

Instituto Tecnológico de Salina Cruz

Fundamentos de Redes

Semestre Enero – Julio 2015

Reporte de Práctica

Práctica nº 1

Unidad 6

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Objetivo:

- Conectar una red de acuerdo con el Diagrama de topología
- Realizar tareas de configuración básicas en un router
- Configurar y activar interfaces
- Configurar el enrutamiento OSPF en todos los routers
- Configurar las ID del router OSPF
- Verificar el enrutamiento OSPF por medio de los comandos show
- Configurar una ruta estática por defecto

:

Topología de red.

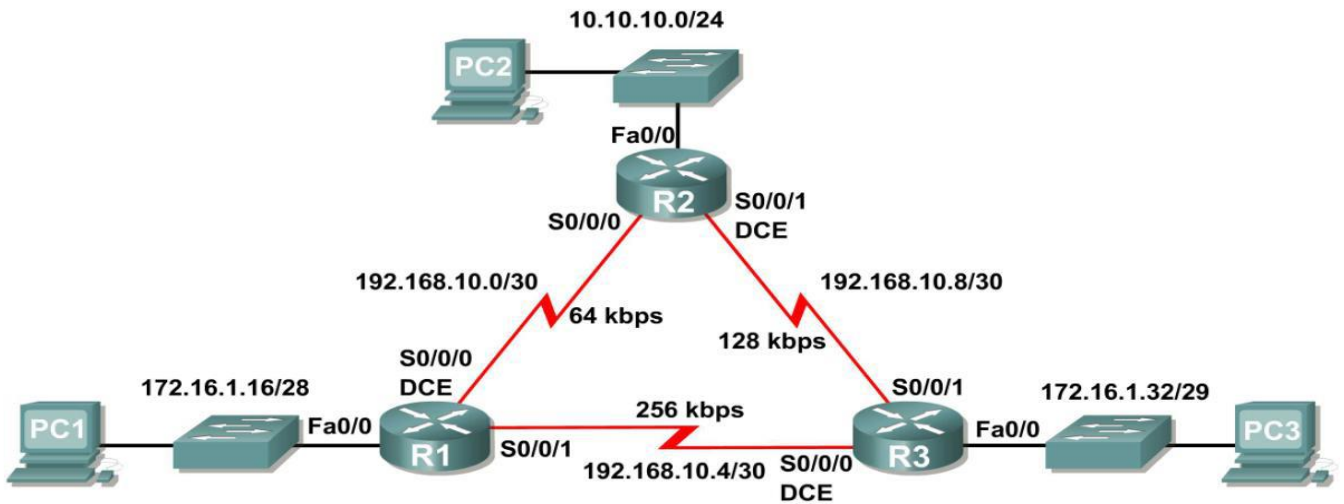


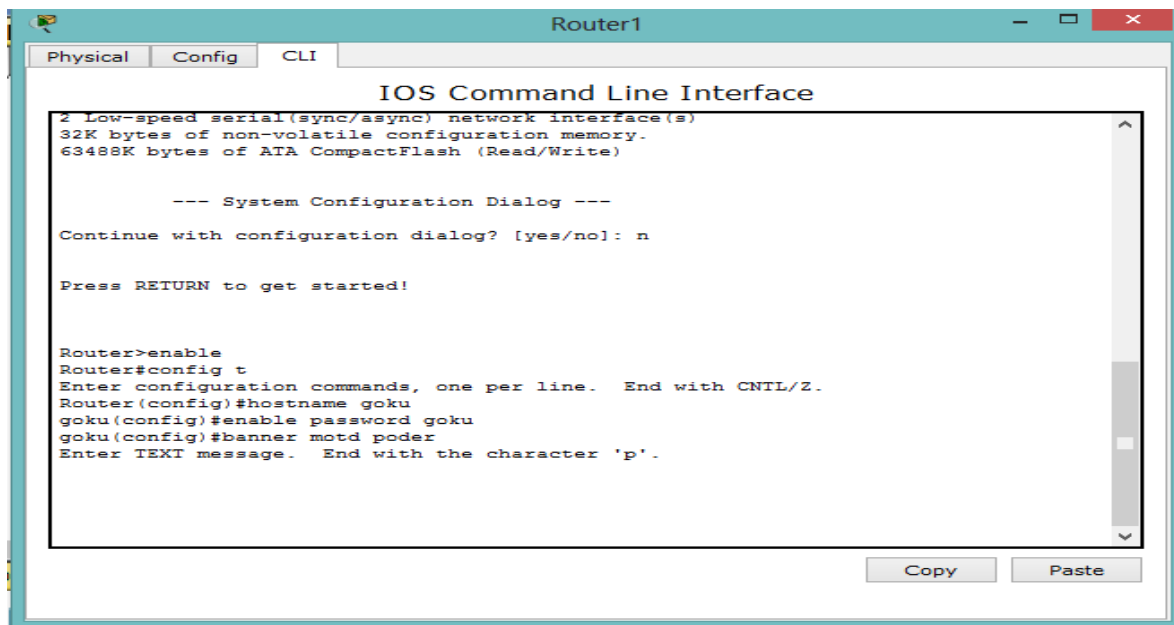
Tabla de direccionamiento.

