НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ

ФАКУЛЬТЕТ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ

Факультет інформаційних технологій

ЛАБОРАТОРНА РОБОТА №6

Виконав:

студент групи ІПЗ-20006б

Симон Дмитрій Вікторович

Київ – 2023

Тема: вивчення динамічної маршрутизації напротоколах rip, eigrp і ospf

Мета роботи: : вивчити принципи динамічної маршрутизації на протоколах RIP, EIGRP і OSPF, застосувати отримані знання при виконанні практичних завдань

Завдання:

Завдання 6.1. Налаштування протоколу RIP версії 2 для мережі з шести пристроїв.

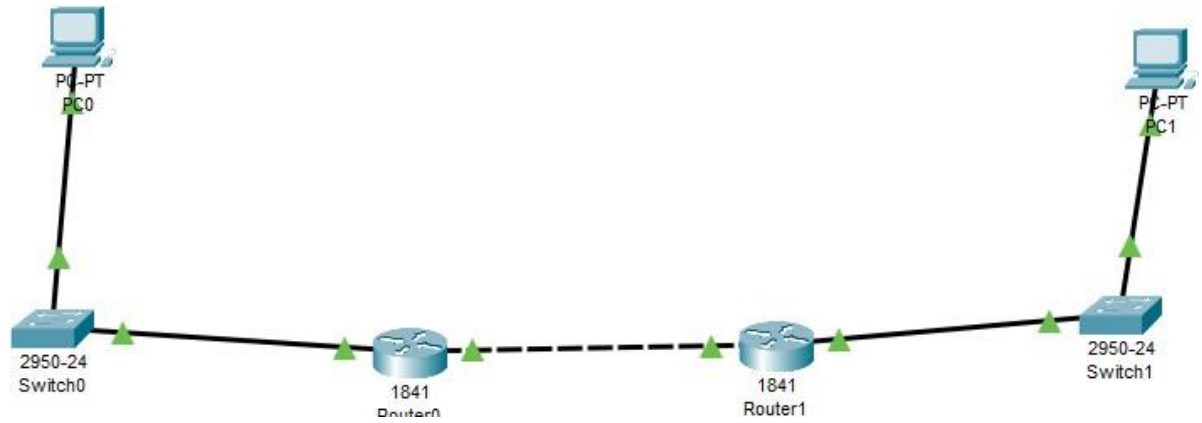
Завдання 6.2. Провести конфігурування протоколу RIP версії 2 длямережі з чотирьох пристроїв.

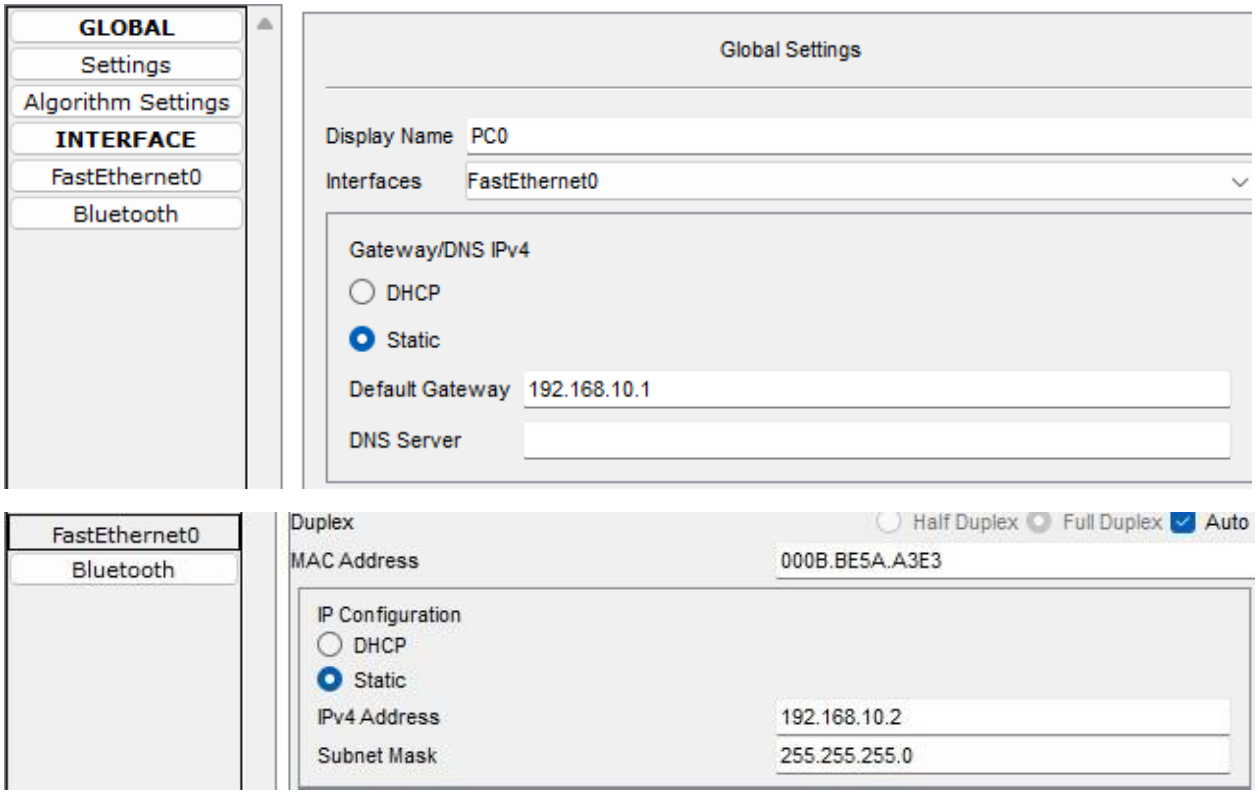
Завдання 6.3. Конфігурування протоколу EIGRP.

Завдання 6.4. Конфігурування протоколу OSPF для 4-х пристроїв.

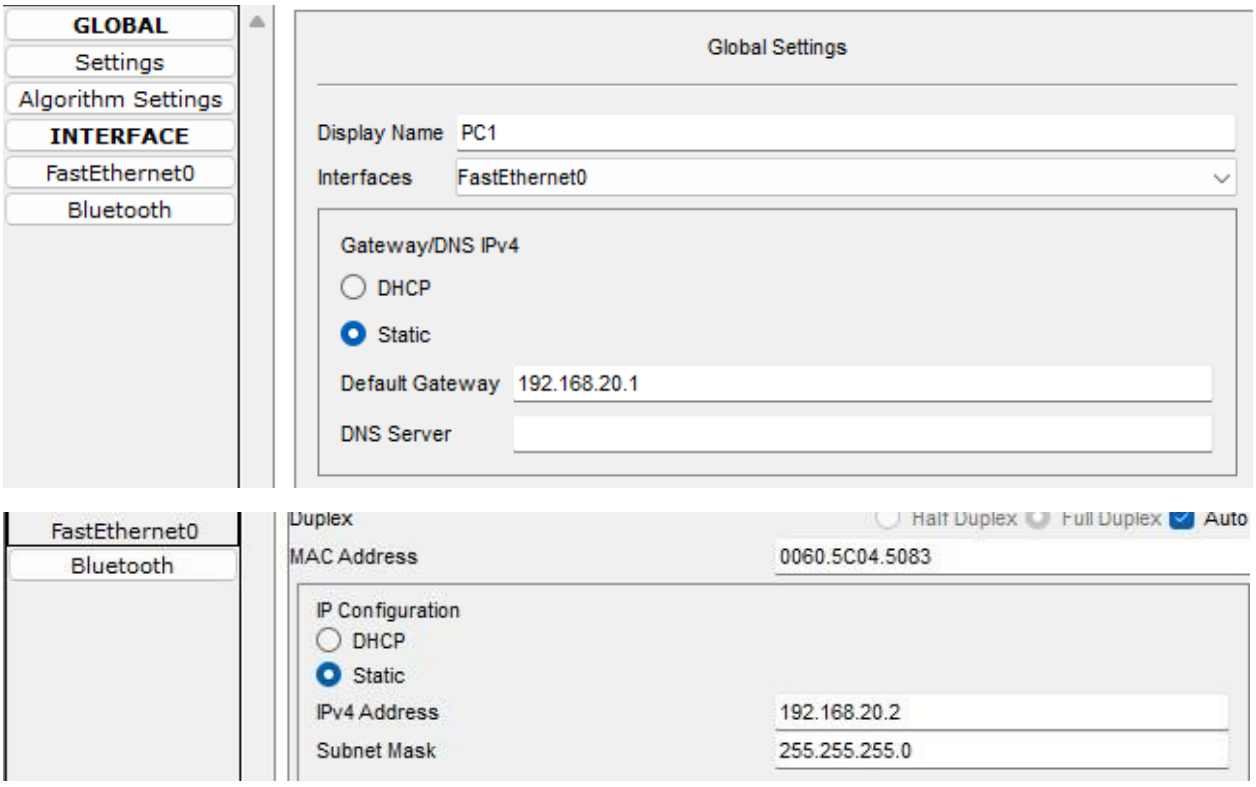
Завдання 6.5. Налаштування маршрутизації по протоколу OSPF для 6 пристроїв.

