

# Защита лабораторной работы №12

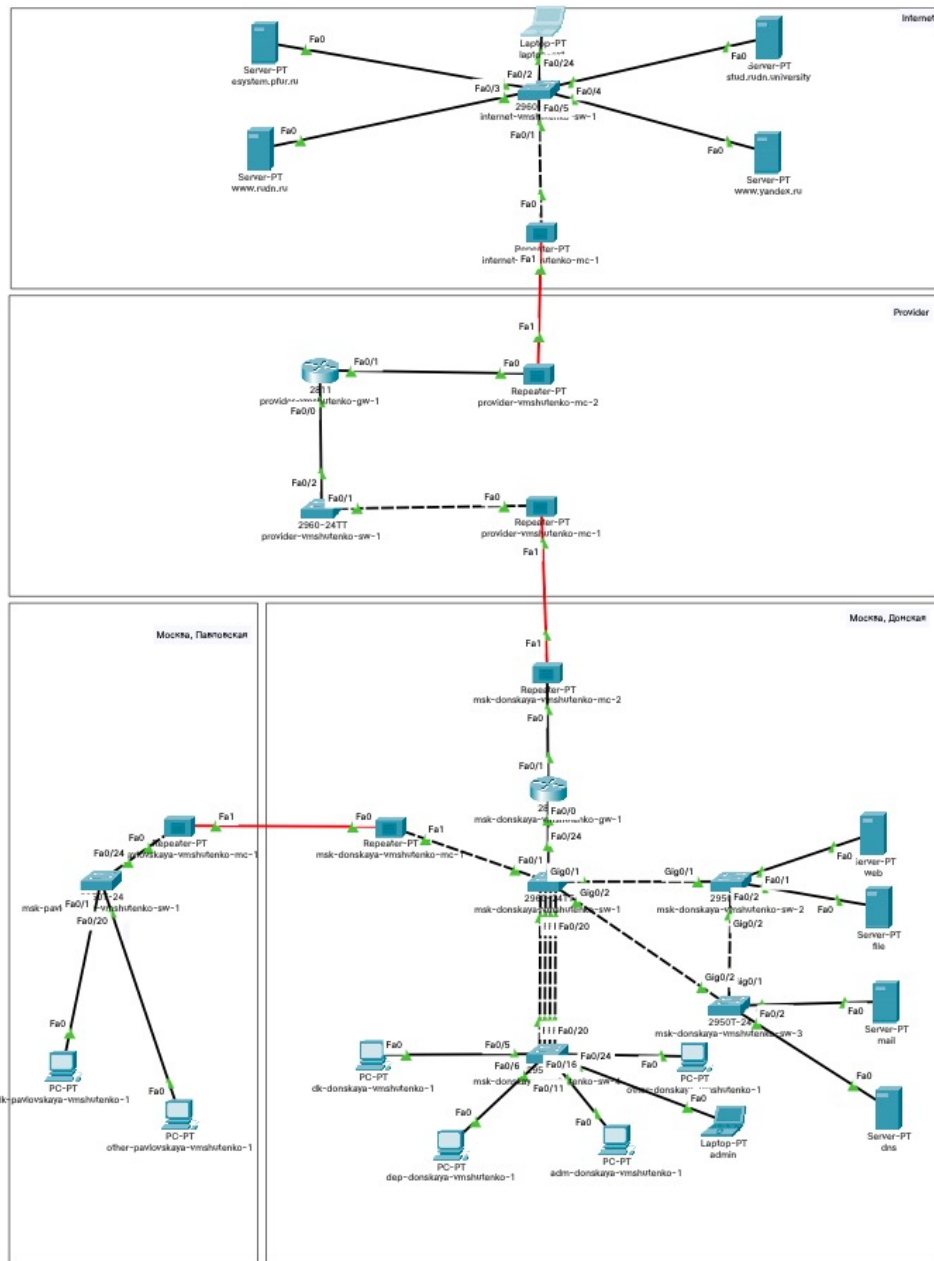
# Цель лабораторной работы

- Приобретение практических навыков по настройке доступа локальной сети к внешней сети посредством NAT.

# Задание лабораторной работы

1. Сделать первоначальную настройку маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера: задать имя, настроить доступ по паролю и т.п. (см. разделы 12.4.1, 12.4.2).
2. Настроить интерфейсы маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера: (см. разделы 12.4.3, 12.4.4).
3. Настроить интерфейсы маршрутизатора сети «Донская» для доступа к сети провайдера (см. раздел 12.4.5).
4. Настроить на маршрутизаторе сети «Донская» NAT с правилами, указанными в разделе 12.2 (см. разделы 12.4.6–12.4.8).
5. Настроить доступ из внешней сети в локальную сеть организации, как указано в разделе 12.2 (см. раздел 12.4.9).
6. Проверить работоспособность заданных настроек.
7. При выполнении работы необходимо учитывать соглашение об именовании (см. раздел 2.5).