Dispositivo	Interfaz	Dirección IP	Máscara de subred	Gateway por defecto
R1	Fa0/0	172.16.1.17	255.255.255.240	No aplicable
	S0/0/0	192.168.10.1	255.255.255.252	No aplicable
	S0/0/1	192.168.10.5	255.255.255.252	No aplicable
R2	Fa0/0	10.10.10.1	255.255.255.0	No aplicable
	S0/0/0	192.168.10.2	255.255.255.252	No aplicable
	S0/0/1	192.168.10.9	255.255.255.252	No aplicable
R3	Fa0/0	172.16.1.33	255.255.255.248	No aplicable
	S0/0/0	192.168.10.6	255.255.255.252	No aplicable
	S0/0/1	192.168.10.10	255.255.255.252	No aplicable
PC1	NIC	172.16.1.20	255.255.255.240	172.16.1.17
PC2	NIC	10.10.10.10	255.255.255.0	10.10.10.1
PC3	NIC	172.16.1.35	255.255.255.248	172.16.1.33

Realización de las configuraciones básicas del router.

## Configurar el nombre y la contraseña del router1

Configure un mensaje del día.



The screenshot shows the CLI interface for Router1. The window title is "Router1". The interface has tabs for "Physical", "Config", and "CLI". The main content area displays the following text:

```
IOS Command Line Interface
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: n

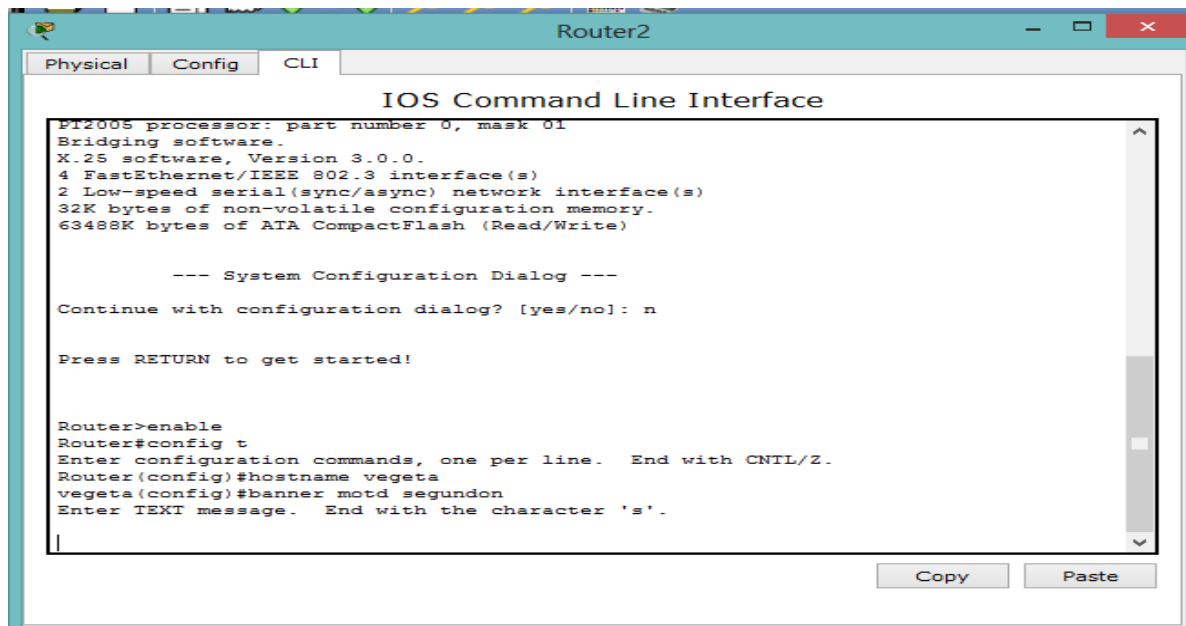
Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname goku
goku(config)#enable password goku
goku(config)#banner motd poder
Enter TEXT message.  End with the character 'p'.
```

