**РОССИЙСКИЙ УНИВЕРСИТЕТ ДРУЖБЫ НАРОДОВ**

**Факультет физико-математических и естественных наук**

**Кафедра прикладной информатики и теории вероятностей**

# ОТЧЕТ
# ПО ЛАБОРАТОРНОЙ РАБОТЕ № 16

**Настройка VPN**

*дисциплина: Администрирование локальных сетей*

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**МОСКВА**

2022 г.

## Цель работы

Получение навыков настройки VPN-туннеля через незащищённое Интернет соединение.

## Выполнение работы

1. Разместить в рабочей области проекта в соответствии с модельными предположениями оборудование для сети Университета г. Пиза: 2 медиаконвертера (Repeater-PT), 1 маршрутизатора типа Cisco 2811, 1 коммутатора типа Cisco 2950-24, 1 оконечных устройства типа PC-PT (рис. 1).

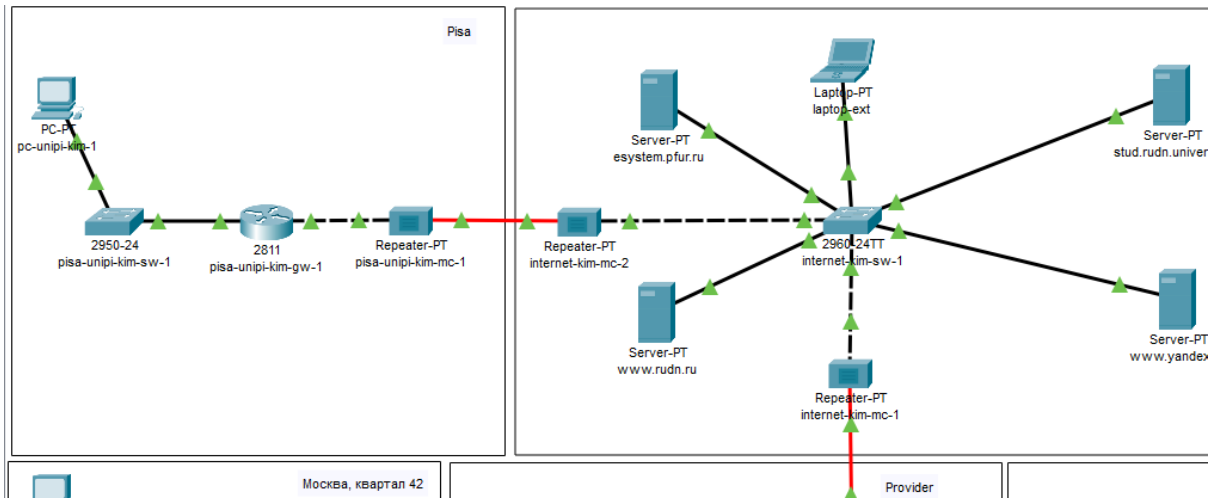


*Рисунок 1*

2. В физической рабочей области проекта создать город Пиза, здание Университета г. Пиза. Переместить туда соответствующее оборудование (рис. 2-3).

