Лабораторная работа 16

Настройка VPN

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Информация

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Цель работы

Получение навыков настройки VPN-туннеля через незащищённое Интернет-соединение.

Настроить VPN-туннель между сетью Университета г. Пиза (Италия) и сетью «Донская» в г. Москваs

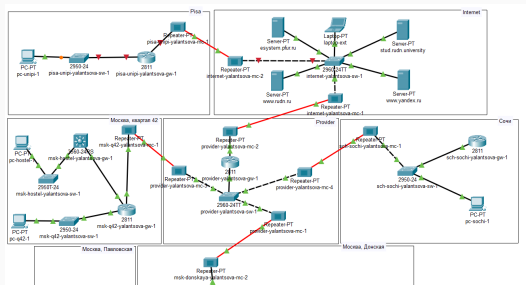# Выполнение лабораторной работы
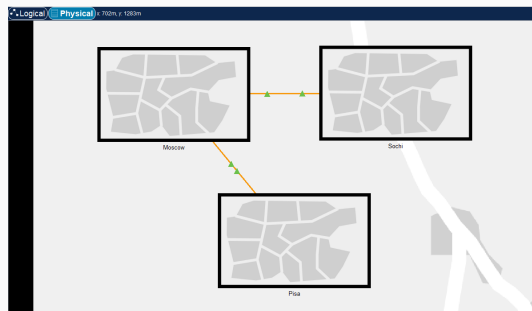
Размещение оборудования

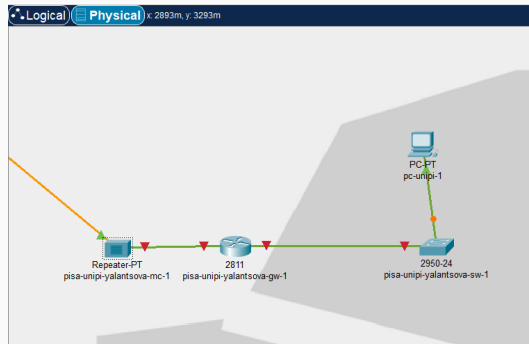**Рис. 1:** Схема сети

Рис. 2: Города сети

Рис. 3: Физическая область города Пиза

Первоначальная настройка оборудования

Выполнение лабораторной работы


```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname pisa-unipi-yalantsova-gw-1
pisa-unipi-yalantsova-gw-1(config)#
pisa-unipi-yalantsova-gw-1(config)#line vty 0 4
pisa-unipi-yalantsova-gw-1(config-line)#password cisco
pisa-unipi-yalantsova-gw-1(config-line)#login
pisa-unipi-yalantsova-gw-1(config-line)#exit
pisa-unipi-yalantsova-gw-1(config)#line console 0
pisa-unipi-yalantsova-gw-1(config-line)#password cisco
pisa-unipi-yalantsova-gw-1(config-line)#login
pisa-unipi-yalantsova-gw-1(config-line)#exit
pisa-unipi-yalantsova-gw-1(config)#enable secret cisco
pisa-unipi-yalantsova-gw-1(config)#service password-encryption
pisa-unipi-yalantsova-gw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-yalantsova-gw-1(config)#ip domain-name unipi.edu
pisa-unipi-yalantsova-gw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-yalantsova-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-yalantsova-gw-1(config)#line vty 0 4
*Mar 1 0:12:26.629: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-yalantsova-gw-1(config-line)#transport input ssh
```

Рис. 4: Настройка маршрутизатора pisa-unipi-yalantsova-gw-1

```
pisa-unipi-yalantsova-sw-1(config)#line vty 0 4
pisa-unipi-yalantsova-sw-1(config-line)#password cisco
pisa-unipi-yalantsova-sw-1(config-line)#login
pisa-unipi-yalantsova-sw-1(config-line)#exit
pisa-unipi-yalantsova-sw-1(config)#line console 0
pisa-unipi-yalantsova-sw-1(config-line)#password cisco
pisa-unipi-yalantsova-sw-1(config-line)#login
pisa-unipi-yalantsova-sw-1(config-line)#exit
pisa-unipi-yalantsova-sw-1(config)#enable secret cisco
pisa-unipi-yalantsova-sw-1(config)#service password-encryption
pisa-unipi-yalantsova-sw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-yalantsova-sw-1(config)#ip domain-name unipi.edu
pisa-unipi-yalantsova-sw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-yalantsova-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-yalantsova-sw-1(config)#line vty 0 4
*Mar 1 0:13:44.489: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-yalantsova-sw-1(config-line)#transport input ssh
pisa-unipi-yalantsova-sw-1(config-line)#exit
```

