrutamiento y configuración de protocolos

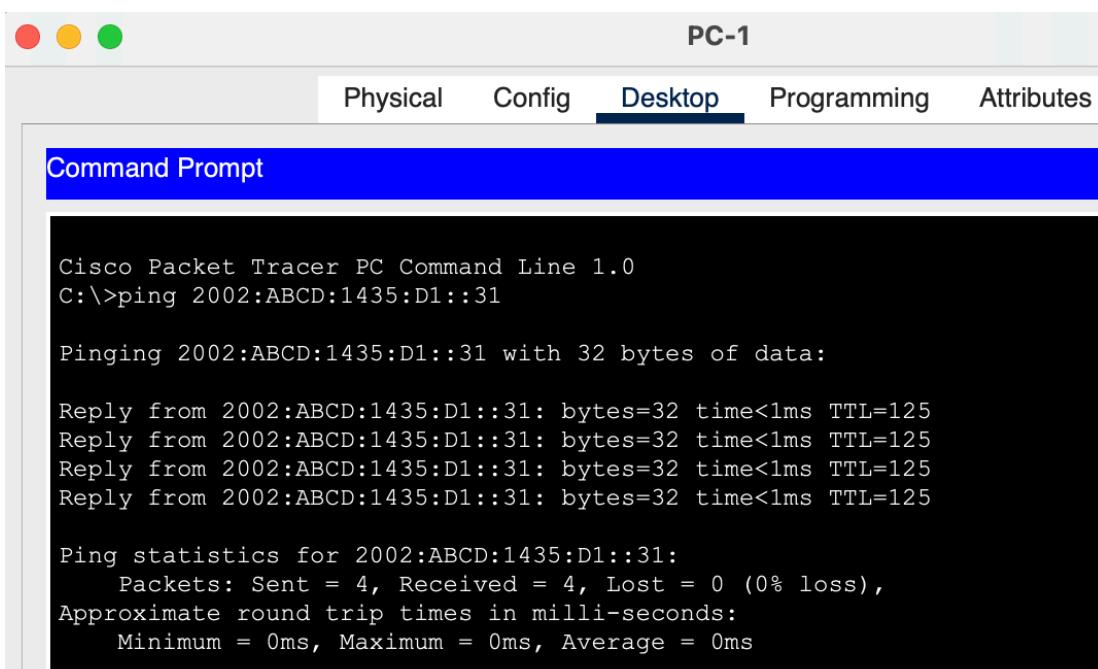
```
R3>enable
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ipv6 router rip infracom
R3(config-rtr)#
R3(config-rtr)#
R3(config-rtr)#
R3(config-rtr)#interface g0/0
R3(config-if)#ipv6 rip infracom enable
R3(config-if)#interface g0/1
R3(config-if)#ipv6 rip infracom enable
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
```

```
R3#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "rip infracom"
  Interfaces:
    GigabitEthernet0/0
    GigabitEthernet0/1
  Redistribution:
    None

R3#show ipv6 route
IPv6 Routing Table - 7 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
      U - Per-user Static route, M - MIPv6
      I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
      ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
      O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
      ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
      D - EIGRP, EX - EIGRP external
R   2001:ABCD:1435:A1::/64 [120/2]
      via FE80::260:2FFF:FE33:D375, GigabitEthernet0/0
C   2002:ABCD:1435:B1::/64 [0/0]
      via GigabitEthernet0/0, directly connected
L   2002:ABCD:1435:B1::4/128 [0/0]
      via GigabitEthernet0/0, receive
R   2002:ABCD:1435:C1::/64 [120/3]
      via FE80::260:2FFF:FE33:D375, GigabitEthernet0/0
C   2002:ABCD:1435:D1::/64 [0/0]
      via GigabitEthernet0/1, directly connected
L   2002:ABCD:1435:D1::1/128 [0/0]
      via GigabitEthernet0/1, receive
L   FF00::/8 [0/0]
      via Null0, receive
```

Prueba de conectividad

PC 1 a PC 2



PC 2 a PC 1

The screenshot shows the Cisco Packet Tracer interface with the title bar "PC-2". The "Desktop" tab is selected. A blue header bar says "Command Prompt". The main window displays the output of a ping command:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2002:ABCD:1435:C1::31