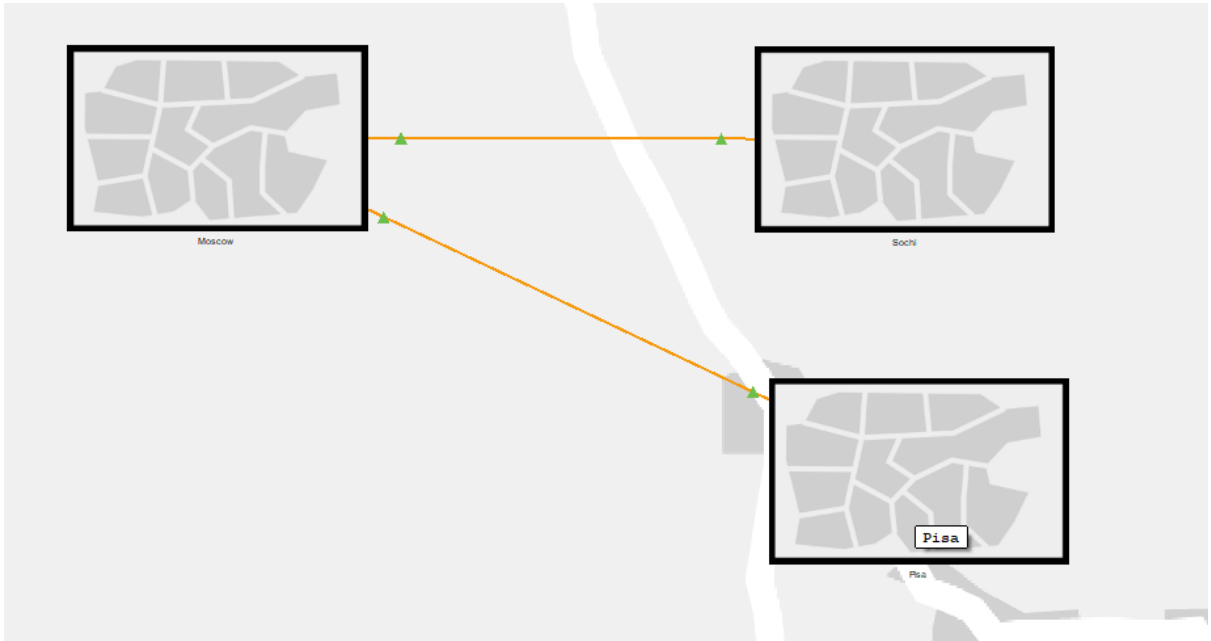


*Рисунок 2. Москва и Сочи на физической схеме проекта*

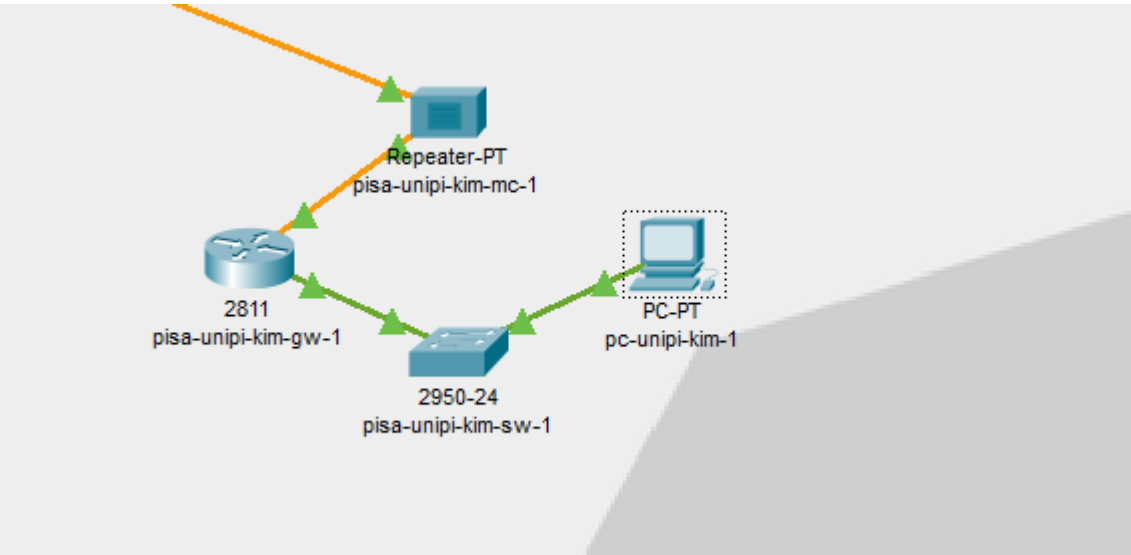


*Рисунок 3. Размещение объектов в здании университета в г. Пиза*

3. Сделала первоначальную настройку оборудования сети Университета г. Пиза

- Первоначальная настройка маршрутизатора pisa-unipi-kim-gw-1(рис. 4)

```
pisa-unipi-kim-gw-1>en
pisa-unipi-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
pisa-unipi-kim-gw-1(config)#line vty 0 4
pisa-unipi-kim-gw-1(config-line)#password cisco
pisa-unipi-kim-gw-1(config-line)#login
pisa-unipi-kim-gw-1(config-line)#exit
pisa-unipi-kim-gw-1(config)#line console 0
pisa-unipi-kim-gw-1(config-line)#password cisco
pisa-unipi-kim-gw-1(config-line)#login
pisa-unipi-kim-gw-1(config-line)#exit
pisa-unipi-kim-gw-1(config)#enable secret cisco
pisa-unipi-kim-gw-1(config)#service password-encryption
pisa-unipi-kim-gw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-kim-gw-1(config)#ip domain-name unipi.edu
pisa-unipi-kim-gw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-kim-gw-1.unipi.edu
Choose the size of the key modulus in the range of 360 to 2048 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-kim-gw-1(config)#line vty 0 4
*Mar 1 0:12:18.498: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-kim-gw-1(config-line)#transport input ssh
pisa-unipi-kim-gw-1(config-line)#^Z
pisa-unipi-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

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

*Рисунок 4*

- Первоначальная настройка коммутатора pisa-unipi-kim-sw-1(рис. 5)

```
pisa-unipi-kim-sw-1>en
pisa-unipi-kim-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
pisa-unipi-kim-sw-1(config)#line vty 0 4
pisa-unipi-kim-sw-1(config-line)#password cisco
pisa-unipi-kim-sw-1(config-line)#login
pisa-unipi-kim-sw-1(config-line)#exit
pisa-unipi-kim-sw-1(config)#line console 0
pisa-unipi-kim-sw-1(config-line)#password cisco
pisa-unipi-kim-sw-1(config-line)#login
pisa-unipi-kim-sw-1(config-line)#exit
pisa-unipi-kim-sw-1(config)#enable secret cisco
pisa-unipi-kim-sw-1(config)#service password-encryption
pisa-unipi-kim-sw-1(config)#username admin privilege 1 secret cisco
pisa-unipi-kim-sw-1(config)#ip domain-name unipi.edu
pisa-unipi-kim-sw-1(config)#crypto key generate rsa
The name for the keys will be: pisa-unipi-kim-sw-1.unipi.edu
Choose the size of the key modulus in the range of 360 to 2048 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-kim-sw-1(config)#line vty 0 4
*Mar 1 0:14:7.744: %SSH-5-ENABLED: SSH 1.99 has been enabled
