

Лабораторная работа №16

Настройка VPN.

Исаев Булат Абубакарович

1132227131

НПИБД-01-22

Открытие проекта

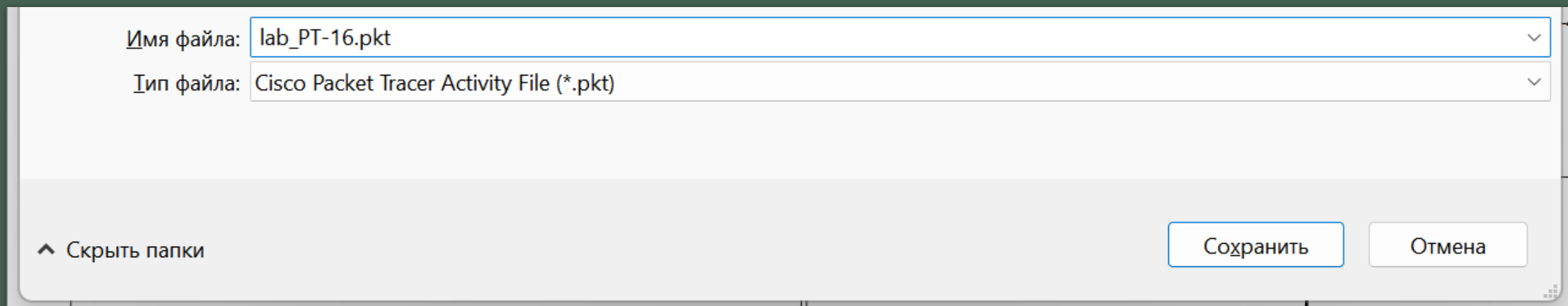


Рис. 1.1. Открытие проекта lab_PT-16.pkt.

Размещение оборудования

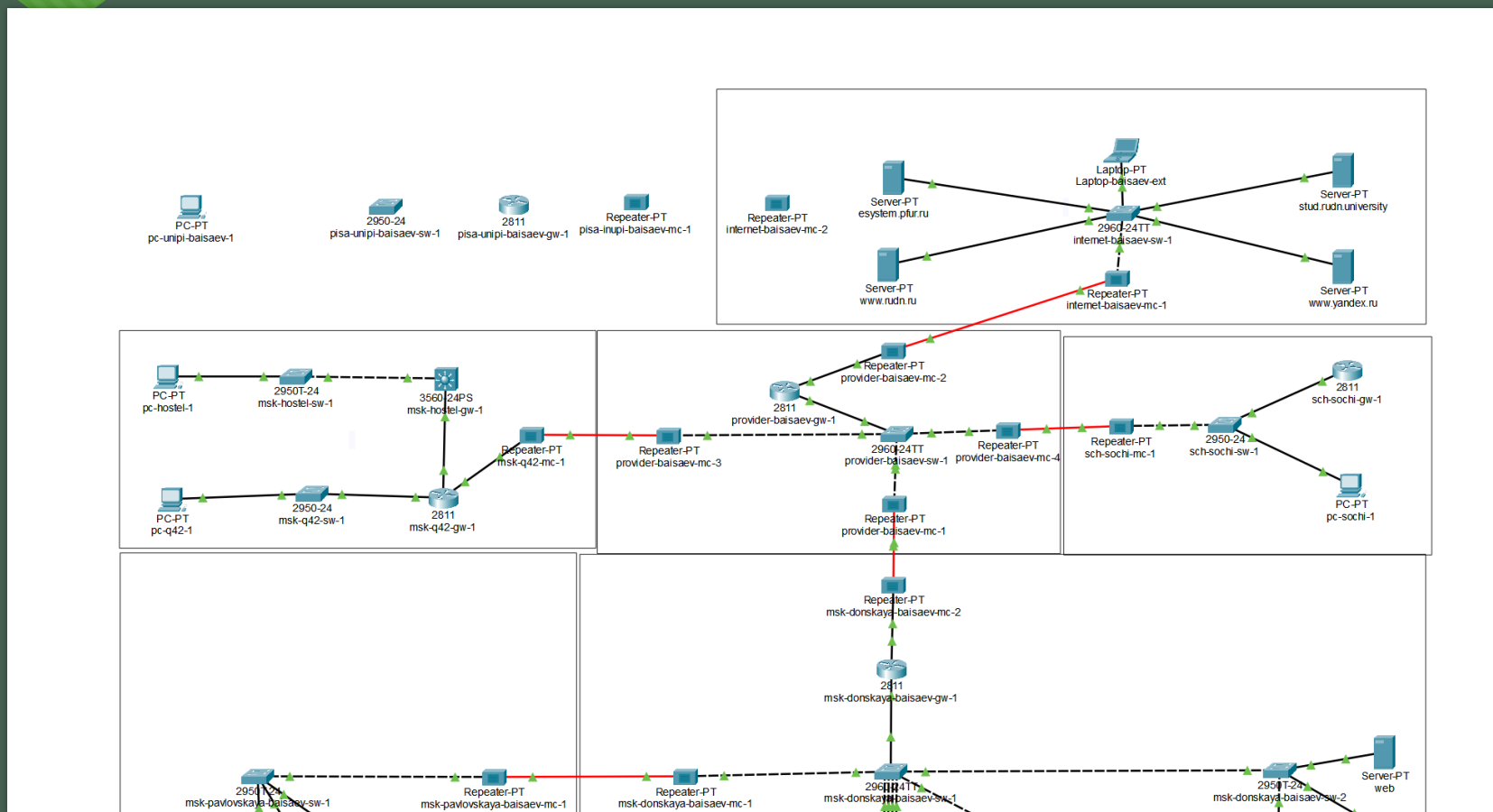


Рис. 1.2. Размещение оборудования в рабочей области проекта.