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

## Configurar el nombre y la contraseña del router2

Configure un mensaje del día.



The screenshot shows the CLI interface for Router2. The window title is "Router2". The interface has tabs for "Physical", "Config", and "CLI". The main content area displays the following text:

```
IOS Command Line Interface
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: n

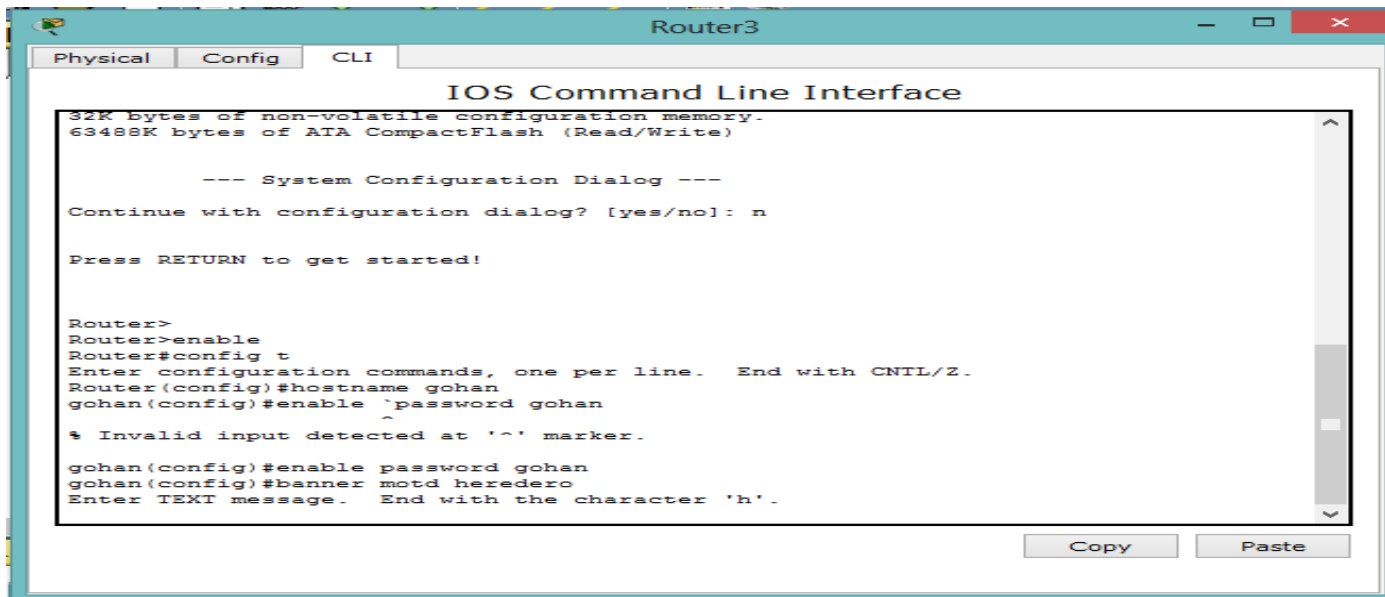
Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname vegeta
vegeta(config)#banner motd segundon
Enter TEXT message.  End with the character 's'.
```

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

## Configurar el nombre y la contraseña del router3

Configure un mensaje del día.



