Interconexión de Redes

Práctica 4

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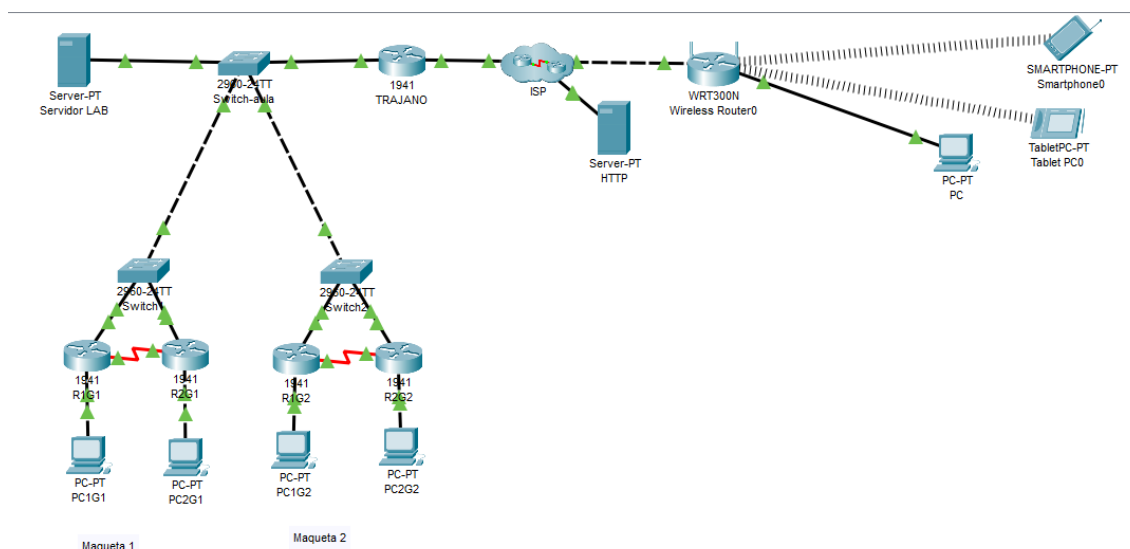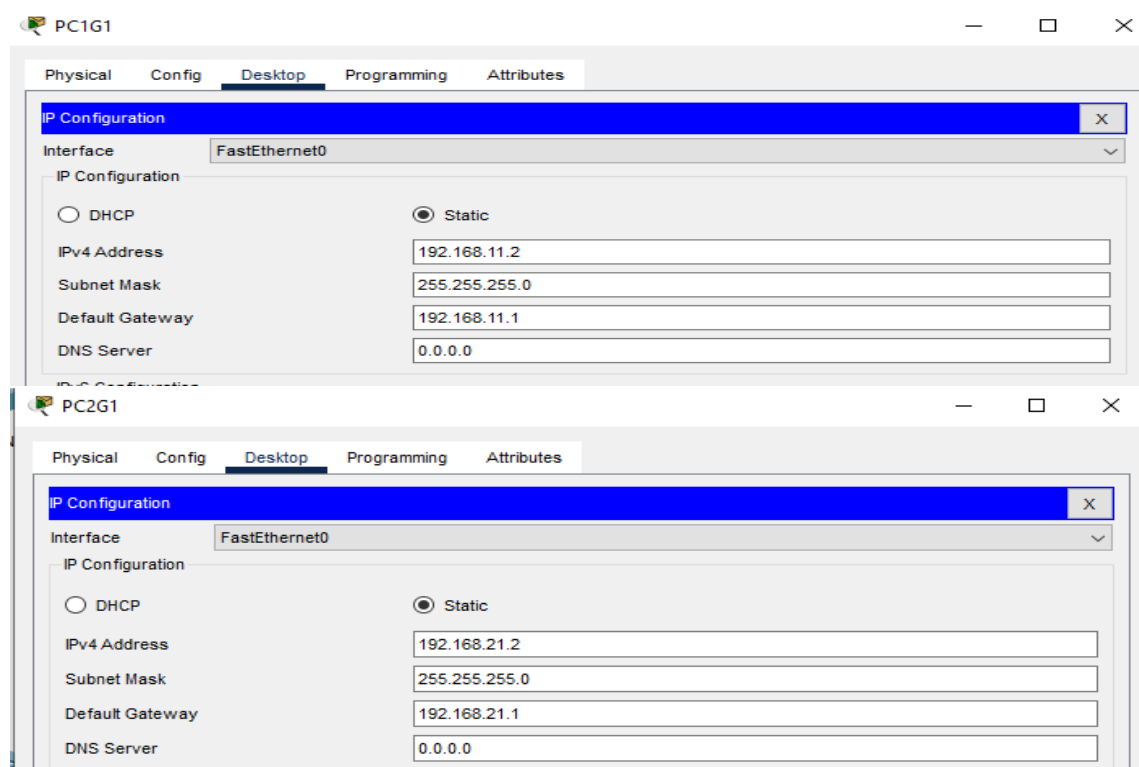
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Índice

1. -. Conexionado y direccionamiento

Lo primero es conectar la maqueta 2 igual que la maqueta 1 quedando así:

Tras ello, tenemos que asignar a los 4 router y 4 pc sus direcciones para ello cogemos las siguientes direcciones (según el Word de la práctica):