Завдання 6.1. Налаштування протоколу RIP версії 2 для мережі з шести пристроїв



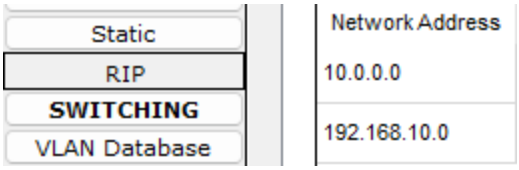


PC0



PC1

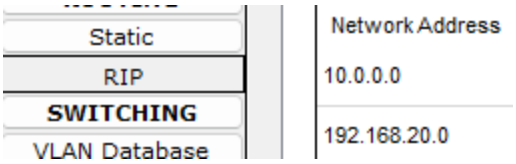
```
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#net
Router(config-router)#network 192.168.10.1
Router(config-router)#network 10.10.0.1
Router(config-router)#version 2
Router(config-router)#exit
```




```
Router#show ip route rip
R    192.168.20.0/24 [120/1] via 10.10.0.2, 00:00:08, FastEthernet0/0
```

Router0

```
Router(config)#router rip
Router(config-router)#
Router(config-router)#vers
Router(config-router)#version 2
Router(config-router)#network 192.168.20.1
Router(config-router)#network 10.10.0.2
Router(config-router)#version 2
Router(config-router)#exit
```

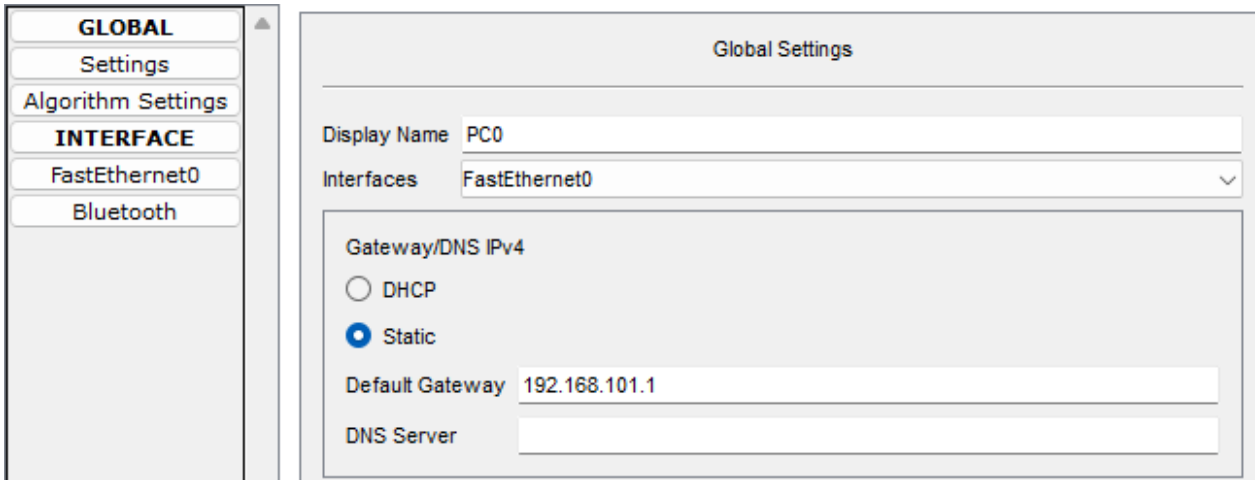



```
Router#show ip route rip
R    192.168.10.0/24 [120/1] via 10.10.0.1, 00:00:11, FastEthernet0/1
```

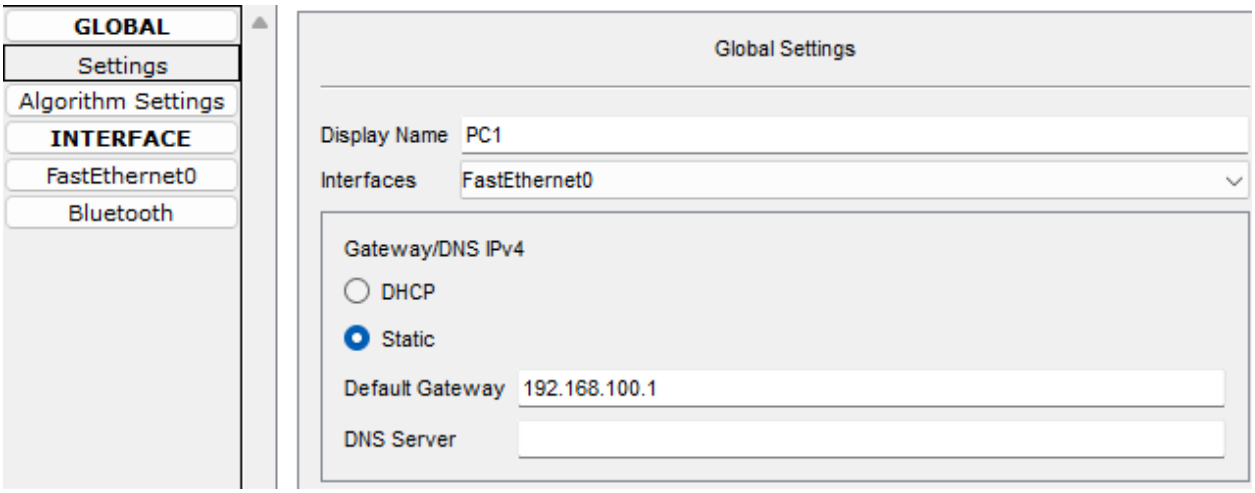
Router1

```
C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126
Reply from 192.168.20.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

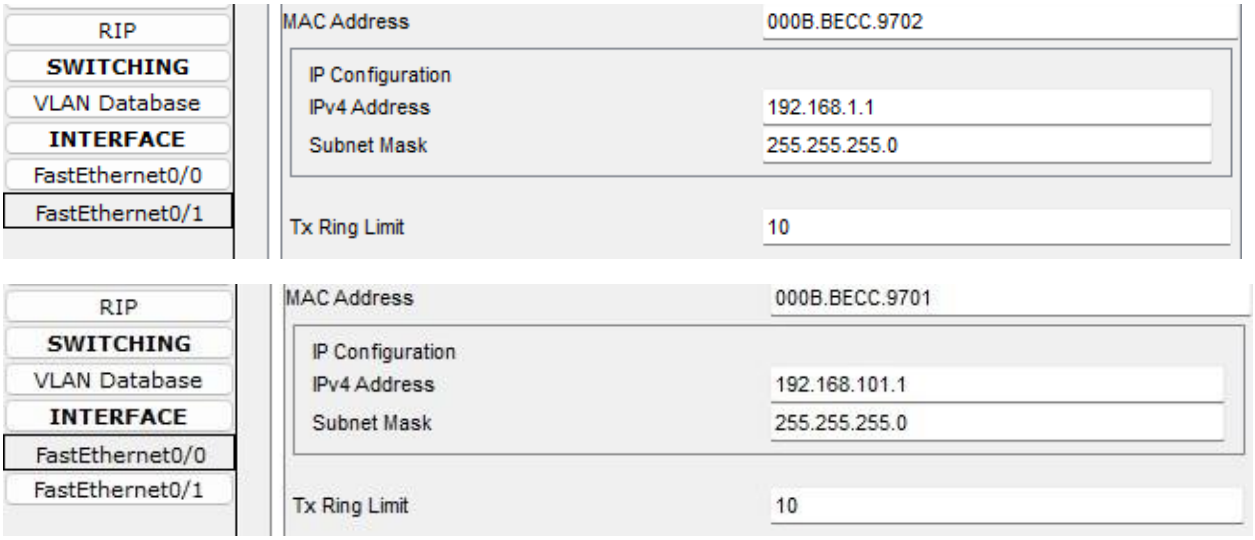
Завдання 6.2. Провести конфігурування протоколу RIP версії 2 для мережі з чотирьох пристроїв



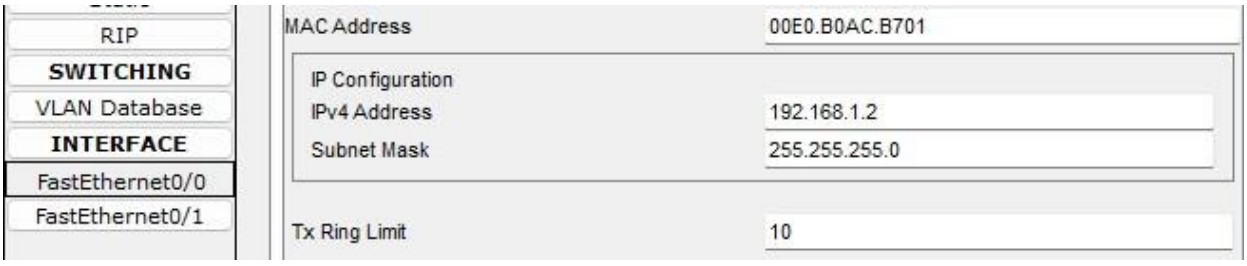
PC0


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC1
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.100.1
DNS Server

PC1


RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
MAC Address
000B.BECC.9702
IP Configuration
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
MAC Address
000B.BECC.9701
IP Configuration
IPv4 Address
192.168.101.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10

Router0


RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
MAC Address
00E0.B0AC.B701
IP Configuration
IPv4 Address
192.168.1.2
Subnet Mask
255.255.255.0
Tx Ring Limit
10

Router1

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.101.1
Router(config-router)#network 192.168.100.1
Router(config-router)#end
```

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.100.1
Router(config-router)#network 192.168.1.2
Router(config-router)#end
```