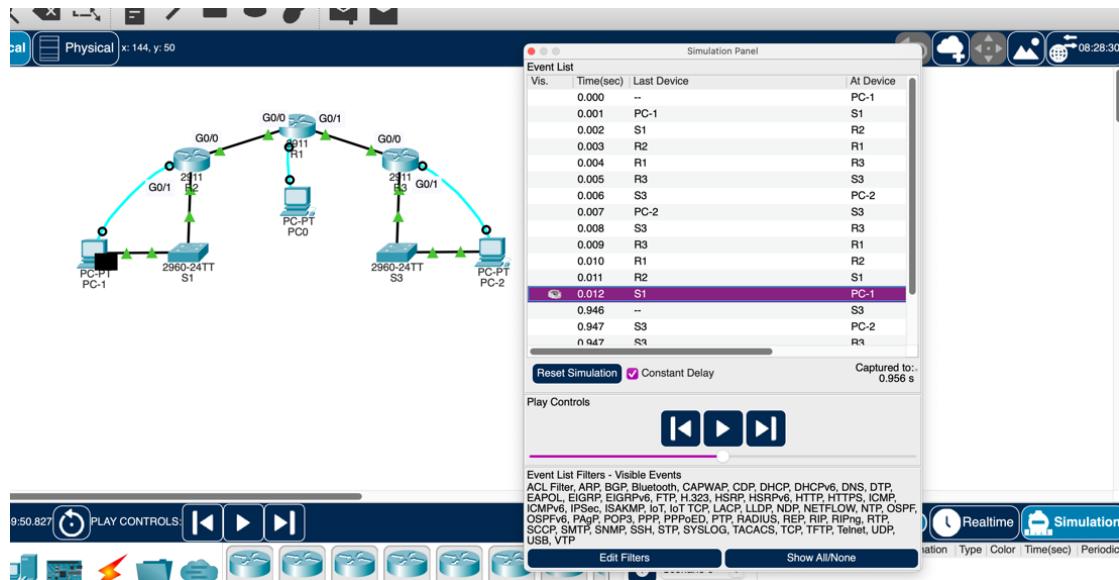
Pinging 2002:ABCD:1435:C1::31 with 32 bytes of data:

Reply from 2002:ABCD:1435:C1::31: bytes=32 time<1ms TTL=125

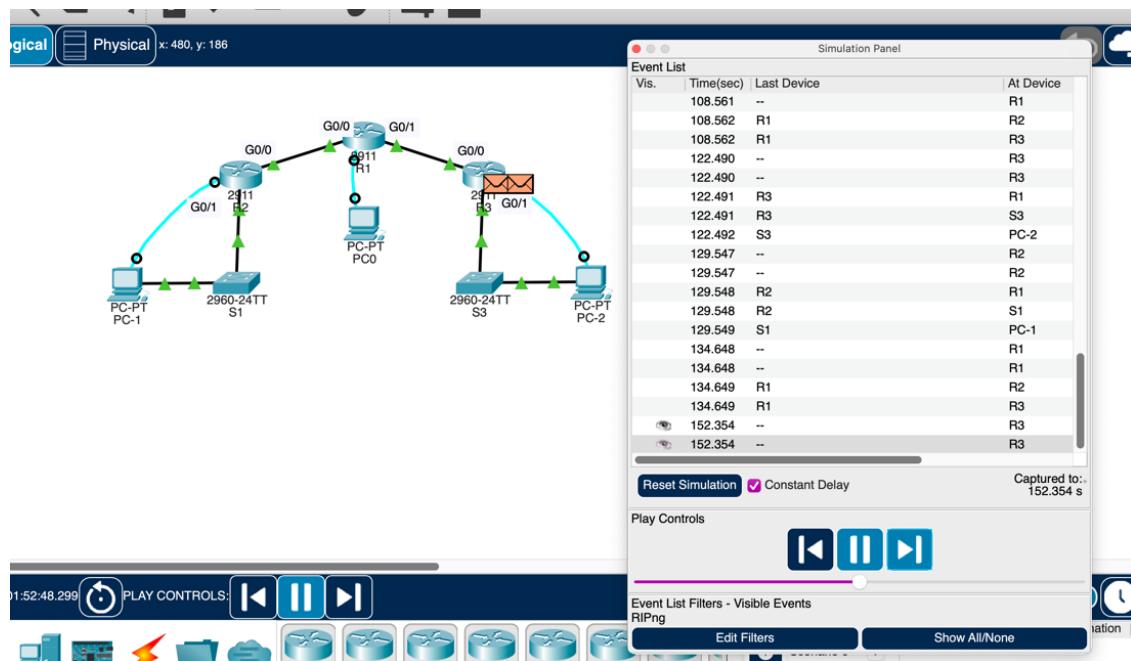
Ping statistics for 2002:ABCD:1435:C1::31:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

