

Лабораторная работа №12

Администрирование локальных сетей

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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.

Выполнение лабораторной работы

Первоначальная настройка

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

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

Первоначальная настройка

```
provider-aamishina-sw-1>en
provider-aamishina-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
provider-aamishina-sw-1(config)#line vty 0 4
provider-aamishina-sw-1(config-line)#password cisco
provider-aamishina-sw-1(config-line)#login
provider-aamishina-sw-1(config-line)#exit
provider-aamishina-sw-1(config)#
provider-aamishina-sw-1(config)#line console 0
provider-aamishina-sw-1(config-line)#password cisco
provider-aamishina-sw-1(config-line)#login
^
% Invalid input detected at '^' marker.

provider-aamishina-sw-1(config-line)#login
provider-aamishina-sw-1(config-line)#exit
provider-aamishina-sw-1(config)#
provider-aamishina-sw-1(config)#enable secret cisco
provider-aamishina-sw-1(config)#service password-encryption
provider-aamishina-sw-1(config)#username admin privilege 1 secret cisco
provider-aamishina-sw-1(config)#exit
provider-aamishina-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-aamishina-sw-1#
```

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

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

provider-aamishina-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-aamishina-gw-1(config-if)#exit
provider-aamishina-gw-1(config)#
provider-aamishina-gw-1(config)#interface f0 /0.4
      ^
% Invalid input detected at '^' marker.

provider-aamishina-gw-1(config)#interface f0/0.4
provider-aamishina-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-aamishina-gw-1(config-subif)#encapsulation dot1Q 4
provider-aamishina-gw-1(config-subif)#ip address 198.51.100.1 255.255.255.240
provider-aamishina-gw-1(config-subif)#description mks-donskaya
provider-aamishina-gw-1(config-subif)#exit
provider-aamishina-gw-1(config)#
provider-aamishina-gw-1(config)#interface f0/1
provider-aamishina-gw-1(config-if)#no shutdown

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

provider-aamishina-gw-1#
```

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

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

provider-aamishina-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-aamishina-sw-1(config-if)#exit
provider-aamishina-sw-1(config)#
provider-aamishina-sw-1(config)#vlan 4
provider-aamishina-sw-1(config-vlan)#name nat
provider-aamishina-sw-1(config-vlan)#exit
provider-aamishina-sw-1(config)#
provider-aamishina-sw-1(config)# interface vlan4
provider-aamishina-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-aamishina-sw-1(config-if)#no shutdown
provider-aamishina-sw-1(config-if)#exit
provider-aamishina-sw-1(config)#
```

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

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

msk-donskaya-aamishina-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-aamishina-gw-1(config-if)#exit
msk-donskaya-aamishina-gw-1(config)#interface f0/1.4
msk-donskaya-aamishina-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-aamishina-gw-1(config-subif)#encapsulation dot1Q 4
msk-donskaya-aamishina-gw-1(config-subif)#ip address 198.51.100.2 255.255.255.240
msk-donskaya-aamishina-gw-1(config-subif)#description internet
msk-donskaya-aamishina-gw-1(config-subif)#exit
msk-donskaya-aamishina-gw-1(config)#exit
msk-donskaya-aamishina-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

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

msk-donskaya-aamishina-gw-1#
```

Рис. 5: Настройка интерфейсов маршрутизатора msk-donskaya-gw-1

```
msk-donskaya-aamishina-gw-1#ping 198.51.100.1  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 198.51.100.1, timeout is 2 seconds:  
.!!!!  
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms  
msk-donskaya-aamishina-gw-1#
```

Рис. 6: Проверка доступа с маршрутизатора на Донской к маршрутизатору провайдера

```
msk-donskaya-aamishina-gw-1#en
msk-donskaya-aamishina-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-aamishina-gw-1(config)#ip nat pool main-pool 198.51.100.2 198.51.100.14 netmask
255.255.255.240
msk-donskaya-aamishina-gw-1(config)#
```

Рис. 7: Настройка пула адресов для NAT

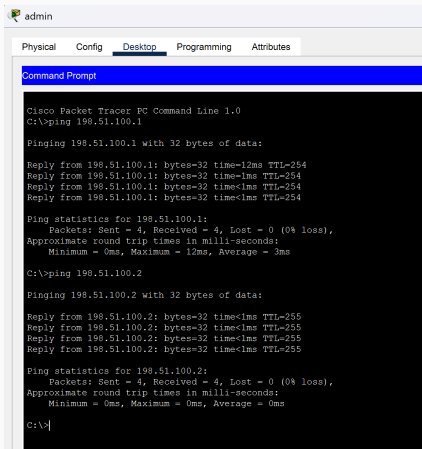
Настройка списка доступа для NAT