```
Router#show ip route rip
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
R    192.168.100.0/24 [120/1] via 192.168.1.2, 00:00:03, FastEthernet0/1
```

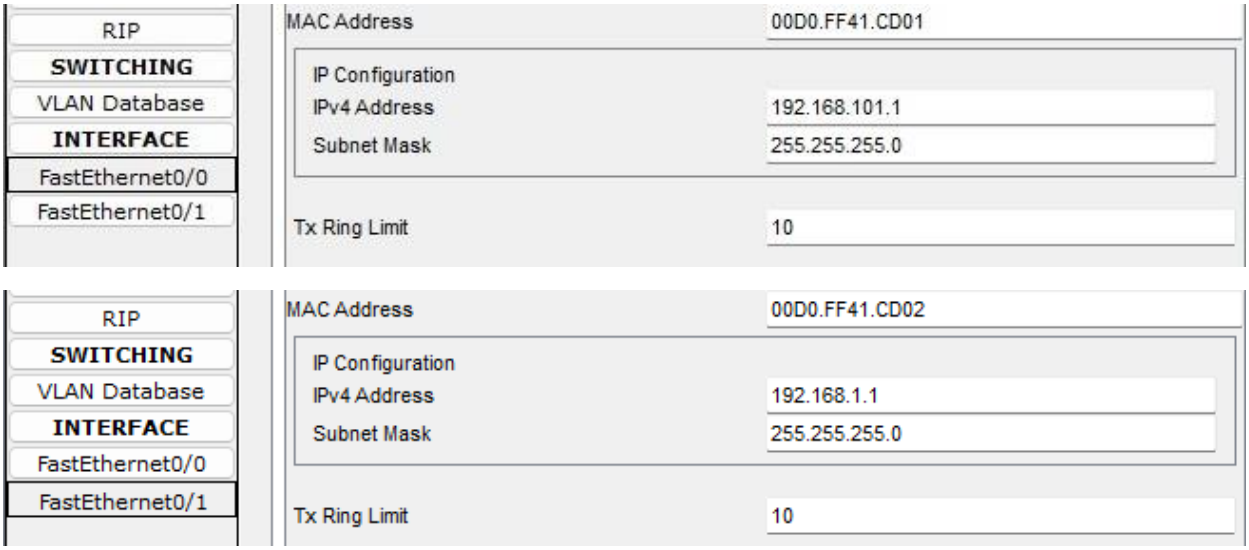
Router0

```
Router#show ip route rip
     192.168.100.0/24 is variably subnetted, 2 subnets, 2 masks
R    192.168.101.0/24 [120/1] via 192.168.1.1, 00:00:28, FastEthernet0/0
```

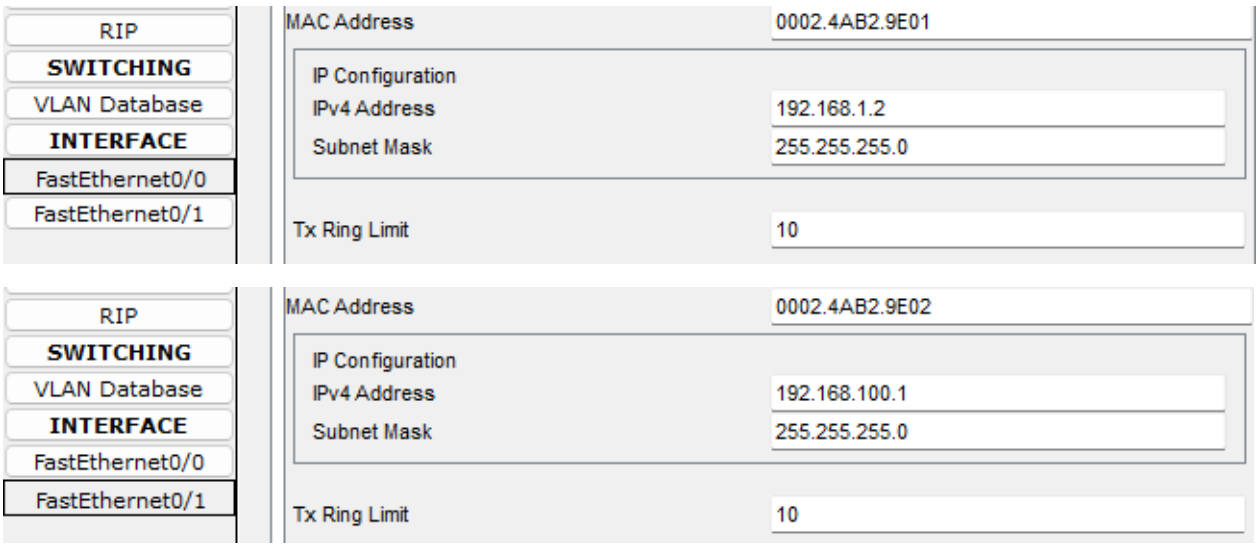
Router1

```
C:\>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.100.2: bytes=32 time<1ms TTL=126
Reply from 192.168.100.2: bytes=32 time<1ms TTL=126
Reply from 192.168.100.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

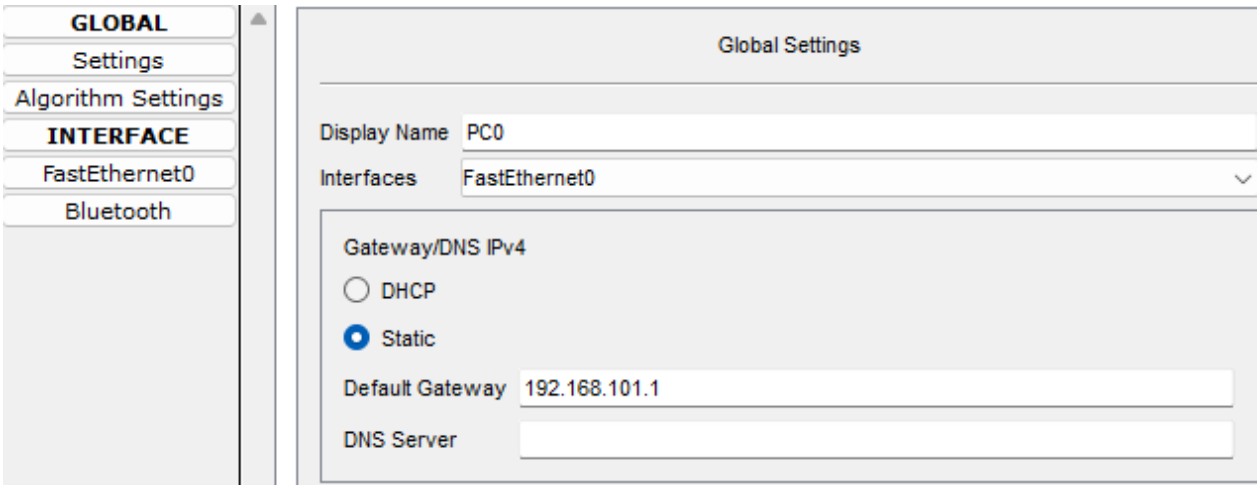
Завдання 6.3. Конфігурування протоколу EIGRP