# Схема сети

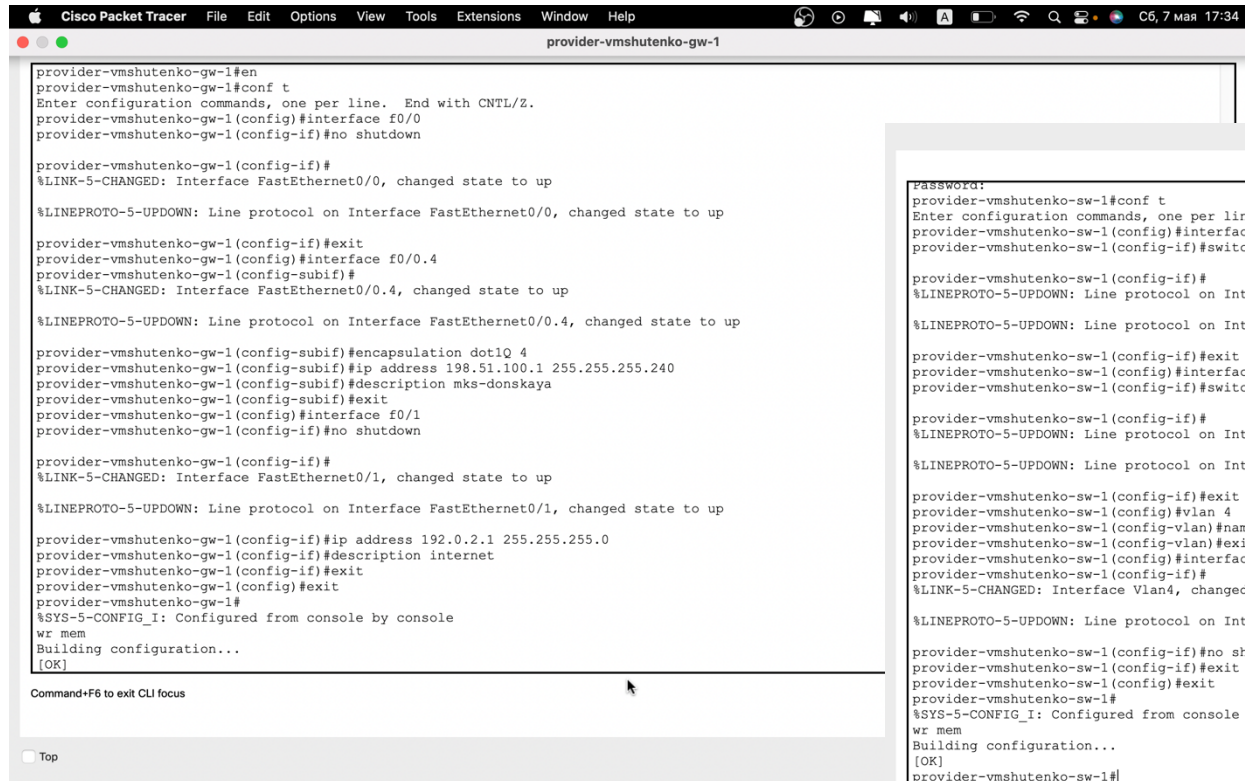


# Настройка маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера:

```
provider-vmshutenko-gw-1>enable
provider-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
provider-vmshutenko-gw-1(config)#line vty 0 4
provider-vmshutenko-gw-1(config-line)#password cisco
provider-vmshutenko-gw-1(config-line)#login
provider-vmshutenko-gw-1(config-line)#exit
provider-vmshutenko-gw-1(config)#line console 0
provider-vmshutenko-gw-1(config-line)#password cisco
provider-vmshutenko-gw-1(config-line)#login
provider-vmshutenko-gw-1(config-line)#exit
provider-vmshutenko-gw-1(config)#enable secret cisco
provider-vmshutenko-gw-1(config)#service password-encryption
provider-vmshutenko-gw-1(config)#username admin privilege 1 secret cisco
provider-vmshutenko-gw-1(config)#
```

```
provider-vmshutenko-sw-1>enable
provider-vmshutenko-sw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
provider-vmshutenko-sw-1(config)#line vty 0 4
provider-vmshutenko-sw-1(config-line)#password cisco
provider-vmshutenko-sw-1(config-line)#login
provider-vmshutenko-sw-1(config-line)#exit
provider-vmshutenko-sw-1(config)#line console 0
provider-vmshutenko-sw-1(config-line)#password cisco
provider-vmshutenko-sw-1(config-line)#login
provider-vmshutenko-sw-1(config-line)#exit
provider-vmshutenko-sw-1(config)#enable secret cisco
provider-vmshutenko-sw-1(config)#service password-encryption
provider-vmshutenko-sw-1(config)#username admin privilege 1 secret cisco
provider-vmshutenko-sw-1(config)^Z
provider-vmshutenko-sw-1#
```