4.4.3 Verificación de tráfico del protocolo de enrutamiento

Prueba de conectividad – Simulation mode



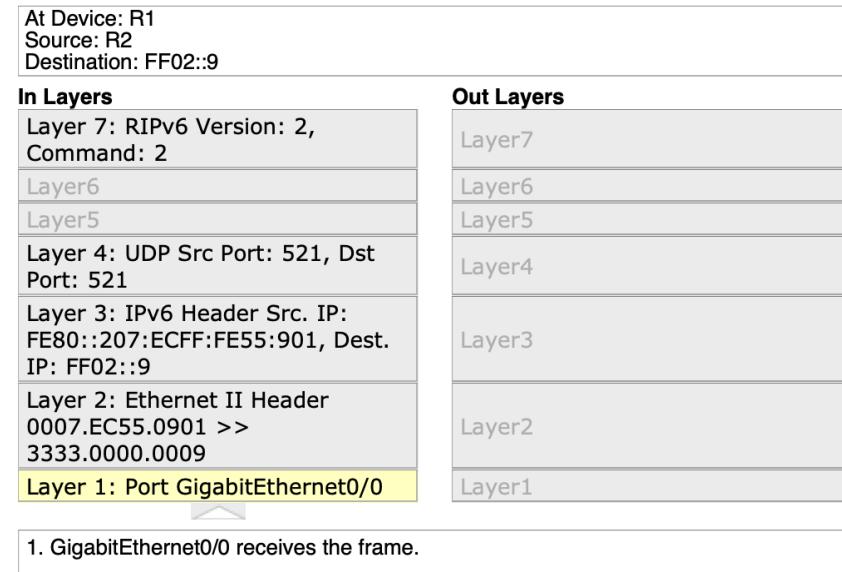
Prueba de conectividad – Simulation mode filtrado RIPng



Pregunta

¿Qué variación encuentra en los mensajes intercambiados con los capturados anteriormente para RIPv1 y RIPv2?

R// Se incluye el cambio de la versión en la capa 7, tal como se indica en la siguiente imagen:



4.5 Configuración de OSPFv3 (OSPF soporte IPv6)

En este ejercicio se realizará una conexión mediante OSPF, pero utilizando el protocolo de IPv6 en la topología presentada

4.5.1. Configuración básica de enrutadores

Activado nuevamente R1

Activado nuevamente R2

```
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface G0/0
R2(config-if)#no shutdown
R2(config-if)#
*Nov  3 15:36:00.459: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to downinterface G0/1
R2(config-if)#no shutdown
*Nov  3 15:36:04.815: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Nov  3 15:36:05.815: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R2(config-if)#
*Nov  3 15:36:08.955: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to down
R2(config-if)#
R2(config-if)#
*Nov  3 15:36:12.815: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Nov  3 15:36:13.815: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*Nov  3 15:36:46.815: %OSPFv3-5-ADJCHG: Process 1, Nbr 1.1.1.1 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
R2(config-if)#[
```

Activado nuevamente R3

```
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface G0/0
R3(config-if)#no shutdown
R3(config-if)#interface G0/1
R3(config-if)#no shutdown
R3(config-if)#
*Nov  3 15:48:17.959: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to down
*Nov  3 15:48:20.951: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to down
*Nov  3 15:48:22.271: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Nov  3 15:48:23.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*Nov  3 15:48:25.271: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Nov  3 15:48:26.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*Nov  3 15:49:04.271: %OSPFv3-5-ADJCHG: Process 1, Nbr 1.1.1.1 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
R3(config-if)#{^Z
R3#
*Nov  3 15:52:01.035: %SYS-5-CONFIG_I: Configured from console by console
R3#[
```