**Configuración y activación de las direcciones serial y Ethernet. Configurar y activar las interfaces y los seriales de R1.**

```
>enable
rd:
#conf t
configuration commands, one per line. End with CNTL/Z.
(config)#interface fa0/0
(config-if)#ip address 172.16.1.17 255.255.255.240
(config-if)#no shut

-----
(config)#interface s2/0
(config-if)#ip address 192.168.10.1 255.255.255.252
(config-if)#no shut

5-CHANGED: Interface Serial2/0, changed state to down
(config-if)#

-----
(config)#interface s3/0
(config-if)#ip address 192.168.10.5 255.255.255.252
(config-if)#no shut

5-CHANGED: Interface Serial3/0, changed state to down
(config-if)#
```

## Configurar y activar las interfaces y los seriales de R2.

```
>enable
d:
#conf t
onfiguration commands, one per line. End with CNTL/Z.
(config)#interface fa0/0
(config-if)#ip address 10.10.10.1 255.0.0.0
(config-if)#no shut

(config)#interface s2/0
(config-if)#ip address 192.168.10.2 255.255.255.252
(config-if)#no shut

(config-if)#
-CHANGED: Interface Serial2/0, changed state to up

(config-if)#
OTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up



---


[config)#interface s3/0
[config-if)#ip address 192.168.10.9 255.255.255.252
[config-if)#no shut

-CHANGED: Interface Serial3/0, changed state to down
[config-if)#
[config-if)#
```

## Configurar y activar las interfaces y los seriales de R3.

```
-enable
:d:
tconf t
:configuration commands, one per line. End with CNTL/Z.
[config)#interface f0/0
[config-if)#ip address 172.16.1.33 255.255.255.248
[config-if)#no shut

[config)#interface s2/0
[config-if)#ip address 192.168.10.6 255.255.255.252
[config-if)#no shut

[config)#interface s3/0
[config-if)#ip address 192.168.10.10 255.255.255.252
[config-if)#no shut

[config-if)#
5-CHANGED: Interface Serial3/0, changed state to up
```

## Verificar el direccionamiento IP y las interfaces.

### R1.

```
Dreysi#show ip interface brief
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          172.16.1.17     YES manual up           up
FastEthernet1/0          unassigned      YES unset   administratively down down
Serial2/0                192.168.10.1    YES manual up           up
Serial3/0                192.168.10.5    YES manual up           up
FastEthernet4/0          unassigned      YES unset   administratively down down
FastEthernet5/0          unassigned      YES unset   administratively down down
Dreysi#
```

### R2.

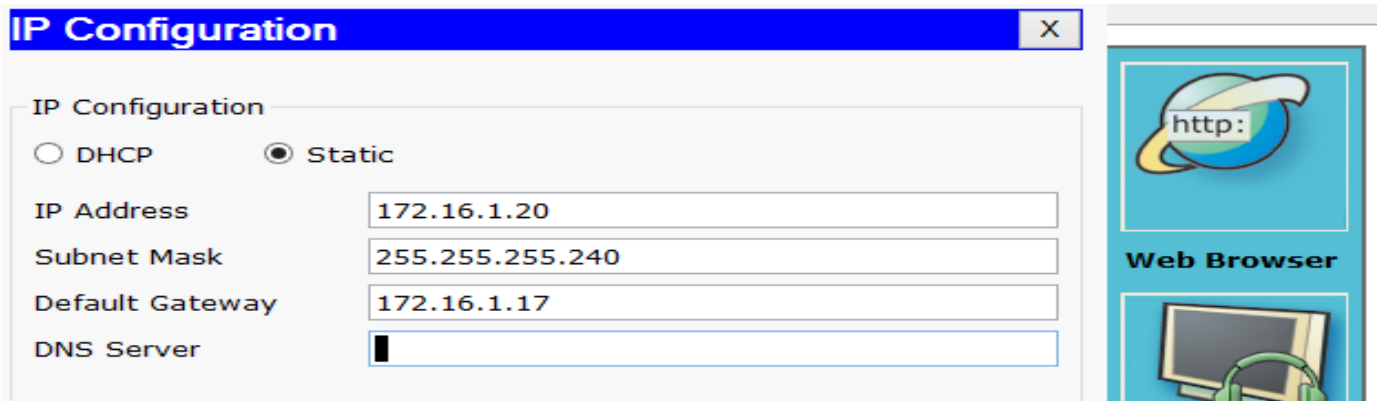
```
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          10.10.10.1      YES manual up           up
FastEthernet1/0          unassigned      YES unset   administratively down down
Serial2/0                192.168.10.2    YES manual up           up
Serial3/0                192.168.10.9    YES manual up           up
FastEthernet4/0          unassigned      YES unset   administratively down down
FastEthernet5/0          unassigned      YES unset   administratively down down
Chulera#
```

