INSTITUTO TÉCNOLOGICO DE SALINA CRUZ

REDES DE COMPUTADORA

SEMESTRE FEBRERO-AGOSTO 2015

REPORTE DE PRÁCTICAS

PRACTICA N°: 1

UNIDAD: 6

FECHA: 04 DE JUNIO DE 2015

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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

Instrucciones:

1.- Realización de las configuraciones básicas del router.

2.- Configuración y activación de las direcciones serial y Ethernet.

3.- Configuración OSPF en los 3 router´s.

4.- Verificación del funcionamiento de OSPF.

5.- Redistribución de una ruta OSPF por defecto.

6.- Configuración de funciones adicionales de OSPF.

Materiales:

1.- PC

2.- Packet tracer.

3.- Libro de Cisco

Topología de red.

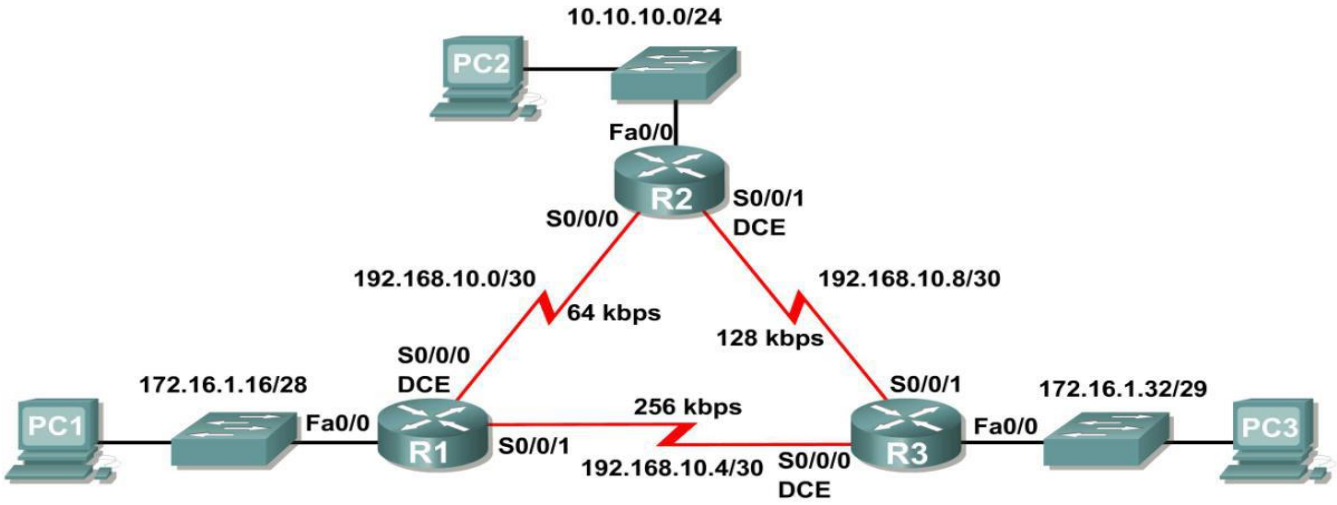

Tabla de direccionamiento.

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

```
Router>enable
Router#configure terminal
                                                    line.  End with CNTL/Z.
Router(config)#hostname Dreysi
Dreysi(config)#enable password 1234
```

Configure un mensaje del día.

```
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Dreysi>
```

Configurar el nombre y la contraseña del router2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Chuleta
Chuleta(config)#enable password lalo
Chuleta(config)#
```

Configure un mensaje del día.

```
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Chuleta>
```

Copy

Configurar el nombre y la contraseña del router3

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Crosas
Crosas(config)#enable password azul
Crosas(config)#
```

Configure un mensaje del día.

```
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Crosas>
```

Configuración y activación de las direcciones serial y Ethernet.

Configurar y activar las interfaces y los seriales de R1.

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

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

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

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

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

Configurar y activar las interfaces y los seriales de R2.

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

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

Chuleta(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

```
Chuleta(config)#interface s3/0
Chuleta(config-if)#ip address 192.168.10.9 255.255.255.252
Chuleta(config-if)#no shut

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

Configurar y activar las interfaces y los seriales de R3.

