

Презентация по лабораторной работе №16

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Получить навыки настройки VPN-туннеля через незащищённое Интернет-соединение.

1. Разместить в рабочей области проекта в соответствии с модельными предположениями оборудование для сети Университета г. Пиза.
2. В физической рабочей области проекта создать город Пиза, здание Университета г. Пиза. Переместить туда соответствующее оборудование.
3. Сделать первоначальную настройку и настройку интерфейсов оборудования сети Университета г. Пиза.
4. Настроить VPN на основе протокола GRE.
5. Проверить доступность узлов сети Университета г. Пиза с ноутбука администратора сети «Донская».

Выполнение лабораторной работы

Repeater1

Physical

Config

Attributes

MODULES

PT-REPEATER-NM-1CE

PT-REPEATER-NM-1CFE

PT-REPEATER-NM-1CGE

PT-REPEATER-NM-1FFE

PT-REPEATER-NM-1FGE


PT-REPEATER-NM-COVER

Physical Device View

Zoom In

Original Size

Zoom Out



Customize Icon in Physical View

Customize Icon in Logical View

The PT-REPEATER-NM-1FFE Module provides one Fast-Ethernet interface for use with fiber media. Ideal for a wide range of LAN applications, the Fast Ethernet network modules support many internetworking features and standards. Single port network modules offer autosensing 10/100BaseTX or 100BaseFX Ethernet.

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Выполнение лабораторной работы

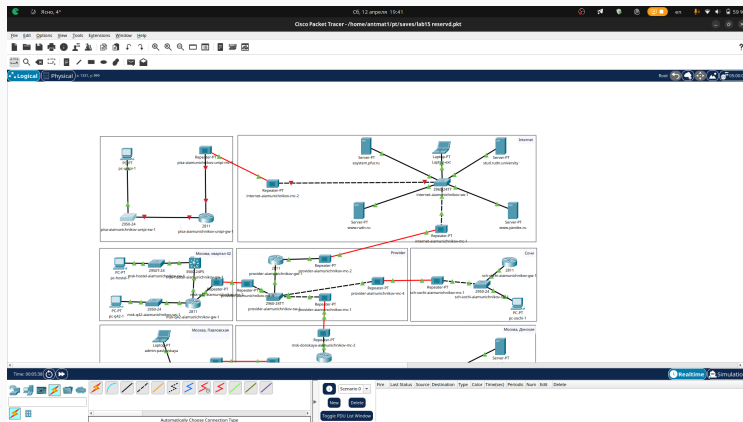


Рис. 2: Схема сети с дополнительными площадками

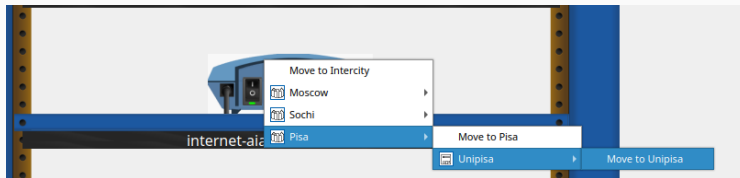


Рис. 3: Перемещение оборудования в г. Пиза

Выполнение лабораторной работы

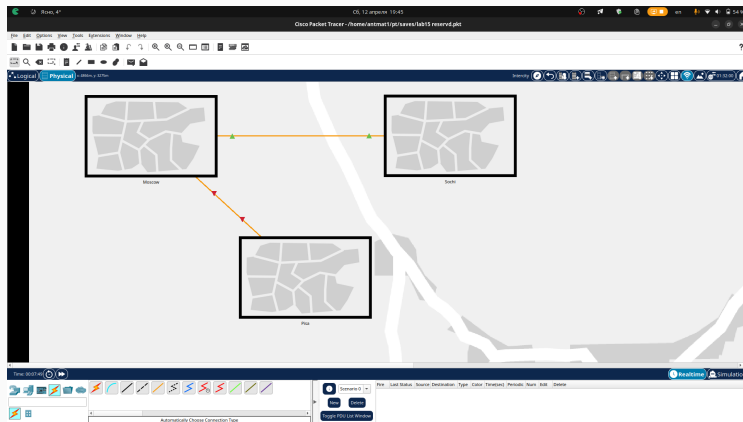
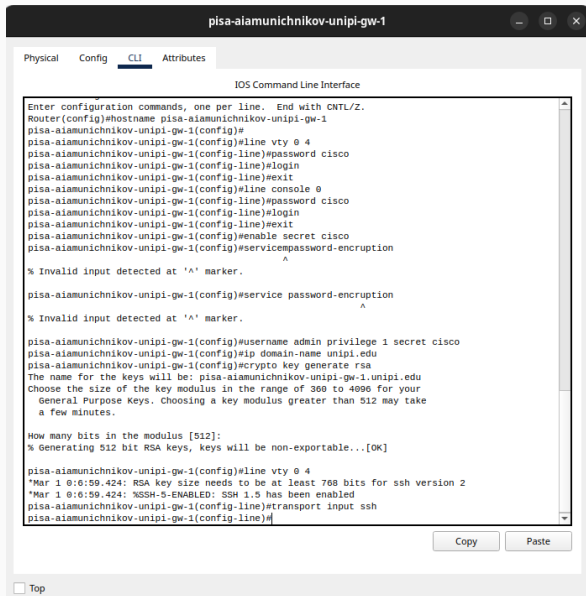


