# Лабораторная работа №12

## Настройка NAT

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# Информация

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# Вводная часть

# Цель работы

Приобрести практические навыки по настройке доступа локальной сети к внешней сети посредством NAT.

# Задание

1. Сделать первоначальную настройку маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера: задать имя, настроить доступ по паролю и т.п.
2. Настроить интерфейсы маршрутизатора provider-gw-1 и коммутатора provider-sw-1 провайдера.
3. Настроить интерфейсы маршрутизатора сети «Донская» для доступа к сети провайдера.
4. Настроить на маршрутизаторе сети «Донская» NAT с правилами.
5. Настроить доступ из внешней сети в локальную сеть организации.
6. Проверить работоспособность заданных настроек.
7. При выполнении работы необходимо учитывать соглашение об именовании.

**Таблица 1:** Распределение ip-адресов модельного Интернета {#tbl:ip}

| IP-адреса | Примечание |
|---|---|
| 192.0.2.1 | provider-gw-1 |
| 192.0.2.11 | www.yandex.ru |
| 192.0.2.12 | stud.rudn.university |
| 192.0.2.13 | esystem.pfur.ru |
| 192.0.2.14 | www.rudn.ru |

# Выполнение лабораторной работы

```
provider-mgkhvatov-gw-1>enable
provider-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
provider-mgkhvatov-gw-1(config)#line vty 0 4
provider-mgkhvatov-gw-1(config-line)#password cisco
provider-mgkhvatov-gw-1(config-line)#login
provider-mgkhvatov-gw-1(config-line)#exit
provider-mgkhvatov-gw-1(config)#line console 0
provider-mgkhvatov-gw-1(config-line)#password cisco
provider-mgkhvatov-gw-1(config-line)#login
provider-mgkhvatov-gw-1(config-line)#exit
provider-mgkhvatov-gw-1(config)#enable secret cisco
provider-mgkhvatov-gw-1(config)#service password-encryption
provider-mgkhvatov-gw-1(config)#username admin privilege 1 secret cisco
provider-mgkhvatov-gw-1(config)#^Z
provider-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
```

**Рис. 1:** Первоначальная настройка маршрутизатора provider-gw-1

# Выполнение лабораторной работы

```
provider-mgkhvatov-gw-1(config)#interface f0/0
provider-mgkhvatov-gw-1(config-if)#no shutdown

provider-mgkhvatov-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-mgkhvatov-gw-1(config-if)#exit
provider-mgkhvatov-gw-1(config)#interface f0/0.4
provider-mgkhvatov-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-mgkhvatov-gw-1(config-subif)#encapsulation dot1Q 4
provider-mgkhvatov-gw-1(config-subif)#ip address 198.51.100.1 255.255.255.240
provider-mgkhvatov-gw-1(config-subif)#descriprion msk-donskaya-mgkhvatov
                                     ^
% Invalid input detected at '^' marker.

provider-mgkhvatov-gw-1(config-subif)#description msk-donskaya-mgkhvatov
provider-mgkhvatov-gw-1(config-subif)#exit
```

Рис. 2: Первоначальная настройка коммутатора provider-sw-1

# Выполнение лабораторной работы

```
provider-mgkhvatov-gw-1(config)#interface f0/1
provider-mgkhvatov-gw-1(config-if)#no shutdon
                                          ^
% Invalid input detected at '^' marker.

provider-mgkhvatov-gw-1(config-if)#no shutdown

provider-mgkhvatov-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-mgkhvatov-gw-1(config-if)#ip address 192.0.2.1 255.255.255.0
provider-mgkhvatov-gw-1(config-if)#description internet
provider-mgkhvatov-gw-1(config-if)#exit
provider-mgkhvatov-gw-1(config)#exit
provider-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
```