```
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Crosas>enable
Password:
Crosas#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Crosas(config)#interface f0/0
Crosas(config-if)#ip address 172.16.1.33 255.255.255.248
Crosas(config-if)#no shut
```

```
Crosas(config)#interface s2/0
Crosas(config-if)#ip address 192.168.10.6 255.255.255.252
Crosas(config-if)#no shut
```

```
Crosas(config)#interface s3/0
Crosas(config-if)#ip address 192.168.10.10 255.255.255.252
Crosas(config-if)#no shut

Crosas(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up
```

Verificar el direccionamiento IP y las interfaces.

R1.

```
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Dreysi>enable
Password:
Dreysi#show ip brief
          ^
% Invalid input detected at '^' marker.

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.

```
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Chuleta>enable
Password:
Chuleta#show ip interface brief
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
Chuleta#
```

R3.

```
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Crosas>enable
Password:
Crosas#show ip interface brief
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#
```
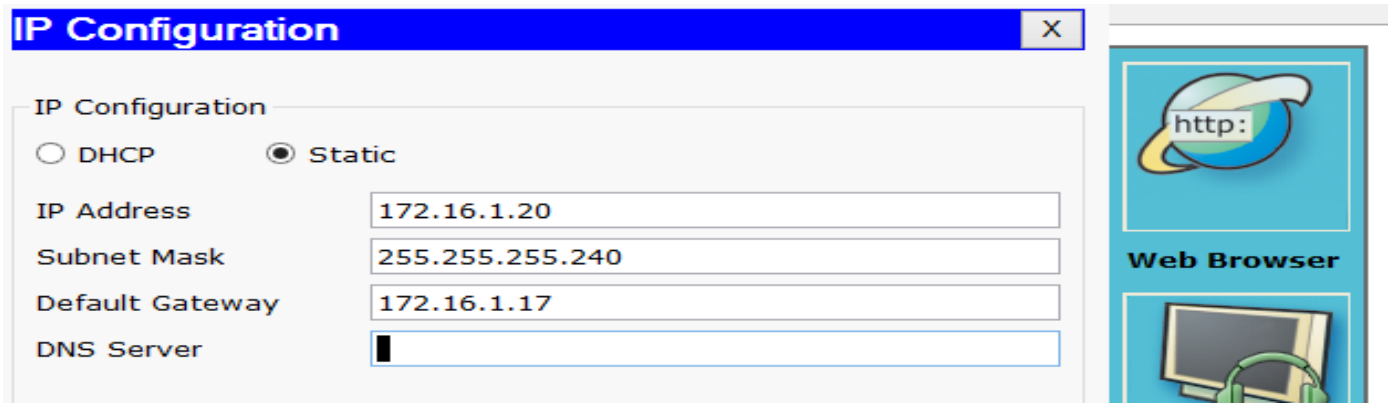
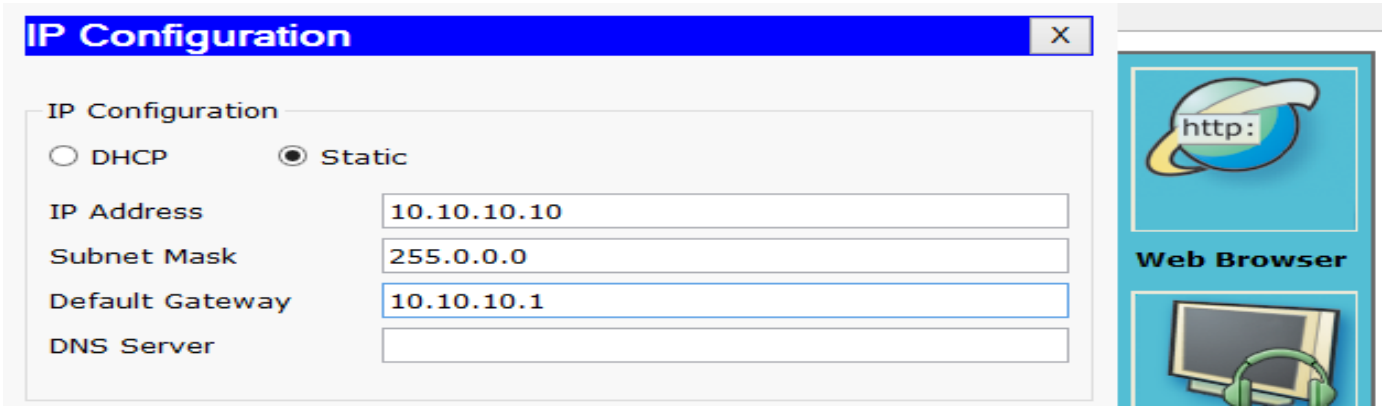

Configurar las interfaces Ethernet de las PC1, PC2 y PC3.

