



Enrutamiento dinámico

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1º ASIR

PLANIFICACIÓN Y ADMINISTRACIÓN DE REDES

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En el siguiente diagrama de red, configura los routers para que en lugar de enrutamiento estático utilicen el protocolo RIP (*Routing Information Protocol*) versión 1.

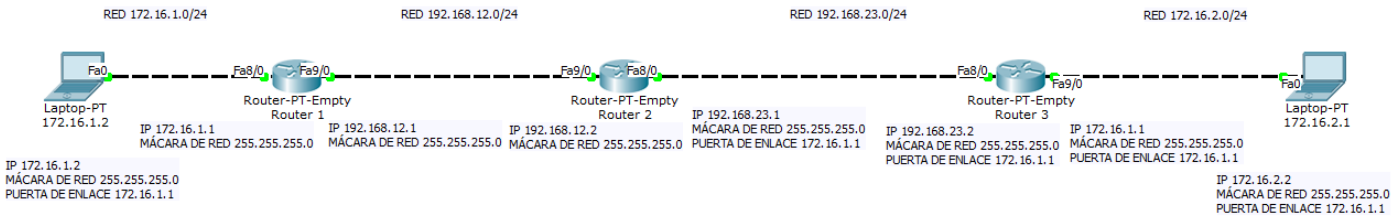


ILUSTRACIÓN 1 ESQUEMA DE RED

CONFIGURA LAS INTERFACES DE RED DE R1, R2 Y R3.