**Рис. 3:** Настройка интерфейсов маршрутизатора provider-gw-1

# Выполнение лабораторной работы

```
provider-mgkhvatov-sw-1>en
provider-mgkhvatov-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
provider-mgkhvatov-sw-1(config)#line vty 0 4
provider-mgkhvatov-sw-1(config-line)#password cisco
provider-mgkhvatov-sw-1(config-line)#login
provider-mgkhvatov-sw-1(config-line)#exit
provider-mgkhvatov-sw-1(config)#line console 0
provider-mgkhvatov-sw-1(config-line)#password cisco
provider-mgkhvatov-sw-1(config-line)#login
provider-mgkhvatov-sw-1(config-line)#exit
provider-mgkhvatov-sw-1(config)#enable secret cisco
provider-mgkhvatov-sw-1(config)#service password-encryption
provider-mgkhvatov-sw-1(config)#username admin privilege 1 secret cisco
provider-mgkhvatov-sw-1(config)#^Z
provider-mgkhvatov-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-mgkhvatov-sw-1#wr mem
Building configuration...
[OK]
```

**Рис. 4:** Настройка интерфейсов коммутатора provider-sw-1

# Выполнение лабораторной работы

```
provider-mgkhvatov-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
provider-mgkhvatov-sw-1(config)#inerface f0/1
                               ^
% Invalid input detected at '^' marker.

provider-mgkhvatov-sw-1(config)#interface f0/1
provider-mgkhvatov-sw-1(config-if)#switchport mode trunk

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

provider-mgkhvatov-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-mgkhvatov-sw-1(config-if)#^Z
provider-mgkhvatov-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-mgkhvatov-sw-1#wr mem
Building configuration...
[OK]
```

**Рис. 5:** Настройка интерфейсов коммутатора provider-sw-1

# Выполнение лабораторной работы

```
msk-donskaya-mgkhvatov-gw-1>en
Password:
msk-donskaya-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#interface f0/1
msk-donskaya-mgkhvatov-gw-1(config-if)#no shutdown

msk-donskaya-mgkhvatov-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-mgkhvatov-gw-1(config-if)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#interface  f0/1.4
msk-donskaya-mgkhvatov-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-mgkhvatov-gw-1(config-subif)#encapsulation dot1Q 4
msk-donskaya-mgkhvatov-gw-1(config-subif)#ip address 198.51.100.2 255.255.255.240
msk-donskaya-mgkhvatov-gw-1(config-subif)#description internet
msk-donskaya-mgkhvatov-gw-1(config-subif)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
```

**Рис. 6:** Настройка интерфейсов маршрутизатора msk-donskaya-gw-1

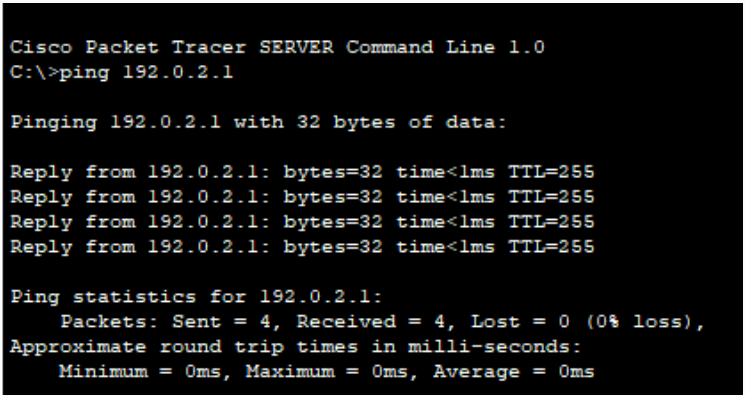


Рис. 7: Проверка доступности маршрутизатора

# Выполнение лабораторной работы

```
msk-donskaya-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#ip route 0.0.0.0 0.0.0.0 198.51.100.1
msk-donskaya-mgkhvatov-gw-1(config)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
```

**Рис. 8:** Настройка роута по умолчанию

# Выполнение лабораторной работы

```
msk-donskaya-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#ip nat pool main-pool 198.51.100.2 198.51.100.14 netmask 255.255.255.240
msk-donskaya-mgkhvatov-gw-1(config)#ip access-list extended nat-inet
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark dk
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.11 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.12 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark departments
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.4.0 0.0.0.255 host 192.0.2.14 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark admin
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit ip host 10.128.6.200 any
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
msk-donskaya-mgkhvatov-gw-1#
```

**Рис. 9:** Попытка пропинговать 198.51.100.1

# Выполнение лабораторной работы

```
msk-donskaya-mgkhvatov-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#ip nat pool main-pool 198.51.100.2 198.51.100.14 netmask 255.255.255.240
msk-donskaya-mgkhvatov-gw-1(config)#ip access-list extended nat-inet
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark dk
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.11 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.12 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark departments
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit tcp 10.128.4.0 0.0.0.255 host 192.0.2.14 eq 80
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#remark admin
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#permit ip host 10.128.6.200 any
msk-donskaya-mgkhvatov-gw-1(config-ext-nacl)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
msk-donskaya-mgkhvatov-gw-1#
```