Замена модулей

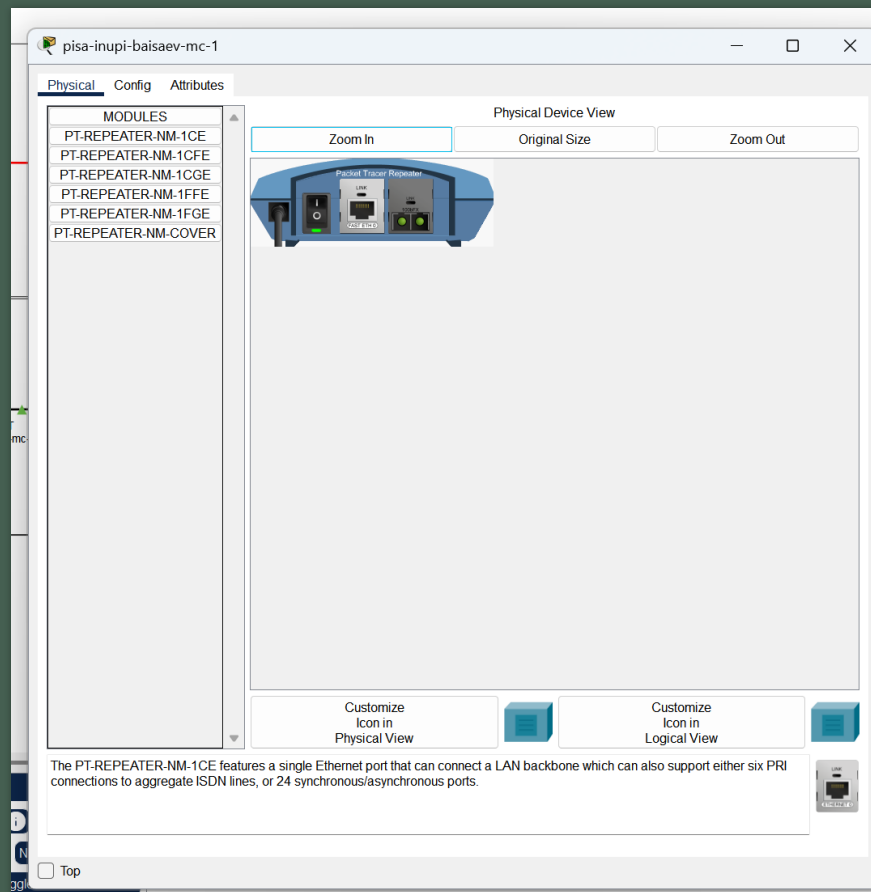


Рис. 1.3. Замена модулей на Repeater-PT.

Подключение

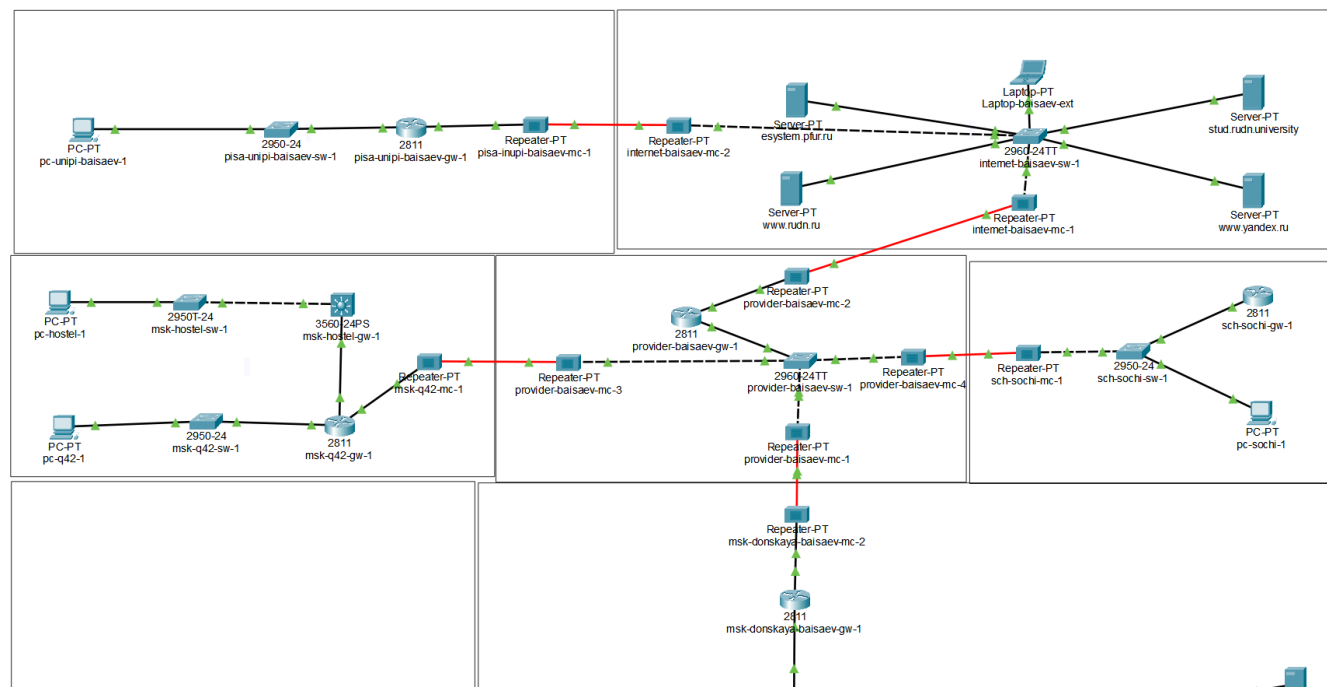


Рис. 1.4. Подключение оборудования.