Maqueta 1:

```
Router#show interfaces
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0040.0ba8.1101 (bia 0040.0ba8.1101)
  Internet address is 192.168.11.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 1 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 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     1 packets output, 50 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 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0040.0ba8.1102 (bia 0040.0ba8.1102)
  Internet address is 10.0.0.6/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 167 bits/sec, 0 packets/sec
  5 minute output rate 1 bits/sec, 0 packets/sec
     255 packets input, 16572 bytes, 0 no buffer
     Received 18 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     4 packets output, 320 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 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.121.1/30
  MTU 1500 bytes, BW 1544 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
```

```
R2G1#show interfaces
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0001.9664.5b01 (bia 0001.9664.5b01)
  Internet address is 192.168.21.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 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 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0001.9664.5b02 (bia 0001.9664.5b02)
  Internet address is 10.0.0.5/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 166 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     283 packets input, 18348 bytes, 0 no buffer
     Received 19 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     3 packets output, 270 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 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.121.2/30
  MTU 1500 bytes, BW 1544 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
```

Maqueta 2:

PC1G2

Physical | Config | Desktop | Programming | Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address: 192.168.12.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.12.1
DNS Server: 0.0.0.0

PC2G2

Physical | Config | Desktop | Programming | Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address: 192.168.22.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.22.1
DNS Server: 0.0.0.0

```
R1G2#show interfaces
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0001.6309.e212 (bia 0001.6309.e212)
  Internet address is 192.168.12.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 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 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0007.ec67.ea3d (bia 0007.ec67.ea3d)
  Internet address is 10.0.0.3/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 168 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     504 packets input, 32596 bytes, 0 no buffer
     Received 19 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     3 packets output, 270 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 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.122.1/30
  MTU 1500 bytes, BW 1544 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
```

```
R2G2#show interfaces
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0030.f2d2.d456 (bia 0030.f2d2.d456)
  Internet address is 192.168.22.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 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 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 000a.f35d.b6de (bia 000a.f35d.b6de)
  Internet address is 10.0.0.4/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 169 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     570 packets input, 36856 bytes, 0 no buffer
     Received 19 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     3 packets output, 270 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 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.122.2/30
  MTU 1500 bytes, BW 1544 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
```

Con el comando show ip route obtenemos las siguientes tablas de ruta:

R1G1
Physical   Config   CLI   Attributes

IOS Command Line Interface
```
Router>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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.6/32 is directly connected, GigabitEthernet0/1
     192.168.11.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.11.0/24 is directly connected, GigabitEthernet0/0
L       192.168.11.1/32 is directly connected, GigabitEthernet0/0
     192.168.121.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.121.0/30 is directly connected, Serial0/0/0
L       192.168.121.1/32 is directly connected, Serial0/0/0
S*   0.0.0.0/0 [254/0] via 10.0.0.1
```

R2G1
Physical   Config   CLI   Attributes

IOS Command Line Interface
```
R2G1>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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.5/32 is directly connected, GigabitEthernet0/1
     192.168.21.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.21.0/24 is directly connected, GigabitEthernet0/0
L       192.168.21.1/32 is directly connected, GigabitEthernet0/0
     192.168.121.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.121.0/30 is directly connected, Serial0/0/0
L       192.168.121.2/32 is directly connected, Serial0/0/0
S*   0.0.0.0/0 [254/0] via 10.0.0.1
```

R1G2
Physical   Config   CLI   Attributes

IOS Command Line Interface
```
R1G2#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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.3/32 is directly connected, GigabitEthernet0/1
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/24 is directly connected, GigabitEthernet0/0
L       192.168.12.1/32 is directly connected, GigabitEthernet0/0
     192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.122.0/30 is directly connected, Serial0/0/0
L       192.168.122.1/32 is directly connected, Serial0/0/0
S*   0.0.0.0/0 [254/0] via 10.0.0.1
```

R2G2
Physical   Config   CLI   Attributes

IOS Command Line Interface
```
R2G2#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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.4/32 is directly connected, GigabitEthernet0/1
     192.168.22.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.22.0/24 is directly connected, GigabitEthernet0/0
L       192.168.22.1/32 is directly connected, GigabitEthernet0/0
     192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.122.0/30 is directly connected, Serial0/0/0
L       192.168.122.2/32 is directly connected, Serial0/0/0
S*   0.0.0.0/0 [254/0] via 10.0.0.1
```

Podemos comprobar que cada router solo conoce su red, el mismo y lo que tiene a continuación conectado, es decir si hacemos pings entre la LAN 1 y la LAN 2 no llegará porque cada router conoce al otro, pero no a sus pc vecinos:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Failed	PC1G1	PC2G1	ICMP		0.000	N	0
	Failed	PC1G2	PC2G2	ICMP		0.000	N	1

2. -. Configurar RIPv2

Para la configuración de RIPv2 utilizaré los comandos que yo mismo redacté en un archivo Word llamado Comandos a mano, que incluyo con la práctica.

