

Лабораторная работа № 6  
по дисциплине «Компьютерные сети»  
Вариант IV

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192.168.x.0/24

192.168.4.0 / 1100 0000.1010 1000.0000 0100.0000 0000

255.255.255.0 / 1111 1111.1111 1111.1111 1111.0000 0000 (маска 24)

### **Задача I**

Разделить сеть на 5 подсетей

- 1) Подсети 1 и 5 должны поддерживать до  $x + 10$  устройств
- 2) Подсети 2 и 4 должны поддерживать до 5 устройств
- 3) Подсеть 3 должна поддерживать только 2 устройства

#### **Подсеть 1**

$$2^n - 2 \geq N$$

Положим,  $n = 4$ , тогда:

$$2^4 - 2 \geq 10 + 4$$

$$16 - 2 \geq 14$$

$$14 \geq 14$$

Начальный адрес:

192.168.4.0 = 1100 0000.1010 1000.0000 0100.0000 0000

Новая маска 28:

255.255.255.240 = 1111 1111.1111 1111.1111 1111.1111 0000

Диапазон адресов:

192.168.4.1 – 192.168.4.14

1100 0000.1010 1000.0000 0100.0000 0001 – 1100 0000.1010 1000.0000 0100.0000 1110

Широковещательный адрес:

192.168.4.15 = 1100 0000.1010 1000.0000 0100.0000 1111

#### **Подсеть 5**

Начальный адрес:

192.168.4.16 = 1100 0000.1010 1000.0000 0100.0001 0000

Новая маска 28:

255.255.255.240 = 1111 1111.1111 1111.1111 1111.1111 0000

Диапазон адресов:

192.168.4.17 – 192.168.4.30

1100 0000.1010 1000.0000 0100.0001 0001 – 1100 0000.1010 1000.0000 0100.0001 1110

Широковещательный адрес:

192.168.4.31 = 1100 0000.1010 1000.0000 0100.0001 1111

## **Подсеть 2**

Положим,  $n = 3$ , тогда:

$$2^3 - 2 \geq 5$$

$$8 - 2 \geq 5$$

$$6 \geq 5$$

Начальный адрес:

192.168.4.32 = 1100 0000.1010 1000.0000 0100. 0010 0000

Новая маска 29:

255.255.255.248 = 1111 1111.1111 1111.1111 1111.1111 1000

Диапазон адресов:

192.168.4.33 – 192.168.4.38

1100 0000.1010 1000.0000 0100.0010 0001 – 1100 0000.1010 1000.0000  
0100.0010 0110

Широковещательный адрес:

192.168.4.39 = 1100 0000.1010 1000.0000 0100. 0010 0111

## **Подсеть 4**

Начальный адрес:

192.168.4.40 = 1100 0000.1010 1000.0000 0100. 0010 1000

Новая маска 29:

255.255.255.248 = 1111 1111.1111 1111.1111 1111.1111 1000

Диапазон адресов:

192.168.4.41 – 192.168.4.46

1100 0000.1010 1000.0000 0100.0010 1001 – 1100 0000.1010 1000.0000  
0100.0010 1110

Широковещательный адрес:

192.168.4.47 = 1100 0000.1010 1000.0000 0100. 0010 1111

## **Подсеть 3**

Положим,  $n = 2$ , тогда:

$$2^2 - 2 \geq 2$$

$$4 - 2 \geq 2$$

$$2 \geq 2$$

Начальный адрес:

192.168.4.48 = 1100 0000.1010 1000.0000 0100. 0011 0000

Новая маска 30:

255.255.255.252 = 1111 1111.1111 1111.1111 1111.1111 1100

Диапазон адресов:

192.168.4.49 – 192.168.4.50


1100 0000.1010 1000.0000 0100.0011 0001 – 1100 0000.1010 1000.0000 0100.0011 0010

Широковещательный адрес:

192.168.4.51 = 1100 0000.1010 1000.0000 0100. 0011 0011

## Задача II

### 1. Настройка DHCP-сервера для выдачи адресов

 DHCP server

Physical Config **Services** Desktop Programming Attributes

**SERVICES**

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

**DHCP**

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

Start IP Address: 192 168 4 0

Subnet Mask: 255 255 255 240

Maximum Number of Users: 255

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool1	192.168....	0.0.0.0	192.168....	255.255....	14	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	192.168....	255.255....	255	0.0.0.0	0.0.0.0