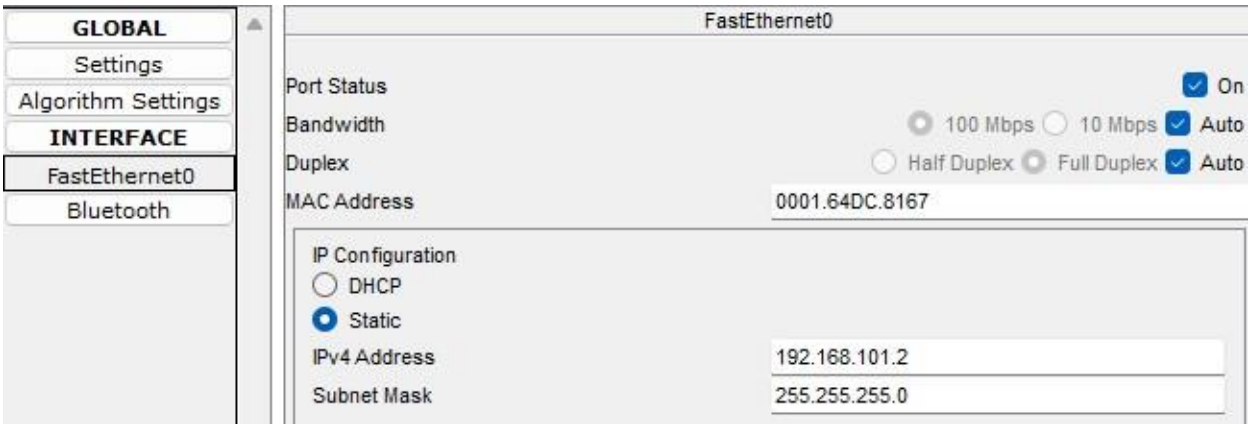


Router0

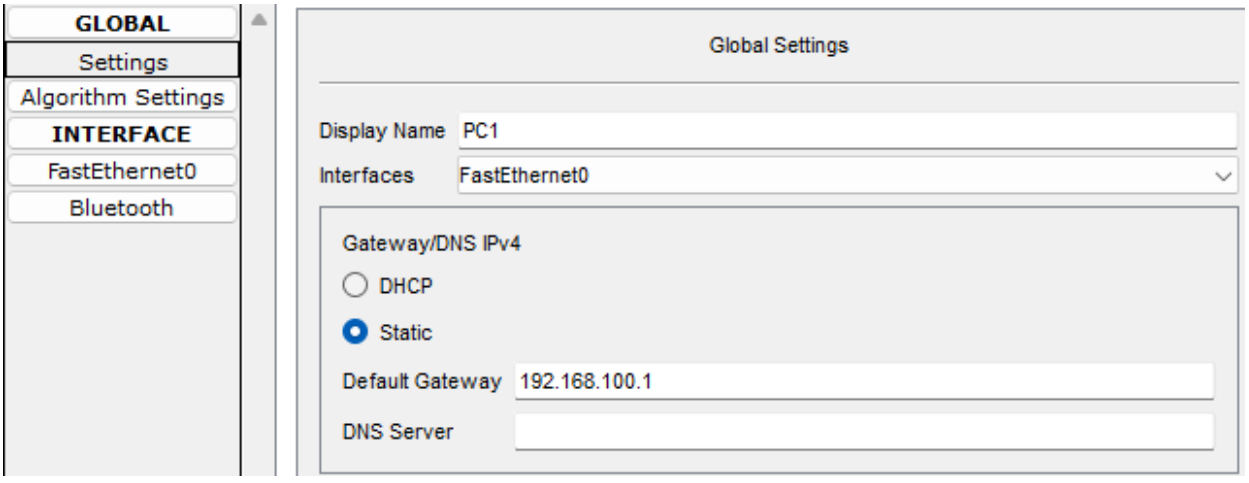


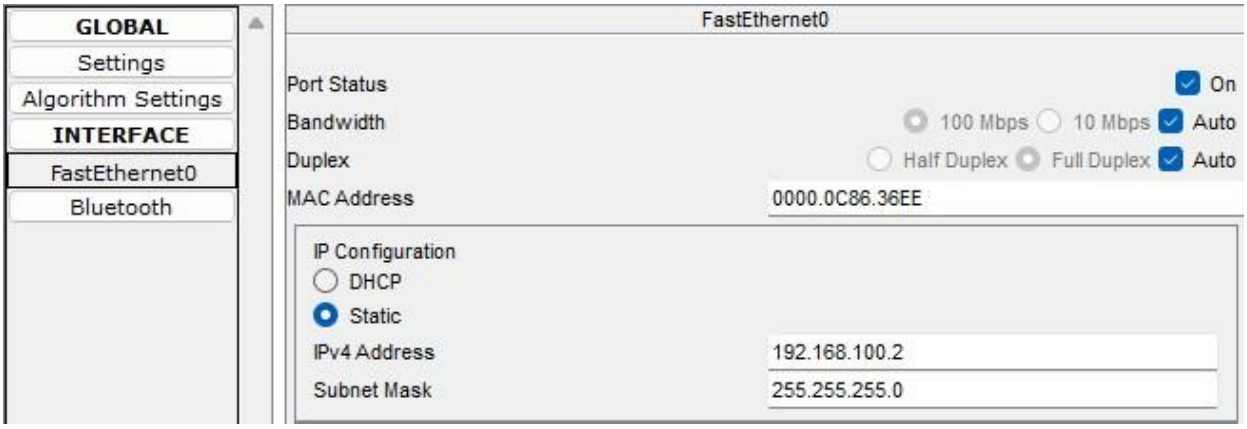
Router1


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name PC0
Interfaces FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.101.1
DNS Server


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status On
Bandwidth 100 Mbps 10 Mbps Auto
Duplex Half Duplex Full Duplex Auto
MAC Address 0001.64DC.8167
IP Configuration
DHCP
Static
IPv4 Address 192.168.101.2
Subnet Mask 255.255.255.0

PC0


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name PC1
Interfaces FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.100.1
DNS Server



PC1

```
Router(config)#router eigrp 10
Router(config-router)#network 192.168.101.1
Router(config-router)#exit

Router(config)#router eigrp 10
Router(config-router)#networ
Router(config-router)#network 192.168.100.1
Router(config-router)#net
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
```

Самостійно:

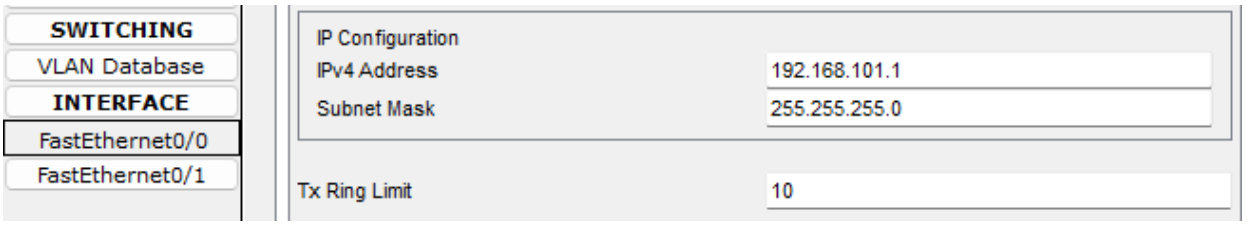
Маска в бінарному вигляді: 255.255.255.248 =
11111111.11111111.11111111.11111000

Тепер інвертуємо кожен біт маски:
00000000.00000000.00000000.00000111

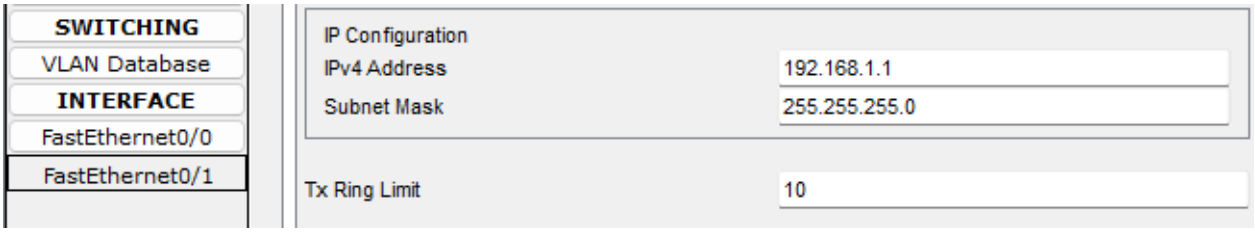
Це бінарне представлення зворотної маски. Тепер перетворимо його назад у десятковий формат:
0.0.0.7

Отже, зворотна маска для заданої маски 255.255.255.248 дорівнює 0.0.0.7.

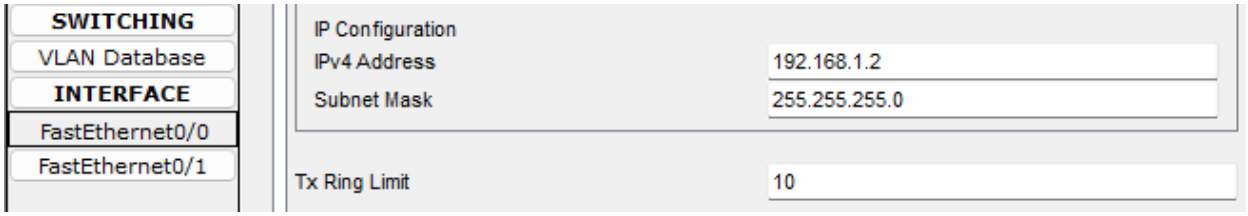
Завдання 6.4. Конфігурування протоколу OSPF для 4-х пристроїв