# Настройка интерфейсов маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера



```
provider-vmshutenko-gw-1#en
provider-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
provider-vmshutenko-gw-1(config)#interface f0/0
provider-vmshutenko-gw-1(config-if)#no shutdown

provider-vmshutenko-gw-1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

provider-vmshutenko-gw-1(config-if)#exit
provider-vmshutenko-gw-1(config)#interface f0/0.4
provider-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.4, changed state to up

provider-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 4
provider-vmshutenko-gw-1(config-subif)#ip address 198.51.100.1 255.255.255.240
provider-vmshutenko-gw-1(config-subif)#description mks-donskaya
provider-vmshutenko-gw-1(config-subif)#exit
provider-vmshutenko-gw-1(config)#interface f0/1
provider-vmshutenko-gw-1(config-if)#no shutdown

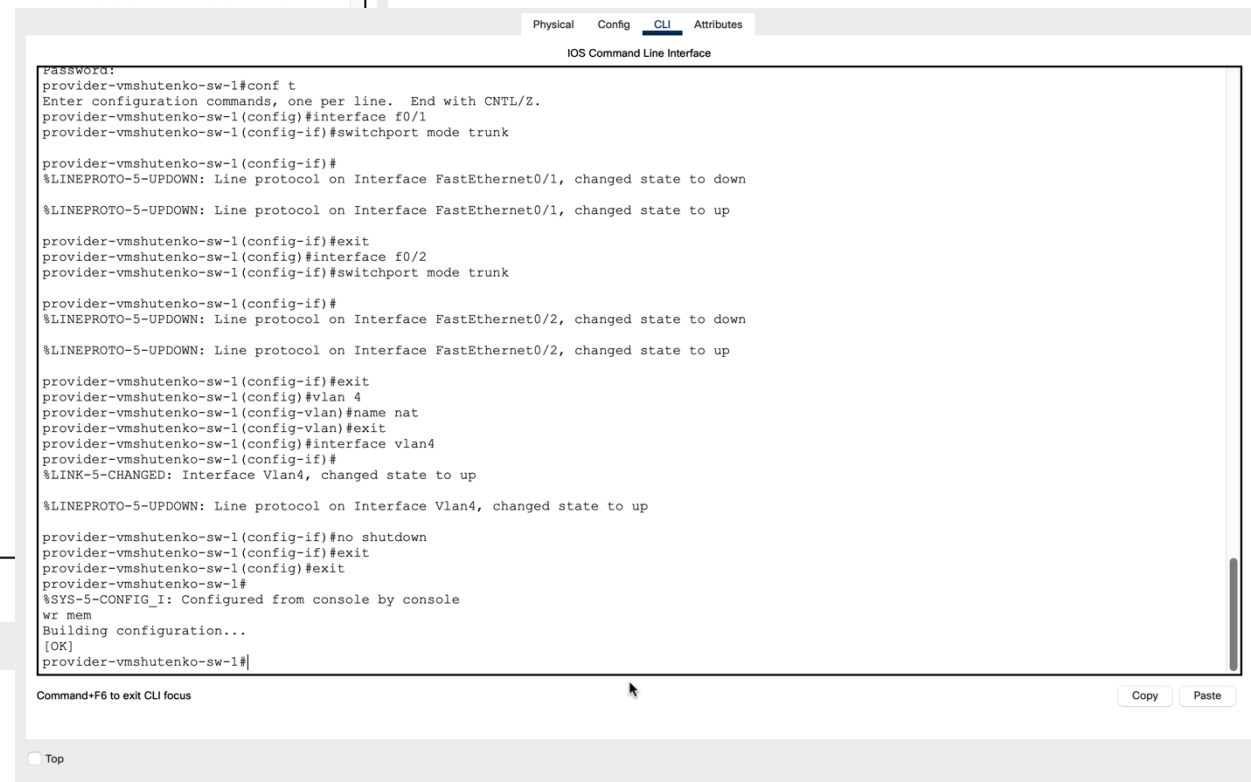
provider-vmshutenko-gw-1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

provider-vmshutenko-gw-1(config-if)#ip address 192.0.2.1 255.255.255.0
provider-vmshutenko-gw-1(config-if)#description internet
provider-vmshutenko-gw-1(config-if)#exit
provider-vmshutenko-gw-1(config)#exit
provider-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
```