Создание города

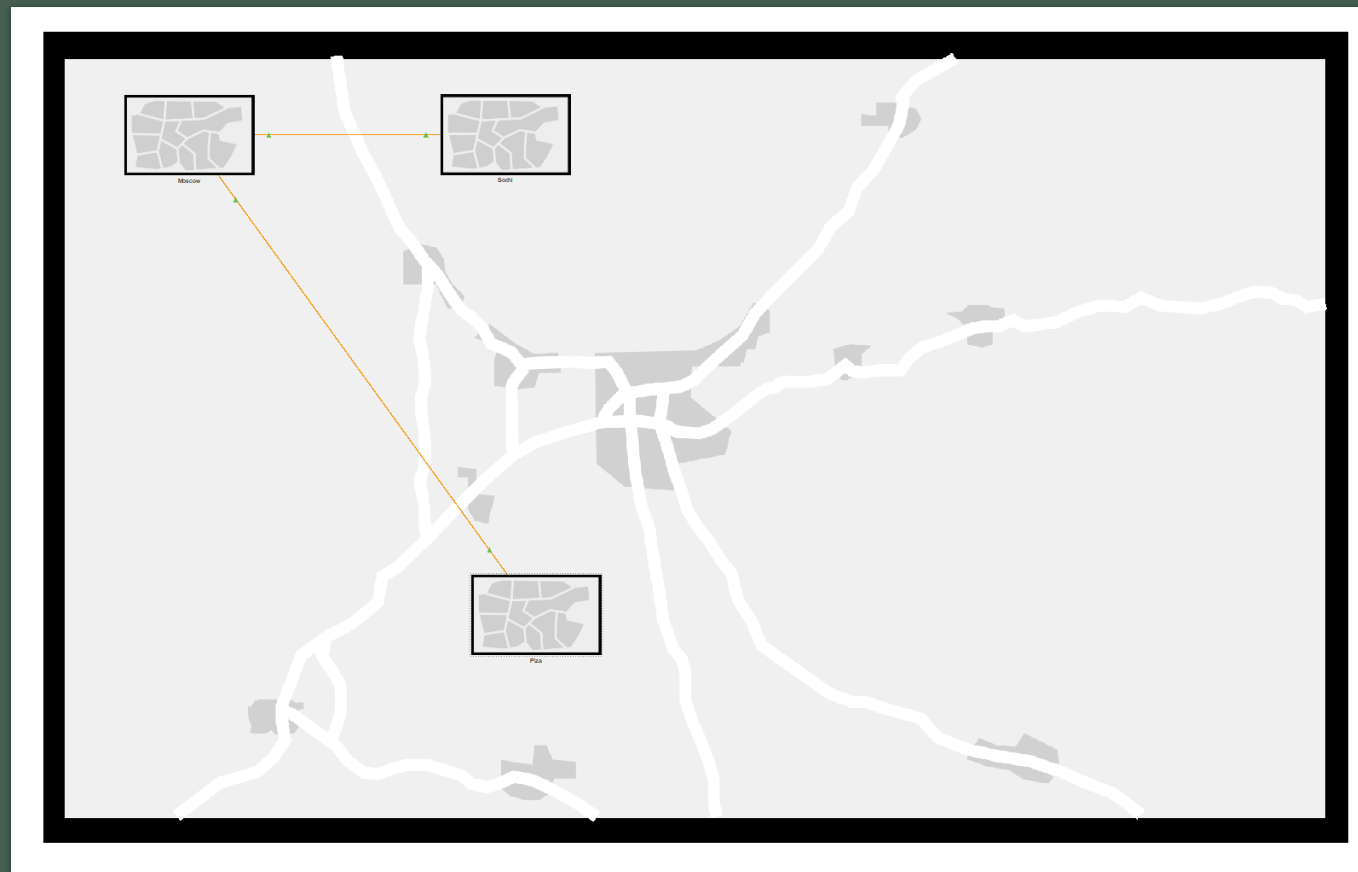


Рис. 1.5. Создание города Пиза в физической рабочей области.

Перемещение оборудования

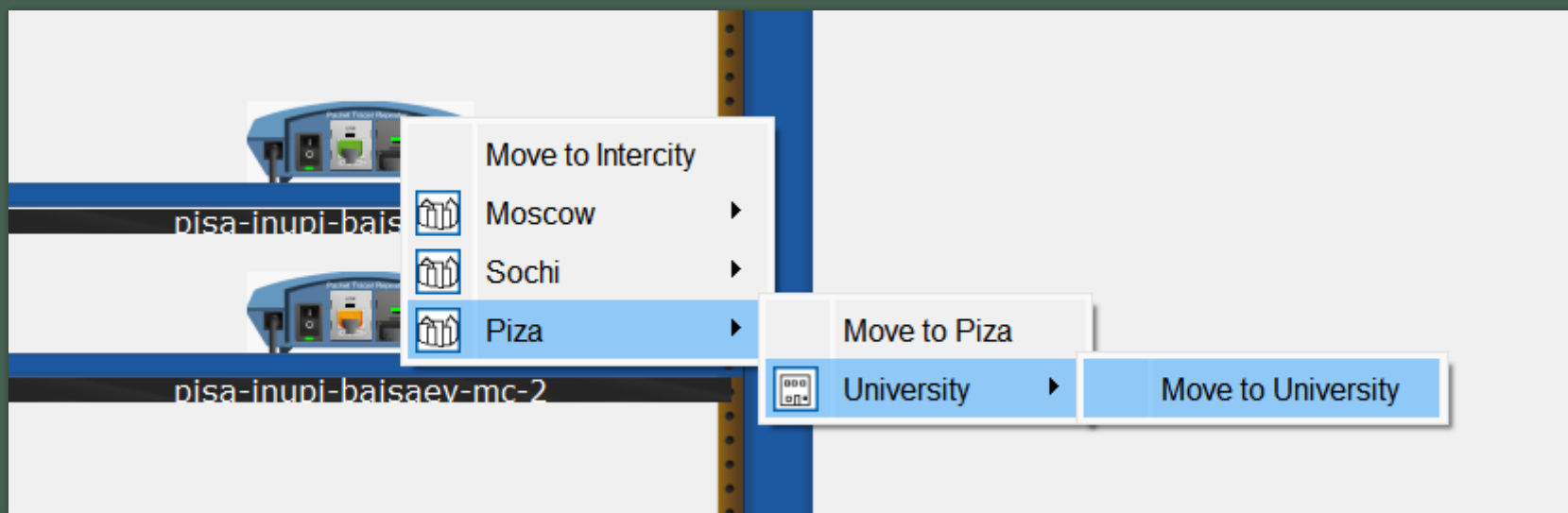
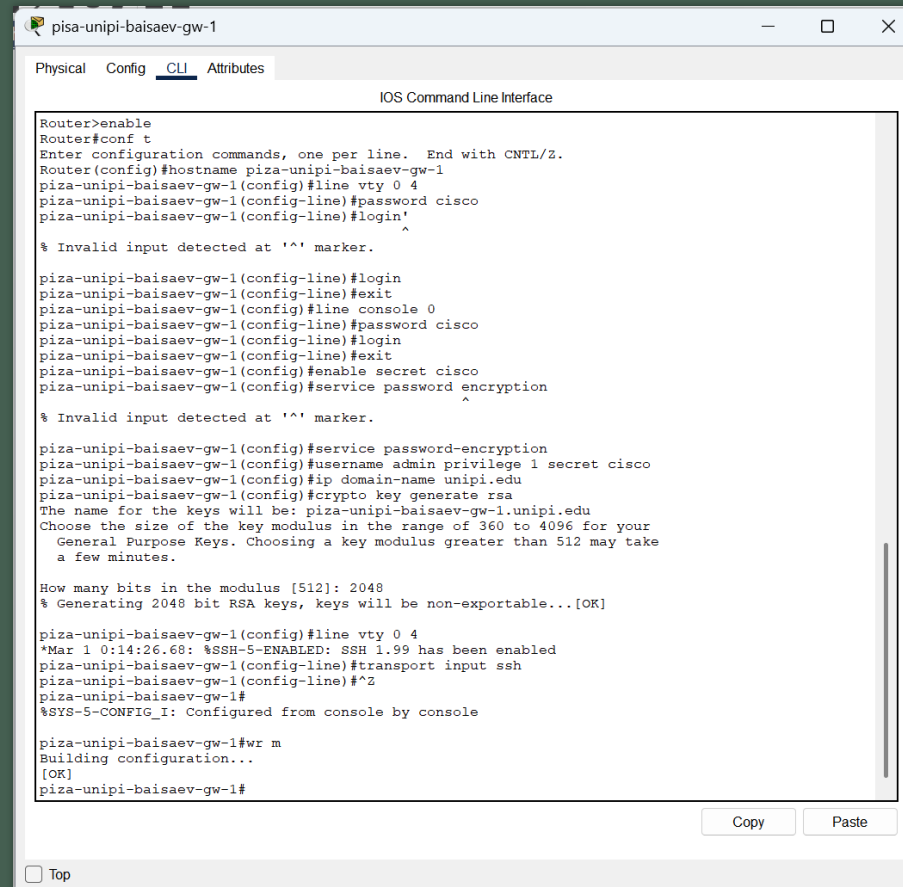


Рис. 1.6. Перемещение оборудования.

