

РОССИЙСКИЙ УНИВЕРСИТЕТ ДРУЖБЫ НАРОДОВ
Факультет физико-математических и естественных наук
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ОТЧЕТ
ПО ЛАБОРАТОРНОЙ РАБОТЕ № 6

дисциплина: Администрирование локальных сетей

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Группа: НФИ-бд-03-19

МОСКВА

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Цель работы: Настроить статическую маршрутизацию VLAN в сети.

6.2. Задание

1. Добавить в локальную сеть маршрутизатор, провести его первоначальную настройку.
2. Настроить статическую маршрутизацию VLAN.
3. При выполнении работы необходимо учитывать соглашение об именовании (см. раздел 2.5).

Последовательность выполнения работы

1. В логической области проекта разместила маршрутизатор Cisco 2811, подключила его к порту 24 коммутатора msk-donskaya-vmshutenko-sw-1 в соответствии с таблицей портов (см. табл. 3.3 из раздела 3.3).

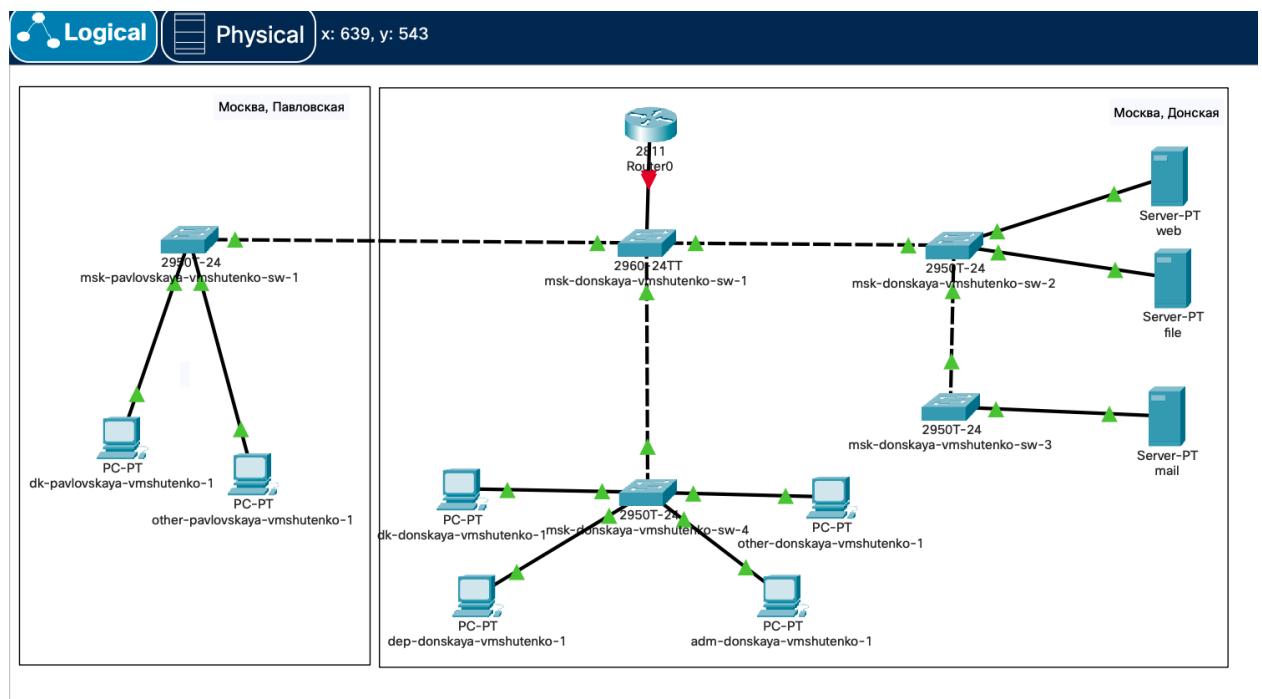


Рисунок 1. Схема сети.

2. Используя приведённую последовательность команд по первоначальной настройке маршрутизатора, сконфигурировала маршрутизатор, задав на нём имя, пароль для доступа к консоли, настроила удалённое подключение к нему по ssh.