Las rutas que aprenden R1G1 , R2G1 y Trajano son:

```
Router#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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.3/32 is directly connected, GigabitEthernet0/1
R    150.214.0.0/16 [120/1] via 10.0.0.1, 00:00:05, GigabitEthernet0/1
     192.168.11.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.11.0/24 is directly connected, GigabitEthernet0/0
L       192.168.11.1/32 is directly connected, GigabitEthernet0/0
R    192.168.12.0/24 [120/1] via 10.0.0.6, 00:00:16, GigabitEthernet0/1
R    192.168.21.0/24 [120/1] via 192.168.121.2, 00:00:26, Serial0/0/0
                     [120/1] via 10.0.0.4, 00:00:26, GigabitEthernet0/1
R    192.168.22.0/24 [120/1] via 10.0.0.5, 00:00:21, GigabitEthernet0/1
     192.168.121.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.121.0/30 is directly connected, Serial0/0/0
L       192.168.121.1/32 is directly connected, Serial0/0/0
     192.168.122.0/30 is subnetted, 1 subnets
R       192.168.122.0/30 [120/1] via 10.0.0.6, 00:00:16, GigabitEthernet0/1
                         [120/1] via 10.0.0.5, 00:00:21, GigabitEthernet0/1
R    198.3.2.0/24 [120/2] via 10.0.0.1, 00:00:05, GigabitEthernet0/1
R*   0.0.0.0/0 [120/1] via 10.0.0.1, 00:00:05, GigabitEthernet0/1
```

```
R2G1#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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.4/32 is directly connected, GigabitEthernet0/1
R    150.214.0.0/16 [120/1] via 10.0.0.1, 00:00:12, GigabitEthernet0/1
R    192.168.11.0/24 [120/1] via 192.168.121.1, 00:00:05, Serial0/0/0
                     [120/1] via 10.0.0.3, 00:00:05, GigabitEthernet0/1
R    192.168.12.0/24 [120/1] via 10.0.0.6, 00:00:25, GigabitEthernet0/1
     192.168.21.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.21.0/24 is directly connected, GigabitEthernet0/0
L       192.168.21.1/32 is directly connected, GigabitEthernet0/0
R    192.168.22.0/24 [120/1] via 10.0.0.5, 00:00:04, GigabitEthernet0/1
     192.168.121.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.121.0/30 is directly connected, Serial0/0/0
L       192.168.121.2/32 is directly connected, Serial0/0/0
     192.168.122.0/30 is subnetted, 1 subnets
R       192.168.122.0/30 [120/1] via 10.0.0.5, 00:00:04, GigabitEthernet0/1
                         [120/1] via 10.0.0.6, 00:00:25, GigabitEthernet0/1
R    198.3.2.0/24 [120/2] via 10.0.0.1, 00:00:12, GigabitEthernet0/1
R*   0.0.0.0/0 [120/1] via 10.0.0.1, 00:00:12, GigabitEthernet0/1
```

```
TRAJANO#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 150.214.163.254 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/0
L       10.0.0.1/32 is directly connected, GigabitEthernet0/0
     150.214.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       150.214.0.0/16 is directly connected, GigabitEthernet0/1
L       150.214.163.145/32 is directly connected, GigabitEthernet0/1
R    192.168.11.0/24 [120/1] via 10.0.0.3, 00:00:20, GigabitEthernet0/0
R    192.168.12.0/24 [120/1] via 10.0.0.6, 00:00:18, GigabitEthernet0/0
R    192.168.21.0/24 [120/1] via 10.0.0.4, 00:00:23, GigabitEthernet0/0
R    192.168.22.0/24 [120/1] via 10.0.0.5, 00:00:20, GigabitEthernet0/0
     192.168.121.0/30 is subnetted, 1 subnets
R       192.168.121.0/30 [120/1] via 10.0.0.4, 00:00:23, GigabitEthernet0/0
                         [120/1] via 10.0.0.3, 00:00:20, GigabitEthernet0/0
     192.168.122.0/30 is subnetted, 1 subnets
R       192.168.122.0/30 [120/1] via 10.0.0.5, 00:00:20, GigabitEthernet0/0
                         [120/1] via 10.0.0.6, 00:00:18, GigabitEthernet0/0
R    198.3.2.0/24 [120/1] via 150.214.163.254, 00:00:24, GigabitEthernet0/1
S*   0.0.0.0/0 [1/0] via 150.214.163.254
```
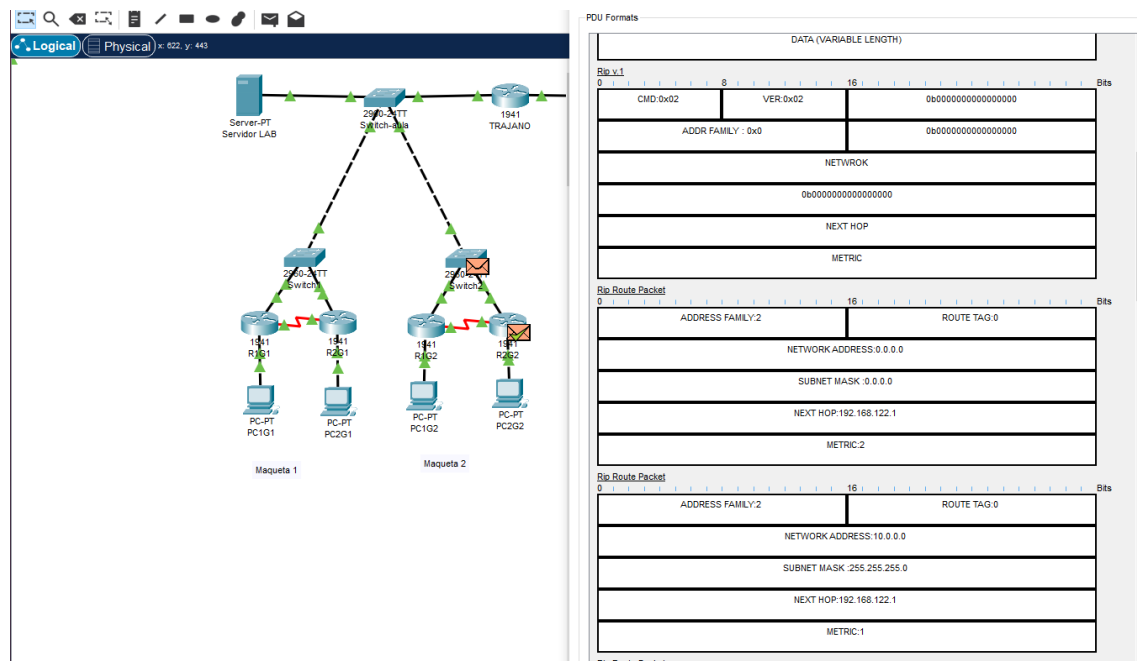
Todos aprenden las rutas de acceso a todos los pc y router que hemos configurado, hacia el servidorlab y hacia internet (estos últimos ya lo sabía Trajano de antes)