Command+F6 to exit CLI focus

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```
provider-vmshutenko-sw-1#en
provider-vmshutenko-sw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
provider-vmshutenko-sw-1(config)#interface f0/1
provider-vmshutenko-sw-1(config-if)#switchport mode trunk

provider-vmshutenko-sw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

provider-vmshutenko-sw-1(config-if)#exit
provider-vmshutenko-sw-1(config)#interface f0/2
provider-vmshutenko-sw-1(config-if)#switchport mode trunk

provider-vmshutenko-sw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

provider-vmshutenko-sw-1(config-if)#exit
provider-vmshutenko-sw-1(config)#vlan 4
provider-vmshutenko-sw-1(config-vlan)#name nat
provider-vmshutenko-sw-1(config-vlan)#exit
provider-vmshutenko-sw-1(config)#interface vlan4
provider-vmshutenko-sw-1(config-if)#
%LINK-5-CHANGED: Interface Vlan4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan4, changed state to up

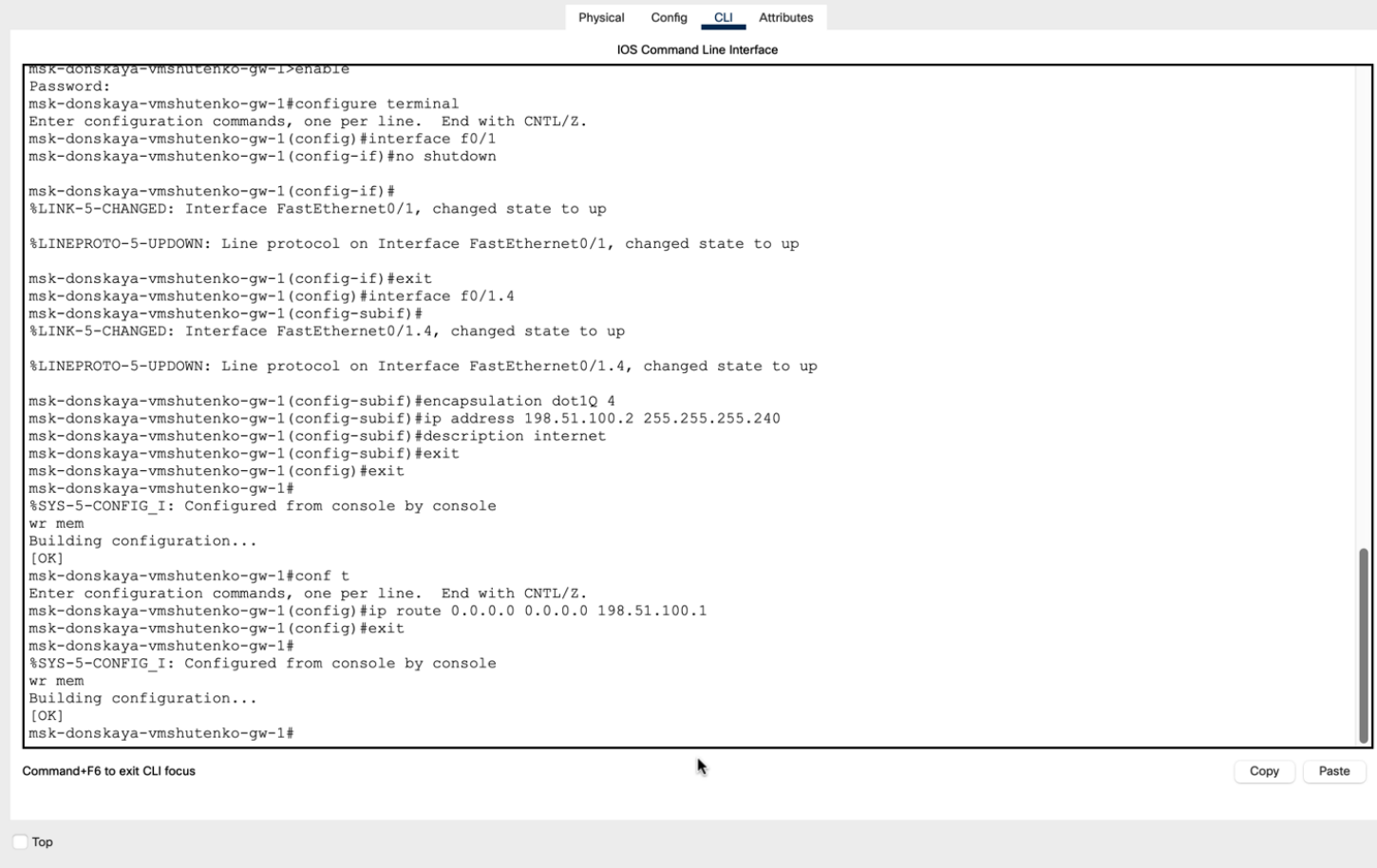
provider-vmshutenko-sw-1(config-if)#no shutdown
provider-vmshutenko-sw-1(config-if)#exit
provider-vmshutenko-sw-1(config)#exit
provider-vmshutenko-sw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
provider-vmshutenko-sw-1#
```

Command+F6 to exit CLI focus

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# Настройка интерфейсов маршрутизатора сети «Донская» для доступа к сети провайдера