HOST 172.16.1.2

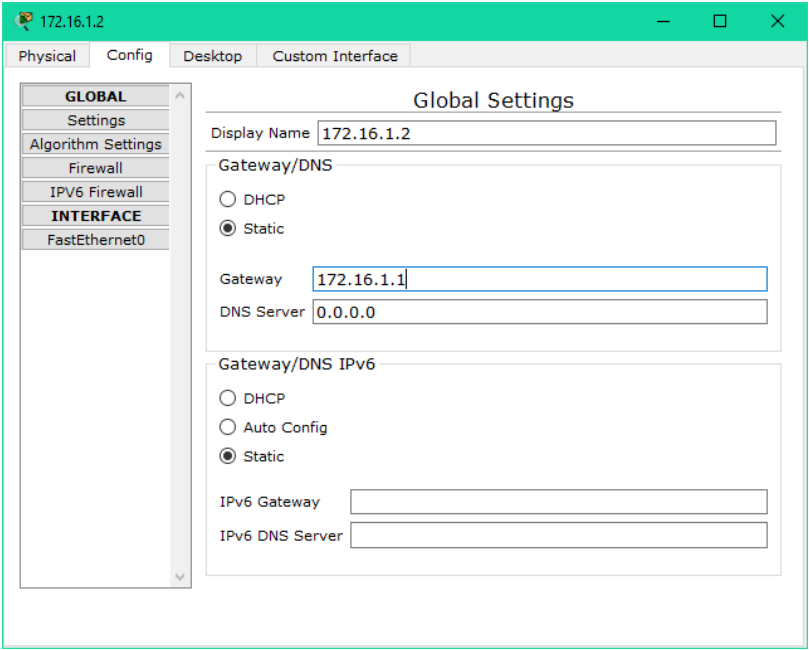


ILUSTRACIÓN 2 HOST 172.16.1.2

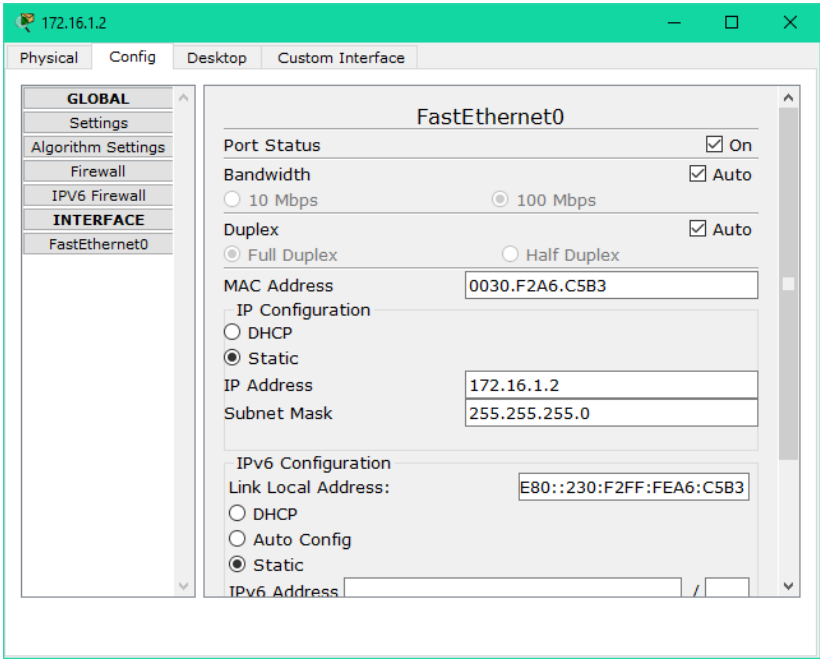
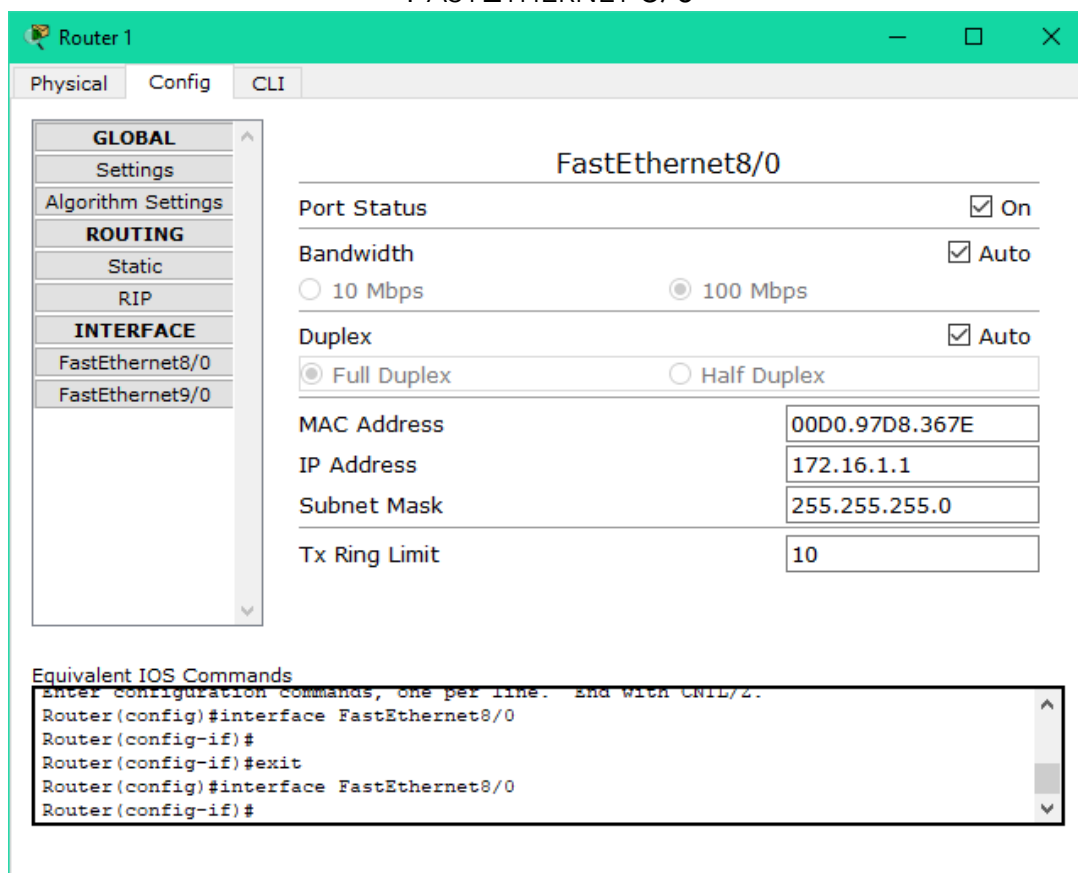


ILUSTRACIÓN 3HOST 172.16.1.2

FASTETHERNET 8/0



The screenshot shows the configuration window for FastEthernet8/0 on Router 1. The window has a green title bar with 'Router 1' and standard window controls. Below the title bar are tabs for 'Physical', 'Config', and 'CLI'. The 'Config' tab is active, showing a tree view on the left with 'GLOBAL', 'ROUTING', and 'INTERFACE' sections. Under 'INTERFACE', 'FastEthernet8/0' is selected. The main area displays configuration options for FastEthernet8/0: Port Status (checked On), Bandwidth (checked Auto, 100 Mbps selected), Duplex (checked Auto, Full Duplex selected), MAC Address (00D0.97D8.367E), IP Address (172.16.1.1), Subnet Mask (255.255.255.0), and Tx Ring Limit (10). At the bottom, a text area titled 'Equivalent IOS Commands' shows the following commands: Router(config)#interface FastEthernet8/0, Router(config-if)#, Router(config-if)#exit, Router(config)#interface FastEthernet8/0, and Router(config-if)#.

Router 1

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet8/0

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps ☒ 100 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