La dirección donde se envían los paquetes de RIPv2 es la 227.0.0.9 que es la multicast de RIP:
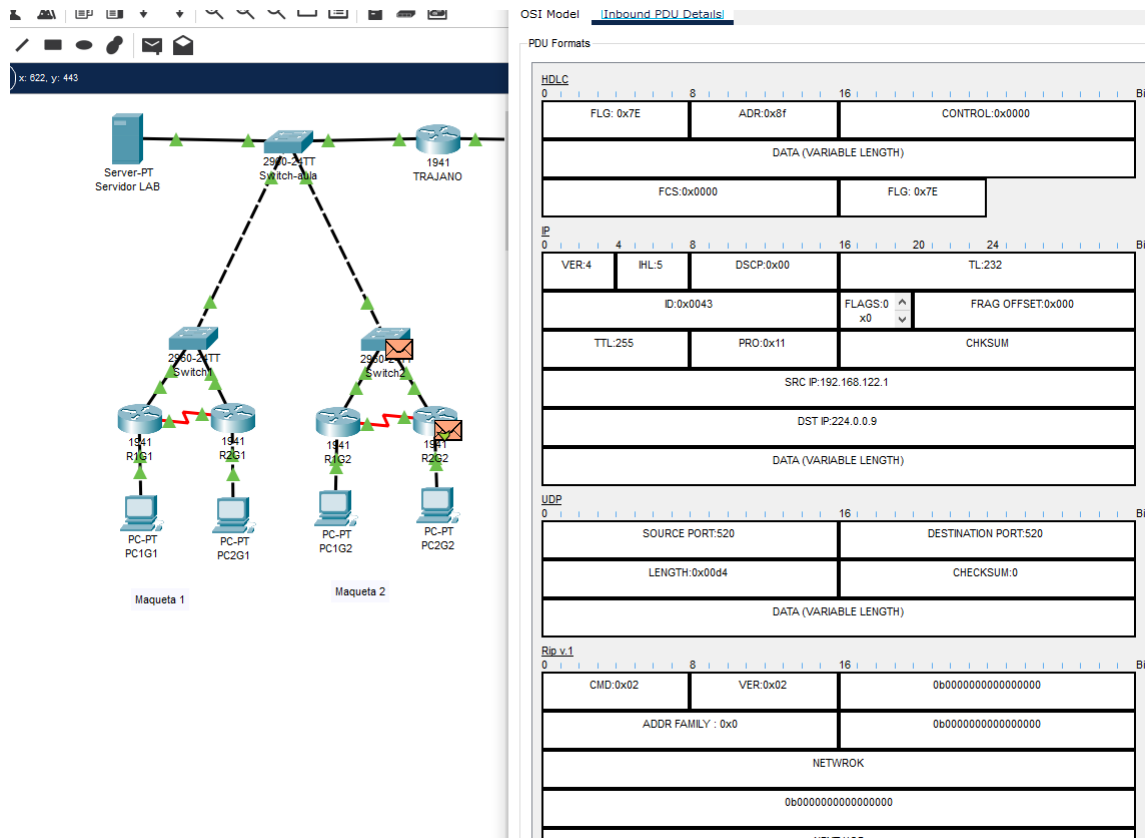
En "RIP route packet" podemos ver como se envía la red con su máscara:

Las tablas de rutas siguen como estaban en las anteriores fotos para todos los router.

Si hay conexión para cualquier punto de la topología incluso para internet:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	PC1G1	HTTP	ICMP		0.000	N	0
	Successful	PC2G1	HTTP	ICMP		0.000	N	1
	Successful	PC1G2	HTTP	ICMP		0.000	N	2
	Successful	PC2G2	HTTP	ICMP		0.000	N	3

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	Servi...	PC1G1	ICMP		0.000	N	0
	Successful	Servi...	PC2G1	ICMP		0.000	N	1
	Successful	Servi...	PC1G2	ICMP		0.000	N	2
	Successful	Servi...	PC2G2	ICMP		0.000	N	3

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	PC1G1	PC2G2	ICMP		0.000	N	0
	Successful	PC2G1	PC2G2	ICMP		0.000	N	1
	Successful	PC1G1	PC1G2	ICMP		0.000	N	2
	Successful	PC1G2	PC2G2	ICMP		0.000	N	3

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	TRAJANO	PC1G1	ICMP		0.000	N	0
	Successful	TRAJANO	PC2G1	ICMP		0.000	N	1
	Successful	TRAJANO	PC1G2	ICMP		0.000	N	2
	Successful	TRAJANO	PC2G2	ICMP		0.000	N	3