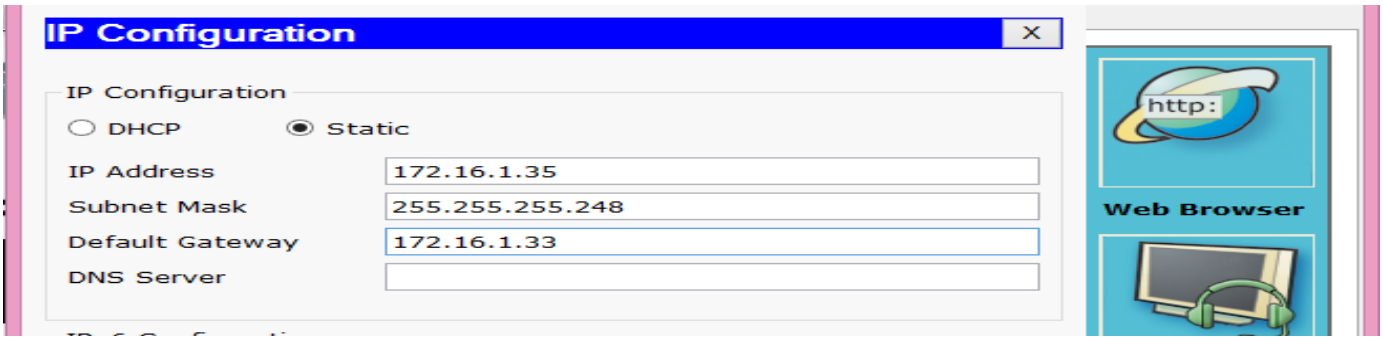
PC1.



PC2.

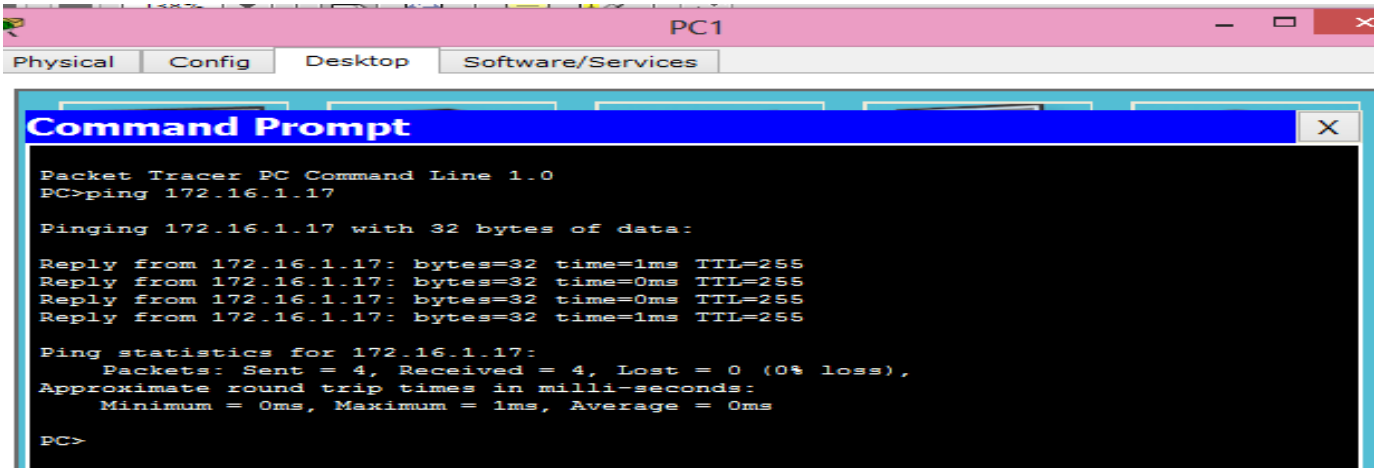


PC3.



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

Ping desde la PC1 al Gateway por defecto.