### R3.

```
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          172.16.1.33     YES manual up           up
FastEthernet1/0          unassigned      YES unset   administratively down down
Serial2/0                192.168.10.6    YES manual up           up
Serial3/0                192.168.10.10   YES manual up           up
FastEthernet4/0          unassigned      YES unset   administratively down down
FastEthernet5/0          unassigned      YES unset   administratively down down
Crosas#
```

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

PC1.

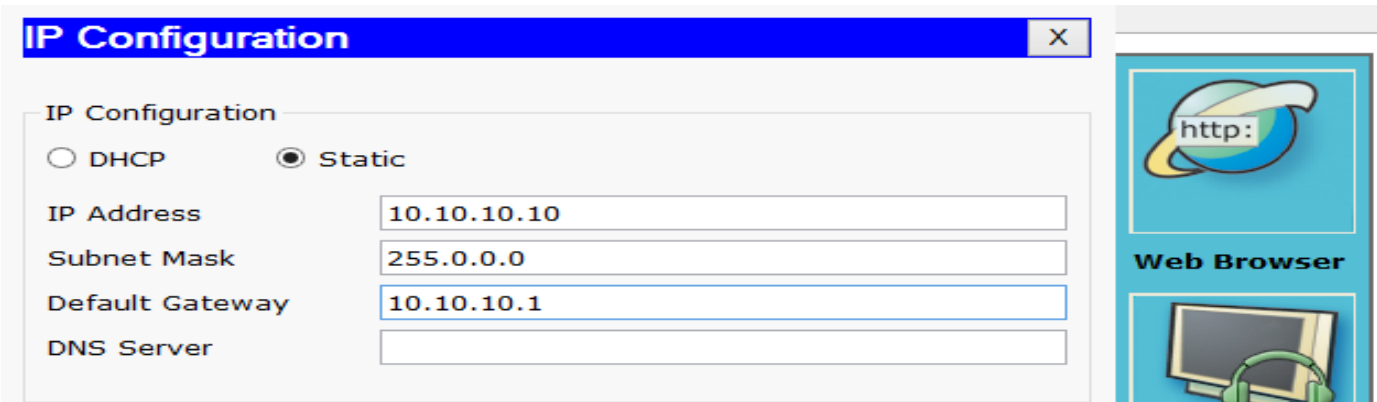


The screenshot shows the 'IP Configuration' window for PC1. The window title is 'IP Configuration' with a close button (X). Under the 'IP Configuration' section, the 'Static' radio button is selected. The fields are filled with the following values:

Field	Value
IP Address	172.16.1.20
Subnet Mask	255.255.255.240
Default Gateway	172.16.1.17
DNS Server	

To the right of the configuration window is a 'Web Browser' icon, which is a blue square containing a globe with 'http:' written on it, and a computer monitor with headphones below it.

PC2.