3. -. Configurar EIGRP

Aquí podemos ver como DUAL efectivamente envía información a los router (yo he puesto una foto de 2, pero los hace para todos los configurados con EIGRP)
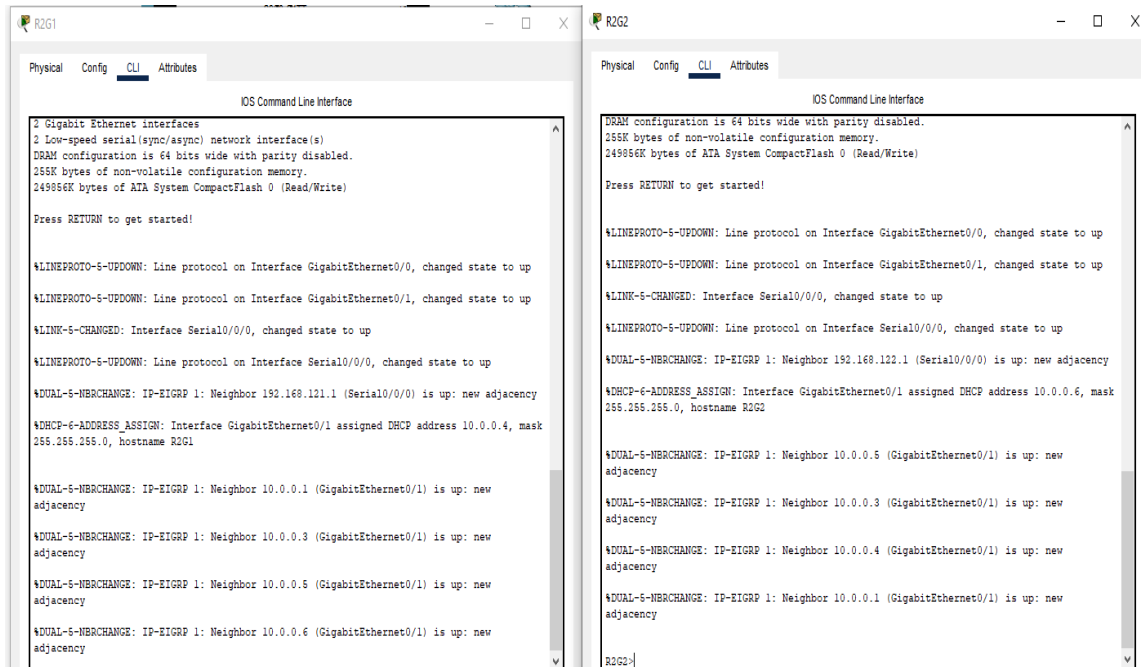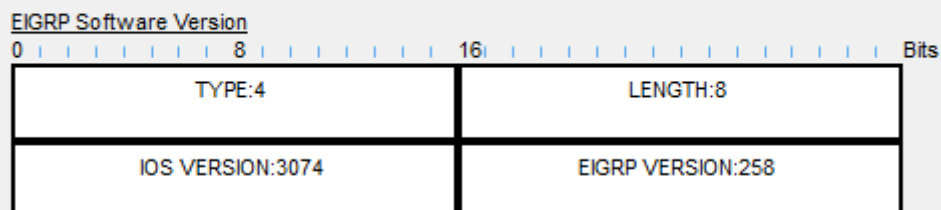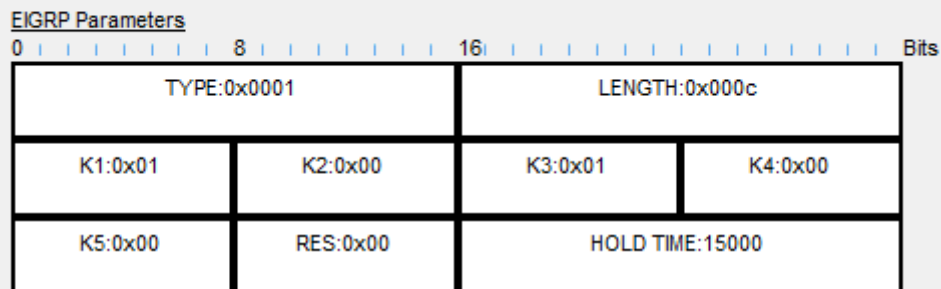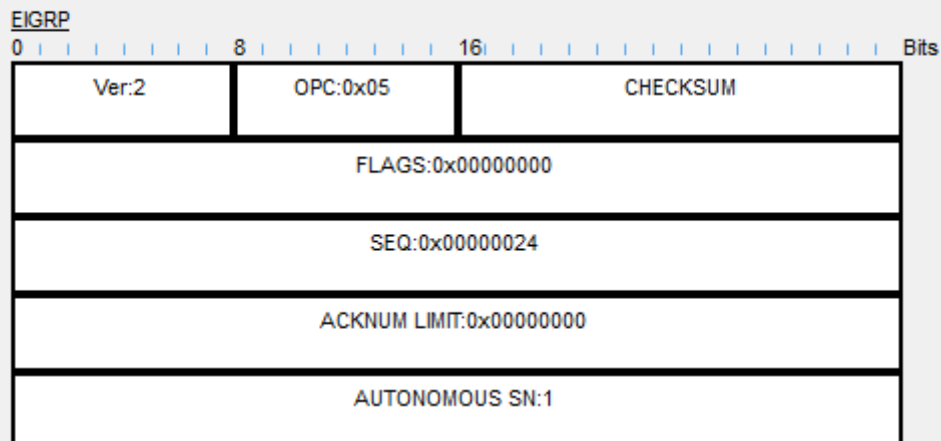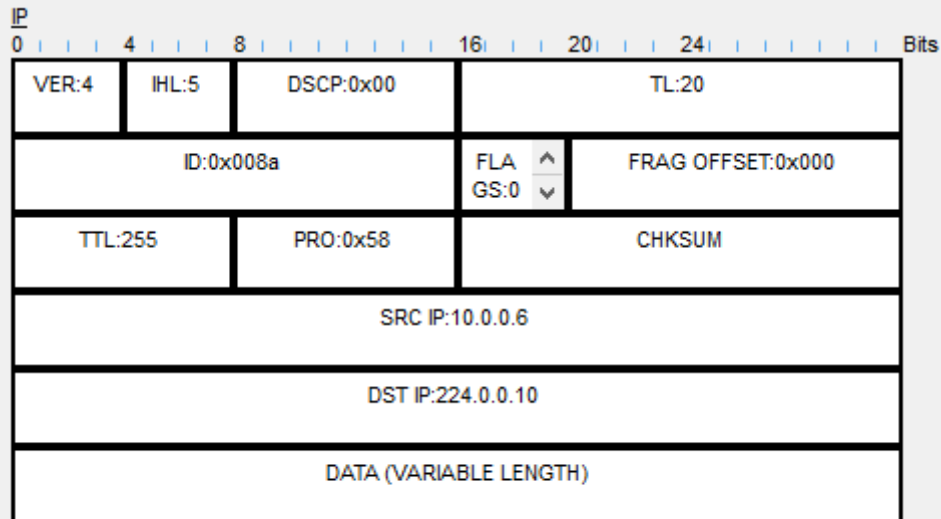