Apagado y clear route R1

```
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface G0/0
R1(config-if)#shutdown
R1(config-if)#
*Nov  3 15:43:12.759: %OSPFv3-5-ADJCHG: Process 1, Nbr 2.2.2.2 on GigabitEthernet0/0 from FULL to DOWN, Neighbor Down: Interface down or detached
*Nov  3 15:43:14.759: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Nov  3 15:43:15.759: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to down
R1(config-if)#
R1(config-if)#interface G0/1
R1(config-if)#shutdown
R1(config-if)#
*Nov  3 15:43:41.215: %OSPFv3-5-ADJCHG: Process 1, Nbr 3.3.3.3 on GigabitEthernet0/1 from FULL to DOWN, Neighbor Down: Interface down or detached
*Nov  3 15:43:43.215: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Nov  3 15:43:44.215: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
R1(config-if)#
R1(config-if)#
R1(config-if)#
R1(config-if)#{^Z
R1#clear
*Nov  3 15:45:51.671: %SYS-5-CONFIG_I: Configured from console by consoleip route
%
% Incomplete command.

R1#
R1#
R1#
R1#
R1#clear ip route *
```

Apagado y clear route R2

```
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface G0/0
R2(config-if)#shutdown
R2(config-if)#
*Nov  3 15:29:58.051: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
R2(config-if)#
R2(config-if)#
R2(config-if)#interface G0/1
R2(config-if)#shutdown
R2(config-if)#
*Nov  3 15:30:09.635: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Nov  3 15:30:10.635: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
R2(config-if)#
R2(config-if)#{^Z
R2#clear i
*Nov  3 15:32:02.403: %SYS-5-CONFIG_I: Configured from console by console
% Type "clear ?" for a list of subcommands
R2#
R2#
R2#
R2#clear ip route *
```

Apagado y clear route R3

```
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface G0/0
R3(config-if)#shutdown
R3(config-if)#
R3(config-if)#
*Nov  3 15:42:43.735: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
R3(config-if)#
R3(config-if)#
R3(config-if)#
*Nov  3 15:42:58.195: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Nov  3 15:42:59.195: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
R3(config-if)#
R3(config-if)#
R3(config-if)#end
R3#
*Nov  3 15:43:07.195: %SYS-5-CONFIG_I: Configured from console by console
R3#
R3#
R3#clear ip route *
```

Configuración IP R1

```
R1#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::A2EC:F9FF:FEFB:EEE8
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:ABCD:1435:A1::3, subnet is 2001:ABCD:1435:A1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:3
    FF02::1:FFFFB:EEE8
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.

GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::A2EC:F9FF:FEFB:EEE9
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:ABCD:1435:B1::3, subnet is 2001:ABCD:1435:B1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:3
    FF02::1:FFFFB:EEE9
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

Configuración IP R2

```
R2#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::A2EC:F9FF:FEFB:F028
    No Virtual link-local address(es):
    Global unicast address(es):
      2001:ABCD:1435:A1::4, subnet is 2001:ABCD:1435:A1::/64
    Joined group address(es):
      FF02::1
      FF02::2
      FF02::1:FF00:4
      FF02::1:FFFFB:F028
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.

GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::A2EC:F9FF:FEFB:F029
    No Virtual link-local address(es):
    Global unicast address(es):
      2002:ABCD:1435:C1::1, subnet is 2002:ABCD:1435:C1::/64
    Joined group address(es):
      FF02::1
      FF02::2
      FF02::1:FF00:1
      FF02::1:FFFFB:F029
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

Configuración IP R3

```
R3#show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::D66D:50FF:FE94:CB70
  No Virtual link-local address(es):
  Global unicast address(es):
    2002:ABCD:1435:B1::4, subnet is 2002:ABCD:1435:B1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:4
    FF02::1:FF94:CB70
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.

GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::D66D:50FF:FE94:CB71
  No Virtual link-local address(es):
  Global unicast address(es):
    2002:ABCD:1435:D1::1, subnet is 2002:ABCD:1435:D1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:1
    FF02::1:FF94:CB71
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
```

Configuración PC 1

← Configuración

Red 11

[esta red](#)

Configuración de IP

Asignación de IP:	Manual
Dirección IPv6:	2002:abcd:1435:c1::31
Longitud del prefijo de subred IPv6:	64
Puerta de enlace IPv6:	2002:abcd:1435:c1::1
Servidores DNS IPv6:	::1

[Editar](#)

Configuración PC 2

Red e Internet > Ethernet

dispositivos de la red.