```
msk-donskaya-vmshutenko-gw-1>enable
Password:
msk-donskaya-vmshutenko-gw-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#interface f0/1
msk-donskaya-vmshutenko-gw-1(config-if)#no shutdown

msk-donskaya-vmshutenko-gw-1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

msk-donskaya-vmshutenko-gw-1(config-if)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/1.4
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/1.4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1.4, changed state to up

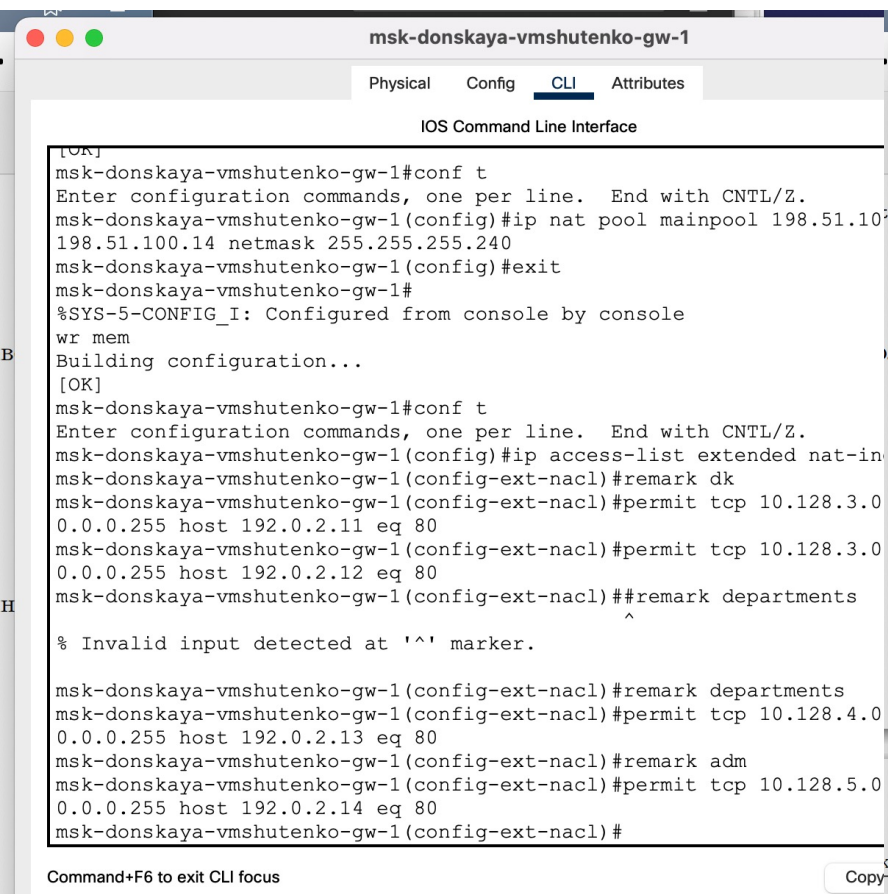
msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 4
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 198.51.100.2 255.255.255.240
msk-donskaya-vmshutenko-gw-1(config-subif)#description internet
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#exit
msk-donskaya-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#ip route 0.0.0.0 0.0.0.0 198.51.100.1
msk-donskaya-vmshutenko-gw-1(config)#exit
msk-donskaya-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#
```

Command+F6 to exit CLI focus

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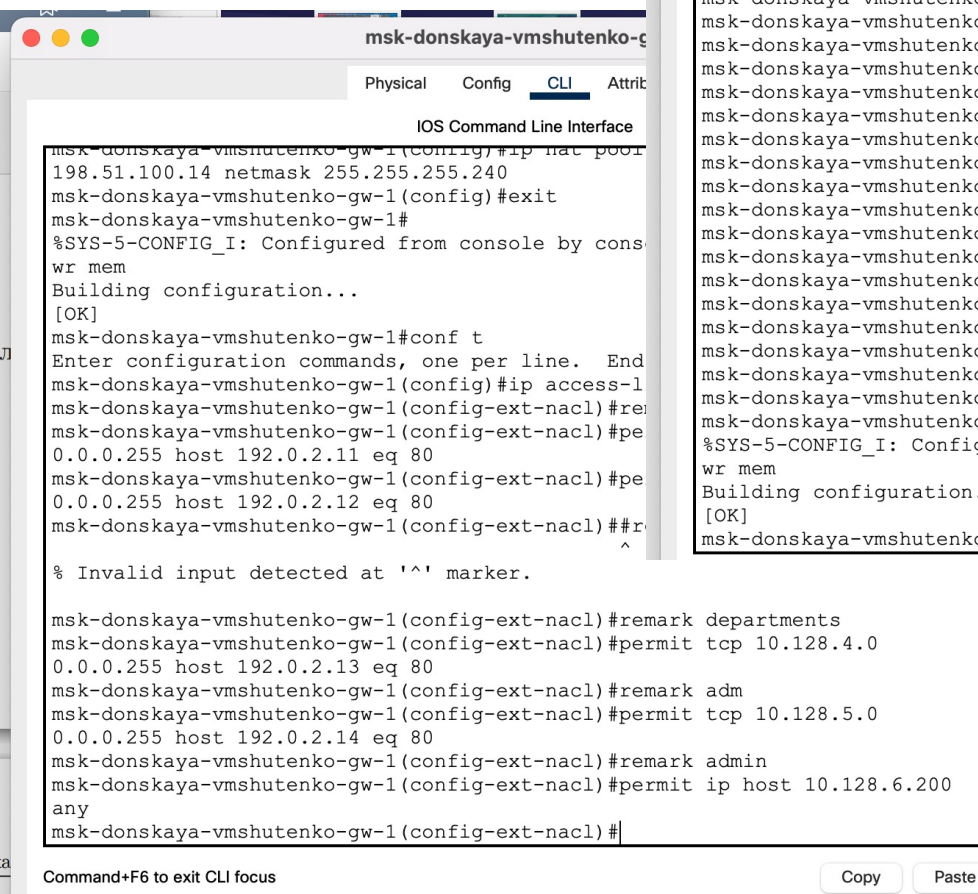
Настройка пула адресов для NAT. Настройка списка доступа для NAT. Сети дисплейных классов, кафедр, администрации. Доступ для компьютера администратора. Настройка NAT.