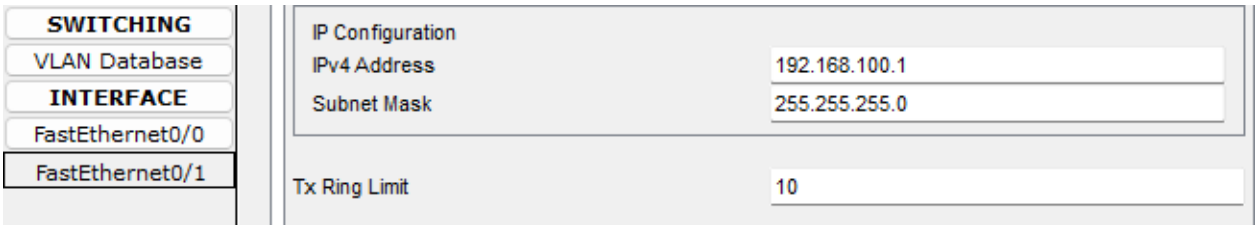
Router0



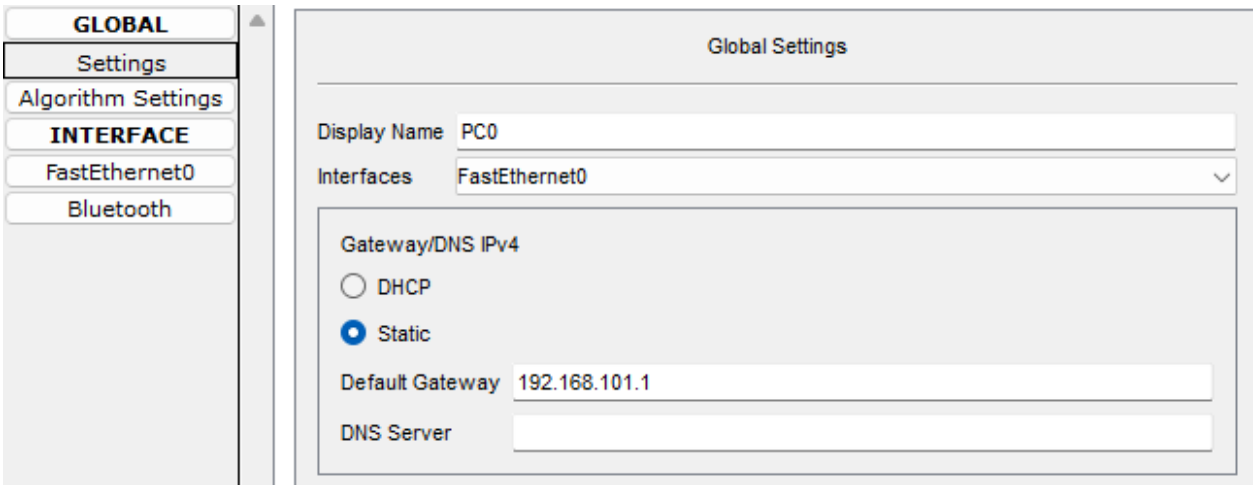
Router0



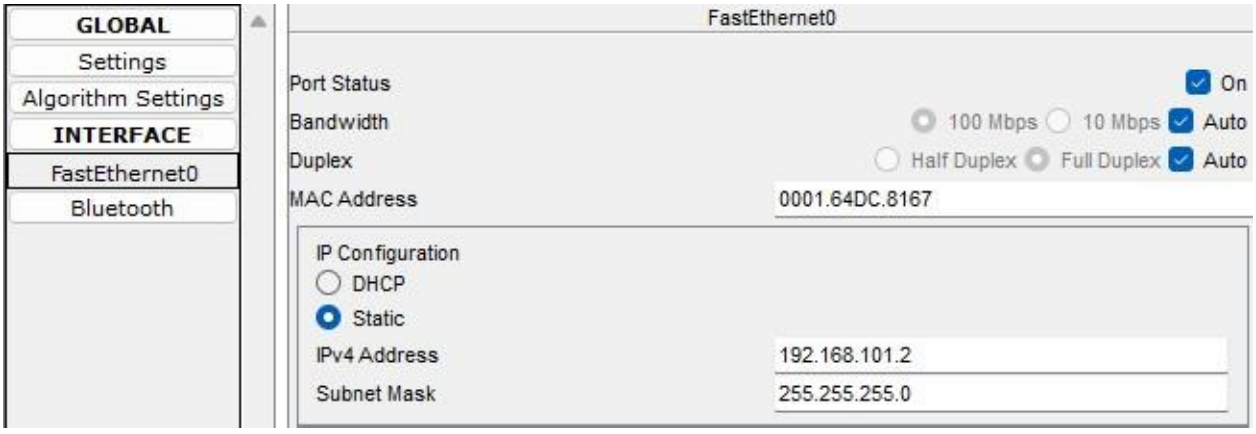
Router1



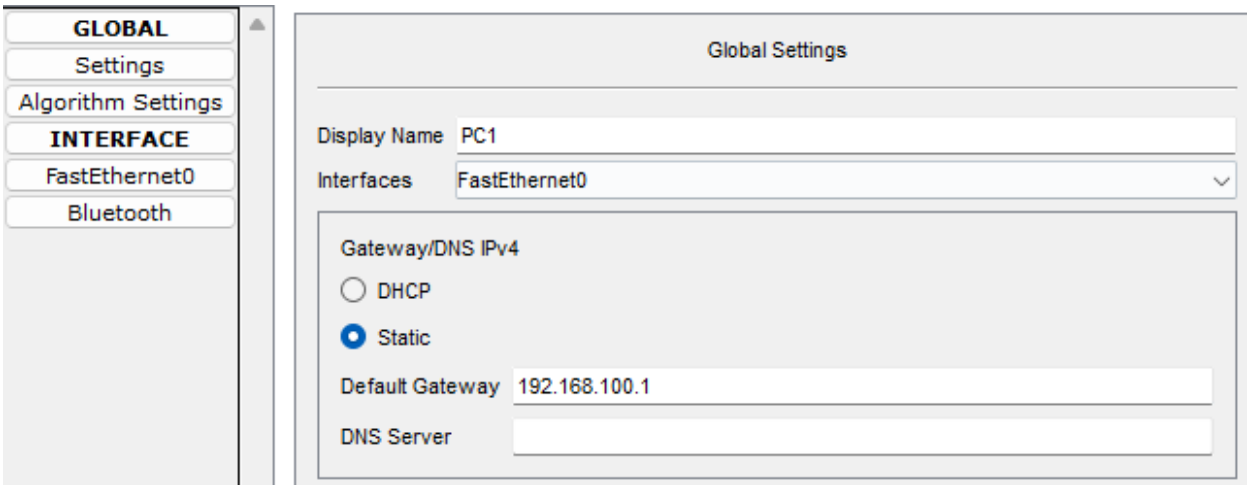
Router1

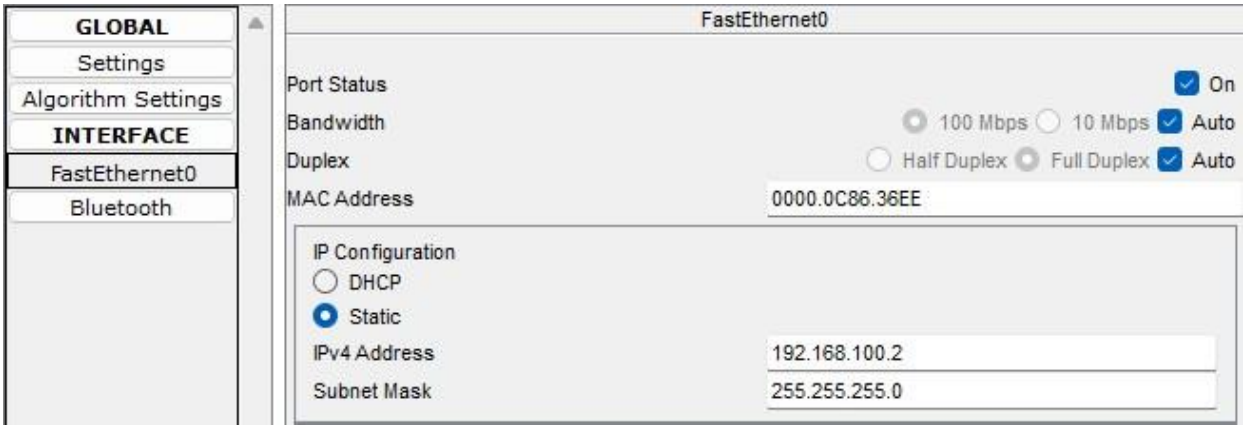

GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC0
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.101.1
DNS Server

PC0


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0001.64DC.8167
IP Configuration
DHCP
Static
IPv4 Address
192.168.101.2
Subnet Mask
255.255.255.0

PC0


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC1
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.100.1
DNS Server



PC1

```
Router(config-router)#router ospf 1
Router(config-router)#network 192.168.101.0 0.0.0.255 area 0
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0

Router(config)#router ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.100.1 0.0.0.255 area 0
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#exit
```

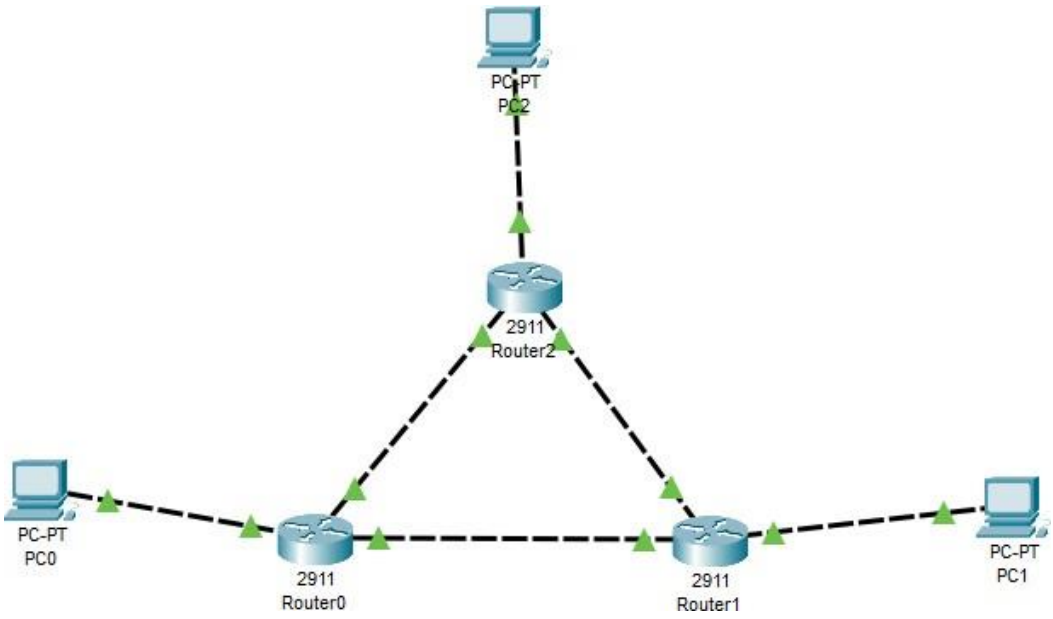
```
C:\>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.100.2: bytes=32 time<1ms TTL=126
Reply from 192.168.100.2: bytes=32 time<1ms TTL=126
Reply from 192.168.100.2: bytes=32 time=6ms TTL=126

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 2ms

C:\>
```