MAC Address 00D0.97D8.367E

IP Address 172.16.1.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

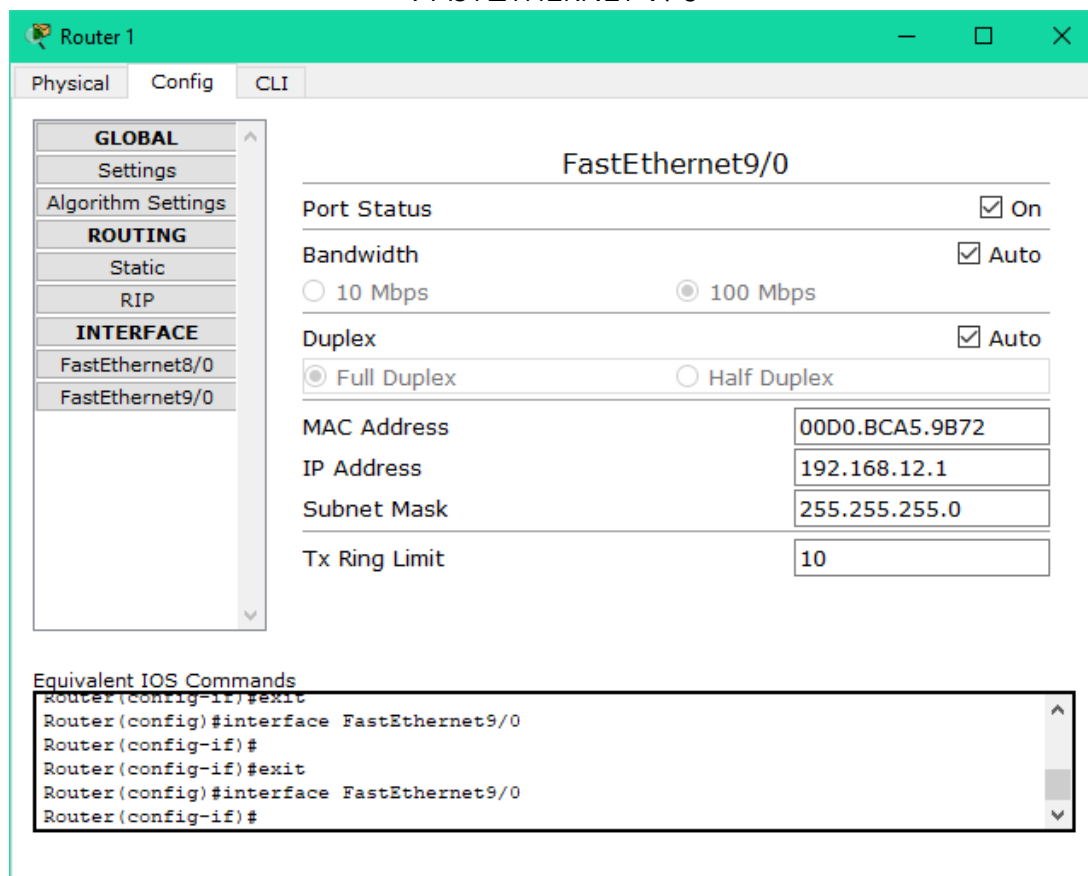
Equivalent IOS Commands

Enter configuration commands, one per line. End with CNTRL/Z.

```
Router(config)#interface FastEthernet8/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet8/0
Router(config-if)#
```

ILUSTRACIÓN 4 ROUTER 1 8/0

FASTETHERNET 9/0



The screenshot shows the configuration window for FastEthernet9/0 on Router 1. The window has a green title bar with 'Router 1' and standard window controls. Below the title bar are tabs for 'Physical', 'Config', and 'CLI'. The 'Config' tab is active, showing a tree view on the left with 'GLOBAL', 'ROUTING', and 'INTERFACE' sections. Under 'INTERFACE', 'FastEthernet9/0' is selected. The main area displays configuration options for FastEthernet9/0: Port Status (checked On), Bandwidth (checked Auto, 100 Mbps selected), Duplex (checked Auto, Full Duplex selected), MAC Address (00D0.BCA5.9B72), IP Address (192.168.12.1), Subnet Mask (255.255.255.0), and Tx Ring Limit (10). At the bottom, a text area titled 'Equivalent IOS Commands' shows the following commands: Router(config-if)#exit, Router(config)#interface FastEthernet9/0, Router(config-if)#, Router(config-if)#exit, Router(config)#interface FastEthernet9/0, and Router(config-if)#.

Router 1

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet9/0

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps ☒ 100 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

