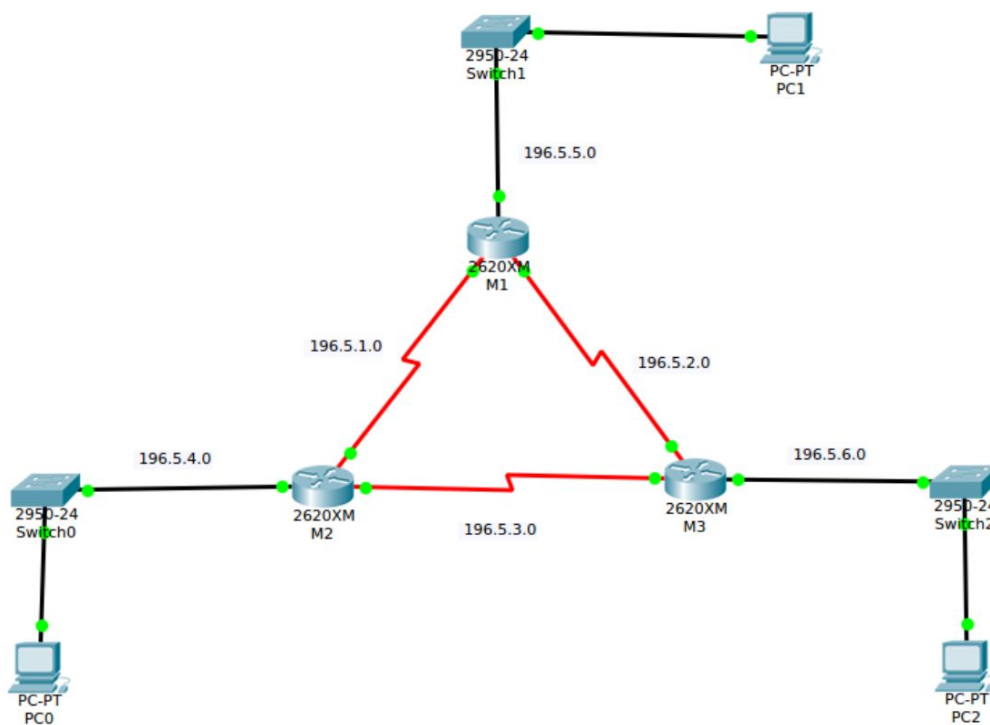


# Лабараторная работа 7

## OSPF

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Схема сеткі (такая ж, як і у лабараторнай 6):



Наладжваем OSPF.

**process-id = area-id = 3**

На прыкладзе роўтара M1:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 3
Router(config-router)#network 196.5.1.0 0.0.0.255 area 3
Router(config-router)#network 196.5.2.0 0.0.0.255 area 3
Router(config-router)#network 196.5.5.0 0.0.0.255 area 3
Router(config-router)#exit
Router(config)#exit
Router#
```

show ip route on M1:

```
Router#
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

C    196.5.1.0/24 is directly connected, Serial0/1
C    196.5.2.0/24 is directly connected, Serial0/0
O    196.5.3.0/24 [110/128] via 196.5.1.1, 00:00:50, Serial0/1
      [110/128] via 196.5.2.2, 00:00:50, Serial0/0
O    196.5.4.0/24 [110/65] via 196.5.1.1, 00:00:40, Serial0/1
C    196.5.5.0/24 is directly connected, FastEthernet0/0
O    196.5.6.0/24 [110/65] via 196.5.2.2, 00:02:00, Serial0/0
Router#
```

праз show ip ospf визначаєм ID роўтараў:

```
Router#
Router#show ip ospf
Routing Process "ospf 3" with ID 196.5.5.1
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 0. Checksum Sum 0x000000
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 3
    Number of interfaces in this area is 3
    Area has no authentication
    SPF algorithm executed 8 times
    Area ranges are
    Number of LSA 3. Checksum Sum 0x024e28
    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
--More--
```

M1 : 196.5.5.1

M2 : 196.5.4.1

M3 : 196.5.6.1

Пераканаліся, што абіраецца максімальны з актыўных IP-адрасоў.

Праз show ip ospf neighbor правяраем адносіны суседства:

```
Router#show ip ospf neighbor

Neighbor ID      Pri   State           Dead Time   Address        Interface
196.5.4.1        0     FULL/ -         00:00:32    196.5.1.1      Serial0/1
196.5.6.1        0     FULL/ -         00:00:38    196.5.2.2      Serial0/0
Router#
```

Разбіраемся з коштамі на паслядоўных інтэрфейсах.

На M1 зараз маем (каманда show ip ospf interface):

```

Router#
Router#show ip ospf interface

Serial0/1 is up, line protocol is up
Internet address is 196.5.1.2/24, Area 3
Process ID 3, Router ID 196.5.5.1, Network Type POINT-TO-POINT, Cost: 64
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 00:00:07
Index 1/1, 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 196.5.4.1
  Suppress hello for 0 neighbor(s)
Serial0/0 is up, line protocol is up
Internet address is 196.5.2.1/24, Area 3
Process ID 3, Router ID 196.5.5.1, Network Type POINT-TO-POINT, Cost: 64
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 00:00:07
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 196.5.6.1
  Suppress hello for 0 neighbor(s)

```

Пачаткова маем кошт праходу праз паслядоўныя парты **64**.

На роўтары M1 на інтэрфейс S0/0 выстаўляем кошт **2000**:

```

Router(config)#
Router(config)#interface serial 0/0
Router(config-if)#ip ospf cost 2000
Router(config-if)#exit

```

Глядзім на абноўленую табліцу з дадзенымі інтэрфейсаў:

```

Router#
Router#show ip ospf interface

Serial0/1 is up, line protocol is up
Internet address is 196.5.1.2/24, Area 3
Process ID 3, Router ID 196.5.5.1, Network Type POINT-TO-POINT, Cost: 64
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 00:00:00
Index 1/1, 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 196.5.4.1
  Suppress hello for 0 neighbor(s)
Serial0/0 is up, line protocol is up
Internet address is 196.5.2.1/24, Area 3
Process ID 3, Router ID 196.5.5.1, Network Type POINT-TO-POINT, Cost: 2000
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
--More--

```

Усё класна, усё абнавілася! Цяпер і маршруты могуць памяняцца (праз падвышэнне кошту за праход).

Правяраем узаемадасягальнасць вузлоў у сетцы.

```
Packet Tracer PC Command Line 1.0
PC>ping 196.5.5.1

Pinging 196.5.5.1 with 32 bytes of data:

Reply from 196.5.5.1: bytes=32 time=3ms TTL=253
Reply from 196.5.5.1: bytes=32 time=1ms TTL=253
Reply from 196.5.5.1: bytes=32 time=1ms TTL=253
Reply from 196.5.5.1: bytes=32 time=1ms TTL=253

Ping statistics for 196.5.5.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 1ms

PC>tracert 196.5.5.1

Tracing route to 196.5.5.1 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      196.5.6.1
  2  1 ms      1 ms      3 ms      196.5.5.1

Trace complete.

PC>|
```

Адключым адзін з партоў на МЗ так, каб пакеты пайшлі іншым шляхам.

```
PC>ping 196.5.5.1

Pinging 196.5.5.1 with 32 bytes of data:

Reply from 196.5.5.1: bytes=32 time=2ms TTL=253
Reply from 196.5.5.1: bytes=32 time=2ms TTL=253
Reply from 196.5.5.1: bytes=32 time=2ms TTL=253
Reply from 196.5.5.1: bytes=32 time=2ms TTL=253

Ping statistics for 196.5.5.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

PC>tracert 196.5.5.1

Tracing route to 196.5.5.1 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      196.5.6.1
  2  0 ms      2 ms      0 ms      196.5.3.2
  3  1 ms      1 ms      2 ms      196.5.5.1

Trace complete.

PC>|
```

Пакеты знайшлі альтэрнатыўны шлях! Выдатна!