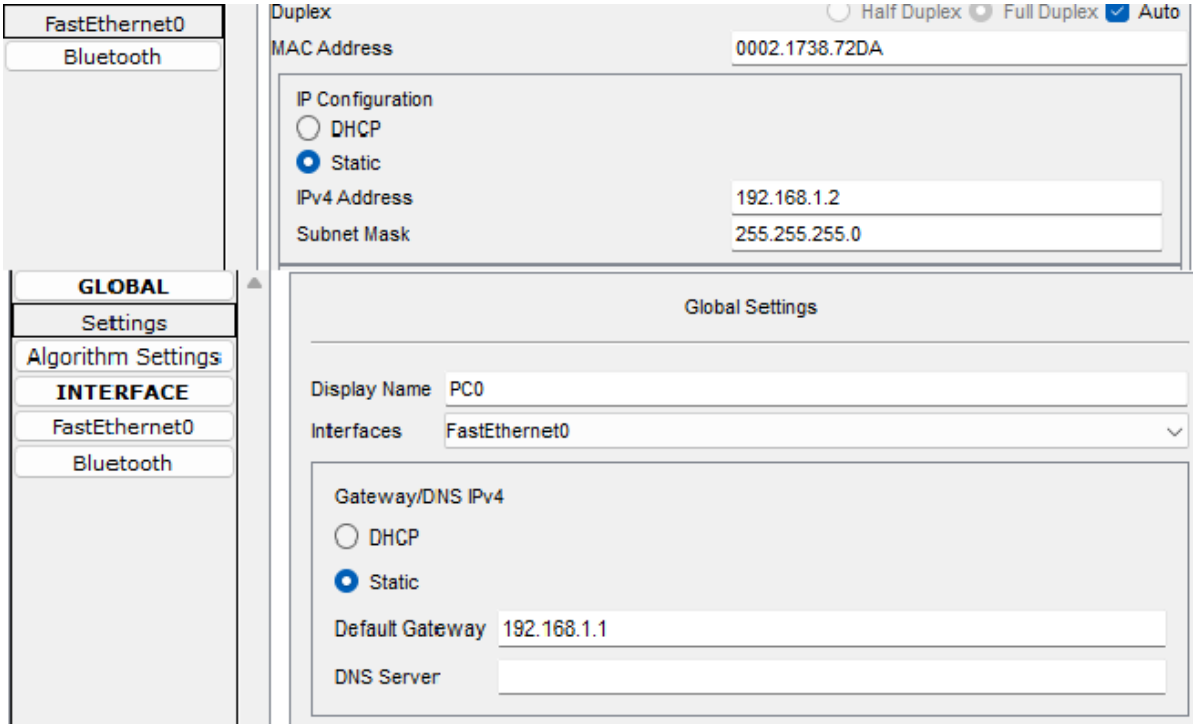
PC0

```
C:\>ping 192.168.101.2

Pinging 192.168.101.2 with 32 bytes of data:

Reply from 192.168.101.2: bytes=32 time<1ms TTL=126
Reply from 192.168.101.2: bytes=32 time<1ms TTL=126
Reply from 192.168.101.2: bytes=32 time<1ms TTL=126
Reply from 192.168.101.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.101.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

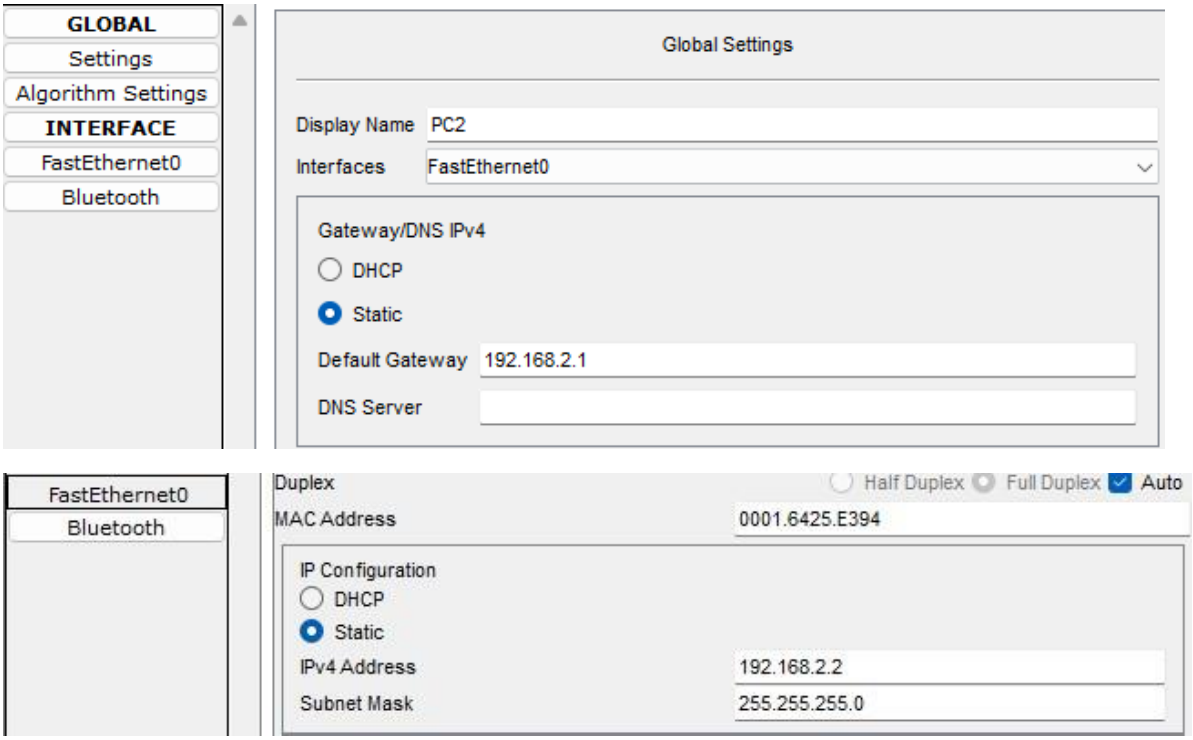
PC1

Завдання 6.5. Налаштування маршрутизації по протоколу OSPFдля 6 пристроїв

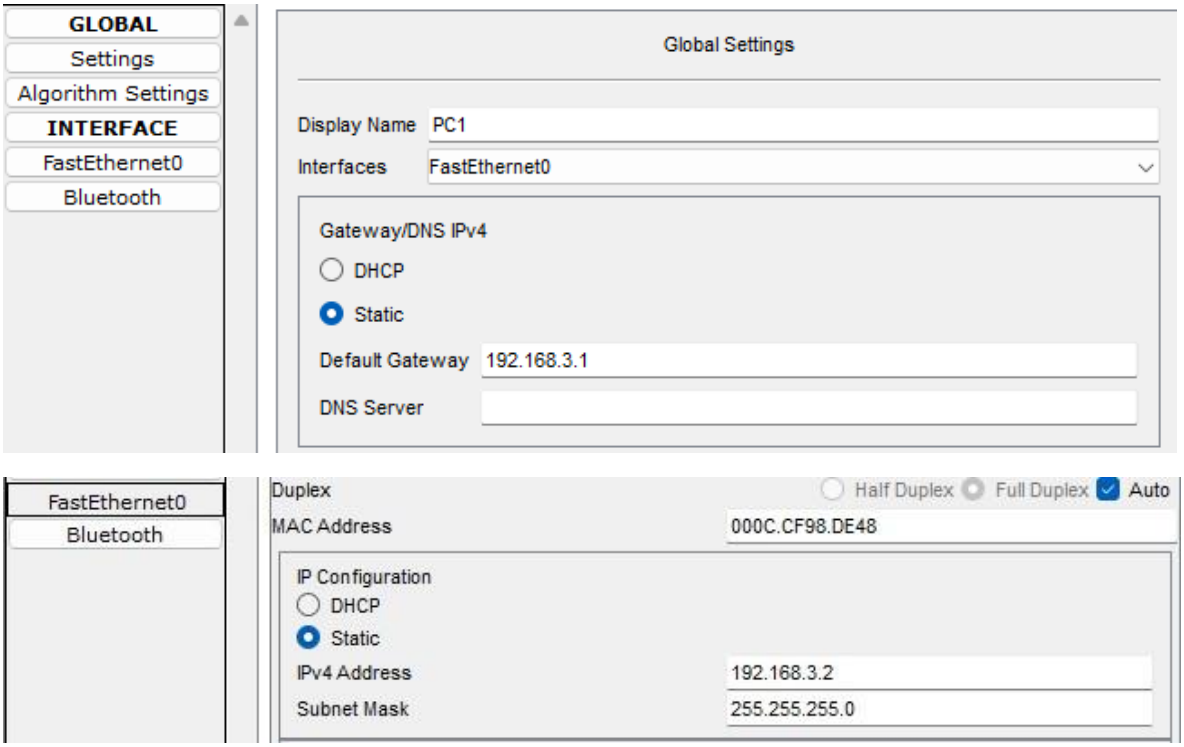




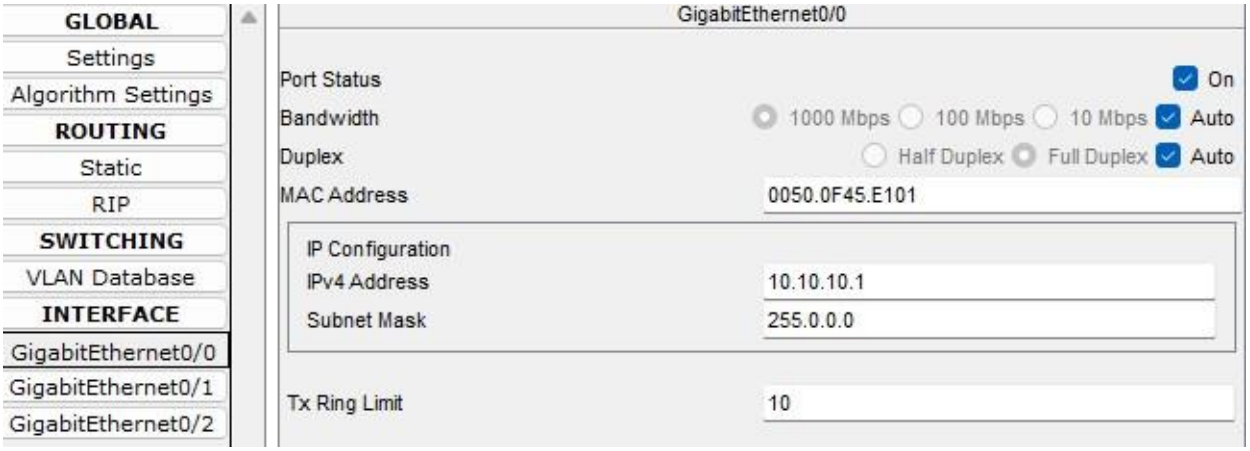
PC0

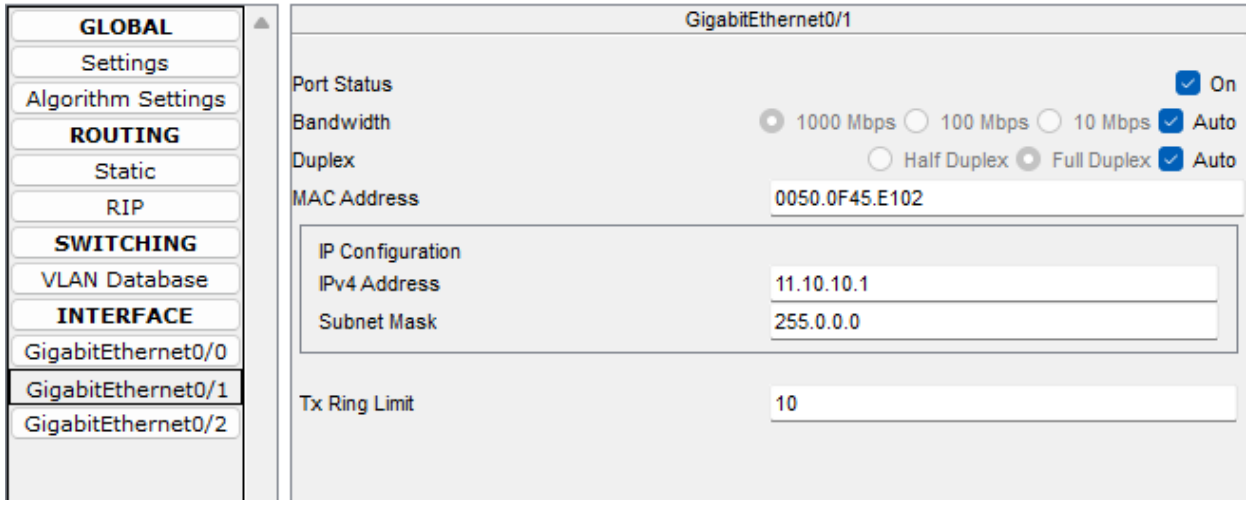

GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name PC2
Interfaces FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.2.1
DNS Server
FastEthernet0
Bluetooth
Duplex Half Duplex Full Duplex Auto
MAC Address 0001.6425.E394
IP Configuration
DHCP
Static
IPv4 Address 192.168.2.2
Subnet Mask 255.255.255.0

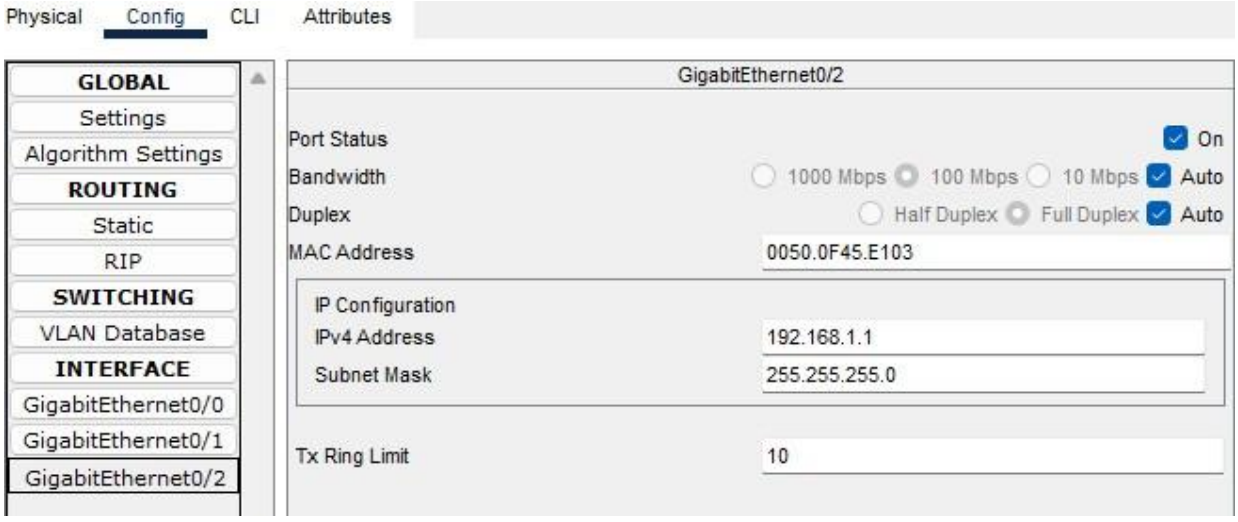
PC2


GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name PC1
Interfaces FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway 192.168.3.1
DNS Server
FastEthernet0
Bluetooth
Duplex Half Duplex Full Duplex Auto
MAC Address 000C.CF98.DE48
IP Configuration
DHCP
Static
IPv4 Address 192.168.3.2
Subnet Mask 255.255.255.0

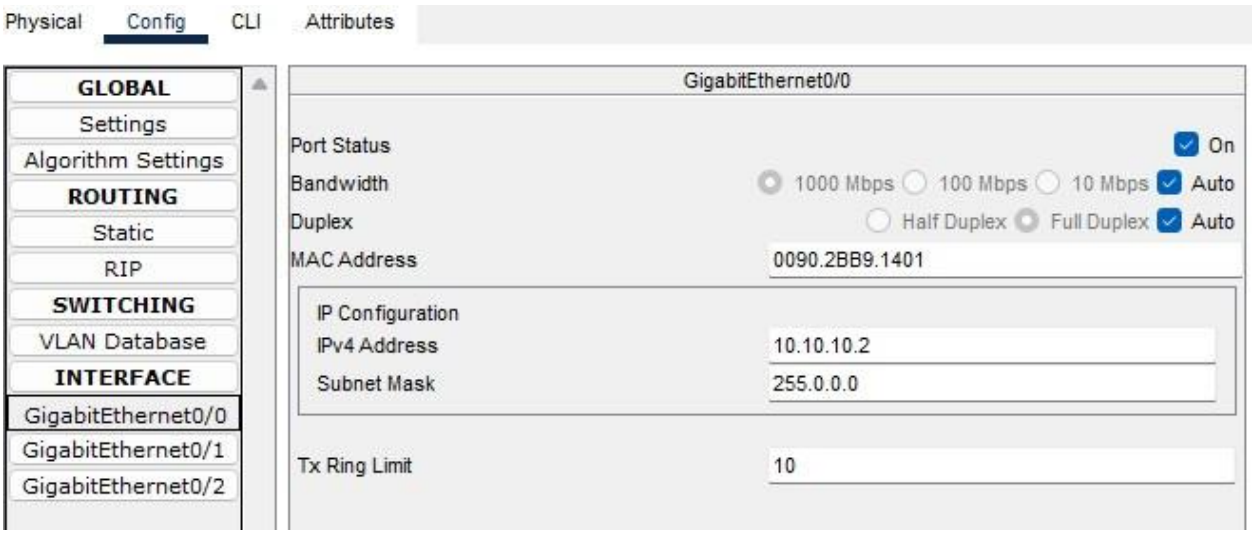
PC1

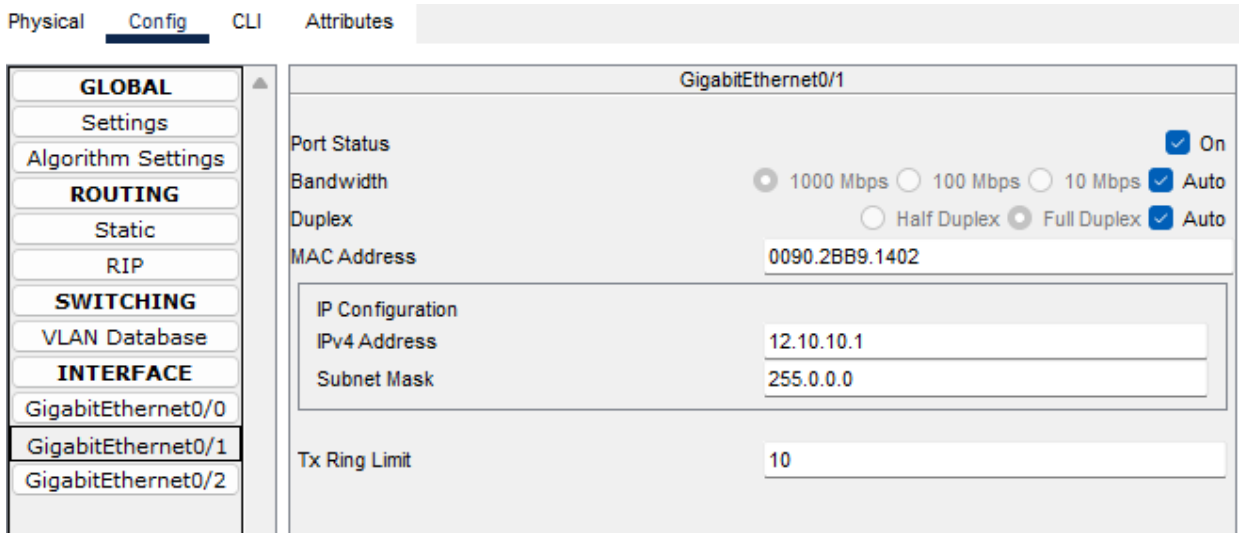

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0050.0F45.E101
IP Configuration
IPv4 Address
10.10.10.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Physical
Config
CLI
Attributes

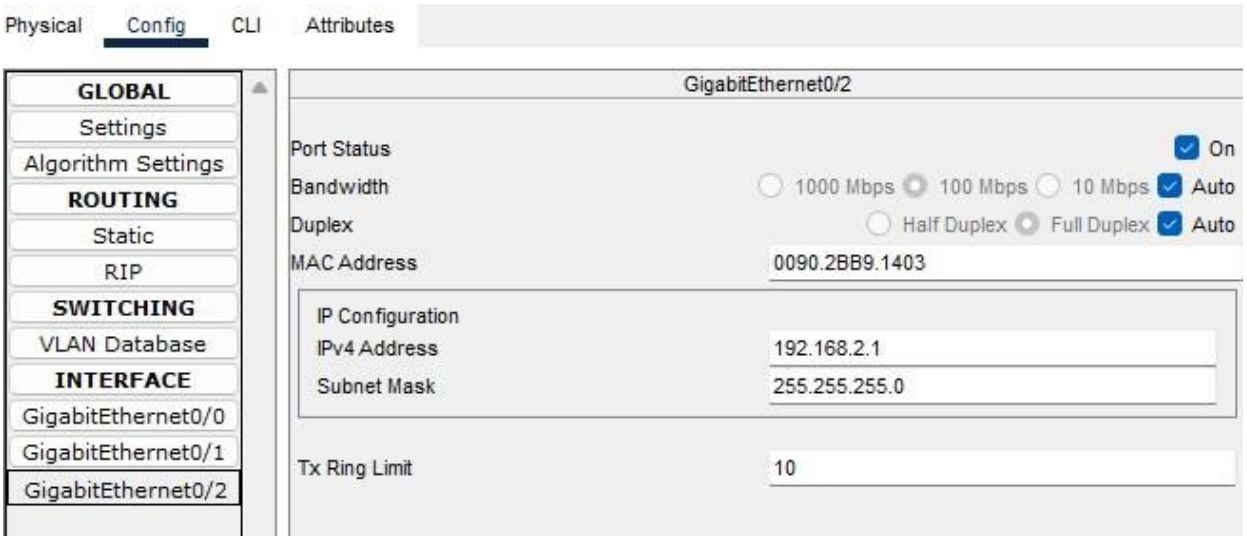