Configuración OSPF en el router R1

```
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Dreysi>enable
Password:
Dreysi#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Dreysi(config)#router ospf 1
Dreysi(config-router)#network 172.16.1.16 0.0.0.15 area 0
Dreysi(config-router)#network 192.168.10.4 0.0.0.3 area 0
Dreysi(config-router)#network 192.168.10.0 0.0.0.3 area 0
Dreysi(config-router)#end
Dreysi#
%SYS-5-CONFIG_I: Configured from console by console

Dreysi#
```

Configuración OSPF en el router R2.

```
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Chuleta>enable
Password:
Chuleta#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Chuleta(config)#router ospf 1
Chuleta(config-router)#network 10.10.10.0 0.0.0.255 area 0
Chuleta(config-router)#network 192.168.10.0 0.0.0.3 area 0
Chuleta(config-router)#
01:03:03: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.5 on Serial2/0 from LOADING
to FULL, Loading Done

Chuleta(config-router)#network 192.168.10.8 0.0.0.3 area o
                                                         ^
% Invalid input detected at '^' marker.

Chuleta(config-router)#network 192.168.10.8 0.0.0.3 area 0
Chuleta(config-router)#end
Chuleta#
%SYS-5-CONFIG_I: Configured from console by console

Chuleta#
```

Configuración OSPF en el router R3.

```
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Crosas>enable
Password:
Crosas#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Crosas(config)#router ospf 1
Crosas(config-router)#network 172.16.1.32 0.0.0.7 area 0
Crosas(config-router)#network 192.168.10.4 0.0.0.3 area 0
Crosas(config-router)#
01:06:02: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.5 on Serial2/0 from LOADING
to FULL, Loading Done

Crosas(config-router)#network 192.168.10.8 0.0.0.3 area 0
Crosas(config-router)#
01:06:41: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial3/0 from LOADING
to FULL, Loading Done

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

Crosas#
```

Examinar las ID actuales del router en la topología.

¿Cuál es la ID del router en R1?

192.168.10.5

¿Cuál es la ID del router en R2?

192.168.10.9

¿Cuál es la ID del router en R3?

192.168.10.10

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

```
Dreysi(config)#interface loopback 0

Dreysi(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Dreysi(config-if)#ip address 10.1.1.1 255.255.255.255
```

```
Chuleta(config)#interface loopback 0
Chuleta(config-if)#ip address 11.2.2.2 255.255.255.255
Chuleta(config-if)#end
Chuleta#
%SYS-5-CONFIG_I: Configured from console by console

Chuleta#
```

```
Crosas(config)#interface loopback 0

Crosas(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Crosas(config-if)#ip address 10.3.3.3 255.255.255.255
Crosas(config-if)#end
Crosas#
```

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

```
Dreysi#show ip ospf neighbor

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
Dreysi#
```

```
Chuleta#show ip ospf neighbor

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
Chuleta#
```

```
Crosas#show ip ospf neighbor

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
Crosas#
```

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

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


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

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

Dreysi#
00:17:07: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
DOWN, 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.

```
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Dreysi>enable
Password:
Dreysi#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 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”.

```
Dreysi#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

     10.0.0.0/8 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.

```
Dreysi#show interface serial2/0
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.

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

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

```
Dreysi(config)#interface loopback 1

Dreysi(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

Dreysi(config-if)#ip address 172.30.1.1 255.255.255.252
```

Configurar los intervalos de Hello y Dead de OSPF.

```
Dreysi(config)#interface serial2/0
Dreysi(config-if)#ip ospf hello-interval 5
Dreysi(config-if)#ip ospf dead-interval 20
Dreysi(config-if)#
01:56:43: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
DOWN, Neighbor Down: Dead timer expired

01:56:43: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.9 on Serial2/0 from FULL to
DOWN, Neighbor Down: Interface down or detached
```

```
Chuleta(config)#interface serial2/0
Chuleta(config-if)#ip ospf hello-interval 5
Chuleta(config-if)#ip ospf dead-interval 20
Chuleta(config-if)#
03:23:05: %OSPF-5-ADJCHG: Process 1, Nbr 10.4.4.4 on Serial2/0 from LOADING to F
ULL, Loading Done
```

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.

```
Chuleta#show ip ospf interface serial2/0
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
  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)
Chuleta#
```

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

```
Dreysi#show ip ospf neighbor

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
Dreysi#
```

CONCLUSIÓN

Podemos decir que en esta práctica fue la implementación del protocolo ospf, como sabemos este es un protocolo sin clase que puede utilizarse para proporcionar información de la máscara de subred en las actualizaciones del enrutamiento. Esto permitirá que se propague la información de red a través de la red de subred VLSM. Porque antes de realizar configuraciones se dividió la red en subredes por medio de VLSM.