```
msk-donskaya-aamishina-gw-1#en
msk-donskaya-aamishina-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-aamishina-gw-1(config)#ip access-list extended nat-inet
msk-donskaya-aamishina-gw-1(config-ext-nacl)#remark dk
msk-donskaya-aamishina-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.11 eq 80
msk-donskaya-aamishina-gw-1(config-ext-nacl)#permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.12 eq 80
msk-donskaya-aamishina-gw-1(config-ext-nacl)#remark departments
msk-donskaya-aamishina-gw-1(config-ext-nacl)#permit tcp 10.128.4.0 0.0.0.255 host 192.0.2.13 eq 80
msk-donskaya-aamishina-gw-1(config-ext-nacl)#remark adm
msk-donskaya-aamishina-gw-1(config-ext-nacl)#permit tcp 10.128.5.0 0.0.0.255 host 192.0.2.14 eq 80
msk-donskaya-aamishina-gw-1(config-ext-nacl)#remark admin
msk-donskaya-aamishina-gw-1(config-ext-nacl)#permit ip host 10.128.6.200 any
msk-donskaya-aamishina-gw-1(config-ext-nacl)#^Z
msk-donskaya-aamishina-gw-1#
```

Рис. 8: Настройка списка доступа для NAT

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

Рис. 9: Настройка Port Address Translation (PAT) на субинтерфейсах маршрутизатора



```
admin
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
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=12ms 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
Reply from 198.51.100.1: bytes=32 time<1ms TTL=254

Ping statistics for 198.51.100.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms

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 = 0ms, Average = 0ms

C:\>|
```

Рис. 10: Проверка доступности к маршрутизаторам от ноутбука админ

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

Рис. 11: Настройка доступа из Интернета

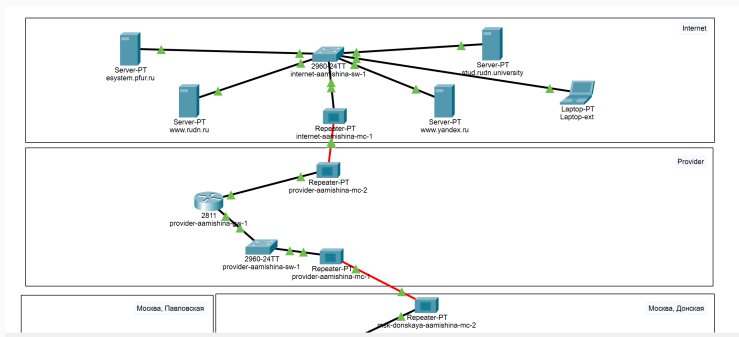


Рис. 12: Добавление ноутбука

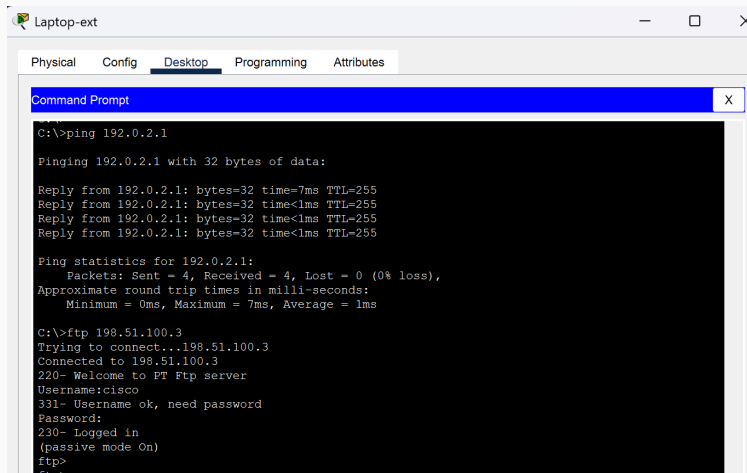


Рис. 13: Проверка доступа из Интернета по ftp

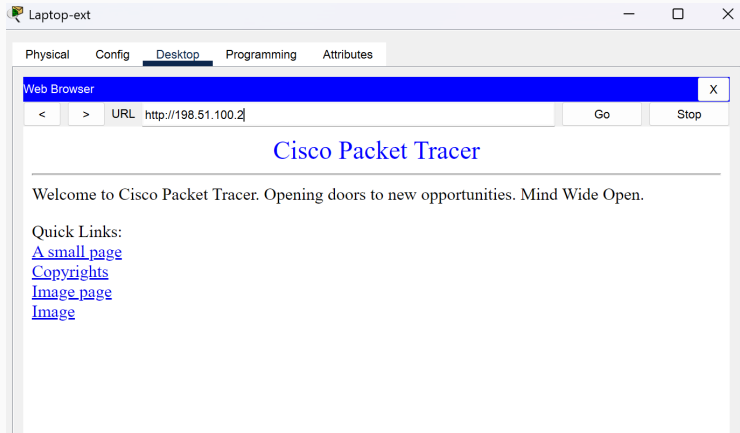


Рис. 14: Проверка доступа из Интернета к web-серверу

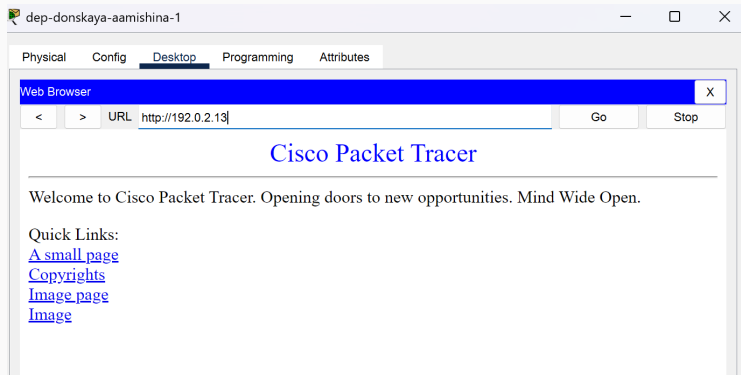


Рис. 15: Доступ dep-donskaya-1 к 192.0.2.13

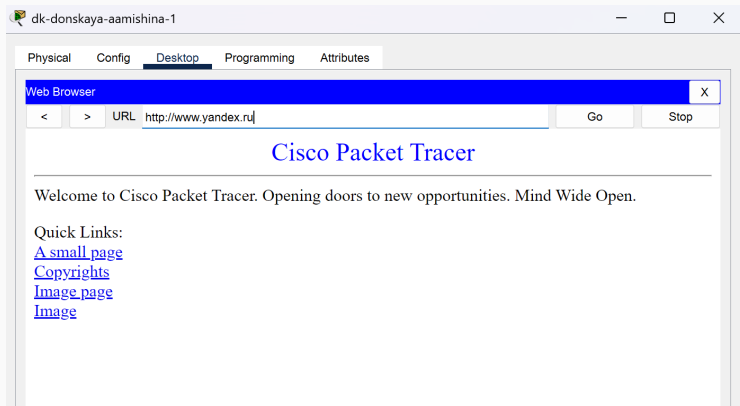


Рис. 16: Доступ dk-donskaya-1 к www.yandex.ru

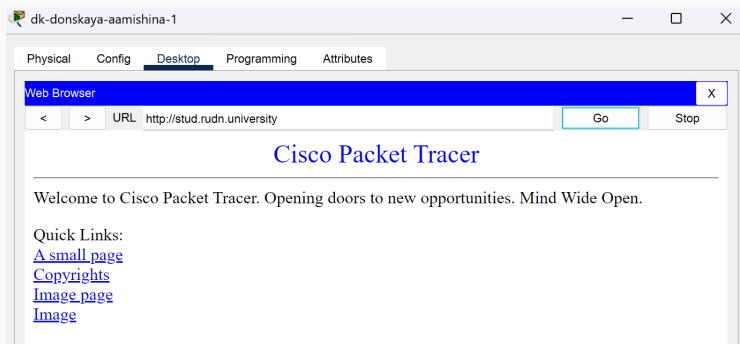


Рис. 17: Доступ dk-donskaya-1 к stud.rudn.university

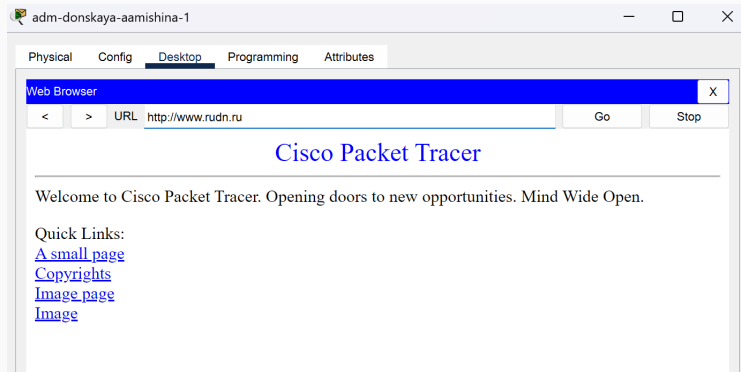


Рис. 18: Доступ adm-donskaya-1 к www.rudn.ru

- В результате выполнения данной лабораторной работы я приобрела практические навыки по настройке доступа локальной сети к внешней сети посредством NAT.