Рис. 4: Добавление г. Пиза

Выполнение лабораторной работы



```
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname pisa-aiaamunichnikov-unipi-gw-1
pisa-aiaamunichnikov-unipi-gw-1(config)#
pisa-aiaamunichnikov-unipi-gw-1(config)#line vty 0 4
pisa-aiaamunichnikov-unipi-gw-1(config-line)#password cisco
pisa-aiaamunichnikov-unipi-gw-1(config-line)#login
pisa-aiaamunichnikov-unipi-gw-1(config-line)#exit
pisa-aiaamunichnikov-unipi-gw-1(config)#line console 0
pisa-aiaamunichnikov-unipi-gw-1(config-line)#password cisco
pisa-aiaamunichnikov-unipi-gw-1(config-line)#login
pisa-aiaamunichnikov-unipi-gw-1(config-line)#exit
pisa-aiaamunichnikov-unipi-gw-1(config)#enable secret cisco
pisa-aiaamunichnikov-unipi-gw-1(config)#service password-encryption
^
% Invalid input detected at '^' marker.

pisa-aiaamunichnikov-unipi-gw-1(config)#service password-encryption
^
% Invalid input detected at '^' marker.

pisa-aiaamunichnikov-unipi-gw-1(config)#username admin privilege 1 secret cisco
pisa-aiaamunichnikov-unipi-gw-1(config)#ip domain-name unipi.edu
pisa-aiaamunichnikov-unipi-gw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-aiaamunichnikov-unipi-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.

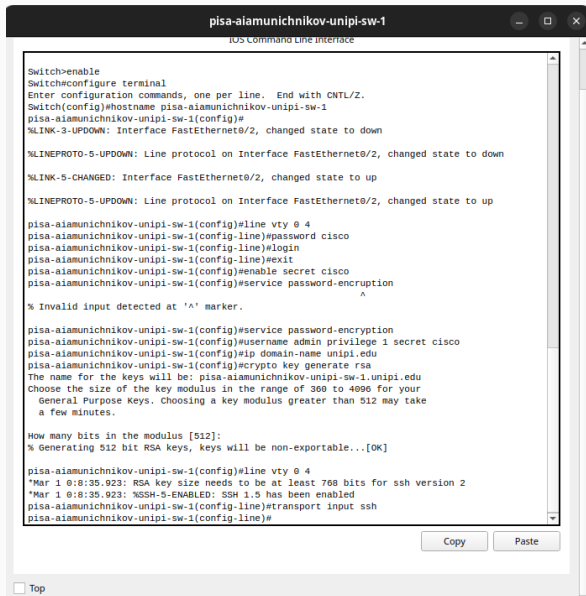
How many bits in the modulus [512]:
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

pisa-aiaamunichnikov-unipi-gw-1(config)#line vty 0 4
*Mar 1 0:06:59.424: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 0:06:59.424: %SSH-5-ENABLED: SSH 1.5 has been enabled
pisa-aiaamunichnikov-unipi-gw-1(config-line)#transport input ssh
pisa-aiaamunichnikov-unipi-gw-1(config-line)#
```