**Рис. 10:** Настройка пула адресов

# Выполнение лабораторной работы

```
msk-donskaya-mgkhvatov-gw-1#cont t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.2 80 198.51.100.2 80
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.3 80 198.51.100.3 20
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.3 20 198.51.100.2 20
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.3 21 198.51.100.3 21
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.3 20 198.51.100.3 20
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.4 25 198.51.100.4 25
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.0.4 110 198.51.100.4 110
msk-donskaya-mgkhvatov-gw-1(config)#ip nat inside source static tcp 10.128.6.200 3389 198.51.100.10 3389
msk-donskaya-mgkhvatov-gw-1(config)#^Z
msk-donskaya-mgkhvatov-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-mgkhvatov-gw-1#wr mem
Building configuration...
[OK]
```

**Рис. 11:** Настройка PAT

```
C:\>ping 198.51.100.1

Pinging 198.51.100.1 with 32 bytes of data:

Reply from 198.51.100.1: bytes=32 time=14ms TTL=254
Reply from 198.51.100.1: bytes=32 time<1ms TTL=254
Reply from 198.51.100.1: bytes=32 time<1ms TTL=254

Ping statistics for 198.51.100.1:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 14ms, Average = 4ms
```

Рис. 12: Пинг

```
C:\>ping 198.51.100.2

Pinging 198.51.100.2 with 32 bytes of data:

Reply from 198.51.100.2: bytes=32 time=1ms TTL=255
Reply from 198.51.100.2: bytes=32 time<1ms TTL=255
Reply from 198.51.100.2: bytes=32 time<1ms TTL=255
Reply from 198.51.100.2: bytes=32 time<1ms TTL=255

Ping statistics for 198.51.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Рис. 13: Пинг

```
C:\>ping 192.0.2.11

Pinging 192.0.2.11 with 32 bytes of data:

Request timed out.
Reply from 192.0.2.11: bytes=32 time<1ms TTL=126
Reply from 192.0.2.11: bytes=32 time<1ms TTL=126
Reply from 192.0.2.11: bytes=32 time=4ms TTL=126

Ping statistics for 192.0.2.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms
```

Рис. 14: Пинг

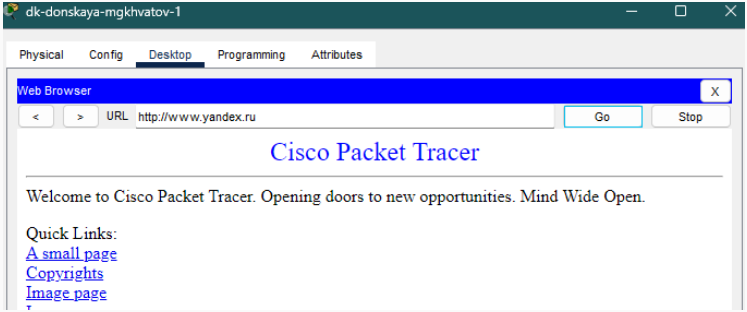


Рис. 15: www.yandex.ru

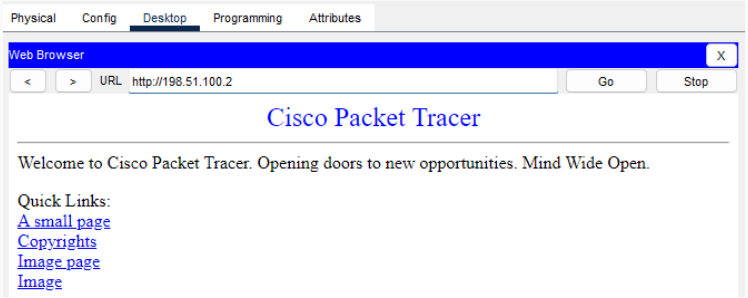


**Рис. 16:** 198.51.100.2

# Выводы

В процессе выполнения данной лабораторной работы я провел подготовительные мероприятия по подключению локальной сети организации к Интернету.