[Establecer la configuración de firewall y seguridad](#)

Configuración de autenticación

[Editar](#)

Conexión de uso medido

Es posible que algunas aplicaciones funcionen de forma diferente para reducir el uso de datos cuando estés conectado a esta red

Desactivado

[Establecer un límite de datos para ayudar a controlar el uso de datos en esta red](#)

Asignación de IP:

Manual

Dirección IPv6:

2002:abcd:1435:d1::31

Longitud del prefijo de subred IPv6:

64

[Editar](#)

Puerta de enlace IPv6:

2002:abcd:1435:d1::1

Asignación de servidor DNS:

Manual

Servidores DNS IPv6:

::1 (sin cifrar)

[Editar](#)

Velocidad de vínculo (recepción/transmisión):

100/100 (Mbps)

[Copiar](#)

Dirección IPv6:

2002:abcd:1435:d1:c268:be8f:4759:cc

5d

2002:abcd:1435:d1::31

Dirección IPv6 local de vínculo:

fe80::ff39:5b62:ea00:54ae%44

Fabricante:

Realtek

Descripción:

Realtek USB FE Family Controller

Versión del controlador:

10.38.117.2020

4.5.2. Configuración de protocolo OSPFv3

Configuración OSPF R1

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ipv6 unicast-routing
R1(config)#ipv6 router ospf 1
R1(config-rtr)#i
*Nov 3 15:25:04.283: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a
router-id, please configure manually
R1(config-rtr)#router-id 1.1.1.1
R1(config-rtr)#interface G0/0
R1(config-if)#ipv6 ospf 1 area 0
R1(config-if)#interface G0/1
R1(config-if)#
*Nov 3 15:25:26.947: %OSPFv3-5-ADJCHG: Process 1, Nbr 2.2.2.2 on GigabitEtherne
t0/0 from LOADING to FULL, Loading Done
R1(config-if)#ipv6 ospf 1 area 0
R1(config-if)#
*Nov 3 15:25:35.439: %OSPFv3-5-ADJCHG: Process 1, Nbr 3.3.3.3 on GigabitEtherne
t0/1 from LOADING to FULL, Loading Done
```

Configuración OSPF R2

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ipv6 unicast-routing
R2(config)#ipv6 router ospf 1
R2(config-rtr)#
*Nov 3 15:06:25.003: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a
router-id, please configure manually
R2(config-rtr)#
R2(config-rtr)#router-id 2.2.2.2
R2(config-rtr)#interface G0/0
R2(config-if)#ipv6 ospf 1 area 0
R2(config-if)#interface G0/1
R2(config-if)#ipv6 ospf 1 area 0
R2(config-if)#
A
V
```

Configuración OSPF R3

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ipv6 unicast-routing
R3(config)#ipv6 router ospf 1
R3(config-rtr)#
*Nov 3 15:21:04.991: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a
router-id, please configure manually
R3(config-rtr)#router-id 3.3.3.3
R3(config-rtr)#interface G0/0
R3(config-if)#ipv6 ospf 1 area 0
R3(config-if)#interface G0/1
R3(config-if)#ipv6 ospf 1 area 0
R3(config-if)#
A
V
```

Pruebas de conectividad

PC 2 a PC 1

```
PS C:\Users\ElRey> ping 2002:ABCD:1435:C1::31

Haciendo ping a 2002:abcd:1435:c1::31 con 32 bytes de datos:
Respueta desde 2002:abcd:1435:c1::31: tiempo=2ms
Respueta desde 2002:abcd:1435:c1::31: tiempo=3ms
Respueta desde 2002:abcd:1435:c1::31: tiempo=3ms
Respueta desde 2002:abcd:1435:c1::31: tiempo=3ms

Estadisticas de ping para 2002:abcd:1435:c1::31:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
Tiempos aproximados de ida y vuelta en milisegundos:
    Mínimo = 2ms, Máximo = 3ms, Media = 2ms
PS C:\Users\ElRey> |
```

PC 1 a PC 2

```
C:\Users\n.segura>ping 2002:ABCD:1435:D1::1

Haciendo ping a 2002:abcd:1435:d1::1 con 32 bytes de datos:
Respuesta desde 2002:abcd:1435:d1::1: tiempo=1ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=1ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=1ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=1ms

Estadísticas de ping para 2002:abcd:1435:d1::1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 1ms, Máximo = 1ms, Media = 1ms