MAC Address 00D0.BCA5.9B72

IP Address 192.168.12.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#interface FastEthernet9/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet9/0
Router(config-if)#
```

ILUSTRACIÓN 5 ROUTER 1 9/0

ROUTER 2

FASTETHERNET 8/0

Router 2

PhysicalConfigCLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet8/0

Port Status

☒ On

Bandwidth

☒ Auto

☐ 10 Mbps

☒ 100 Mbps

Duplex

☒ Auto

☒ Full Duplex

☐ Half Duplex

MAC Address

000C.CF80.D3E7

IP Address

192.168.23.1

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#interface FastEthernet9/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet8/0
Router(config-if)#

ILUSTRACIÓN 6 ROUTER 2 8/0

FASTETHERNET 9/0

Router 2

PhysicalConfigCLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet9/0

Port Status

☒ On

Bandwidth

☒ Auto

☐ 10 Mbps

☒ 100 Mbps

Duplex

☒ Auto

☒ Full Duplex

☐ Half Duplex

MAC Address

0001.640C.56C9

IP Address

192.168.12.2

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Router(config-if)#exit
Router(config)#interface FastEthernet8/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet9/0
Router(config-if)#

ILUSTRACIÓN 7 ROUTER 2 9/0

ROUTER 3

FASTETHERNET 8/0

Router 3

PhysicalConfigCLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet8/0

Port Status

☒ On

Bandwidth

☒ Auto

☐ 10 Mbps

☒ 100 Mbps

Duplex

☒ Auto

☒ Full Duplex

☐ Half Duplex

MAC Address

0060.4724.0BA1

IP Address

192.168.23.2

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Router>enable

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#

Router(config)#interface FastEthernet8/0

Router(config-if)#

ILUSTRACIÓN 8 ROUTER 3 8/0

FASTETHERNET 9/0

Router 3

PhysicalConfigCLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet8/0