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0050.0F45.E102
IP Configuration
IPv4 Address
11.10.10.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Physical
Config
CLI
Attributes


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/2
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0050.0F45.E103
IP Configuration
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10

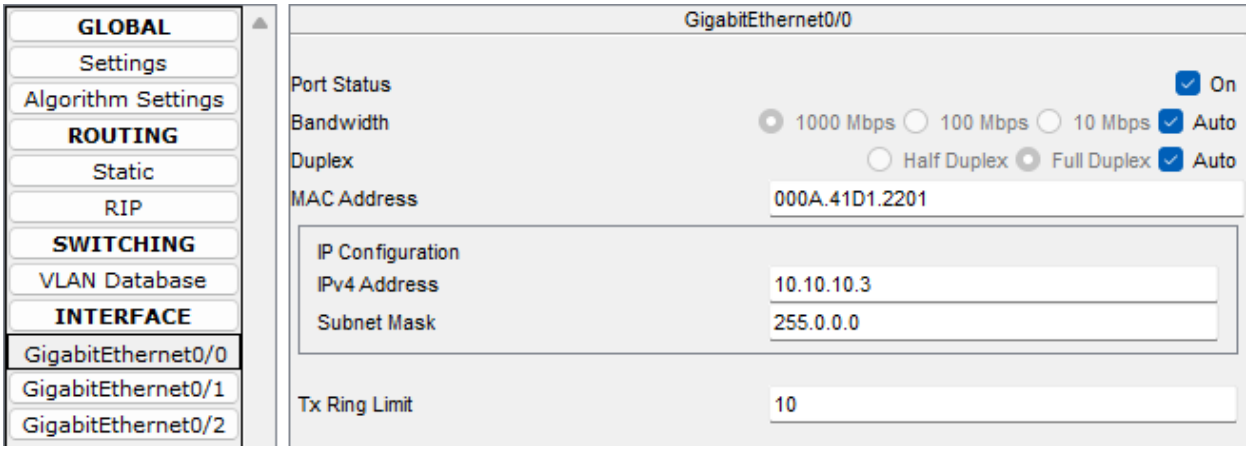
Router0

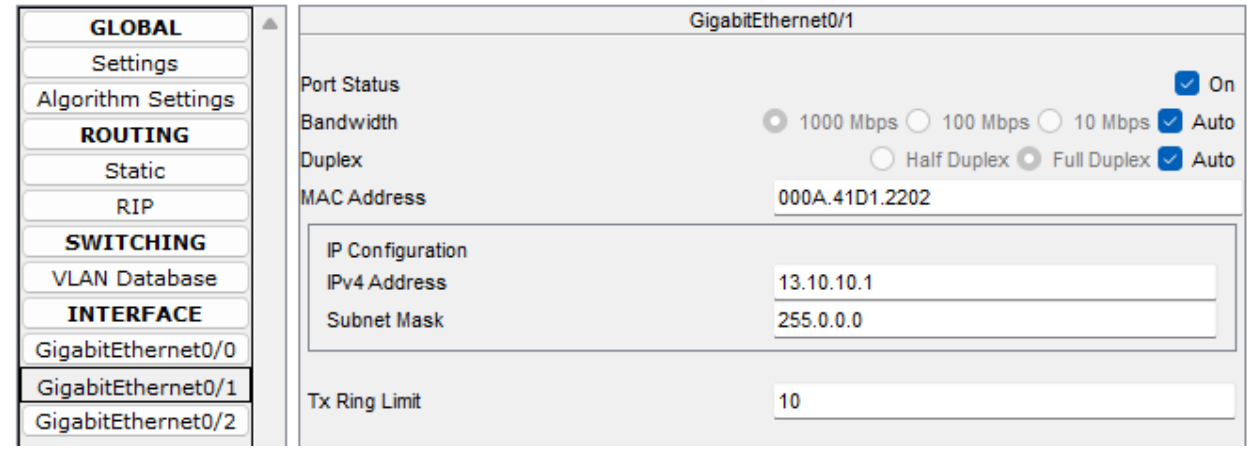

Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0090.2BB9.1401
IP Configuration
IPv4 Address
10.10.10.2
Subnet Mask
255.0.0.0
Tx Ring Limit
10

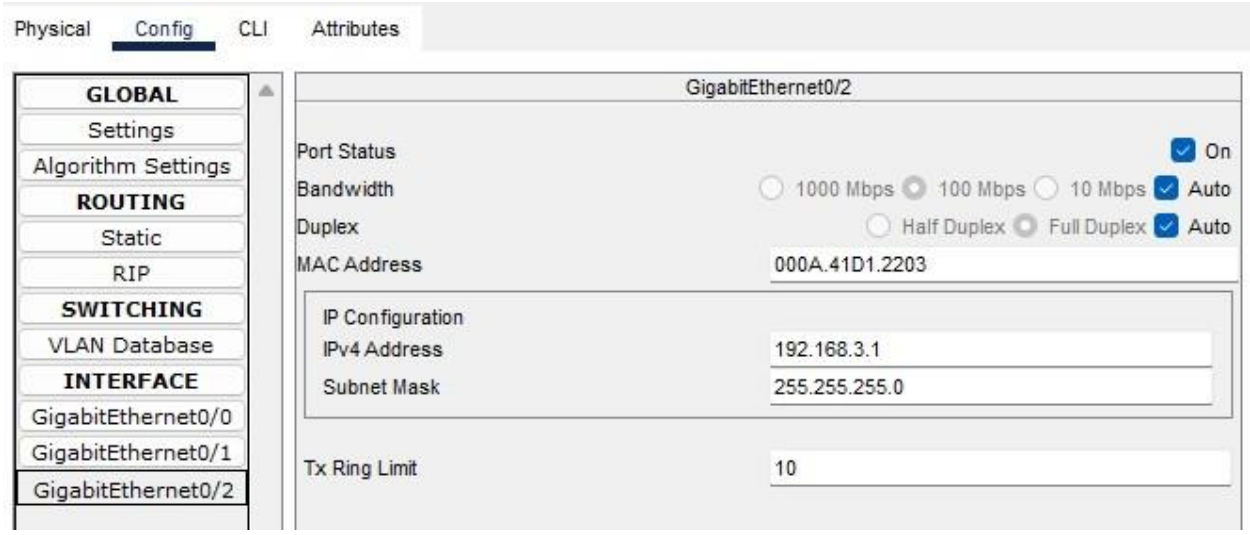

Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0090.2BB9.1402
IP Configuration
IPv4 Address
12.10.10.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10


Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/2
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0090.2BB9.1403
IP Configuration
IPv4 Address
192.168.2.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10

Router2


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000A.41D1.2201
IP Configuration
IPv4 Address
10.10.10.3
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Physical
Config
CLI
Attributes


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000A.41D1.2202
IP Configuration
IPv4 Address
13.10.10.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10
Physical
Config
CLI
Attributes


GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/2
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000A.41D1.2203
IP Configuration
IPv4 Address
192.168.3.1
Subnet Mask
255.255.255.0
Tx Ring Limit
10

Router1