pisa-unipi-kim-sw-1(config-line)#transport input ssh
pisa-unipi-kim-sw-1(config-line)#^Z
pisa-unipi-kim-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

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

*Рисунок 5*

4. Настройка интерфейсов оборудования сети Университета г. Пиза.
    - Настройка интерфейсов маршрутизатора pisa-unipi-kim-gw-1(рис. 6)

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

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

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

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

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

pisa-unipi-kim-gw-1#wr m
Building configuration...
[OK]
pisa-unipi-kim-gw-1#ping 192.0.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.0.2.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/4/16 ms

pisa-unipi-kim-gw-1#ping 192.0.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.0.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

*Рисунок 6*

- Настройка интерфейсов коммутатора pisa-unipi-kim-sw-1(рис. 7)

```
pisa-unipi-kim-sw-1>en
Password:
pisa-unipi-kim-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
pisa-unipi-kim-sw-1(config)#int f0/24
pisa-unipi-kim-sw-1(config-if)#switchport mode trunk

pisa-unipi-kim-sw-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

pisa-unipi-kim-sw-1(config-if)#exit
pisa-unipi-kim-sw-1(config)#int f0/1
pisa-unipi-kim-sw-1(config-if)#switchport mode access
pisa-unipi-kim-sw-1(config-if)#switchport access vlan 401
% Access VLAN does not exist. Creating vlan 401
pisa-unipi-kim-sw-1(config-if)#exit
pisa-unipi-kim-sw-1(config)#vlan 401
pisa-unipi-kim-sw-1(config-vlan)#name unipi-main
pisa-unipi-kim-sw-1(config-vlan)#exit
pisa-unipi-kim-sw-1(config)#int vlan401
pisa-unipi-kim-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-kim-sw-1(config-if)#no shutdown
pisa-unipi-kim-sw-1(config-if)#exit
pisa-unipi-kim-sw-1(config)#exit
pisa-unipi-kim-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

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

*Рисунок 7*

5. Настроить VPN на основе протокола GRE.

    - Настройка маршрутизатора msk-donskaya-kim-gw-1(рис. 8)

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

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

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

msk-donskaya-kim-gw-1(config-if)#exit
msk-donskaya-kim-gw-1(config)#int loopback0

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

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

*Рисунок 8*

- Настройка маршрутизатора pisa-unipi-kim-gw-1(рис. 9)