Рис. 5: Настройка коммутатора pisa-unipi-yalantsova-sw-1

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

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

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

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

pisa-unipi-yalantsova-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-yalantsova-gw-1(config-if)#ip address 192.0.2.20 255.255.255.0
pisa-unipi-yalantsova-gw-1(config-if)#description internet
pisa-unipi-yalantsova-gw-1(config-if)#exit
pisa-unipi-yalantsova-gw-1(config)#ip route 0.0.0.0 0.0.0.0 192.0.2.1
```

Рис. 6: Настройка интерфейсов маршрутизатора pisa-unipi-yalantsova-gw-1

Выполнение лабораторной работы


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

pisa-unipi-yalantsova-sw-1(config-vlan)#name unipi-main
pisa-unipi-yalantsova-sw-1(config-vlan)#interface vlan401
pisa-unipi-yalantsova-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-yalantsova-sw-1(config-if)#no shutdown
pisa-unipi-yalantsova-sw-1(config-if)#exit
```
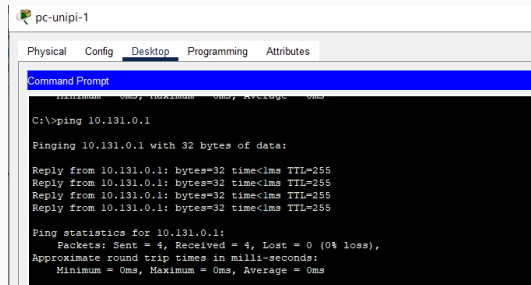
Рис. 7: Настройка интерфейсов маршрутизатора pisa-unipi-yalantsova-sw-1

Настройка VPN на основе GRE

Рис. 8: Проверка связи между устройствами в городе Пиза

```
msk-donskaya-yalantsova-gw-1>en
Password:
msk-donskaya-yalantsova-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-yalantsova-gw-1(config)#interface Tunnel0

msk-donskaya-yalantsova-gw-1(config-if)#
%LINK-5-CHANGED: Interface Tunnel0, changed state to up

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

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

msk-donskaya-yalantsova-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-yalantsova-gw-1(config-if)#ip address 10.128.254.1 255.255.255.255
msk-donskaya-yalantsova-gw-1(config-if)#exit
msk-donskaya-yalantsova-gw-1(config)#ip route 10.128.254.5 255.255.255.255 10.128.255.254
```

Рис. 9: Настройка VPN на маршрутизаторе msk-donskaya-yalantsova-gw-1

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

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

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

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

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

Рис. 10: Настройка VPN на маршрутизаторе pisa-unipi-yalantsova-gw-1
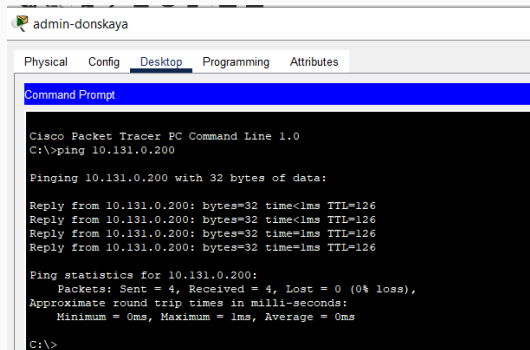
Рис. 11: Проверка доступности узлов сети Университета г. Пиза из сети Донская

Выводы

Выводы

В результате выполнения лабораторной были приобретены практические навыки по настройке VPN-туннеля через незащищённое Интернет-соединение.