FastEthernet9/0

FastEthernet9/0

Port Status

☒ On

Bandwidth

☒ Auto

☐ 10 Mbps

☒ 100 Mbps

Duplex

☒ Auto

☒ Full Duplex

☐ Half Duplex

MAC Address

0090.2BBD.6E82

IP Address

172.16.2.1

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Router(config)#

Router(config)#interface FastEthernet8/0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface FastEthernet9/0

Router(config-if)#

ILUSTRACIÓN 9 ROUTER 3 9/0

ORDENADOR 172.16.2.1

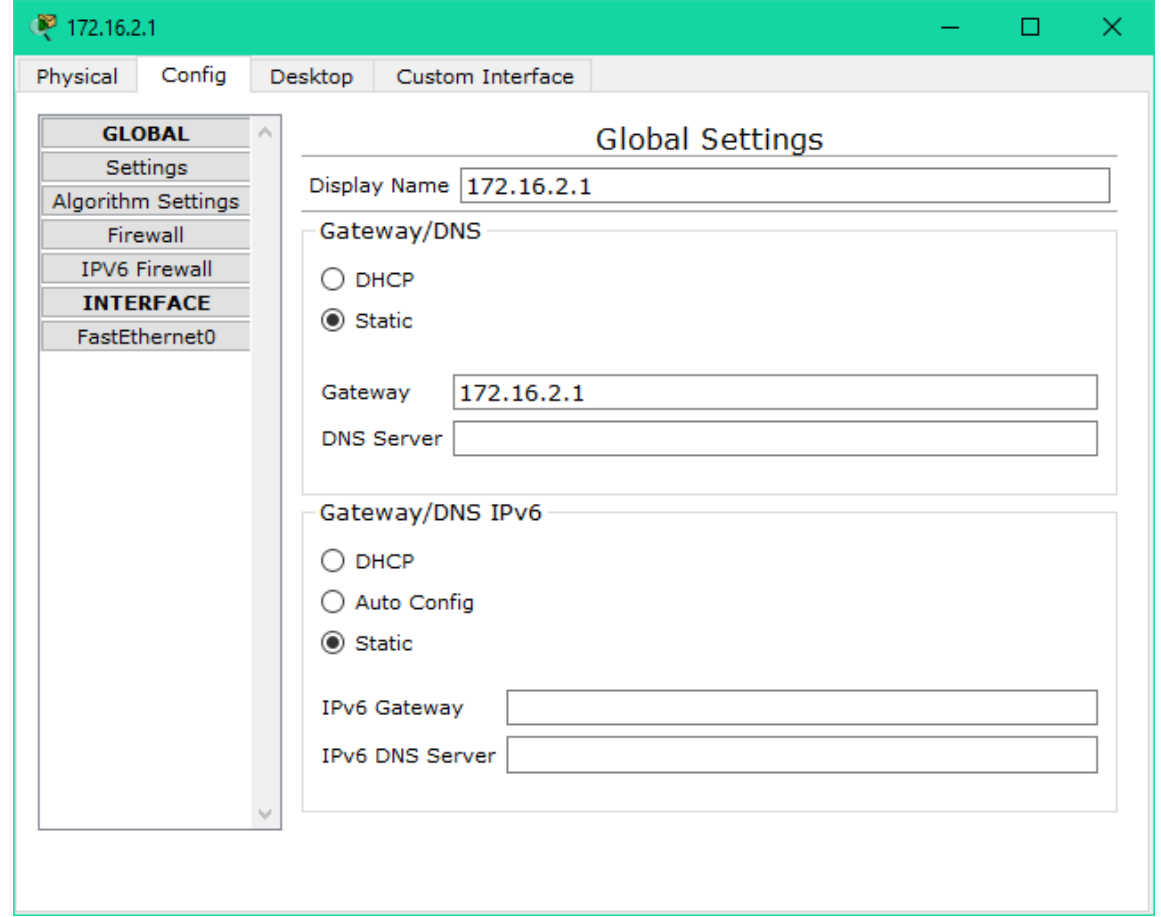


ILUSTRACIÓN 10 HOST 172.16.2.1

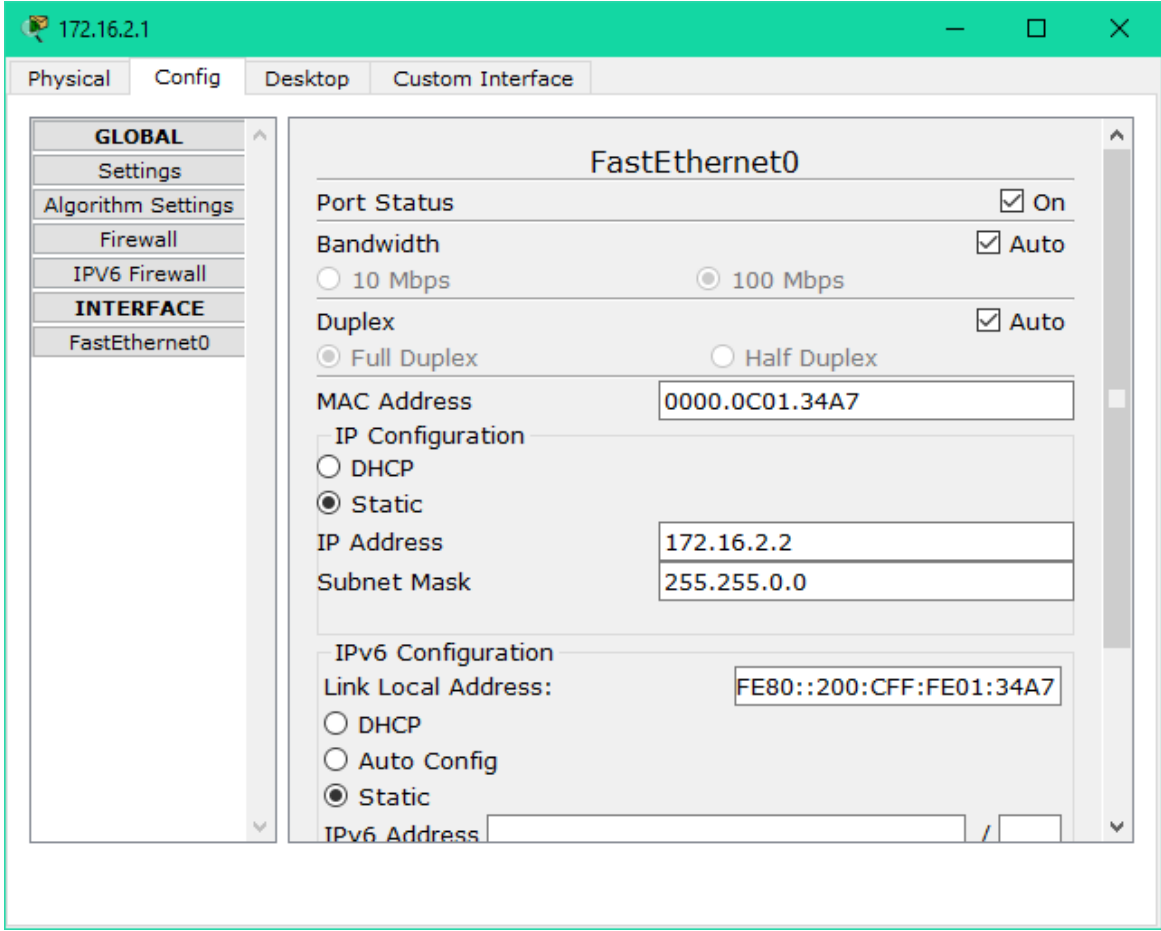
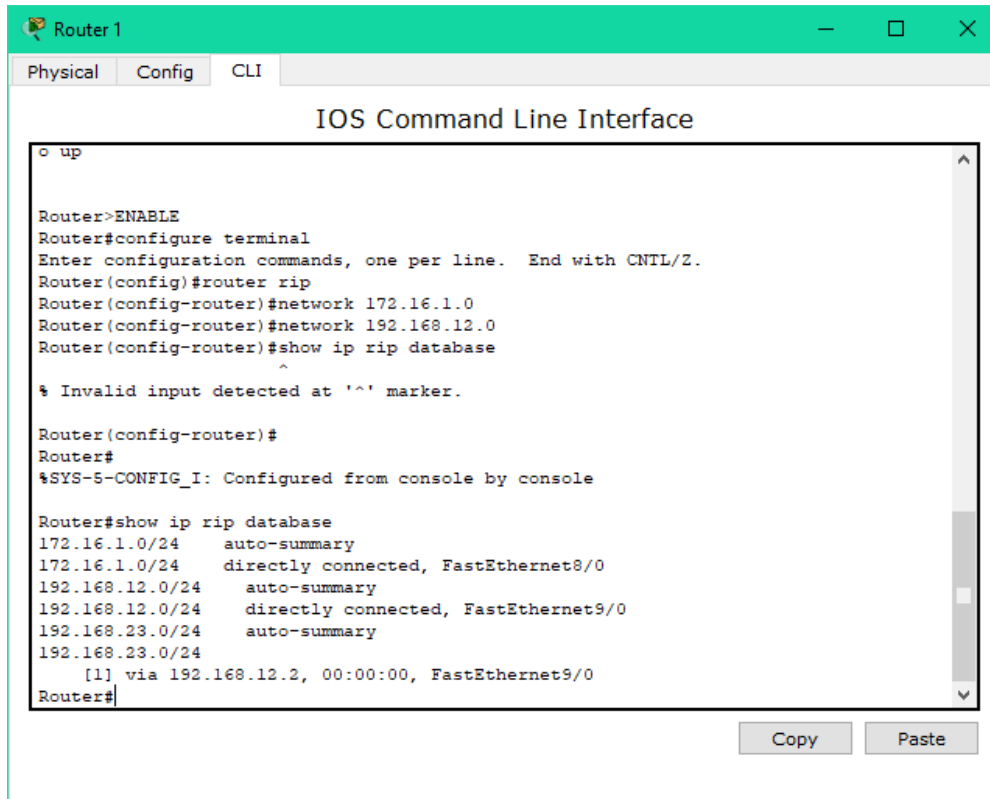


ILUSTRACIÓN 11 HOST 172.16.2.1

INDICA, A NIVEL DE TRANSPORTE, LOS PUERTOS UTILIZADOS POR RIP Y EL PROTOCOLO A NIVEL DE TRANSPORTE.

El protocolo RIP utiliza a capa 4 o capa de transporte el protocolo UDP y el puerto es el 520. Para establecer la ruta dinámica y poder proseguir con los ejercicios introduciremos en los tres router los siguientes comandos:

The screenshot shows the CLI of Router 1. The window title is "Router 1". There are tabs for "Physical", "Config", and "CLI", with "CLI" being the active tab. The main area is titled "IOS Command Line Interface". The command history shows the following sequence: "Router>enable", "Router#configure terminal", "Router(config)#router rip", "Router(config-router)#network 172.16.1.0", "Router(config-router)#network 192.168.12.0", and "Router(config-router)#show ip rip database". The output of the last command is displayed, showing the RIP database with entries for 172.16.1.0/24 and 192.168.12.0/24, both marked as "auto-summary" and "directly connected". There is also a line indicating a route via 192.168.12.2. At the bottom right, there are "Copy" and "Paste" buttons.