DHCP server

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.4.1

Subnet Mask 255.255.255.240

PC1.1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.2

Subnet Mask 255.255.255.240

PC1.2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.5

Subnet Mask 255.255.255.240

PC1.3

Physical Config **Desktop** Programming Attributes

IP Configuration X

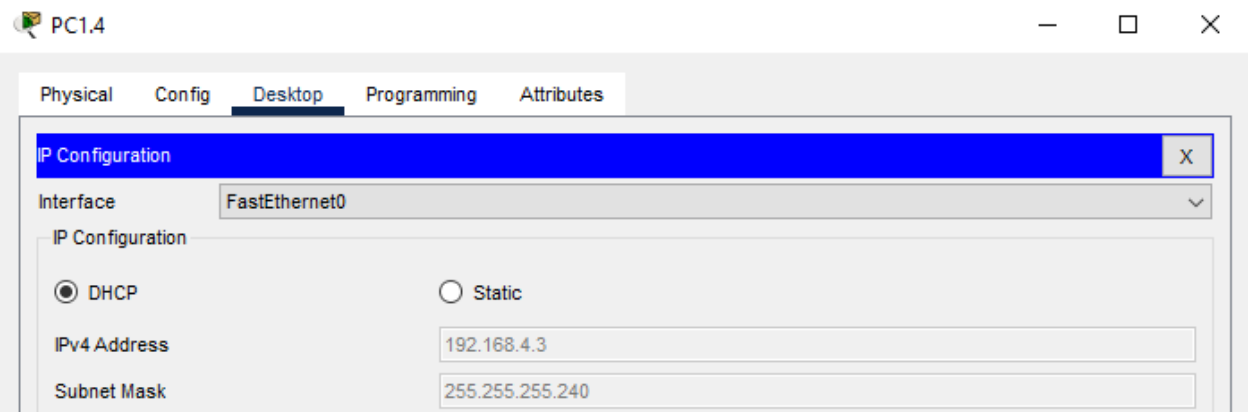
Interface FastEthernet0

IP Configuration

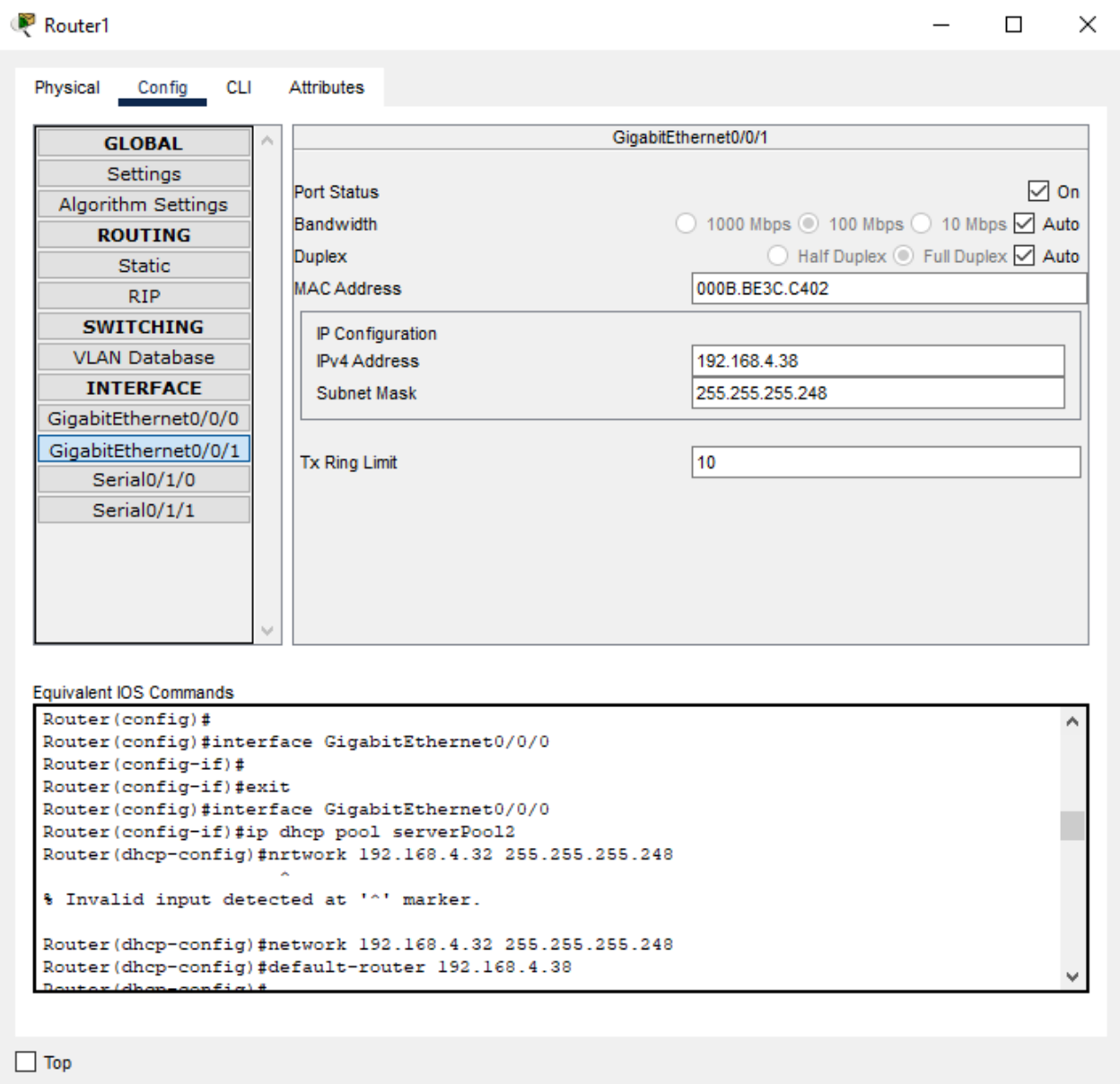
☒ DHCP ☐ Static

IPv4 Address 192.168.4.4

Subnet Mask 255.255.255.240



## 2. Настройка в качестве DHCP-сервера маршрутизатор 1 для подсети 2



Server2.1

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.34

Subnet Mask 255.255.255.248

Default Gateway 192.168.4.38

DNS Server 0.0.0.0

Server2.2

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.35

Subnet Mask 255.255.255.248

Default Gateway 192.168.4.38

DNS Server 0.0.0.0

Server2.3

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.33

Subnet Mask 255.255.255.248

Default Gateway 192.168.4.38

DNS Server 0.0.0.0

#### Equivalent IOS Commands

```
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip dhcp binding
IP address      Client-ID/
                Hardware address    Lease expiration    Type