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Выполнение лабораторной работы



```
pisa-alamunichnikov-unipi-sw-1
IOS Command Line Interface

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname pisa-aiamunichnikov-unipi-sw-1
pisa-aiamunichnikov-unipi-sw-1(config)#
%LINK-3-UPDOWN: Interface FastEthernet0/2, changed state to down

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

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

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

pisa-aiamunichnikov-unipi-sw-1(config)#line vty 0 4
pisa-aiamunichnikov-unipi-sw-1(config-line)#password cisco
pisa-aiamunichnikov-unipi-sw-1(config-line)#login
pisa-aiamunichnikov-unipi-sw-1(config-line)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#enable secret cisco
pisa-aiamunichnikov-unipi-sw-1(config)#service password-encryption
^
% Invalid input detected at '^' marker.

pisa-aiamunichnikov-unipi-sw-1(config)#service password-encryption
pisa-aiamunichnikov-unipi-sw-1(config)#username admin privilege 1 secret cisco
pisa-aiamunichnikov-unipi-sw-1(config)#ip domain-name unipi.edu
pisa-aiamunichnikov-unipi-sw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-aiamunichnikov-unipi-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.

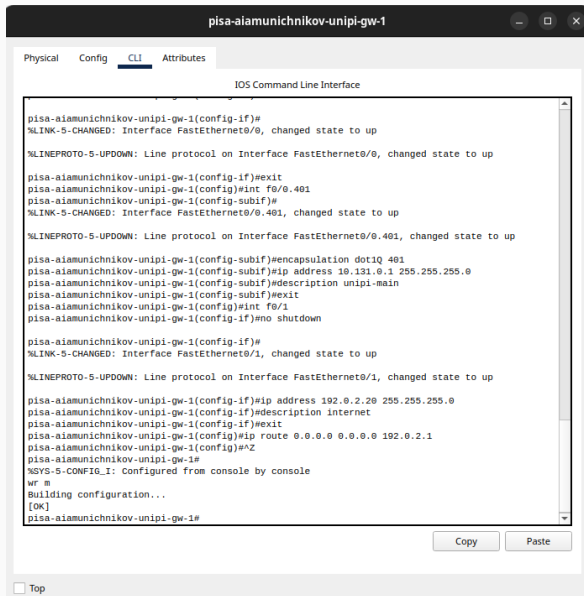
How many bits in the modulus [512]:
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

pisa-aiamunichnikov-unipi-sw-1(config)#line vty 0 4
*Mar 1 0:8:35.923: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 0:8:35.923: %SSH-5-ENABLED: SSH 1.5 has been enabled
pisa-aiamunichnikov-unipi-sw-1(config-line)#transport input ssh
pisa-aiamunichnikov-unipi-sw-1(config-line)#
```

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Выполнение лабораторной работы



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

pisa-aiamunichnikov-unipi-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-aiamunichnikov-unipi-gw-1(config-if)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#int f0/0.401
pisa-aiamunichnikov-unipi-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-aiamunichnikov-unipi-gw-1(config-subif)#encapsulation dot1Q 401
pisa-aiamunichnikov-unipi-gw-1(config-subif)#ip address 10.131.0.1 255.255.255.0
pisa-aiamunichnikov-unipi-gw-1(config-subif)#description unipi-main
pisa-aiamunichnikov-unipi-gw-1(config-subif)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#int f0/1
pisa-aiamunichnikov-unipi-gw-1(config-if)#no shutdown

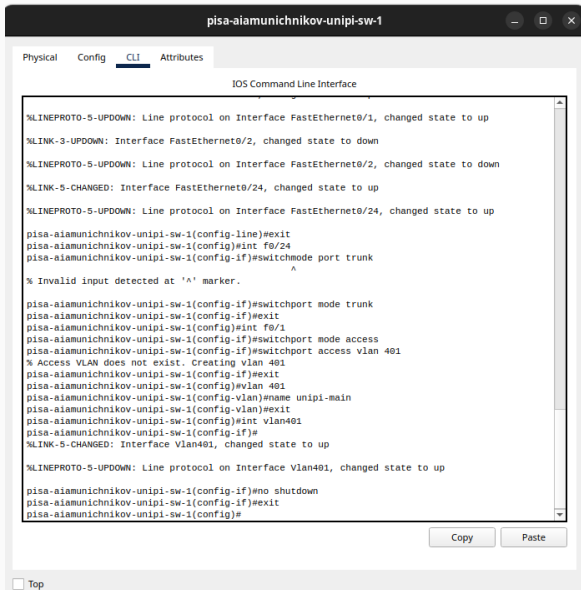
pisa-aiamunichnikov-unipi-gw-1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