Router >enable

Router#configure terminal

Router(config)#hostname msk-donskaya-gw-1

msk-donskaya-gw-1(config)#line vty 0 4

msk-donskaya-gw-1(config-line)#password cisco

```

msk-donskaya-gw-1(config-line)#login
msk-donskaya-gw-1(config)#line console 0
msk-donskaya-gw-1(config-line)#password cisco
msk-donskaya-gw-1(config-line)#login
msk-donskaya-gw-1(config)#enable secret cisco
msk-donskaya-gw-1(config)#service password-encryption
msk-donskaya-gw-1(config)#username admin privilege 1 secret cisco
msk-donskaya-gw-1(config)#ip domain-name donskaya.rudn.edu
msk-donskaya-gw-1(config)#crypto key generate rsa
msk-donskaya-gw-1(config)#line vty 0 4
msk-donskaya-gw-1(config-line)#transport input ssh

```

The screenshot shows a Cisco IOS CLI interface. At the top, there are three colored window control buttons (red, yellow, green) followed by the title "Router0". Below the title is a navigation bar with tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". The main area is labeled "IOS Command Line Interface". The terminal window displays the following configuration commands:

```

Router(config)#hostname mskdonskayagw1
mskdonskayagw1(config)#hostname msk-donskaya-vmshutenko-gw-1
msk-donskaya-vmshutenko-gw-1(config)#exit
msk-donskaya-vmshutenko-gw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0
msk-donskaya-vmshutenko-gw-1(config-if)#no shutdown

msk-donskaya-vmshutenko-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

msk-donskaya-vmshutenko-gw-1(config-if)#conf t
%Invalid hex value
msk-donskaya-vmshutenko-gw-1(config)#line vty 0 4
msk-donskaya-vmshutenko-gw-1(config-line)#password cisco
msk-donskaya-vmshutenko-gw-1(config-line)#login
msk-donskaya-vmshutenko-gw-1(config-line)#line console 0
msk-donskaya-vmshutenko-gw-1(config-line)#password cisco
msk-donskaya-vmshutenko-gw-1(config-line)#login
msk-donskaya-vmshutenko-gw-1(config-line)#

```

At the bottom left of the terminal window, the text "Command+F6 to exit CLI focus" is displayed. To the right of the terminal window, there are two buttons: "Copy" and "Paste". Below the terminal window, there is a small checkbox labeled "Top" and a horizontal scrollbar.

Рисунок 2. Сконфигурирование маршрутизатор, задав на нём имя, пароль для доступа к консоли.

```
Router0
Physical Config CLI Attributes

IOS Command Line Interface

msk-donskaya-vmshutenko-gw-1(config-line)#line console 0
msk-donskaya-vmshutenko-gw-1(config-line)#password cisco
msk-donskaya-vmshutenko-gw-1(config-line)#login
msk-donskaya-vmshutenko-gw-1(config-line)#enable secret cisco
msk-donskaya-vmshutenko-gw-1(config)#service passwordencryption
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-gw-1(config)#service password-encryption
msk-donskaya-vmshutenko-gw-1(config)#username admin privilege 1 secret
cisco
msk-donskaya-vmshutenko-gw-1(config)#ip domainname donskaya.rudn.edu
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-gw-1(config)#ip domain-name donskaya.rudn.edu
msk-donskaya-vmshutenko-gw-1(config)#crypto key generate rsa
The name for the keys will be: msk-donskaya-vmshutenko-
gw-1.donskaya.rudn.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]

msk-donskaya-vmshutenko-gw-1(config)#line vty 0 4
*Mar 1 0:15:50.315: %SSH-5-ENABLED: SSH 1.99 has been enabled
msk-donskaya-vmshutenko-gw-1(config-line)#transport input ssh
msk-donskaya-vmshutenko-gw-1(config-line)#

Command+F6 to exit CLI focus
Copy Paste
```

Рисунок 3. Сконфигурирование маршрутизатора, настройка удалённого подключение к нему по ssh.