```
Router 1
Physical Config CLI
IOS Command Line Interface

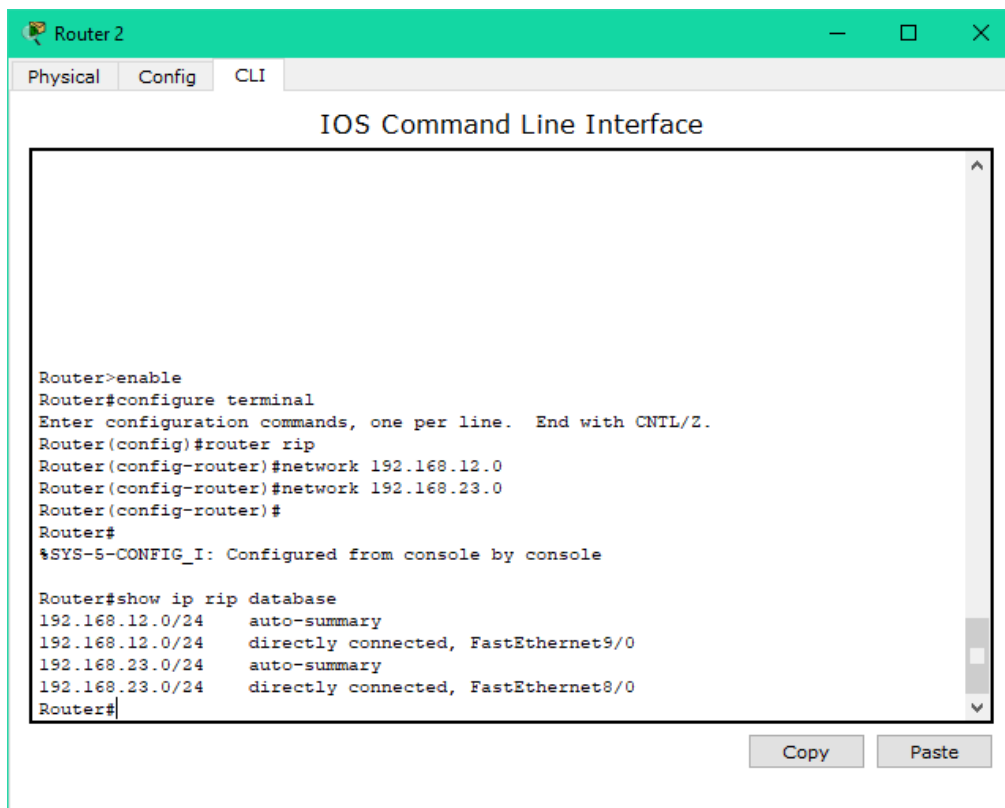
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 172.16.1.0
Router(config-router)#network 192.168.12.0
Router(config-router)#show ip rip database

% Invalid input detected at '^' marker.

Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip rip database
172.16.1.0/24    auto-summary
172.16.1.0/24    directly connected, FastEthernet8/0
192.168.12.0/24  auto-summary
192.168.12.0/24  directly connected, FastEthernet9/0
192.168.23.0/24  auto-summary
192.168.23.0/24  [1] via 192.168.12.2, 00:00:00, FastEthernet9/0
Router#
```

ILUSTRACIÓN 12 ROUTER 1

The screenshot shows the CLI of Router 2. The window title is "Router 2". There are tabs for "Physical", "Config", and "CLI", with "CLI" being the active tab. The main area is titled "IOS Command Line Interface". The command history shows the following sequence: "Router>enable", "Router#configure terminal", "Router(config)#router rip", "Router(config-router)#network 192.168.12.0", "Router(config-router)#network 192.168.23.0", and "Router(config-router)#show ip rip database". The output of the last command is displayed, showing the RIP database with entries for 192.168.12.0/24 and 192.168.23.0/24, both marked as "auto-summary" and "directly connected". At the bottom right, there are "Copy" and "Paste" buttons.

```
Router 2
Physical Config CLI
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.12.0
Router(config-router)#network 192.168.23.0
Router(config-router)#show ip rip database