Первоначальная настройка



```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname pisa-unipi-baisaev-gw-1
pisa-unipi-baisaev-gw-1(config)#line vty 0 4
pisa-unipi-baisaev-gw-1(config-line)#password cisco
pisa-unipi-baisaev-gw-1(config-line)#login
^
% Invalid input detected at '^' marker.

pisa-unipi-baisaev-gw-1(config-line)#login
pisa-unipi-baisaev-gw-1(config-line)#exit
pisa-unipi-baisaev-gw-1(config)#line console 0
pisa-unipi-baisaev-gw-1(config-line)#password cisco
pisa-unipi-baisaev-gw-1(config-line)#login
pisa-unipi-baisaev-gw-1(config-line)#exit
pisa-unipi-baisaev-gw-1(config)#enable secret cisco
pisa-unipi-baisaev-gw-1(config)#service password encryption
^
% Invalid input detected at '^' marker.

pisa-unipi-baisaev-gw-1(config)#service password-encryption
pisa-unipi-baisaev-gw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-baisaev-gw-1(config)#ip domain-name unipi.edu
pisa-unipi-baisaev-gw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-baisaev-gw-1.unipi.edu
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

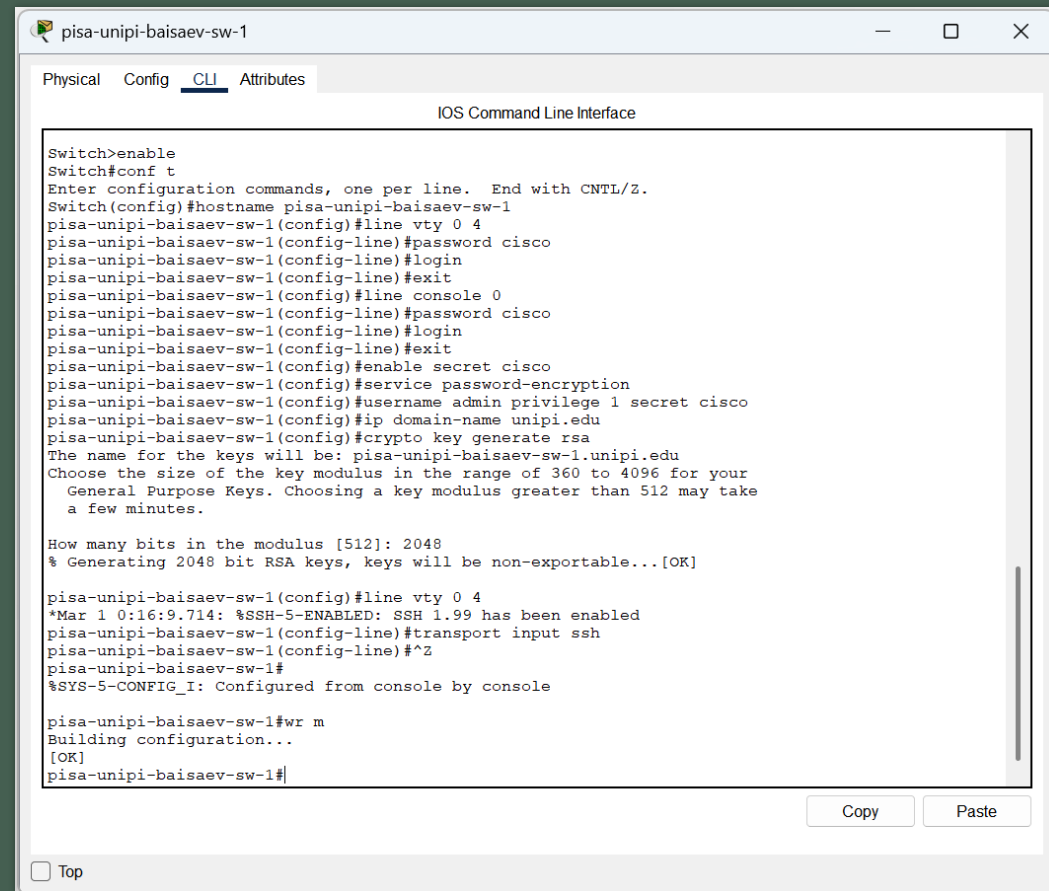
How many bits in the modulus [512]: 2048
% Generating 2048 bit RSA keys, keys will be non-exportable...[OK]

pisa-unipi-baisaev-gw-1(config)#line vty 0 4
*Mar 1 0:14:26.68: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-baisaev-gw-1(config-line)#transport input ssh
pisa-unipi-baisaev-gw-1(config-line)#^Z
pisa-unipi-baisaev-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

pisa-unipi-baisaev-gw-1#wr m
Building configuration...
[OK]
pisa-unipi-baisaev-gw-1#
```

Рис. 1.7. Первоначальная настройка маршрутизатора pisa-unipi-baisaev-gw-1.