C:\Users\n.segura>
```

PC1 a R2

```
C:\Users\n.segura>ping 2002:ABCD:1435:C1::1

Haciendo ping a 2002:abcd:1435:c1::1 con 32 bytes de datos:
Respuesta desde 2002:abcd:1435:c1::1: tiempo=1ms
Respuesta desde 2002:abcd:1435:c1::1: tiempo<1m
Respuesta desde 2002:abcd:1435:c1::1: tiempo<1m
Respuesta desde 2002:abcd:1435:c1::1: tiempo=1ms

Estadísticas de ping para 2002:abcd:1435:c1::1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 0ms, Máximo = 1ms, Media = 0ms

C:\Users\n.segura>
```

PC2 a R3

```
PS C:\Users\ElRey> ping 2002:ABCD:1435:D1::1

Haciendo ping a 2002:abcd:1435:d1::1 con 32 bytes de datos:
Respuesta desde 2002:abcd:1435:d1::1: tiempo=1ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=361ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=67ms
Respuesta desde 2002:abcd:1435:d1::1: tiempo=471ms

Estadísticas de ping para 2002:abcd:1435:d1::1:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 1ms, Máximo = 471ms, Media = 225ms
PS C:\Users\ElRey> |
```

R1 a R2

```
R1#ping 2001:ABCD:1435:A1::4
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:ABCD:1435:A1::4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/8 ms
R1#
```

R1 a R3

```
R1#ping 2002:ABCD:1435:B1::4
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2002:ABCD:1435:B1::4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
R1#
```

Show IP protocols

R1

```
R1#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "application"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "ospf 1"
    Router ID 1.1.1.1
    Number of areas: 1 normal, 0 stub, 0 nssa
    Interfaces (Area 0):
        GigabitEthernet0/1
        GigabitEthernet0/0
    Redistribution:
        None
```

R2

```
R2#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "application"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "ospf 1"
    Router ID 2.2.2.2
    Number of areas: 1 normal, 0 stub, 0 nssa
    Interfaces (Area 0):
        GigabitEthernet0/1
        GigabitEthernet0/0
    Redistribution:
        None
R2#
```

R3

```
R3#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "application"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "ospf 1"
    Router ID 3.3.3.3
    Number of areas: 1 normal, 0 stub, 0 nssa
    Interfaces (Area 0):
        GigabitEthernet0/1
        GigabitEthernet0/0
    Redistribution:
        None
R3#
```

Show IP route

R1

```
R1#show ipv6 route
IPv6 Routing Table - default - 8 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       a - Application
C  2001:ABCD:1435:A1::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L  2001:ABCD:1435:A1::3/128 [0/0]
    via GigabitEthernet0/0, receive
C  2001:ABCD:1435:B1::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L  2001:ABCD:1435:B1::3/128 [0/0]
    via GigabitEthernet0/1, receive
O  2002:ABCD:1435:B1::/64 [110/1]
    via GigabitEthernet0/1, directly connected
O  2002:ABCD:1435:C1::/64 [110/2]
    via FE80::A2EC:F9FF:FEFB:F028, GigabitEthernet0/0
O  2002:ABCD:1435:D1::/64 [110/2]
    via FE80::D66D:50FF:FE94:CB70, GigabitEthernet0/1
L  FF00::/8 [0/0]
    via Null0, receive
```

R2

```
R2#show ipv6 route
IPv6 Routing Table - default - 8 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       a - Application
C  2001:ABCD:1435:A1::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L  2001:ABCD:1435:A1::4/128 [0/0]
    via GigabitEthernet0/0, receive
O  2001:ABCD:1435:B1::/64 [110/2]
    via FE80::A2EC:F9FF:FEFB:EEE8, GigabitEthernet0/0
O  2002:ABCD:1435:B1::/64 [110/2]
    via FE80::A2EC:F9FF:FEFB:EEE8, GigabitEthernet0/0
C  2002:ABCD:1435:C1::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L  2002:ABCD:1435:C1::1/128 [0/0]
    via GigabitEthernet0/1, receive
O  2002:ABCD:1435:D1::/64 [110/3]
    via FE80::A2EC:F9FF:FEFB:EEE8, GigabitEthernet0/0
L  FF00::/8 [0/0]
    via Null0, receive
R2#
```

R3