Por otra parte, en la siguiente foto de la pagina a continuación, podemos ver la captura de un paquete EIGRP que llega a Trajano, podemos ver como este fue enviado por la ip 10.0.0.6 la cual es una ip que se Trajano asigno con DHCP al R2G2, la ip donde la envió 224.0.0.10 que es la multicast de EIGRP y algunos valores más como su versión su offset etc.

PDU Information at Device: TRAJANO
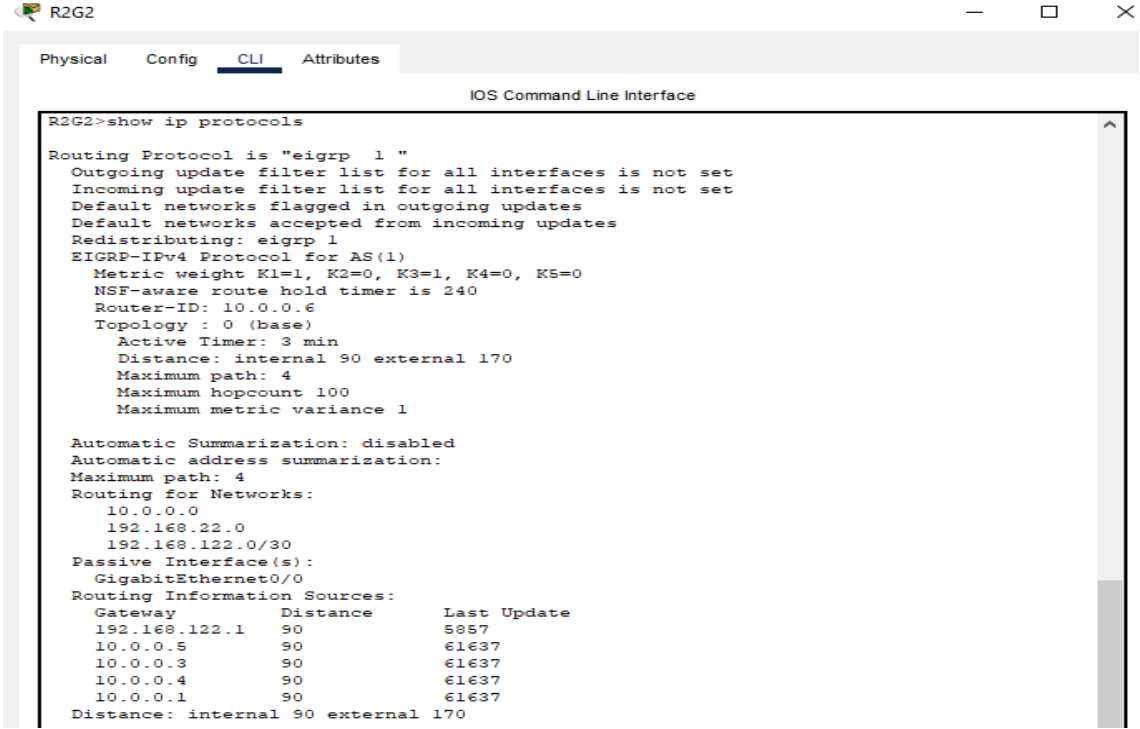
OSI Model   Inbound PDU Details

PDU Formats

| SRC ADDR:000 A.F35D.B6DE | TYPE:0x | DATA (VARIABLE LENGTH) | FCS:0x00000000 |

IP

0 . . . 4 . . . 8 . . . . . . 16 . . 20 . . 24 . . . . Bits

VER:4	IHL:5	DSCP:0x00	TL:20

ID:0x008a		FLAGS:0	FRAG OFFSET:0x000

TTL:255	PRO:0x58	CHKSUM

SRC IP:10.0.0.6

DST IP:224.0.0.10

DATA (VARIABLE LENGTH)