pisa-aiamunichnikov-unipi-gw-1(config-if)#ip address 192.0.2.20 255.255.255.0
pisa-aiamunichnikov-unipi-gw-1(config-if)#description internet
pisa-aiamunichnikov-unipi-gw-1(config-if)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#ip route 0.0.0.0 0.0.0.0 192.0.2.1
pisa-aiamunichnikov-unipi-gw-1(config)#^Z
pisa-aiamunichnikov-unipi-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr m
Building configuration...
[OK]
pisa-aiamunichnikov-unipi-gw-1#
```

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Выполнение лабораторной работы



The screenshot shows a Cisco IOS Command Line Interface (CLI) window for a switch named 'pisa-aiamunichnikov-unipi-sw-1'. The window has tabs for 'Physical', 'Config', 'CLI' (selected), and 'Attributes'. The CLI output shows several status messages and configuration commands. The status messages indicate that the line protocol is up on FastEthernet0/1, 0/2, and 0/24, and that the link is up on FastEthernet0/24. The configuration commands include exiting the line configuration mode, setting the interface to FastEthernet0/24, setting the mode to trunk, and then setting the mode to access and creating VLAN 401. The status messages also indicate that the link is up on VLAN401. The configuration commands end with exiting the interface configuration mode and the global configuration mode.

```
pisa-aiamunichnikov-unipi-sw-1
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

pisa-aiamunichnikov-unipi-sw-1(config-line)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#int f0/24
pisa-aiamunichnikov-unipi-sw-1(config-if)#switchmode port trunk
^
% Invalid input detected at '^' marker.

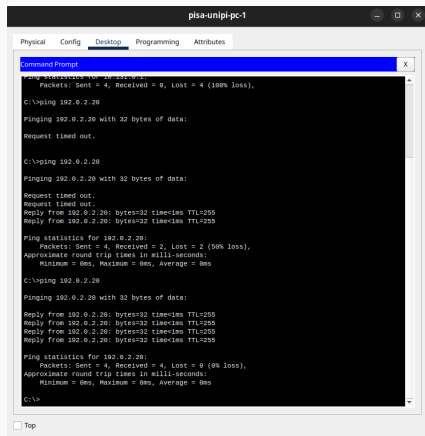
pisa-aiamunichnikov-unipi-sw-1(config-if)#switchport mode trunk
pisa-aiamunichnikov-unipi-sw-1(config-if)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#int f0/1
pisa-aiamunichnikov-unipi-sw-1(config-if)#switchport mode access
pisa-aiamunichnikov-unipi-sw-1(config-if)#switchport access vlan 401
% Access VLAN does not exist. Creating vlan 401
pisa-aiamunichnikov-unipi-sw-1(config-if)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#vlan 401
pisa-aiamunichnikov-unipi-sw-1(config-vlan)#name unipi-main
pisa-aiamunichnikov-unipi-sw-1(config-vlan)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#int vlan401
pisa-aiamunichnikov-unipi-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-aiamunichnikov-unipi-sw-1(config-if)#no shutdown
pisa-aiamunichnikov-unipi-sw-1(config-if)#exit
pisa-aiamunichnikov-unipi-sw-1(config)#
```

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The screenshot shows a Windows Command Prompt window titled "pisa-unlpl-pc-1". The window has tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes", with "Desktop" selected. The Command Prompt displays the following text:

```
Command Prompt
ping statistics for 192.0.2.20:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.0.2.20

Pinging 192.0.2.20 with 32 bytes of data:

Request timed out.

C:\>ping 192.0.2.20

Pinging 192.0.2.20 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.0.2.20: bytes=32 time<1ms TTL=255
Reply from 192.0.2.20: bytes=32 time<1ms TTL=255

Ping statistics for 192.0.2.20:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.0.2.20

Pinging 192.0.2.20 with 32 bytes of data:

Reply from 192.0.2.20: bytes=32 time<1ms TTL=255
Reply from 192.0.2.20: bytes=32 time<1ms TTL=255
Reply from 192.0.2.20: bytes=32 time<1ms TTL=255
Reply from 192.0.2.20: bytes=32 time<1ms TTL=255

Ping statistics for 192.0.2.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

At the bottom left of the Command Prompt window, there is a checkbox labeled "Top" which is currently unchecked.