```
pisa-unipi-kim-gw-1>en
Password:
pisa-unipi-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
pisa-unipi-kim-gw-1(config)#int Tunnel0

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

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

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

pisa-unipi-kim-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-kim-gw-1(config-if)#ip address 10.128.254.5 255.255.255.255
pisa-unipi-kim-gw-1(config-if)#exit
pisa-unipi-kim-gw-1(config)#ip route 10.128.254.1 255.255.255.255 10.128.255.253
pisa-unipi-kim-gw-1(config)#router ospf 1
pisa-unipi-kim-gw-1(config-router)#router-id 10.128.254.5
pisa-unipi-kim-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
pisa-unipi-kim-gw-1(config-router)#exit
pisa-unipi-kim-gw-1(config)#exit
pisa-unipi-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

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

*Рисунок 9*

6. Проверить доступность узлов сети Университета г. Пиза с ноутбука администратора сети «Донская» (рис. 10)

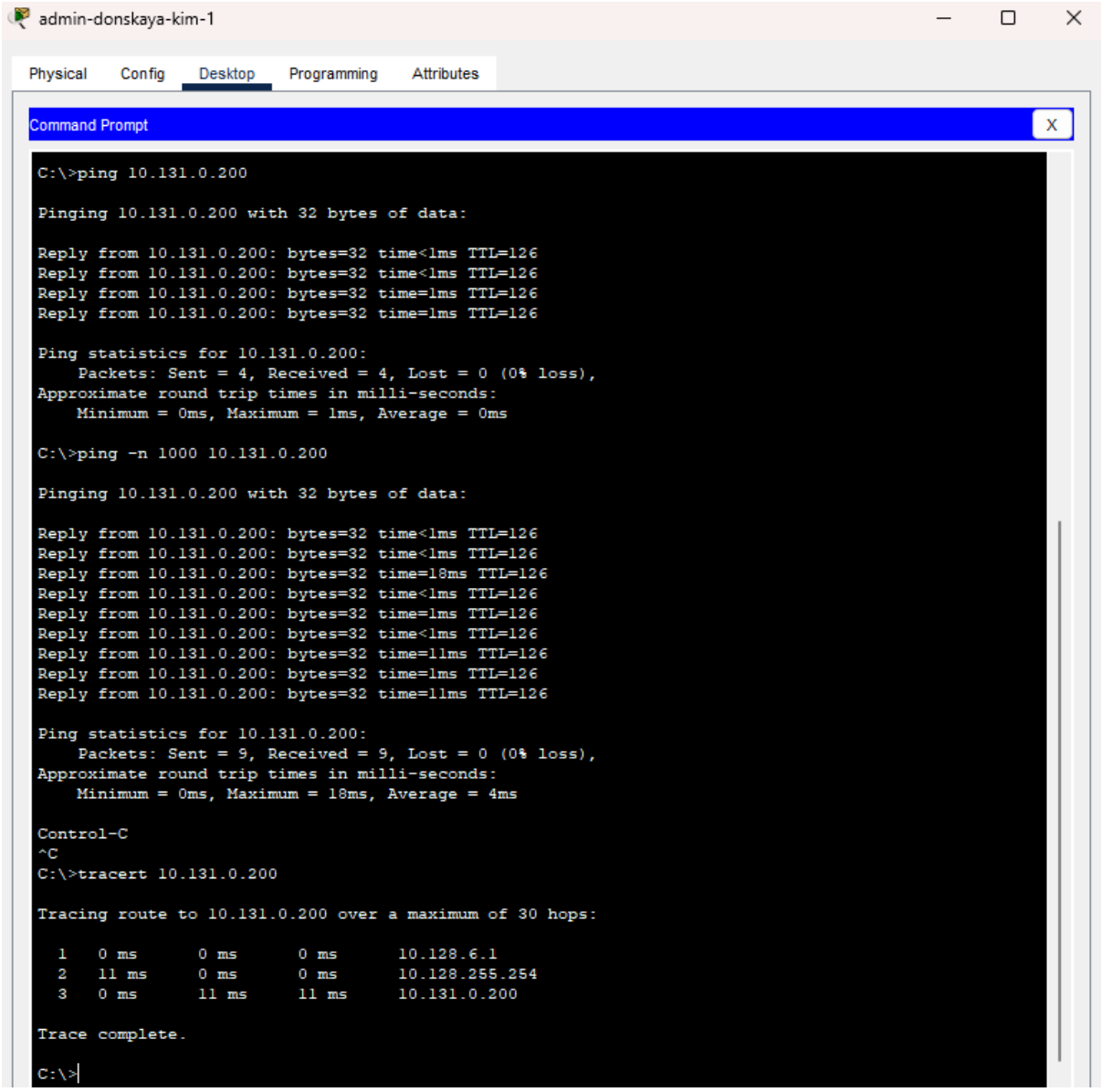


*Рисунок 10*

7. Обновила схемы L1

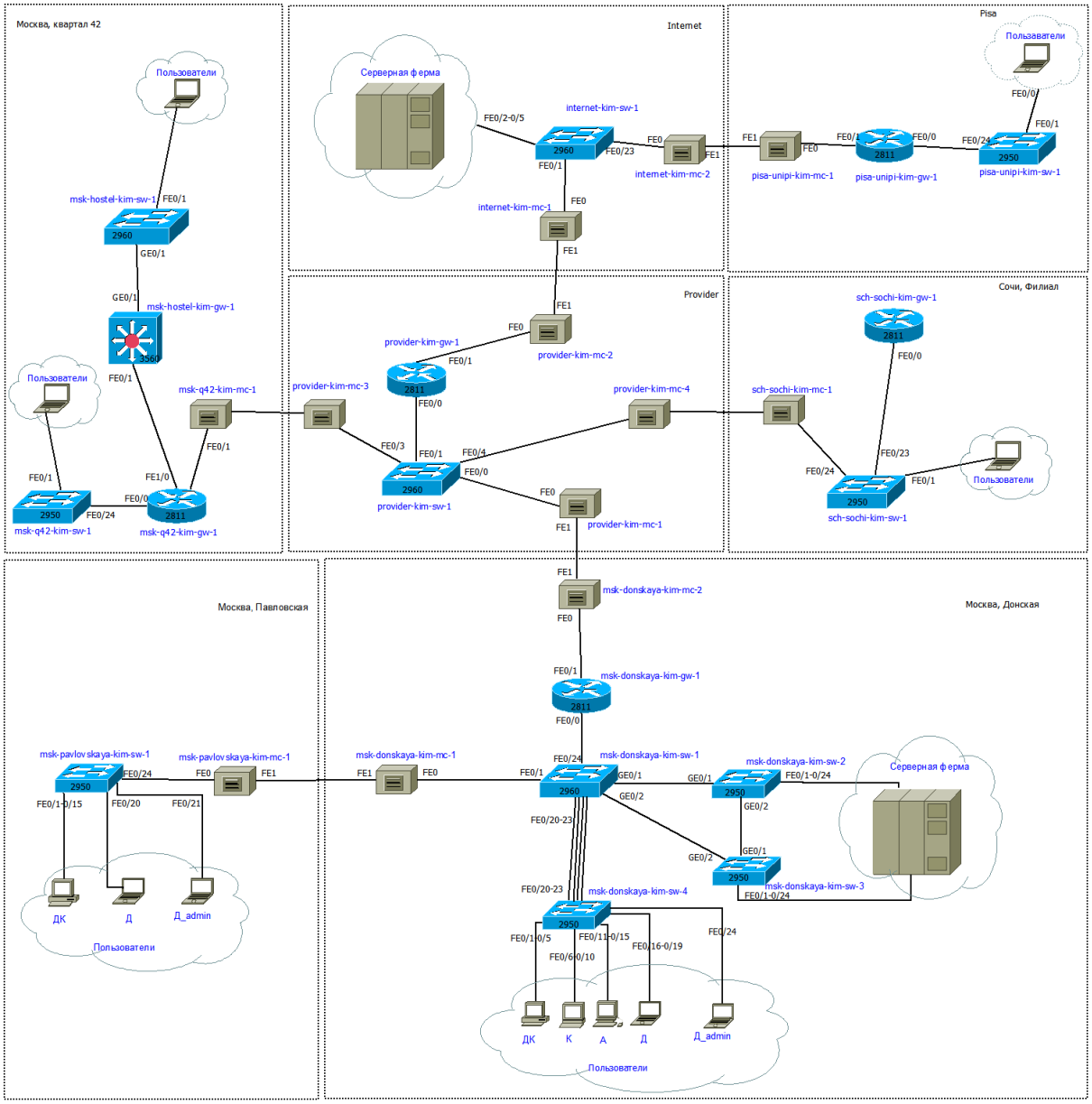


*Рисунок 11. Схема L1*

# Конфигурации оборудования

- **msk-donskaya-kim-gw-1**

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

hostname msk-donskaya-kim-gw-1

!

```
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
ip dhcp excluded-address 10.128.3.1 10.128.3.29
ip dhcp excluded-address 10.128.3.200 10.128.3.254
ip dhcp excluded-address 10.128.4.1 10.128.4.29
ip dhcp excluded-address 10.128.4.200 10.128.4.254
ip dhcp excluded-address 10.128.5.1 10.128.5.29
ip dhcp excluded-address 10.128.5.200 10.128.5.254
ip dhcp excluded-address 10.128.6.1 10.128.6.29
ip dhcp excluded-address 10.128.6.200 10.128.6.254
!
ip dhcp pool dk
 network 10.128.3.0 255.255.255.0
 default-router 10.128.3.1
 dns-server 10.128.0.5
ip dhcp pool departments
 network 10.128.4.0 255.255.255.0
 default-router 10.128.4.1
 dns-server 10.128.0.5
ip dhcp pool adm
 network 10.128.5.0 255.255.255.0