Первоначальная настройка



```
pisa-unipi-baisaev-sw-1
Switch>enable
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname pisa-unipi-baisaev-sw-1
pisa-unipi-baisaev-sw-1(config)#line vty 0 4
pisa-unipi-baisaev-sw-1(config-line)#password cisco
pisa-unipi-baisaev-sw-1(config-line)#login
pisa-unipi-baisaev-sw-1(config-line)#exit
pisa-unipi-baisaev-sw-1(config)#line console 0
pisa-unipi-baisaev-sw-1(config-line)#password cisco
pisa-unipi-baisaev-sw-1(config-line)#login
pisa-unipi-baisaev-sw-1(config-line)#exit
pisa-unipi-baisaev-sw-1(config)#enable secret cisco
pisa-unipi-baisaev-sw-1(config)#service password-encryption
pisa-unipi-baisaev-sw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-baisaev-sw-1(config)#ip domain-name unipi.edu
pisa-unipi-baisaev-sw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-baisaev-sw-1.unipi.edu
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

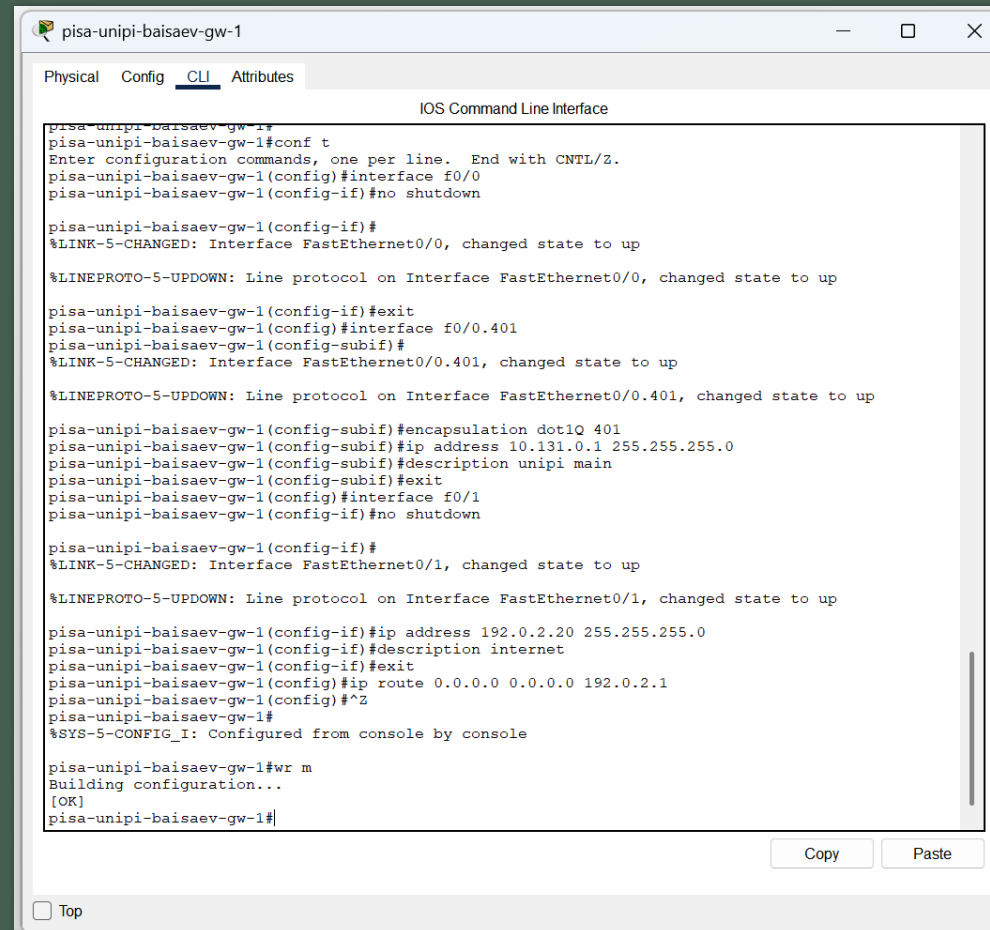
How many bits in the modulus [512]: 2048
% Generating 2048 bit RSA keys, keys will be non-exportable...[OK]

pisa-unipi-baisaev-sw-1(config)#line vty 0 4
*Mar 1 0:16:9.714: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-baisaev-sw-1(config-line)#transport input ssh
pisa-unipi-baisaev-sw-1(config-line)#^Z
pisa-unipi-baisaev-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

pisa-unipi-baisaev-sw-1#wr m
Building configuration...
[OK]
pisa-unipi-baisaev-sw-1#
```

Рис. 1.8. Первоначальная настройка коммутатора pisa-unipi-baisaev-sw-1.

Настройка интерфейсов



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

pisa-unipi-baisaev-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

pisa-unipi-baisaev-gw-1(config-if)#exit
pisa-unipi-baisaev-gw-1(config)#interface f0/0.401
pisa-unipi-baisaev-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.401, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.401, changed state to up

pisa-unipi-baisaev-gw-1(config-subif)#encapsulation dot1Q 401
pisa-unipi-baisaev-gw-1(config-subif)#ip address 10.131.0.1 255.255.255.0
pisa-unipi-baisaev-gw-1(config-subif)#description unipi main
pisa-unipi-baisaev-gw-1(config-subif)#exit
pisa-unipi-baisaev-gw-1(config)#interface f0/1
pisa-unipi-baisaev-gw-1(config-if)#no shutdown

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

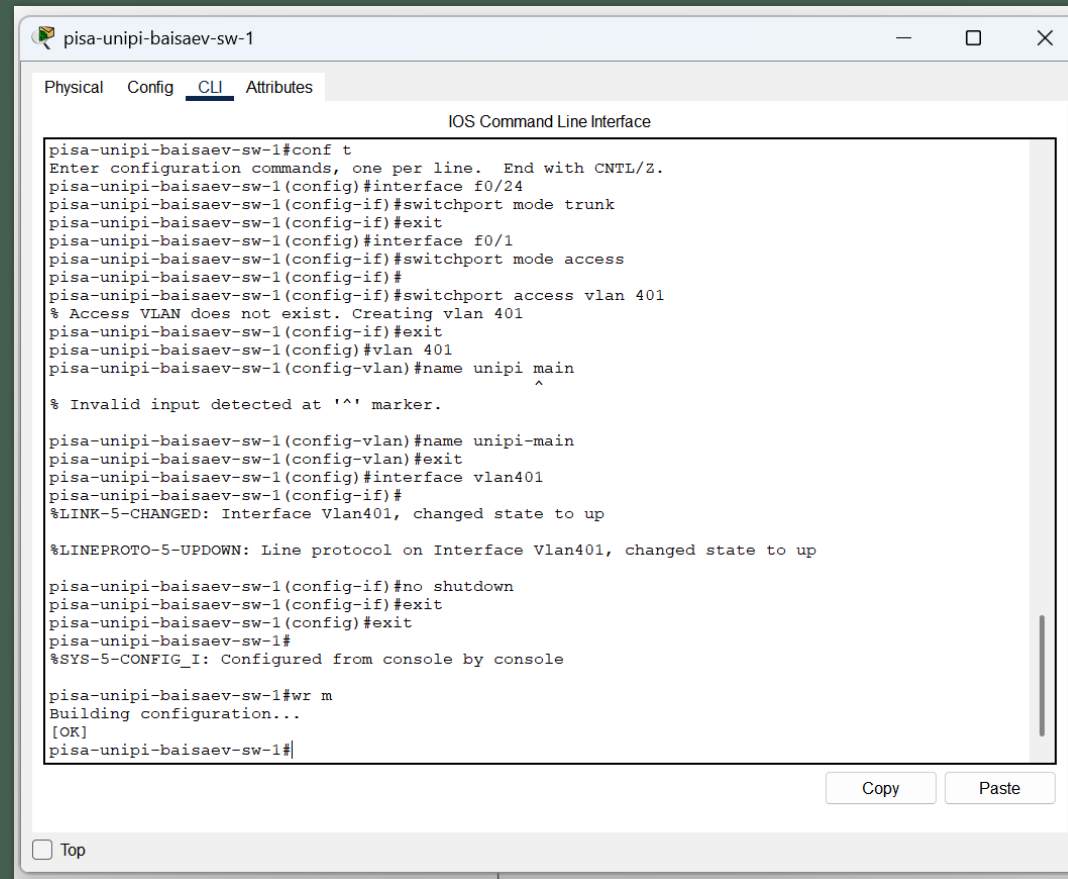
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

pisa-unipi-baisaev-gw-1(config-if)#ip address 192.0.2.20 255.255.255.0
pisa-unipi-baisaev-gw-1(config-if)#description internet
pisa-unipi-baisaev-gw-1(config-if)#exit
pisa-unipi-baisaev-gw-1(config)#ip route 0.0.0.0 0.0.0.0 192.0.2.1
pisa-unipi-baisaev-gw-1(config)#^Z
pisa-unipi-baisaev-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

pisa-unipi-baisaev-gw-1#wr m
Building configuration...
[OK]
pisa-unipi-baisaev-gw-1#
```

Рис. 1.9. Настройка интерфейсов маршрутизатора pisa-unipi-baisaev-gw-1.

Настройка интерфейсов