```
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#ip nat pool mainpool 198.51.100.14 netmask 255.255.255.240
msk-donskaya-vmshutenko-gw-1(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#ip access-list extended nat-in
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark dk
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.3.0
0.0.0.255 host 192.0.2.11 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.3.0
0.0.0.255 host 192.0.2.12 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)##remark departments
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark departments
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.4.0
0.0.0.255 host 192.0.2.13 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark adm
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.5.0
0.0.0.255 host 192.0.2.14 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#
```

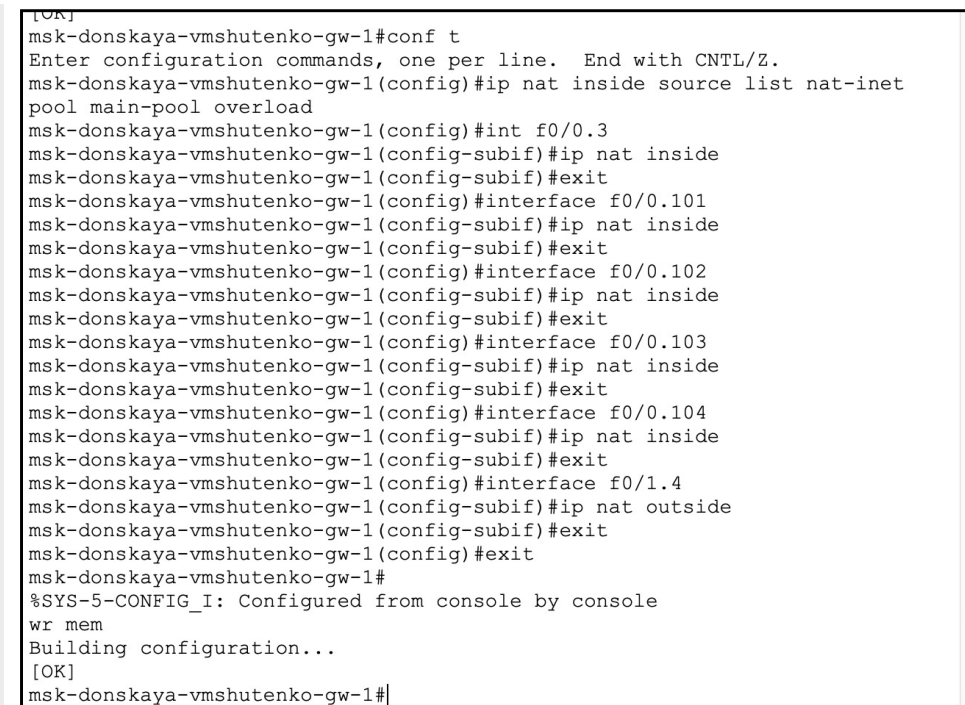
Command+F6 to exit CLI focus