3. Настроила порт 24 коммутатора msk-donskaya-vmshutenko-sw-1 как trunk-порт.

```

msk-donskaya-vmshutenko-sw-1#
msk-donskaya-vmshutenko-sw-1#conf t
^
% Invalid input detected at '^' marker.

msk-donskaya-vmshutenko-sw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-vmshutenko-sw-1(config)#interface f0/24
msk-donskaya-vmshutenko-sw-1(config-if)#switchport mode trunk
msk-donskaya-vmshutenko-sw-1(config-if)#exit
msk-donskaya-vmshutenko-sw-1(config)#exit
msk-donskaya-vmshutenko-sw-1#
%SYS-5-CONFIG_I: Configured from console by console
wr mem
Building configuration...
[OK]
msk-donskaya-vmshutenko-sw-1#

```

Command+F6 to exit CLI focus [Copy](#) [Paste](#)

Top [Toggle PDU List Window](#)

Рисунок 4. Настройка порта 24 коммутатора msk-donskaya-vmshutenko-sw-1 как trunk-порт.

4. На интерфейсе f0/0 маршрутизатора msk-donskaya-vmshutenko-gw-1 настроила виртуальные интерфейсы, соответствующие номерам VLAN. Согласно таблице IP-адресов (см. табл. 3.2 из раздела 3.3) задала соответствующие IPадреса на виртуальных интерфейсах. Для этого используйте приведённую последовательность команд по конфигурации VLAN-интерфейсов маршрутизатора.

```

msk-donskaya-gw-1>enable
msk-donskaya-gw-1#configure terminal
msk-donskaya-gw-1(config)#interface f0/0
msk-donskaya-gw-1(config-if)#no shutdown
msk-donskaya-gw-1(config)#interface f0/0.2
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 2

```

```
msk-donskaya-gw-1(config-subif)#ip address 10.128.1.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description management
msk-donskaya-gw-1(config)#interface f0/0.3
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 3
msk-donskaya-gw-1(config-subif)#ip address 10.128.0.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description servers
msk-donskaya-gw-1(config-subif)#interface f0/0.101
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 101
msk-donskaya-gw-1(config-subif)#ip address 10.128.3.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description dk
msk-donskaya-gw-1(config-subif)#interface f0/0.102
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 102
msk-donskaya-gw-1(config-subif)#ip address 10.128.4.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description departments
msk-donskaya-gw-1(config-subif)#interface f0/0.103
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 103
msk-donskaya-gw-1(config-subif)#ip address 10.128.5.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description adm
msk-donskaya-gw-1(config-subif)#interface f0/0.104
msk-donskaya-gw-1(config-subif)#encapsulation dot1Q 104
msk-donskaya-gw-1(config-subif)#ip address 10.128.6.1 255.255.255.0
msk-donskaya-gw-1(config-subif)#description other
```

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0
msk-donskaya-vmshutenko-gw-1(config-if)#no shutdown
msk-donskaya-vmshutenko-gw-1(config-if)#exit
msk-donskaya-vmshutenko-gw-1(config)#interface f0/0.2
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.2,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 2
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.1.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description management
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.3
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.3,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 3
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.0.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description servers
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.101
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.101, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.101,
```

Command+F6 to exit CLI focus

Top

Copy **Paste**

Рисунок 5.

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.101
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.101, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.101,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 101
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.3.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description dk
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.102
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.102, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.102,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 102
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.4.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description departments
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.103
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.103, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.103,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 103
```

Command+F6 to exit CLI focus

Top

Copy **Paste**

Рисунок 6.