```
Router(config)#int loop
Router(config)#int loopback 0
Router(config-if)#ip addr 192.168.100.1 255.255.255.255
Router(config-if)#no sh
Router(config-if)#exit

Router(config)#router ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.1.0 0.0.0.3 area 0
Router(config-router)#ne
Router(config-router)#net
Router(config-router)#network 10.10.10.0 0.0.0.3 area 0
Router(config-router)#net
Router(config-router)#network 10.10.11.0 0.0.0.3 area 0
```

```
Router(config-if)#ip addr 192.168.100.0 255.255.255.255
Router(config-if)#no sh
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 12.10.10.1 0.0.0.255 area 0
Router(config-router)#network 10.10.10.2 0.0.0.3 area 0
Router(config-router)#network 12.10.10.1 0.0.0.3 area 0
Router(config-router)#network 12.10.10.1 0.0.0.3 area 0
00:28:22: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.100.1 on GigabitEthernet0/0 fr
Router(config-router)#network 192.168.2.1 0.0.0.255 area 0
```

```
Router(config-if)#ip addr 192.168.100.3 255.255.255.255
Router(config-if)#no sh
Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 10.10.10.3 0.0.0.3 area 0
Router(config-router)#network 13.10.10.1 0.0.0.3 area 0
Router(config-router)#network 192.168.3.1 0.0.0.255 area 0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router>ping 192.168.2.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

Висновок

Під час виконання даної лабораторної роботи ми досліджували особливості функціонування та налаштування динамічної маршрутизації, використовуючи протоколи RIP, EIGRP та OSPF на обладнанні від компанії Cisco. Головною метою цього завдання було отримання практичних навичок у налаштуванні, моніторингу та діагностиці роботи протоколів RIP, EIGRP і OSPF на маршрутизаторі Cisco.