192.168.4.33    00D0.BAAD.06BD    --                  Automatic
192.168.4.35    0009.7CBD.13D1    --                  Automatic
192.168.4.34    0060.70ED.38BC    --                  Automatic
Router#
Router#configure terminal
```

### Настройка подсети 3

Router1

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**SWITCHING**

VLAN Database

**INTERFACE**

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Serial0/1/0

Serial0/1/1

Serial0/1/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IPv4 Address 192.168.4.49

Subnet Mask 255.255.255.252

Tx Ring Limit 10

Router2

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**SWITCHING**

VLAN Database

**INTERFACE**

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Serial0/1/0

Serial0/1/1

Serial0/1/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IPv4 Address 192.168.4.50

Subnet Mask 255.255.255.252

Tx Ring Limit 10

### 3.1 Настройка в качестве DHCP-сервера маршрутизатор 2 для подсети 4



Physical **Config** CLI Attributes

<b>GLOBAL</b>	GigabitEthernet0/0/1	
Settings		
Algorithm Settings		
<b>ROUTING</b>		
Static		
RIP		
<b>SWITCHING</b>		
VLAN Database		
<b>INTERFACE</b>		
GigabitEthernet0/0/0		
<b>GigabitEthernet0/0/1</b>		
Serial0/1/0		
Serial0/1/1		