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.102,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 102
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.4.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description departments
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.103
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.103, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.103,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 103
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.5.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description adm
msk-donskaya-vmshutenko-gw-1(config-subif)#interface f0/0.104
msk-donskaya-vmshutenko-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.104, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.104,
changed state to up

msk-donskaya-vmshutenko-gw-1(config-subif)#encapsulation dot1Q 104
msk-donskaya-vmshutenko-gw-1(config-subif)#ip address 10.128.6.1
255.255.255.0
msk-donskaya-vmshutenko-gw-1(config-subif)#description other
msk-donskaya-vmshutenko-gw-1(config-subif)#

Command+F6 to exit CLI focus
```

Top

Copy **Paste**

Рисунок 7.

Рисунки 5-7. Настройка виртуальных интерфейсов, соответствующим номерам VLAN.

5. Проверила доступность оконечных устройств из разных VLAN.

dk-donskaya-vmshutenko-1

Physical Config Desktop Programming Attributes

Command Prompt X

```
C:\>ipconfig

FastEthernet0 Connection: (default port)

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::201:97FF:FE01:DC14
IPv6 Address.....: ::
IPv4 Address.....: 10.128.3.201
Subnet Mask.....: 255.255.255.0
Default Gateway.....: ::
                           10.128.3.1

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
                           0.0.0.0

C:\>ping 10.128.3.202

Pinging 10.128.3.202 with 32 bytes of data:

Reply from 10.128.3.202: bytes=32 time=18ms TTL=128
Reply from 10.128.3.202: bytes=32 time<1ms TTL=128
Reply from 10.128.3.202: bytes=32 time<1ms TTL=128
Reply from 10.128.3.202: bytes=32 time=1ms TTL=128

Ping statistics for 10.128.3.202:
```

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Рисунок 8. Ping одного vlan

dk-donskaya-vmshutenko-1

Physical Config Desktop Programming Attributes

Command Prompt X

```
Approximate round trip times in milli-seconds:  
    Minimum = 0ms, Maximum = 18ms, Average = 4ms  
  
C:\>ping 10.128.4.201  
  
Pinging 10.128.4.201 with 32 bytes of data:  
  
Request timed out.  
Reply from 10.128.4.201: bytes=32 time<1ms TTL=127  
Reply from 10.128.4.201: bytes=32 time<1ms TTL=127  
Reply from 10.128.4.201: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.4.201:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>ping 10.128.4.201  
  
Pinging 10.128.4.201 with 32 bytes of data:  
  
Reply from 10.128.4.201: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.4.201:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>
```

Рисунок 8. Ping разных vlan.

dk-donskaya-vmshutenko-1

Physical Config Desktop **Programming** Attributes

Command Prompt X

```
Ping statistics for 10.128.6.201:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 1ms, Average = 0ms  
  
C:\>ping 10.128.0.2  
  
Pinging 10.128.0.2 with 32 bytes of data:  
  
Request timed out.  
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.0.2:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>ping 10.128.0.3  
  
Pinging 10.128.0.3 with 32 bytes of data:  
  
Request timed out.  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.0.3:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>
```

Рисунок 8. Ping разных vlan, серверов.

The screenshot shows a Windows Command Prompt window with the title bar 'dk-donskaya-vmshutenko-1'. Below the title bar is a menu bar with tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area of the window is a black terminal-like interface with white text. It displays the results of several 'ping' commands. The first command is 'ping 10.128.0.2', which shows 25% loss of packets. The second command is 'ping 10.128.0.3', which shows a request timed out. The third command is 'ping 10.128.0.4', which also shows a request timed out. The text output is as follows:

```
Ping statistics for 10.128.0.2:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>ping 10.128.0.3  
  
Pinging 10.128.0.3 with 32 bytes of data:  
  
Request timed out.  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.3: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.0.3:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 0ms, Average = 0ms  
  
C:\>ping 10.128.0.4  
  
Pinging 10.128.0.4 with 32 bytes of data:  
  
Request timed out.  
Reply from 10.128.0.4: bytes=32 time=12ms TTL=127  
Reply from 10.128.0.4: bytes=32 time<1ms TTL=127  
Reply from 10.128.0.4: bytes=32 time<1ms TTL=127  
  
Ping statistics for 10.128.0.4:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 12ms, Average = 4ms  
  