```
R3#show ipv6 route
IPv6 Routing Table - default - 8 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
      B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
      I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
      EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
      NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
      OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
      a - Application
O  2001:ABCD:1435:A1::/64 [110/2]
    via FE80::A2EC:F9FF:FEFB:EEE9, GigabitEthernet0/0
O  2001:ABCD:1435:B1::/64 [110/1]
    via GigabitEthernet0/0, directly connected
C  2002:ABCD:1435:B1::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L  2002:ABCD:1435:B1::4/128 [0/0]
    via GigabitEthernet0/0, receive
O  2002:ABCD:1435:C1::/64 [110/3]
    via FE80::A2EC:F9FF:FEFB:EEE9, GigabitEthernet0/0
C  2002:ABCD:1435:D1::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L  2002:ABCD:1435:D1::1/128 [0/0]
    via GigabitEthernet0/1, receive
L  FF00::/8 [0/0]
    via Null0, receive
R3#
```

4.5.3. Simulación de convergencia del protocolo de enrutamiento

Captura Wireshark OSPF

The screenshot shows the Wireshark interface capturing traffic on 'Ethernet 3'. The packet list pane displays multiple OSPF Hello Packets. The first few packets are highlighted in yellow, indicating they are selected. The columns in the table are: No., Time, Source, Destination, Protocol, Length, and Info. The 'Info' column shows that all selected packets are 'Hello Packet' type.

No.	Time	Source	Destination	Protocol	Length	Info
115	122.817786	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
134	132.766161	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
148	142.306657	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
156	151.710623	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
168	161.322791	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
176	171.042428	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
184	180.134409	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
191	189.623047	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
202	199.354645	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
210	208.606650	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet
219	218.558736	fe80::d66d:50ff:fe9...	ff02::5	OSPF	90	Hello Packet

The figure shows a Wireshark interface with two panes. The left pane displays a list of network frames, and the right pane shows a detailed hex dump of frame 156.

Frame List:

- > Frame 156: 90 bytes on wire (720 bits), 90 bytes captured (720 bits)
- > Ethernet II, Src: Cisco_94:cb:71 (d4:6d:50:94:cb:71), Dst: IPv6
- > Internet Protocol Version 6, Src: fe80::d66d:50ff:fe94:cb71, Dst:
- ▼ Open Shortest Path First
 - > OSPF Header
 - > OSPF Hello Packet

Hex Dump (Frame 156):

Offset	Hex	Dec	ASCII
0000	33 33 00 00 00 05 d4 6d 50 94 cb 71 86 dd 6c 00	33 33 00 00 00 05 d4 6d 50 94 cb 71 86 dd 6c 00	33...m
0010	00 00 00 24 59 01 fe 80 00 00 00 00 00 00 d6 6d	00 00 00 24 59 01 fe 80 00 00 00 00 00 00 d6 6d	...\$Y..P...q...
0020	50 ff fe 94 cb 71 ff 02 00 00 00 00 00 00 00 00 00	50 ff fe 94 cb 71 ff 02 00 00 00 00 00 00 00 00 00	P.....
0030	00 00 00 00 00 05 03 01 00 24 03 03 03 03 00 00	00 00 00 00 00 05 03 01 00 24 03 03 03 03 00 00
0040	00 00 00 0b 00 00 00 00 00 05 01 00 00 13 00 0a	00 00 00 0b 00 00 00 00 00 05 01 00 00 13 00 0a
0050	00 28 03 03 03 03 00 00 00 00 00 00 00 00 00 00	00 28 03 03 03 03 00 00 00 00 00 00 00 00 00 00	.. 00 28 03 03 03 03 00 00 00 00 00 00 00 00 00 00

Preguntas Planteadas

¿Qué información puede identificar en la simulación?

R// Se puede identificar el intercambio de paquetes de tipo OSPF entre los orígenes, al igual que con el ejercicio de OSPF en IPv4, hay un intercambio de paquetes OSPF entre los routers que también les llega a los computadores personales, sucede el mismo escenario que en IPv4. Los paquetes son descartados por los PCs, pero recibidos e interpretados por los routers.

¿Cómo son los paquetes OSPF?, realice una breve descripción del mismo y enuncie las diferencias con las versiones anteriores del protocolo.

R// Los paquetes OSPF son iguales a los encontrados en el ejercicio 4.2 de OSPF con IPv4 con la diferencia de que en este caso están trabajando en IPv6. También se ve el mensaje de Router Hello, sus direcciones de origen y direcciones de destino, al igual que la interfaz a la que llega.