%SYS-5-CONFIG_I: Configured from console by console

Router#show ip rip database
192.168.12.0/24  auto-summary
192.168.12.0/24  directly connected, FastEthernet9/0
192.168.23.0/24  auto-summary
192.168.23.0/24  directly connected, FastEthernet8/0
Router#
```

ILUSTRACIÓN 13 ROUTER 2

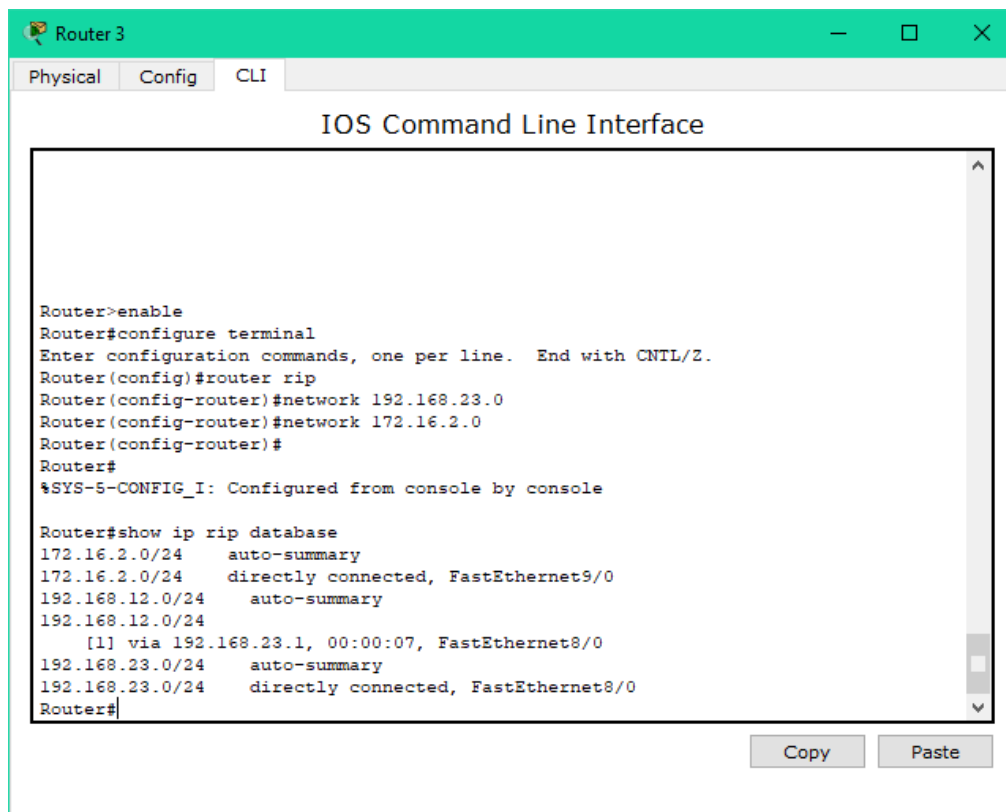
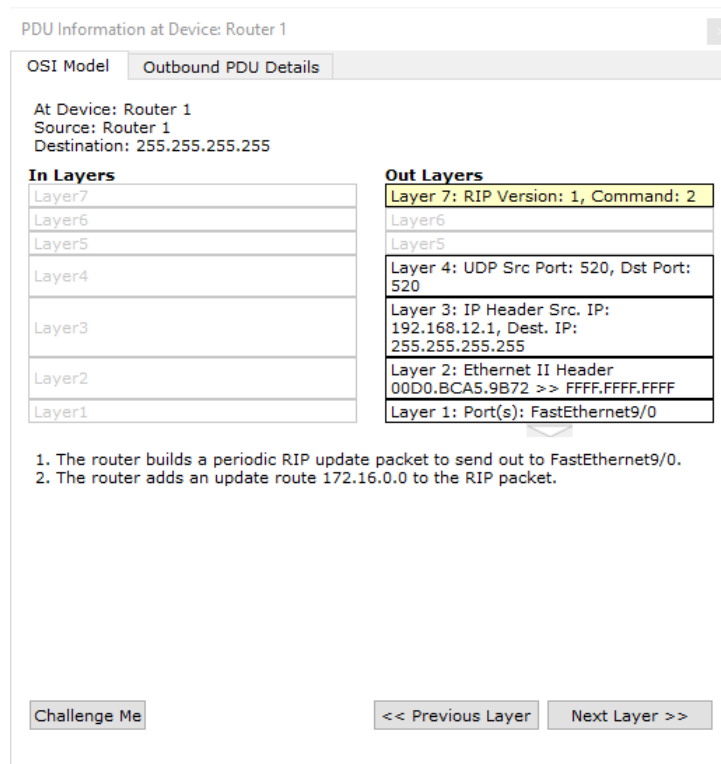


ILUSTRACIÓN 14 ROUTER 3

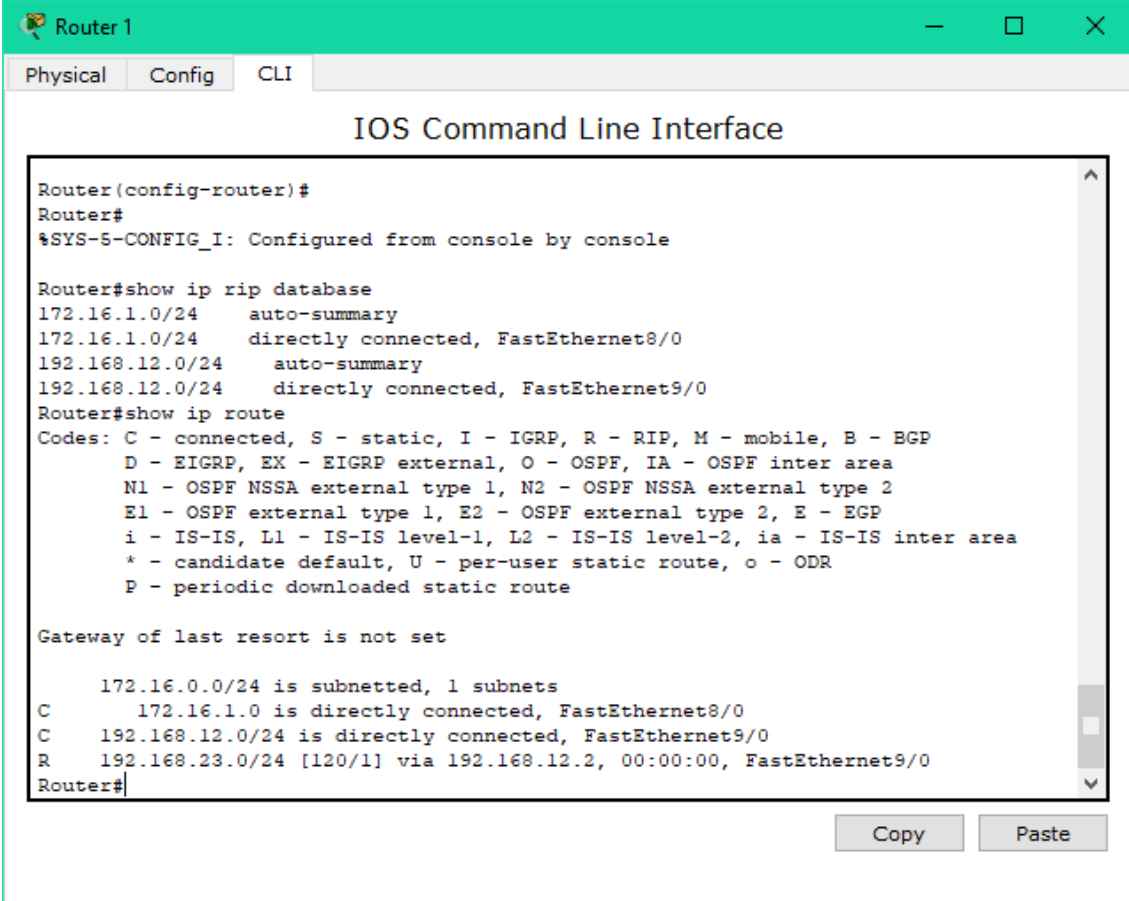
CAPTURA UN MENSAJE DE TIPO RIP GENERADO POR UNO DE LOS ROUTERS E INTERPRETA LA INFORMACIÓN QUE TIENE.



En este mensaje nos está indicando que el mensaje lo va a enviar por broadcast y nos describe las características del mensaje en cada capa. En la capa 1 o capa física nos indica la interfaz en este caso la FastEthernet 9/0, en la capa 2 o capa de enlace de datos nos indica que utiliza Ethernet y dirección de broadcast, en la capa 3 o capa de datos nos indica el emisor del mensaje en este caso 192.168.12.1 y su

destinatario que es broadcast ósea todos, la capa 4 o capa de transporte nos indica que utiliza el protocolo UDP, el puerto 520 tanto para el emisor como para el destinatario y en la capa 7 o capa de aplicación indica que utiliza el protocolo RIP en su versión 1.

UNA VEZ QUE UNO DE LOS PAQUETES HAYA LLEGADO A UN ROUTER, MUESTRA SU TABLA DE RUTAS PARA VER SI SE HA ACTUALIZADO. ¿QUÉ DISTANCIA ADMINISTRATIVA TIENE RIP? ¿QUÉ MÉTRICA?



The screenshot shows a Cisco Router CLI window titled "Router 1" with tabs for "Physical", "Config", and "CLI". The main window is titled "IOS Command Line Interface". The command prompt is "Router(config-router)#". The user has entered the command "Router#show ip rip database", which displays the following output:

```
Router#show ip rip database
172.16.1.0/24    auto-summary
172.16.1.0/24    directly connected, FastEthernet8/0
192.168.12.0/24  auto-summary
192.168.12.0/24  directly connected, FastEthernet9/0
```

The user has then entered the command "Router#show ip route", which displays the following output:

```
Router#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

    172.16.0.0/24 is subnetted, 1 subnets
C       172.16.1.0 is directly connected, FastEthernet8/0
C       192.168.12.0/24 is directly connected, FastEthernet9/0
R       192.168.23.0/24 [120/1] via 192.168.12.2, 00:00:00, FastEthernet9/0
Router#
```

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

Y como vemos se ha actualizado correctamente. La distancia administrativa de RIP es de 120 y para las rutas directamente conectadas 0.

PDU Information at Device: Router 1

OSI Model Outbound PDU Details

PDU Formats

UDP

0	16	31	Bits
SRC PORT: 520		DEST PORT: 520	
LENGTH: 0x34		CHECKSUM: 0x0	
DATA (VARIABLE)			

RIP v.1

0	4	8	16	19	31	Bits
CMD: 0x2		VER: 0x1		0000 0000 0000 0000		
ADDR FAMILY: 0x2				0000 0000 0000 0000		
NETWORK: 192.168.12.0						
0000 0000 0000 0000						
NEXT HOP: 0.0.0.0						
METRIC: 0x1						
ADDR FAMILY: 0x2		0000 0000 0000 0000				
NETWORK: 192.168.23.0						
0000 0000 0000 0000						
NEXT HOP: 0.0.0.0						
METRIC: 0x2						

Su métrica en este caso es de 2 ya que el mensaje le estoy enviando del Router 1 al host 172.16.2.1