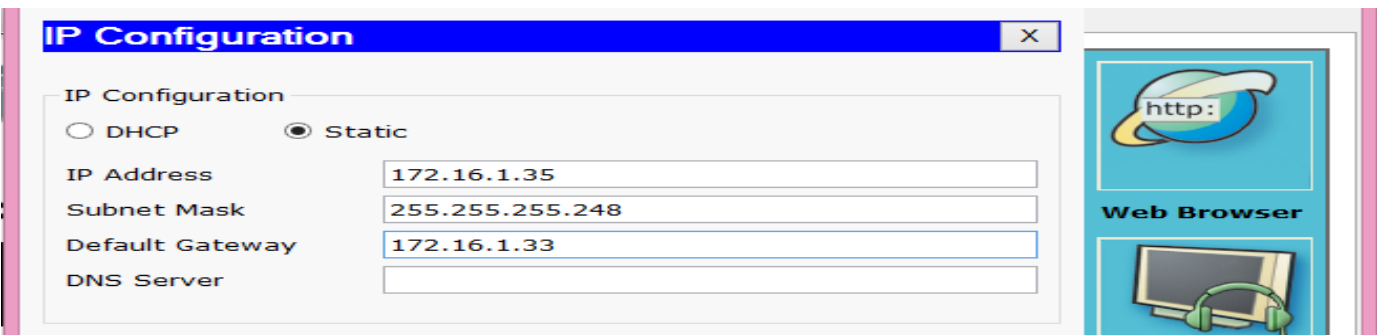


The screenshot shows the 'IP Configuration' window for PC2. The window title is 'IP Configuration' with a close button (X). Under the 'IP Configuration' section, the 'Static' radio button is selected. The fields are filled with the following values:

Field	Value
IP Address	10.10.10.10
Subnet Mask	255.0.0.0
Default Gateway	10.10.10.1
DNS Server	

To the right of the configuration window is a 'Web Browser' icon, which is a blue square containing a globe with 'http:' written on it, and a computer monitor with headphones below it.

PC3.



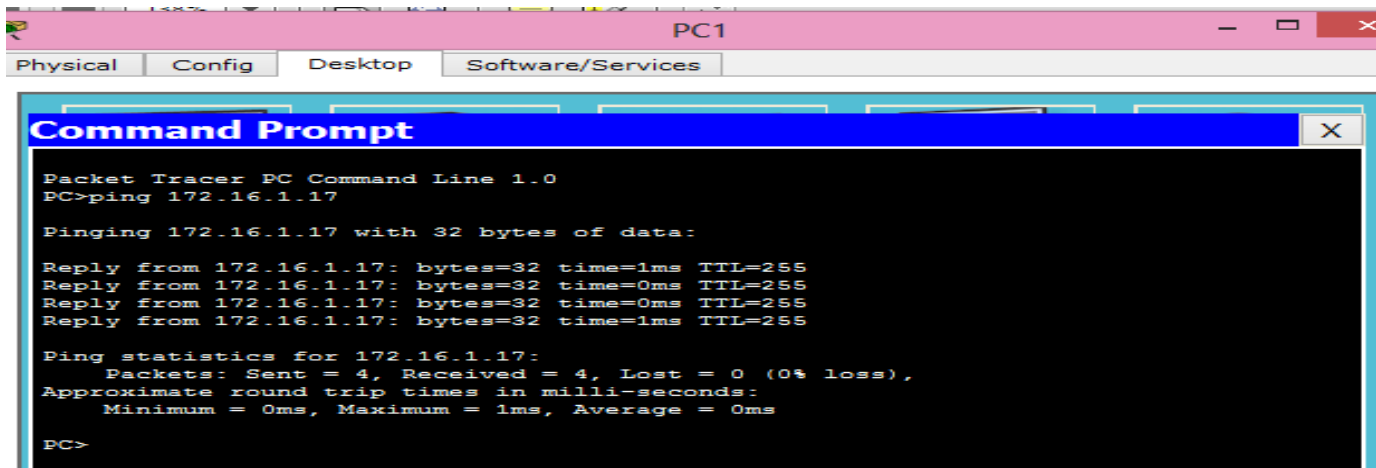
The screenshot shows the 'IP Configuration' window for PC3. The window title is 'IP Configuration' with a close button (X). Under the 'IP Configuration' section, the 'Static' radio button is selected. The fields are filled with the following values:

Field	Value
IP Address	172.16.1.35
Subnet Mask	255.255.255.248
Default Gateway	172.16.1.33
DNS Server	

To the right of the configuration window is a 'Web Browser' icon, which is a blue square containing a globe with 'http:' written on it, and a computer monitor with headphones below it.