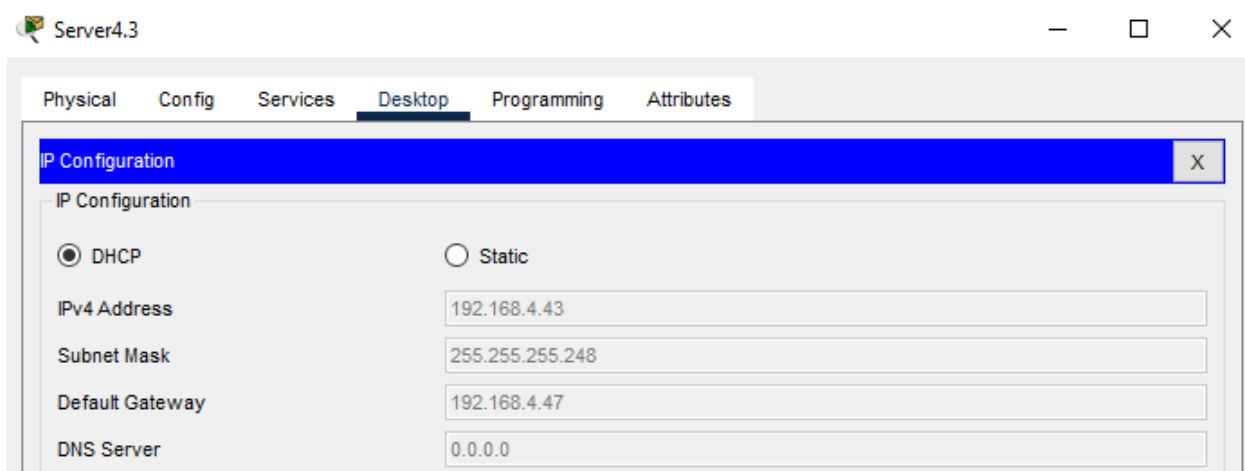
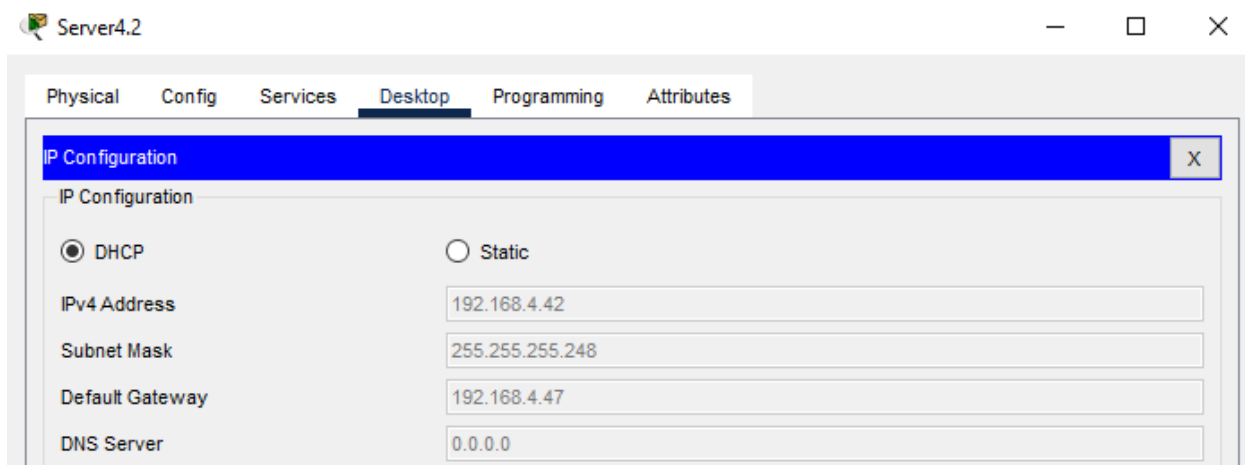
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	00D0.D386.BA42
IP Configuration	
IPv4 Address	192.168.4.46
Subnet Mask	255.255.255.248
Tx Ring Limit	10

Equivalent IOS Commands

```
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#ip dhcp pool serverPool4
Router(dhcp-config)#network 192.168.4.40 255.255.255.248
Router(dhcp-config)#default-router 192.168.4.47
Router(dhcp-config)#exit
Router(config)#exit
```

☐ TopPhysical Config **Services** Desktop Programming Attributes

IP Configuration		X
IP Configuration		
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static	
IPv4 Address	192.168.4.41	
Subnet Mask	255.255.255.248	
Default Gateway	192.168.4.47	
DNS Server	0.0.0.0	



### 3.2 Настройка в качестве DHCP-сервера маршрутизатор 2 для подсети 5

Physical Config CLI Attributes

<b>GLOBAL</b>	<b>GigabitEthernet0/0/0</b>	
Settings		
Algorithm Settings		
<b>ROUTING</b>		
Static		
RIP		
<b>SWITCHING</b>		
VLAN Database		
<b>INTERFACE</b>		
GigabitEthernet0/0/0		
GigabitEthernet0/0/1		
Serial0/1/0		
Serial0/1/1		

Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0001.C7AA.CE54
IP Configuration	
IPv4 Address	192.168.4.30
Subnet Mask	255.255.255.240
Tx Ring Limit	10