```
pisa-unipi-baisaev-sw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
pisa-unipi-baisaev-sw-1(config)#interface f0/24
pisa-unipi-baisaev-sw-1(config-if)#switchport mode trunk
pisa-unipi-baisaev-sw-1(config-if)#exit
pisa-unipi-baisaev-sw-1(config)#interface f0/1
pisa-unipi-baisaev-sw-1(config-if)#switchport mode access
pisa-unipi-baisaev-sw-1(config-if)#
pisa-unipi-baisaev-sw-1(config-if)#switchport access vlan 401
% Access VLAN does not exist. Creating vlan 401
pisa-unipi-baisaev-sw-1(config-if)#exit
pisa-unipi-baisaev-sw-1(config)#vlan 401
pisa-unipi-baisaev-sw-1(config-vlan)#name unipi main
^
% Invalid input detected at '^' marker.

pisa-unipi-baisaev-sw-1(config-vlan)#name unipi-main
pisa-unipi-baisaev-sw-1(config-vlan)#exit
pisa-unipi-baisaev-sw-1(config)#interface vlan401
pisa-unipi-baisaev-sw-1(config-if)#
%LINK-5-CHANGED: Interface Vlan401, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan401, changed state to up

pisa-unipi-baisaev-sw-1(config-if)#no shutdown
pisa-unipi-baisaev-sw-1(config-if)#exit
pisa-unipi-baisaev-sw-1(config)#exit
pisa-unipi-baisaev-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

pisa-unipi-baisaev-sw-1#wr m
Building configuration...
[OK]
pisa-unipi-baisaev-sw-1#
```

Рис. 1. 10. Настройка интерфейсов коммутатора pisa-unipi-baisaev-sw-1.

Присвоение адресов

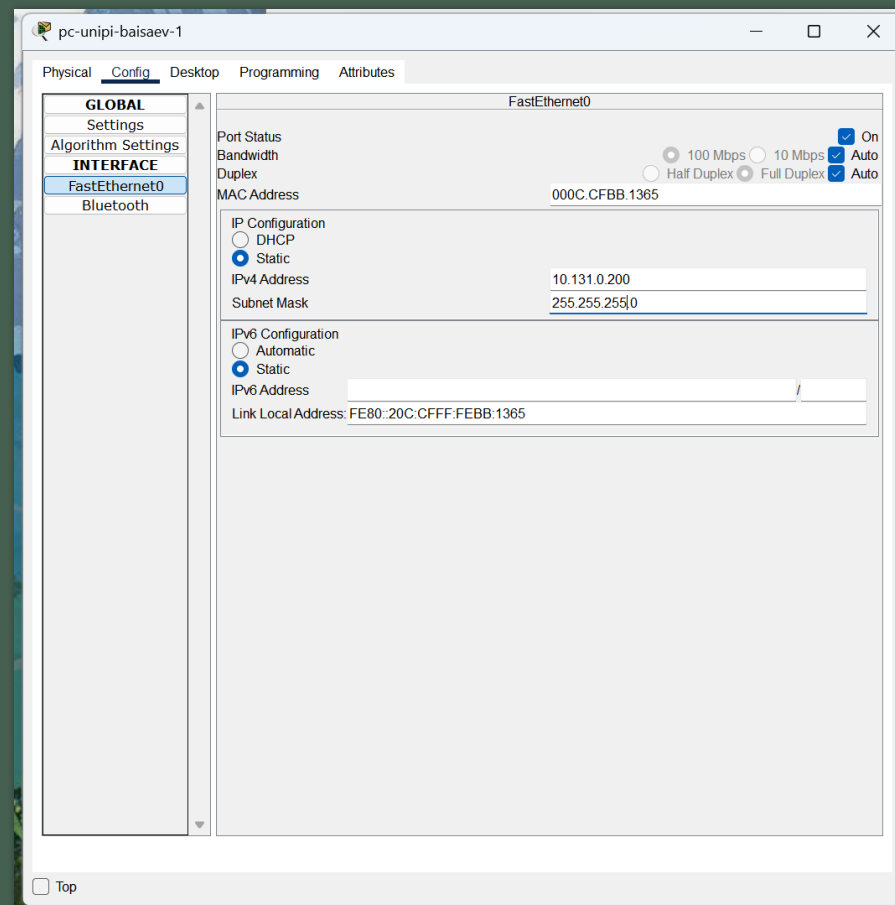
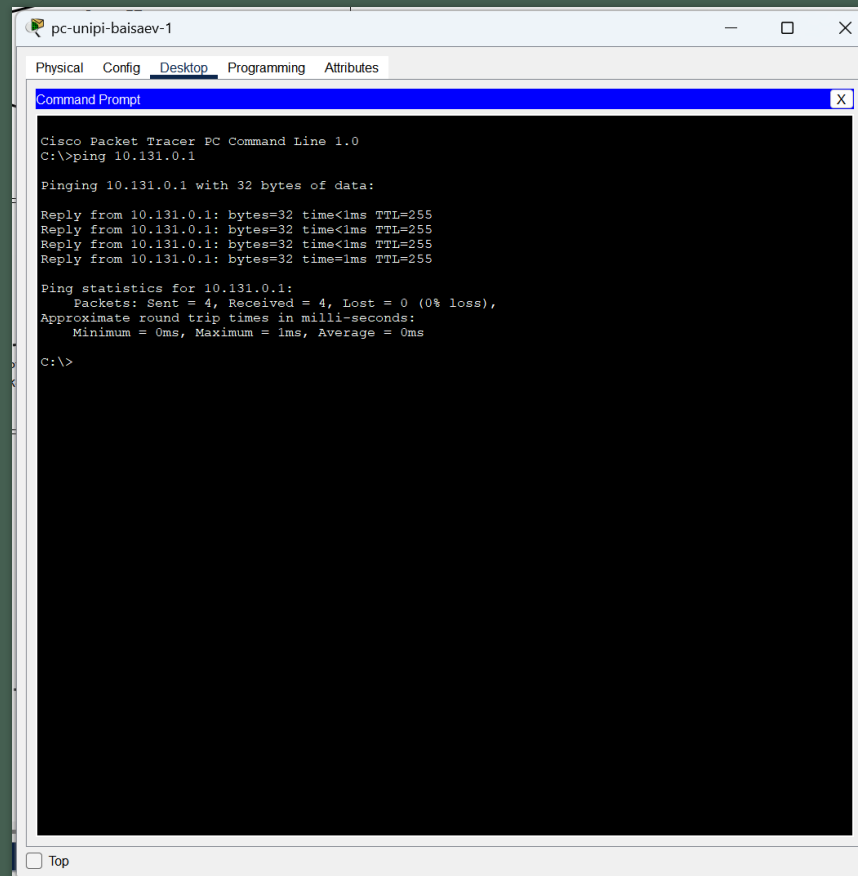


Рис. 1. 11. Присвоение адресов оконечному устройству.

Ping



The screenshot shows a window titled "pc-unipi-baisaev-1" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the output of the command "C:\>ping 10.131.0.1". The output indicates a successful ping with 4 packets sent and received, 0% loss, and a round trip time of 0ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.131.0.1

Pinging 10.131.0.1 with 32 bytes of data:

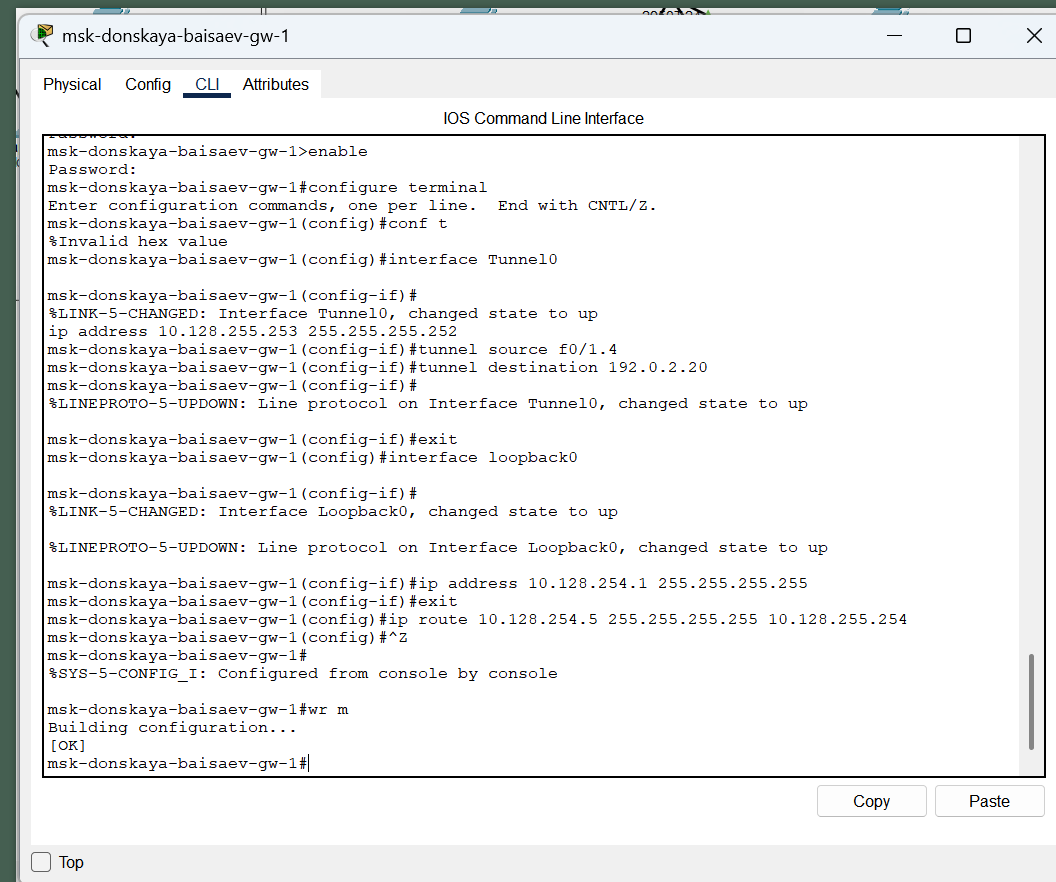
Reply from 10.131.0.1: bytes=32 time<1ms TTL=255
Reply from 10.131.0.1: bytes=32 time<1ms TTL=255
Reply from 10.131.0.1: bytes=32 time<1ms TTL=255
Reply from 10.131.0.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.131.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Рис. 1. 12. Пинг адреса 10.131.0.1.

Настройка VPN на основе GRE