 default-router 10.128.5.1
 dns-server 10.128.0.5
ip dhcp pool other
 network 10.128.6.0 255.255.255.0
 default-router 10.128.6.1
 dns-server 10.128.0.5
!
!
!
ip cef
```

```
no ipv6 cef
!
!
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
license udi pid CISCO2811/K9 sn FTX1017LG55-
!
!
!
!
!
!
!
!
!
!
ip domain-name donskaya.rudn.edu
ip name-server 10.128.0.5
!
!
spanning-tree mode pvst
!
!
!
!
!
!
!
interface Loopback0
 ip address 10.128.254.1 255.255.255.255
!
interface Tunnel0
 ip address 10.128.255.253 255.255.255.252
 mtu 1476
```

```
 tunnel destination 192.0.2.20
!
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.2
 description management
 encapsulation dot1Q 2
 ip address 10.128.1.1 255.255.255.0
 ip access-group management-out out
!
interface FastEthernet0/0.3
 description servers
 encapsulation dot1Q 3
 ip address 10.128.0.1 255.255.255.0
 ip access-group servers-out out
 ip nat inside
!
interface FastEthernet0/0.101
 description dk
 encapsulation dot1Q 101
 ip address 10.128.3.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.102
 description departments
 encapsulation dot1Q 102
 ip address 10.128.4.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.103
```

```
 description adm
 encapsulation dot1Q 103
 ip address 10.128.5.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.104
 description other
 encapsulation dot1Q 104
 ip address 10.128.6.1 255.255.255.0
 ip access-group other-in in
 ip nat inside
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/1.4
 description internet
 encapsulation dot1Q 4
 ip address 198.51.100.2 255.255.255.240
 ip nat outside
!
interface FastEthernet0/1.5
 description q42
 encapsulation dot1Q 5
 ip address 10.128.255.1 255.255.255.252
 ip nat inside
!
interface FastEthernet0/1.6
 description sochi
 encapsulation dot1Q 6
 ip address 10.128.255.5 255.255.255.252
 ip nat inside
```

```
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 router-id 10.128.254.1
 log-adjacency-changes
 network 10.0.0.0 0.255.255.255 area 0
!