Equivalent IOS Commands

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

Router#en
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool serverPool5
Router(dhcp-config)#network 192.168.4.16 255.255.255.240
Router(dhcp-config)#default-router 192.168.4.31
Router(dhcp-config)#
Router(dhcp-config)#end
```

☐ Top

Physical Config Desktop Programming Attributes

<b>IP Configuration</b> X	
Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.4.17
Subnet Mask	255.255.255.240
Default Gateway	192.168.4.31
DNS Server	0.0.0.0

PC5.2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.18

Subnet Mask 255.255.255.240

Default Gateway 192.168.4.31

DNS Server 0.0.0.0

PC5.3

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.19

Subnet Mask 255.255.255.240

Default Gateway 192.168.4.31

DNS Server 0.0.0.0

PC5.4

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.4.20

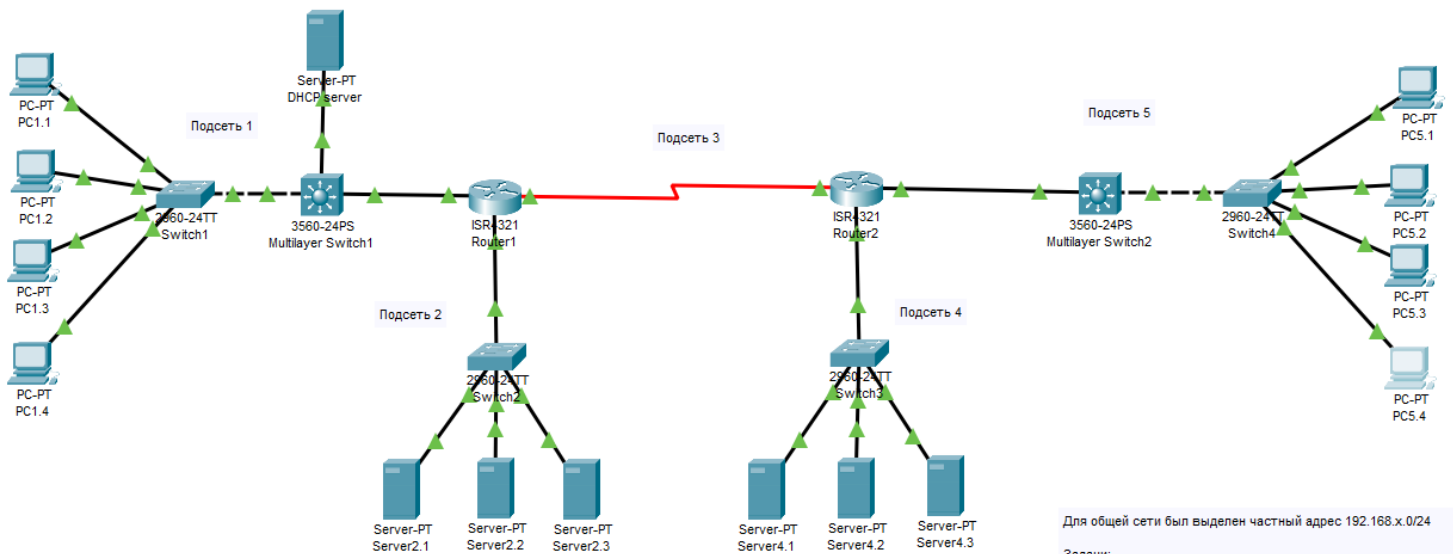
Subnet Mask 255.255.255.240

Default Gateway 192.168.4.31

DNS Server 0.0.0.0

# Equivalent IOS Commands

```
Router#
%SYS-5-CONFIG_I: Configured from console: show ip dhcp bindings
show ip dhcp binding
IP address      Client-ID/      Lease expiration    Type
                Hardware address
192.168.4.41    00D0.D35D.667B   --                  Automatic
192.168.4.42    0050.0F2A.257B   --                  Automatic
192.168.4.43    0000.0CDB.091B   --                  Automatic
192.168.4.17    0005.5E14.38D7   --                  Automatic
192.168.4.18    000D.BD6D.14BC   --                  Automatic
192.168.4.19    0005.5E1D.B2E9   --                  Automatic
192.168.4.20    0060.3E41.5AA9   --                  Automatic
Router#
Router#configure terminal
```



Для общей сети был выделен частный адрес 192.168.x.0/24

Задачи:  
I. Разделить сеть на 5 подсетей