```
msk-donskaya-baisaev-gw-1>enable
Password:
msk-donskaya-baisaev-gw-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-baisaev-gw-1(config)#conf t
%Invalid hex value
msk-donskaya-baisaev-gw-1(config)#interface Tunnel0

msk-donskaya-baisaev-gw-1(config-if)#
%LINK-5-CHANGED: Interface Tunnel0, changed state to up
ip address 10.128.255.253 255.255.255.252
msk-donskaya-baisaev-gw-1(config-if)#tunnel source f0/1.4
msk-donskaya-baisaev-gw-1(config-if)#tunnel destination 192.0.2.20
msk-donskaya-baisaev-gw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel0, changed state to up

msk-donskaya-baisaev-gw-1(config-if)#exit
msk-donskaya-baisaev-gw-1(config)#interface loopback0

msk-donskaya-baisaev-gw-1(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

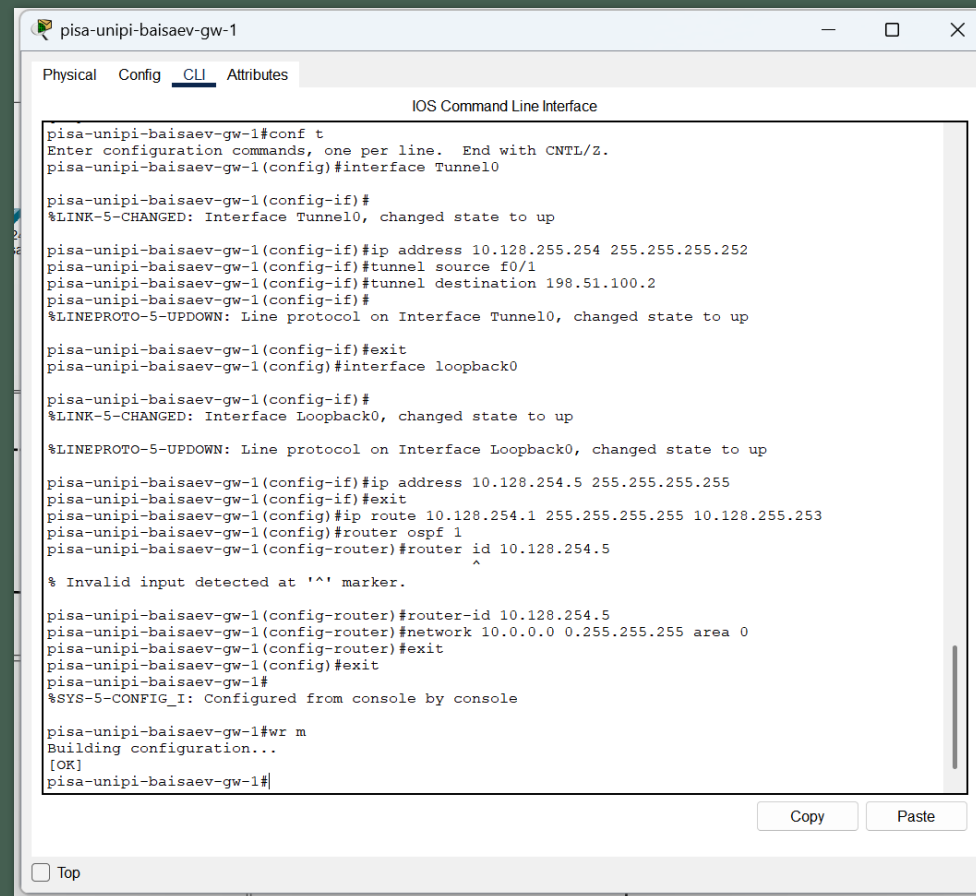
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