```
[OK]
msk-donskaya-vmshutenko-gw-1(config)#ip nat pool
198.51.100.14 netmask 255.255.255.240
msk-donskaya-vmshutenko-gw-1(config)#exit
msk-donskaya-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End
msk-donskaya-vmshutenko-gw-1(config)#ip access-l
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#re
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#pe
0.0.0.255 host 192.0.2.11 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#pe
0.0.0.255 host 192.0.2.12 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)##r
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark departments
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.4.0
0.0.0.255 host 192.0.2.13 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark adm
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit tcp 10.128.5.0
0.0.0.255 host 192.0.2.14 eq 80
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#remark admin
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#permit ip host 10.128.6.200
any
msk-donskaya-vmshutenko-gw-1(config-ext-nacl)#
```

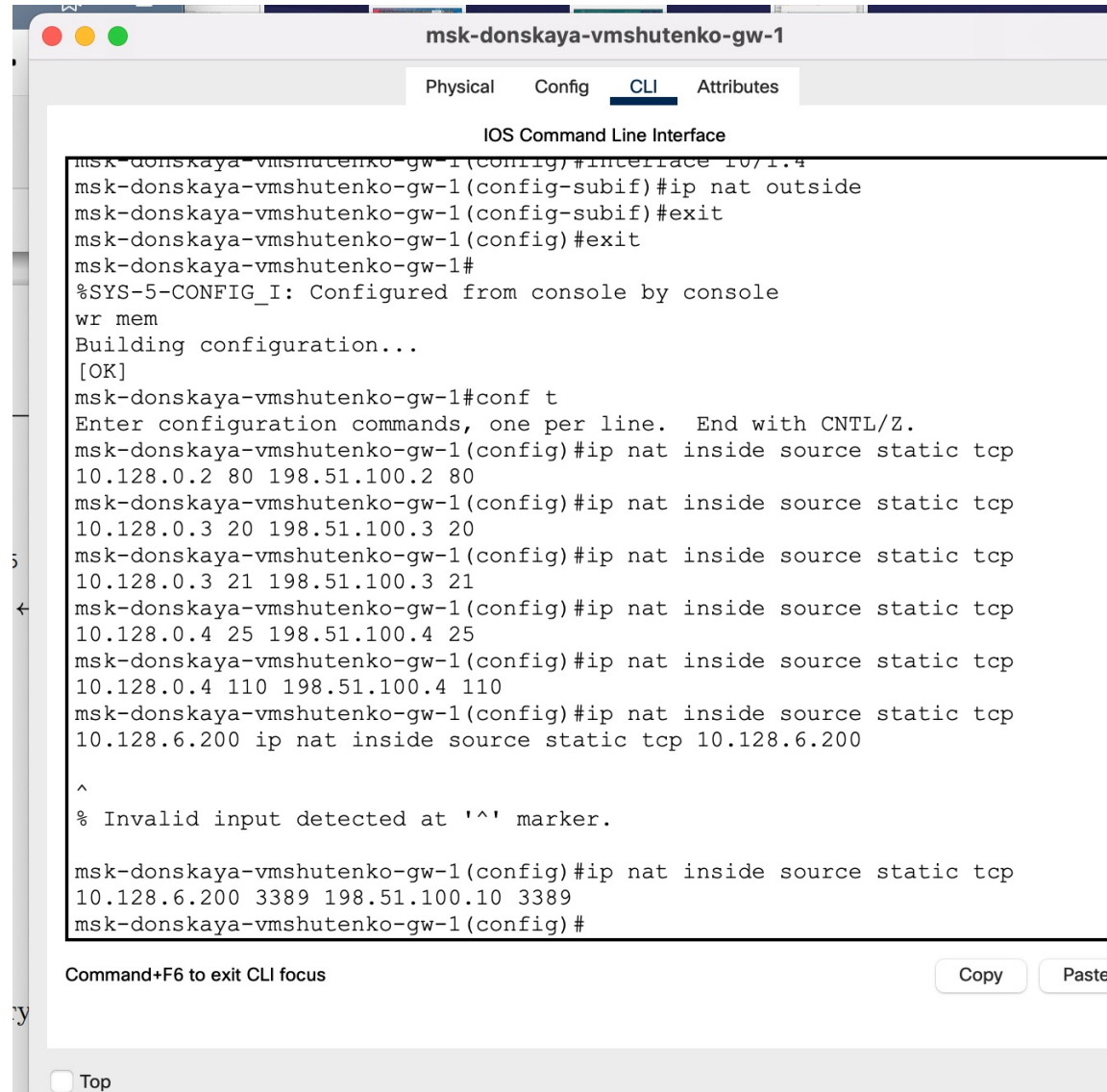
Command+F6 to exit CLI focus



```
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source list nat-inet
pool main-pool overload
msk-donskaya-vmshutenko-gw-1(config)#int f0/0.3
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat inside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0.101
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat inside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0.102
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat inside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0.103
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat inside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0.104
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat inside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/1.4
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat outside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#
```



# Настройка доступа из Интернета. WWW-сервер. Файловый сервер. Почтовый сервер. Доступ по RDP.



The screenshot shows a network configuration window titled "msk-donskaya-vmshutenko-gw-1" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the IOS Command Line Interface. The configuration includes setting the outside interface to 10/1.4, enabling NAT, and configuring static NAT for several IP ranges. The configuration is saved to memory and then displayed in a text area.