ip nat pool main-pool 198.51.100.2 198.51.100.14 netmask 255.255.255.240
ip nat inside source list nat-inet pool main-pool overload
ip nat inside source static tcp 10.128.0.2 80 198.51.100.2 80
ip nat inside source static tcp 10.128.0.3 20 198.51.100.3 20
ip nat inside source static tcp 10.128.0.3 21 198.51.100.3 21
ip nat inside source static tcp 10.128.0.4 25 198.51.100.4 25
ip nat inside source static tcp 10.128.0.4 110 198.51.100.4 110
ip nat inside source static tcp 10.128.6.200 3389 198.51.100.10 3389
ip classless
ip route 0.0.0.0 0.0.0.0 198.51.100.1
ip route 10.129.0.0 255.255.0.0 10.128.255.2
ip route 10.130.0.0 255.255.0.0 10.128.255.6
ip route 10.128.254.5 255.255.255.255 10.128.255.254
!
ip flow-export version 9
!
!
ip access-list extended servers-out
 remark web
 permit icmp any any
 permit tcp any host 10.128.0.2 eq www
 permit tcp host 10.128.6.200 host 10.128.0.2 range 20 ftp
 permit tcp host 10.128.6.200 host 10.128.0.2 eq telnet
 remark file
```

```
 permit tcp 10.128.0.0 0.0.255.255 host 10.128.0.3 eq 445
 permit tcp any host 10.128.0.3 range 20 ftp
 remark mail
 permit tcp any host 10.128.0.4 eq smtp
 permit tcp any host 10.128.0.4 eq pop3
 remark dns
 permit udp 10.128.0.0 0.0.255.255 host 10.128.0.5 eq domain
ip access-list extended other-in
 remark admin
 permit ip host 10.128.6.200 any
ip access-list extended management-out
 remark admin
 permit ip host 10.128.6.200 10.128.1.0 0.0.0.255
ip access-list extended nat-inet
 remark dk
 permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.11 eq www
 permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.12 eq www
 remark departments
 permit tcp 10.128.4.0 0.0.0.255 host 192.0.2.13 eq www
 remark adm
 permit tcp 10.128.5.0 0.0.0.255 host 192.0.2.14 eq www
 remark admin
 permit ip host 10.128.6.200 any
 remark q42
 permit ip host 10.129.0.200 any
 permit ip host 10.129.128.200 any
 remark sochi
 permit ip host 10.130.0.200 any
!
!
!
!
!
line con 0
```

```
 password 7 0822455D0A16
 login
!
line aux 0
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
!
!
!
end
```