EIGRP

0 . . . . 8 . . . . 16 . . . . Bits

Ver:2	OPC:0x05	CHECKSUM

FLAGS:0x00000000

SEQ:0x00000024

ACKNUM LIMIT:0x00000000

AUTONOMOUS SN:1

EIGRP Parameters

0 . . . . 8 . . . . 16 . . . . Bits

TYPE:0x0001	LENGTH:0x000c

K1:0x01	K2:0x00	K3:0x01	K4:0x00

K5:0x00	RES:0x00	HOLD TIME:15000

EIGRP Software Version

0 . . . . 8 . . . . 16 . . . . Bits

TYPE:4	LENGTH:8

IOS VERSION:3074	EIGRP VERSION:258

Utilizando los comandos que se encuentran en los ficheros en el mismo router que mandó el paquete, por ejemplo, podemos ver algunas cosas interesantes del router y del protocolo.

```
R2G2>show ip protocols

Routing Protocol is "eigrp 1 "
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  Redistributing: eigrp 1
  EIGRP-IPv4 Protocol for AS(1)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID: 10.0.0.6
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1

  Automatic Summarization: disabled
  Automatic address summarization:
  Maximum path: 4
  Routing for Networks:
     10.0.0.0
     192.168.22.0
     192.168.122.0/30
  Passive Interface(s):
     GigabitEthernet0/0
  Routing Information Sources:
     Gateway         Distance      Last Update
     192.168.122.1   90            5857
     10.0.0.5        90            61637
     10.0.0.3        90            61637
     10.0.0.4        90            61637
     10.0.0.1        90            61637
  Distance: internal 90 external 170
```

Vecinos:

```
R2G2>show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO    Q    Seq
                                    (sec)          (ms)        Cnt   Num
0   192.168.122.1   Se0/0/0         14   00:05:18   40    1000   0    22
1   10.0.0.5        Gig0/1          11   00:04:23   40    1000   0    31
2   10.0.0.3        Gig0/1          14   00:04:23   40    1000   0    23
3   10.0.0.4        Gig0/1          11   00:04:23   40    1000   0    23
4   10.0.0.1        Gig0/1          13   00:04:23   40    1000   0    26
```

Rutas (Donde D significa que es de EIGRP), 90 es la distancia administrativa de EIGRP

```
R2G2>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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.6/32 is directly connected, GigabitEthernet0/1
D    150.214.0.0/16 [90/3072] via 10.0.0.1, 00:05:17, GigabitEthernet0/1
D    192.168.11.0/24 [90/5376] via 10.0.0.5, 00:05:17, GigabitEthernet0/1
D    192.168.12.0/24 [90/5376] via 10.0.0.3, 00:05:17, GigabitEthernet0/1
D    192.168.21.0/24 [90/5376] via 10.0.0.4, 00:05:17, GigabitEthernet0/1
     192.168.22.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.22.0/24 is directly connected, GigabitEthernet0/0
L       192.168.22.1/32 is directly connected, GigabitEthernet0/0
     192.168.121.0/30 is subnetted, 1 subnets
D       192.168.121.0/30 [90/2170112] via 10.0.0.5, 00:05:17, GigabitEthernet0/1
                         [90/2170112] via 10.0.0.4, 00:05:17, GigabitEthernet0/1
     192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.122.0/30 is directly connected, Serial0/0/0
L       192.168.122.2/32 is directly connected, Serial0/0/0
D*EX 0.0.0.0/0 [170/5376] via 10.0.0.1, 00:05:17, GigabitEthernet0/1
```

Passive (P) significa que esa ruta que puede ser usada.

Active (A) significa que aún no se puede usar por que esta siendo recalculada

```
R2G2>show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(192.168.122.2)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 0.0.0.0/0, 1 successors, FD is 5376
          via Rstatic (5376/5120)
P 10.0.0.0/24, 1 successors, FD is 2816
          via Connected, GigabitEthernet0/1
P 150.214.0.0/16, 1 successors, FD is 3072
          via 10.0.0.1 (3072/2816), GigabitEthernet0/1
P 192.168.11.0/24, 1 successors, FD is 5376
          via 10.0.0.5 (5376/5120), GigabitEthernet0/1
P 192.168.12.0/24, 1 successors, FD is 5376
          via 10.0.0.3 (5376/5120), GigabitEthernet0/1
          via 192.168.122.1 (217241e/5120), Serial0/0/0
P 192.168.21.0/24, 1 successors, FD is 5376
          via 10.0.0.4 (5376/5120), GigabitEthernet0/1
P 192.168.22.0/24, 1 successors, FD is 5120
          via Connected, GigabitEthernet0/0
P 192.168.121.0/30, 2 successors, FD is 2170112
          via 10.0.0.5 (2170112/2169856), GigabitEthernet0/1
          via 10.0.0.4 (2170112/2169856), GigabitEthernet0/1
P 192.168.122.0/30, 1 successors, FD is 2169856
          via Connected, Serial0/0/0
     .
```

Las interfaces donde podemos ver su MTU por ejemplo.

```
R2G2>show interface
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0030.f2d2.d456 (bia 0030.f2d2.d456)
  Internet address is 192.168.22.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 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 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 000a.f35d.b6de (bia 000a.f35d.b6de)
  Internet address is 10.0.0.6/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, 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 337 bits/sec, 1 packets/sec
  5 minute output rate 104 bits/sec, 0 packets/sec
     643 packets input, 39864 bytes, 0 no buffer
     Received 18 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     171 packets output, 10952 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 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.122.2/30
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
```