```
msk-donskaya-vmshutenko-gw-1(config)#interface 10/1.4
msk-donskaya-vmshutenko-gw-1(config-subif)#ip nat outside
msk-donskaya-vmshutenko-gw-1(config-subif)#exit
msk-donskaya-vmshutenko-gw-1(config)#exit
msk-donskaya-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.0.2 80 198.51.100.2 80
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.0.3 20 198.51.100.3 20
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.0.3 21 198.51.100.3 21
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.0.4 25 198.51.100.4 25
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.0.4 110 198.51.100.4 110
msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.6.200 ip nat inside source static tcp 10.128.6.200
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-gw-1(config)#ip nat inside source static tcp
10.128.6.200 3389 198.51.100.10 3389
msk-donskaya-vmshutenko-gw-1(config)#
```

Command+F6 to exit CLI focus

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# Проверка работоспособности заданных настроек

The image displays a network configuration interface for a device named 'laptop-ext' and two command prompts showing the verification of the configured settings.

**Network Configuration Interface (laptop-ext):**

- Physical Tab:** Shows the FastEthernet0 interface.
- Config Tab:** Shows the configuration for FastEthernet0.
- Port Status:** ☒ On
- Bandwidth:** ☒ 100 Mbps, ☐ 10 Mbps, ☒ Aut
- Duplex:** ☐ Half Duplex, ☒ Full Duplex, ☒ Aut
- MAC Address:** 00E0.F949.4992
- IP Configuration:** ☐ DHCP, ☒ Static
- IPv4 Address:** 192.0.2.200
- Subnet Mask:** 255.255.255.0
- IPv6 Configuration:** ☐ Automatic, ☒ Static
- IPv6 Address:** [Empty field]
- Link Local Address:** FE80::2E0:F9FF:FE49:4992

**Command Prompt 1 (laptop-ext):**

```
Link-local IPv6 Address.....: FE80::2E0:F9FF:FE49:4992
IPv6 Address.....: ::
IPv4 Address.....: 192.0.2.200
Subnet Mask.....: 255.255.255.0
Default Gateway.....: 192.0.2.1

Bluetooth Connection:

Connection-specific DNS Suffix.:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: 0.0.0.0

C:\>ping 192.0.2.1

Pinging 192.0.2.1 with 32 bytes of data:

Reply from 192.0.2.1: bytes=32 time<1ms TTL=255
Reply from 192.0.2.1: bytes=32 time<1ms TTL=255
Reply from 192.0.2.1: bytes=32 time<1ms TTL=255
Reply from 192.0.2.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.0.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ftp 198.51.100.3
Trying to connect...198.51.100.3
Connected to 198.51.100.3
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
```

**Command Prompt 2 (laptop-ext):**

```
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
exit
Invalid Command.

C:\>rdp 198.51.100.3
Invalid Command.

C:\>RDP 198.51.100.3
Invalid Command.

C:\>ping 192.0.2.1

Pinging 192.0.2.1 with 32 bytes of data:

Reply from 192.0.2.1: bytes=32 time<1ms TTL=255
Reply from 192.0.2.1: bytes=32 time=22ms TTL=255
Reply from 192.0.2.1: bytes=32 time=1ms TTL=255
Reply from 192.0.2.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.0.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 22ms, Average = 5ms

C:\>ping 192.0.2.1|
```

# ИТОГИ ВЫПОЛНЕНИЯ РАБОТЫ

1. Сделана первоначальная настройку маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера: задано имя, настроен доступ по паролю и т.п. (см. разделы 12.4.1, 12.4.2).
2. Настроены интерфейсы маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера: (см. разделы 12.4.3, 12.4.4).
3. Настроены интерфейсы маршрутизатора сети «Донская» для доступа к сети провайдера (см. раздел 12.4.5).
4. Настроен на маршрутизаторе сети «Донская» NAT с правилами, указанными в разделе 12.2 (см. разделы 12.4.6–12.4.8).
5. Настроен доступ из внешней сети в локальную сеть организации, как указано в разделе 12.2 (см. раздел 12.4.9).
6. Проверена работоспособность заданных настроек.
7. При выполнении работы необходимо учитывалось соглашение об именовании (см. раздел 2.5).

# Вывод

- Я приобрела практические навыки по настройке доступа локальной сети к внешней сети посредством NAT.