Probar la configuración de la PC ejecutando un ping desde la PC al gateway por defecto.

Ping desde la PC1 al Gateway por defecto.



```
PC1
Physical  Config  Desktop  Software/Services

Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 172.16.1.17

Pinging 172.16.1.17 with 32 bytes of data:
Reply from 172.16.1.17: bytes=32 time=1ms TTL=255
Reply from 172.16.1.17: bytes=32 time=0ms TTL=255
Reply from 172.16.1.17: bytes=32 time=0ms TTL=255
Reply from 172.16.1.17: bytes=32 time=1ms TTL=255

Ping statistics for 172.16.1.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

### Configuración OSPF en el router R1

```
>enable
rd:
#conf t
configuration commands, one per line.  End with CNTL/Z.
(config)#router ospf 1
(config-router)#network 172.16.1.16 0.0.0.15 area 0
(config-router)#network 192.168.10.4 0.0.0.3 area 0
(config-router)#network 192.168.10.0 0.0.0.3 area 0
(config-router)#end
#
-CONFIG_I: Configured from console by console
#
```



Utilizar las direcciones de loopback para cambiar las ID del router de los routers en la topología.

```
(config)#interface loopback 0
(config-if)#
%CHANGED: Interface Loopback0, changed state to up
ROTO-S-UPDOWN: Line protocol on Interface Loopback0, changed state to up
(config-if)#ip address 10.1.1.1 255.255.255.255

(config)#interface loopback 0
(config-if)#ip address 11.2.2.2 255.255.255.255
(config-if)#end
#
CONFIG_I: Configured from console by console
#
```

```
(config)#interface loopback 0
(config-if)#
%CHANGED: Interface Loopback0, changed state to up
ROTO-S-UPDOWN: Line protocol on Interface Loopback0, changed state to up
(config-if)#ip address 10.3.3.3 255.255.255.255
(config-if)#end
#
```

Utilizar el comando `show ip ospf neighbors` para verificar que se han cambiado las ID de los routers.

```
Neighbor ID      Pri   State           Dead Time   Address      Interface
192.168.10.9     0    FULL/ -         00:00:30   192.168.10.2 Serial2/0
192.168.10.10   0    FULL/ -         00:00:37   192.168.10.6 Serial3/0

Neighbor ID      Pri   State           Dead Time   Address      Interface
192.168.10.5     0    FULL/ -         00:00:36   192.168.10.1 Serial2/0
192.168.10.10   0    FULL/ -         00:00:35   192.168.10.10 Serial3/0

Neighbor ID      Pri   State           Dead Time   Address      Interface
192.168.10.9     0    FULL/ -         00:00:38   192.168.10.9 Serial3/0
192.168.10.5     0    FULL/ -         00:00:34   192.168.10.5 Serial2/0
```

+

Utilizar el comando router-id para cambiar el ID del router en el router R1.

```
>enable
rd:
#conf t
configuration commands, one per line. End with CNTL/Z.
(config)#router ospf 1
(config-router)#router-id 10.4.4.4
(config-router)#Reload or use "clear ip ospf process" command, for this to
effect

(config-router)#end
#
-CONFIG_I: Configured from console by console

#clear ip ospf process
ALL OSPF processes? [no]: yes

#
07: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
Neighbor Down: Adjacency forced to reset
```

En el router R1 utilice el comando show ip protocols para ver información sobre las operaciones del protocolo de enrutamiento.

```
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 10.4.4.4
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.16.1.16 0.0.0.15 area 0
    192.168.10.4 0.0.0.3 area 0
    192.168.10.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    10.4.4.4         110          00:01:32
    192.168.10.5    110          00:39:42
    192.168.10.9    110          00:01:32
    192.168.10.10  110          00:01:32
  Distance: (default is 110)
```

Visualice la tabla de enrutamiento en el router R1. En la tabla de enrutamiento las rutas OSPF se indican con una "O".