Un mensaje ICMP, por ejemplo, cogerá siempre el camino con una MTU mejor, es decir por el cual puedan pasar más datos, y en este caso el serial tiene una MTU muy mala por lo que para ir de PC1G1 a PC2G1 prefiere coger por donde el switch (Aunque de mas saltos)

Event List

Vis.	Time(sec)	Last Device	At Device	Type	
	0.000	--	PC1G1		ICMP
	0.001	PC1G1	R1G1		ICMP
	0.002	R1G1	Switch1		ICMP
	0.003	Switch1	R2G1		ICMP
	0.004	R2G1	PC2G1		ICMP
	0.005	PC2G1	R2G1		ICMP
	0.006	R2G1	Switch1		ICMP
	0.007	Switch1	R1G1		ICMP
	0.008	R1G1	PC1G1		ICMP

4. -. Configurar OSPF

Como la distancia administrativa de OSPF es mayor que la de EIGRP se pide eliminar esta última ya que los router eligen la configuración que tiene la distancia administrativa mas baja, por eso he separado en 4 las maquetas, con cada uno de los 3 protocolos y 1 solo con direccionamiento (que es la base para las demás)

Tenemos un paquete que va de R2G2 a R1G1, siendo 224.0.0.5 la dirección multicast de OSPF

Utilizaré el router R2G2 para usar los comandos que dejan en la práctica:

```
R2G2>show ip protocols

Routing Protocol is "ospf 10"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.122.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.0.0.0 0.0.0.255 area 0
    192.168.22.0 0.0.0.255 area 0
    192.168.122.0 0.0.0.3 area 0
  Passive Interface(s):
    GigabitEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
    192.168.121.1       110        00:04:02
    192.168.121.2       110        00:04:00
    192.168.122.1       110        00:04:00
    192.168.122.2       110        00:04:00
    200.200.200.200     110        00:04:02
  Distance: (default is 110)
```

Las rutas "O" son rutas OSPF y su distancia administrativa es 110.

```
R2G2>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 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/24 is directly connected, GigabitEthernet0/1
L       10.0.0.3/32 is directly connected, GigabitEthernet0/1
O     150.214.0.0/16 [110/2] via 10.0.0.1, 00:04:49, GigabitEthernet0/1
O     192.168.11.0/24 [110/11] via 10.0.0.4, 00:04:49, GigabitEthernet0/1
O     192.168.12.0/24 [110/11] via 10.0.0.5, 00:04:49, GigabitEthernet0/1
O     192.168.21.0/24 [110/11] via 10.0.0.6, 00:04:49, GigabitEthernet0/1
     192.168.22.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.22.0/24 is directly connected, GigabitEthernet0/0
L       192.168.22.1/32 is directly connected, GigabitEthernet0/0
     192.168.121.0/30 is subnetted, 1 subnets
O       192.168.121.0/30 [110/648] via 10.0.0.6, 00:04:49, GigabitEthernet0/1
                         [110/648] via 10.0.0.4, 00:04:49, GigabitEthernet0/1
     192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.122.0/30 is directly connected, Serial0/0/0
L       192.168.122.2/32 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 10.0.0.1, 00:04:49, GigabitEthernet0/1
```

Vecinos:

```
R2G2>show ip ospf neighbor


Neighbor ID      Pri   State            Dead Time   Address         Interface
192.168.122.1     0    FULL/  -         00:00:31    192.168.122.1   Serial0/0/0
192.168.121.2     1    FULL/DROTHER     00:00:32    10.0.0.6        GigabitEthernet0/1
192.168.121.1     1    FULL/DROTHER     00:00:32    10.0.0.4        GigabitEthernet0/1
192.168.122.1     1    FULL/DROTHER     00:00:32    10.0.0.5        GigabitEthernet0/1
200.200.200.200   1    FULL/DR          00:00:31    10.0.0.1        GigabitEthernet0/1


R2G2>show ip ospf
 Routing Process "ospf 10" with ID 192.168.122.2
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 1. Checksum Sum 0x00951a
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 3
        Area has no authentication
        SPF algorithm executed 4 times
        Area ranges are
        Number of LSA 6. Checksum Sum 0x03963a
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

Para ir de PC1G1 a PCG2 utiliza la misma ruta que en EIGRP:

Vis.	Time(sec)	Last Device	At Device	Type	
	0.000	--	PC1G1		ICMP
	0.001	PC1G1	R1G1		ICMP
	0.002	R1G1	Switch1		ICMP
	0.003	Switch1	R2G1		ICMP
	0.004	R2G1	PC2G1		ICMP
	0.005	PC2G1	R2G1		ICMP
	0.006	R2G1	Switch1		ICMP
	0.007	Switch1	R1G1		ICMP
	0.008	R1G1	PC1G1		ICMP

Esto es debido a que tiene la métrica más corta.

El DR es el Router Asignado que es Trajano porque su ID es la más grande

El BDR utilizando el comando en Trajano podemos saber cuál es, el de la ip 10.0.0.3 es decir el R2G2 que coincide con que tiene la segunda ID más grande después de Trajano cosa que tiene sentido.

```
TRAJANO>show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.122.2    1    FULL/BDR        00:00:31    10.0.0.3        GigabitEthernet0/0
192.168.121.2    1    FULL/DROTHER    00:00:31    10.0.0.6        GigabitEthernet0/0
192.168.121.1    1    FULL/DROTHER    00:00:31    10.0.0.4        GigabitEthernet0/0
192.168.122.1    1    FULL/DROTHER    00:00:32    10.0.0.5        GigabitEthernet0/0
```