- **pisa-unipi-kim-gw-1**

```
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname pisa-unipi-kim-gw-1
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
ip cef
no ipv6 cef
!
```

```
!
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
license udi pid CISCO2811/K9 sn FTX10178G94-
!
!
!
!
!
!
!
!
!
!
ip domain-name unipi.edu
!
!
spanning-tree mode pvst
!
!
!
!
!
!
!
interface Loopback0
 ip address 10.128.254.5 255.255.255.255
!
interface Tunnel0
 ip address 10.128.255.254 255.255.255.252
 mtu 1476
 tunnel source FastEthernet0/1
 tunnel destination 198.51.100.2
!
```

```
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.401
 description unipi-main
 encapsulation dot1Q 401
 ip address 10.131.0.1 255.255.255.0
!
interface FastEthernet0/1
 description internet
 ip address 192.0.2.20 255.255.255.0
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 router-id 10.128.254.5
 log-adjacency-changes
 network 10.0.0.0 0.255.255.255 area 0
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.0.2.1
ip route 10.128.254.1 255.255.255.255 10.128.255.253
!
ip flow-export version 9
!
!
!
```

```
!
!
!
!
line con 0
 password 7 0822455D0A16
 login
!
line aux 0
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
!
!
!
end
```

- **pisa-unipi-kim-sw-1**

```
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname pisa-unipi-kim-sw-1
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
ip domain-name unipi.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
```

```
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 401
 switchport mode access
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
```

```
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
 switchport mode trunk
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan401
 no ip address
!
!
!
!
line con 0
```

```
 password 7 0822455D0A16
 login
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
line vty 5 15
 login
!
!
!
!
end
```

## Ответы на контрольные вопросы

1. Что такое VPN?

Виртуальная частная сеть (VPN) — технология, которая позволяет установить безопасное подключение к сети Интернет. При подключении к Интернету через VPN, программное обеспечение создает безопасное соединение между вашим устройством и удаленным VPN-сервером, шифруя ваши данные просмотра веб-страниц и скрывая ваш IP-адрес.

2. В каких случаях следует использовать VPN?

Для дополнительного шифрования в сетях, безопасному подключению к локальным сетям извне.

3. Как с помощью VPN обойти NAT?

Нужно поднять VPN-туннель.

## Вывод

Получила навыков настройки VPN-туннеля через незащищённое Интернет соединение.