```
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

 10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
O   10.0.0.0/8 [110/65] via 192.168.10.2, 00:04:10, Serial2/0
C   10.1.1.1/32 is directly connected, Loopback0
 172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C   172.16.1.16/28 is directly connected, FastEthernet0/0
O   172.16.1.32/29 [110/65] via 192.168.10.6, 00:04:10, Serial3/0
 192.168.10.0/30 is subnetted, 3 subnets
C   192.168.10.0 is directly connected, Serial2/0
C   192.168.10.4 is directly connected, Serial3/0
O   192.168.10.8 [110/128] via 192.168.10.6, 00:04:10, Serial3/0
                                     [110/128] via 192.168.10.2, 00:04:10, Serial2/0
Dreysi#
```

Utilizar el comando show interfaces serial0/0/0 en el router R1 para visualizar el ancho de banda de la interfaz Serial 0/0/0.

```
Serial2/0 is up, line protocol is up (connected)
Hardware is HD64570
Internet address is 192.168.10.1/30
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 54 bits/sec, 0 packets/sec
5 minute output rate 54 bits/sec, 0 packets/sec
  173 packets input, 12496 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
  140 packets output, 9620 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets
  0 output buffer failures, 0 output buffers swapped out
```

Utilizar el comando bandwidth para cambiar el ancho de banda de las interfaces seriales de los routers R1 y R2 al ancho de banda actual, 64 kbps.

+

```
(config)#interface serial2/0
(config-if)#bandwidth 64
(config-if)#interface serial3/0
(config-if)#bandwidth 64

~

(config)#interface serial2/0
(config-if)#bandwidth 64
(config-if)#interface serial3/0
(config-if)#bandwidth 64
```

Utilizar el comando show ip ospf interface en el router R1 para verificar el costo de los enlaces seriales. El costo de cada uno de los enlaces seriales ahora es de 1562, el resultado del cálculo: 108/64.000 bps.

```
Serial3/0 is up, line protocol is up
Internet address is 192.168.10.5/30, Area 0
Process ID 1, Router ID 10.4.4.4, Network Type POINT-TO-POINT, Cost: 1562
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:02
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1, Adjacent neighbor count is 1
  Adjacent with neighbor 192.168.10.10
Suppress hello for 0 neighbor(s)
Serial2/0 is up, line protocol is up
Internet address is 192.168.10.1/30, Area 0
Process ID 1, Router ID 10.4.4.4, Network Type POINT-TO-POINT, Cost: 1562
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:03
```

**Configurar una dirección de loopback en el router R1 para simular un enlace a un ISP.**

```
(config)#interface loopback 1
(config-if)#
5-CHANGED: Interface Loopback1, changed state to up
ROTO-S-UPDOWN: Line protocol on Interface Loopback1, changed state to up
(config-if)#ip address 172.30.1.1 255.255.255.252
```

**Configurar los intervalos de Hello y Dead de OSPF.**

```
(config)#interface serial2/0
(config-if)#ip ospf hello-interval 5
(config-if)#ip ospf dead-interval 20
(config-if)#
5: %OSPF-5-ADJCHG: Process 1, Nbr 10.4.4.4 on Serial2/0 from LOADING to F
ading Done

(config)#interface serial2/0
(config-if)#ip ospf hello-interval 5
(config-if)#ip ospf dead-interval 20
(config-if)#
43: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
Neighbor Down: Dead timer expired

43: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
Neighbor Down: Interface down or detached
```

**Utilizar el comando show ip ospf interface serial0/0/0 para verificar que se han cambiado los intervalos del temporizador Hello y del temporizador Dead.**

```
Serial2/0 is up, line protocol is up
Internet address is 192.168.10.2/30, Area 0
Process ID 1, Router ID 192.168.10.9, Network Type POINT-TO-POINT, Cost: 1562
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 5, Dead 20, Wait 20, Retransmit 5
Hello due in 00:00:02
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1, Adjacent neighbor count is 1
Adjacent with neighbor 10.4.4.4
Suppress hello for 0 neighbor(s)
```

**Utilizar el comando show ip ospf neighbor en el router R1 para verificar que la adyacencia vecina con R2 se ha restaurado.**

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.10.9	0	FULL/ -	00:00:16	192.168.10.2	Serial2/0
192.168.10.10	0	FULL/ -	00:00:31	192.168.10.6	Serial3/0