msk-donskaya-baisaev-gw-1(config-if)#ip address 10.128.254.1 255.255.255.255
msk-donskaya-baisaev-gw-1(config-if)#exit
msk-donskaya-baisaev-gw-1(config)#ip route 10.128.254.5 255.255.255.255 10.128.255.254
msk-donskaya-baisaev-gw-1(config)#^Z
msk-donskaya-baisaev-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-baisaev-gw-1#wr m
Building configuration...
[OK]
msk-donskaya-baisaev-gw-1#
```

Рис. 1.13. Настройка маршрутизатора msk-donskaya-baisaev-gw-1.

Настройка VPN на основе GRE



```
pisa-unipi-baisaev-gw-1
Physical Config CLI Attributes
IOS Command Line Interface

pisa-unipi-baisaev-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
pisa-unipi-baisaev-gw-1(config)#interface Tunnel0

pisa-unipi-baisaev-gw-1(config-if)#
%LINK-5-CHANGED: Interface Tunnel0, changed state to up

pisa-unipi-baisaev-gw-1(config-if)#ip address 10.128.255.254 255.255.255.252
pisa-unipi-baisaev-gw-1(config-if)#tunnel source f0/1
pisa-unipi-baisaev-gw-1(config-if)#tunnel destination 198.51.100.2
pisa-unipi-baisaev-gw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel0, changed state to up

pisa-unipi-baisaev-gw-1(config-if)#exit
pisa-unipi-baisaev-gw-1(config)#interface loopback0

pisa-unipi-baisaev-gw-1(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

pisa-unipi-baisaev-gw-1(config-if)#ip address 10.128.254.5 255.255.255.255
pisa-unipi-baisaev-gw-1(config-if)#exit
pisa-unipi-baisaev-gw-1(config)#ip route 10.128.254.1 255.255.255.255 10.128.255.253
pisa-unipi-baisaev-gw-1(config)#router ospf 1
pisa-unipi-baisaev-gw-1(config-router)#router id 10.128.254.5
^
% Invalid input detected at '^' marker.

pisa-unipi-baisaev-gw-1(config-router)#router-id 10.128.254.5
pisa-unipi-baisaev-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
pisa-unipi-baisaev-gw-1(config-router)#exit
pisa-unipi-baisaev-gw-1(config)#exit
pisa-unipi-baisaev-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

pisa-unipi-baisaev-gw-1#wr m
Building configuration...
[OK]
pisa-unipi-baisaev-gw-1#
```

Рис. 1.14. Настройка маршрутизатора pisa-unipi-baisaev-gw-1.

Проверка

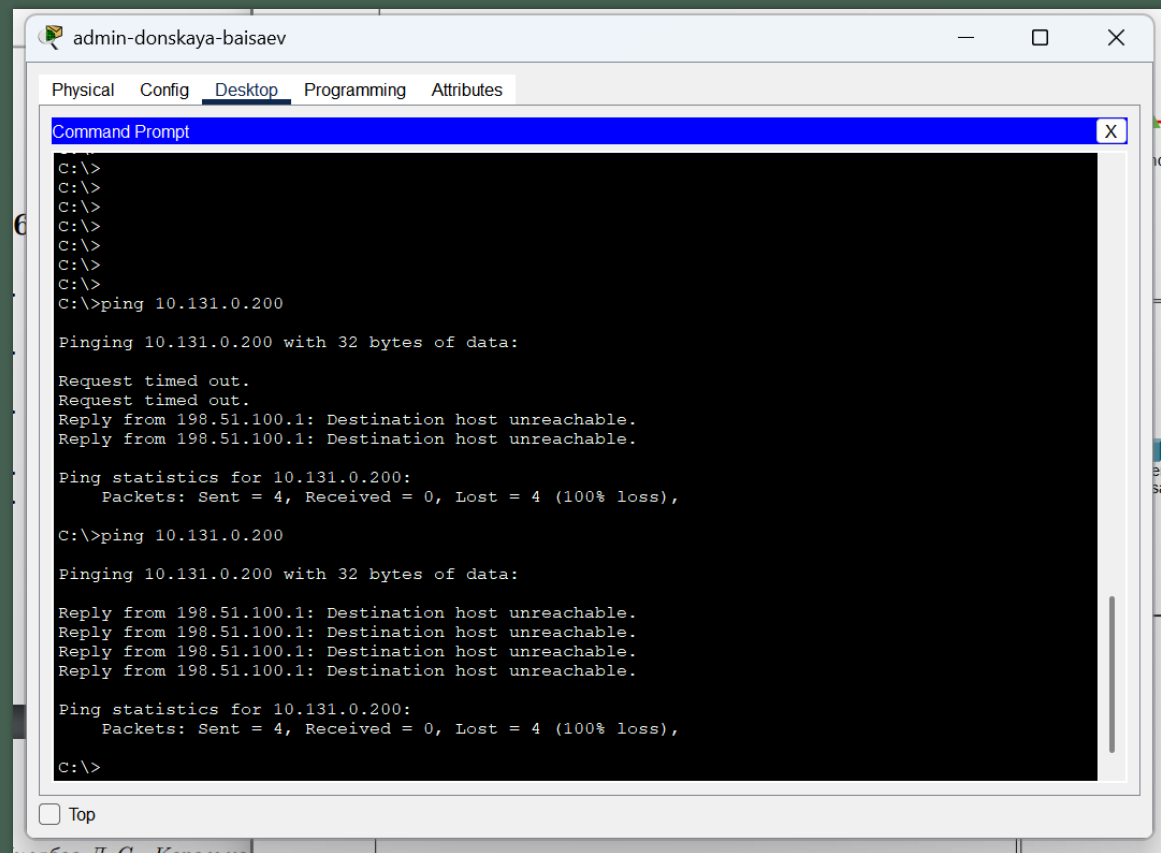


Рис. 1.15. Проверка доступности узлов сети Университета г. Пиза с ноутбука администратора сети «Донская».

ВЫВОД

- В ходе выполнения лабораторной работы мы получили навыки настройки VPN-туннеля через незащищённое Интернет-соединение.

Спасибо за внимание!