Рис. 9: Проверка работоспособности соединения

Выполнение лабораторной работы

msk-donskaya-aiamunichnikov-gw-1

Physical Config CLI Attributes

IOS Command Line Interface

```
01:13:43: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.4 on FastEthernet0/1.6 from FULL to DOWN, Neighbor Down: Interface down or detached
01:13:43: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.2 on FastEthernet0/1.5 from LOADING to FULL, Loading Done
01:13:48: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.4 on FastEthernet0/1.6 from LOADING to FULL, Loading Done

msk-donskaya-aiamunichnikov-gw-01>en
Password:
msk-donskaya-aiamunichnikov-gw-01#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-aiamunichnikov-gw-01(config)#int Tunnel10

msk-donskaya-aiamunichnikov-gw-01(config-if)#
%LINK-5-CHANGED: Interface Tunnel10, changed state to up

msk-donskaya-aiamunichnikov-gw-01(config-if)#ip address 10.128.255.253 255.255.255.252
msk-donskaya-aiamunichnikov-gw-01(config-if)#tunnel source f0/1.4
msk-donskaya-aiamunichnikov-gw-01(config-if)#tunnel destination 192.0.2.20
msk-donskaya-aiamunichnikov-gw-01(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel10, changed state to up

msk-donskaya-aiamunichnikov-gw-01(config-if)#int loopback0

msk-donskaya-aiamunichnikov-gw-01(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-aiamunichnikov-gw-01(config-if)#ip address 10.128.254.1 255.255.255.255
msk-donskaya-aiamunichnikov-gw-01(config-if)#exit
msk-donskaya-aiamunichnikov-gw-01(config)#ip route 10.128.254.5 255.255.255.255 10.128.255.254
msk-donskaya-aiamunichnikov-gw-01(config)#
```

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Выполнение лабораторной работы

pisa-aiamunichnikov-unipi-gw-1

Physical Config CLI Attributes

IOS Command Line Interface

```
%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
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.401, changed state to up

pisa-aiamunichnikov-unipi-gw-1(config-if)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#int Tunnel10

pisa-aiamunichnikov-unipi-gw-1(config-if)#
%LINK-5-CHANGED: Interface Tunnel10, changed state to up

pisa-aiamunichnikov-unipi-gw-1(config-if)#ip address 10.128.255.254 255.255.255.252
pisa-aiamunichnikov-unipi-gw-1(config-if)#tunnel source f0/1
pisa-aiamunichnikov-unipi-gw-1(config-if)#tunnel destination 198.51.100.2
pisa-aiamunichnikov-unipi-gw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel10, changed state to up

pisa-aiamunichnikov-unipi-gw-1(config-if)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#int loopback0

pisa-aiamunichnikov-unipi-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-aiamunichnikov-unipi-gw-1(config-if)#ip address 10.128.254.5 255.255.255.255
pisa-aiamunichnikov-unipi-gw-1(config-if)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#ip route 10.128.254.1 255.255.255.255 10.128.255.253
pisa-aiamunichnikov-unipi-gw-1(config)#router ospf 1
pisa-aiamunichnikov-unipi-gw-1(config-router)#router-id 10.128.254.5
pisa-aiamunichnikov-unipi-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
pisa-aiamunichnikov-unipi-gw-1(config-router)#exit
pisa-aiamunichnikov-unipi-gw-1(config)#
```

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Выполнение лабораторной работы

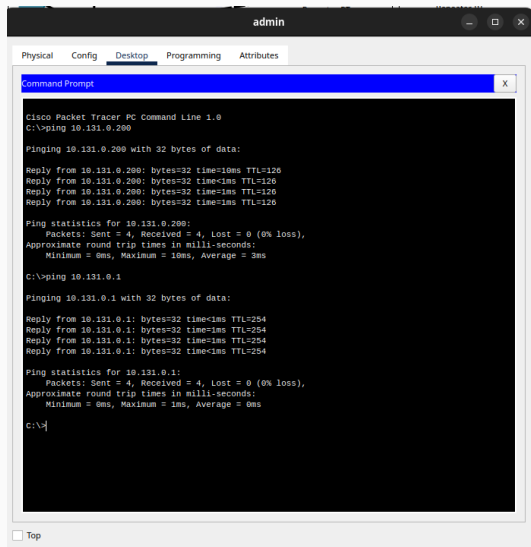


Рис. 12: Проверка доступности соединения

В результате выполнения данной лабораторной работы я получил навыки настройки VPN-туннеля через незащищённое Интернет-соединение.