C:\>
```

Рисунок 10. Ping серверов.

6. Используя режим симуляции в Packet Tracer, изучила процесс передвижения пакета ICMP по сети. Изучила содержимое передаваемого пакета и заголовки задействованных

протоколов.

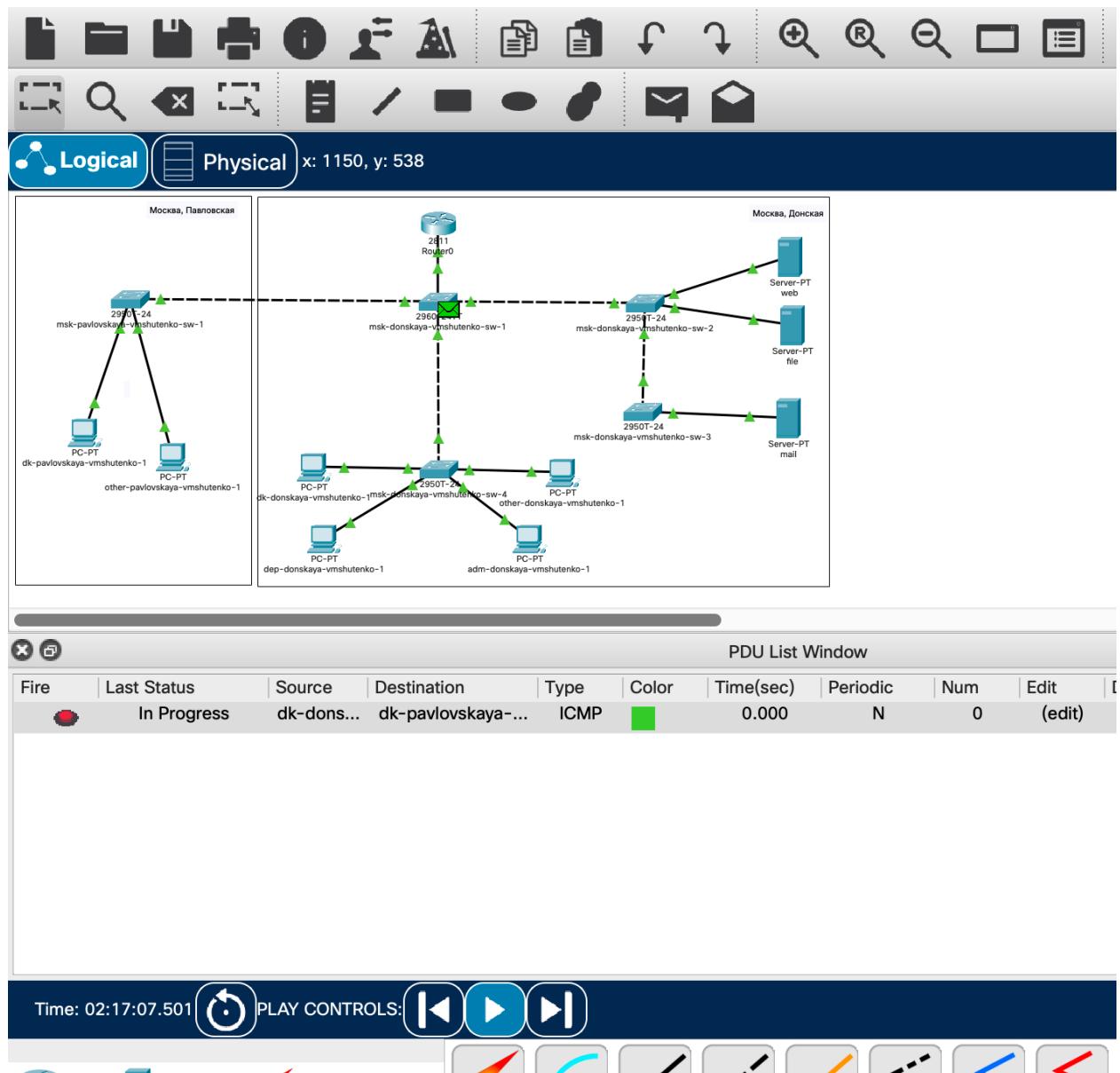


Рисунок 11. Процесс передвижения пакета ICMP по сети. Один VLAN.

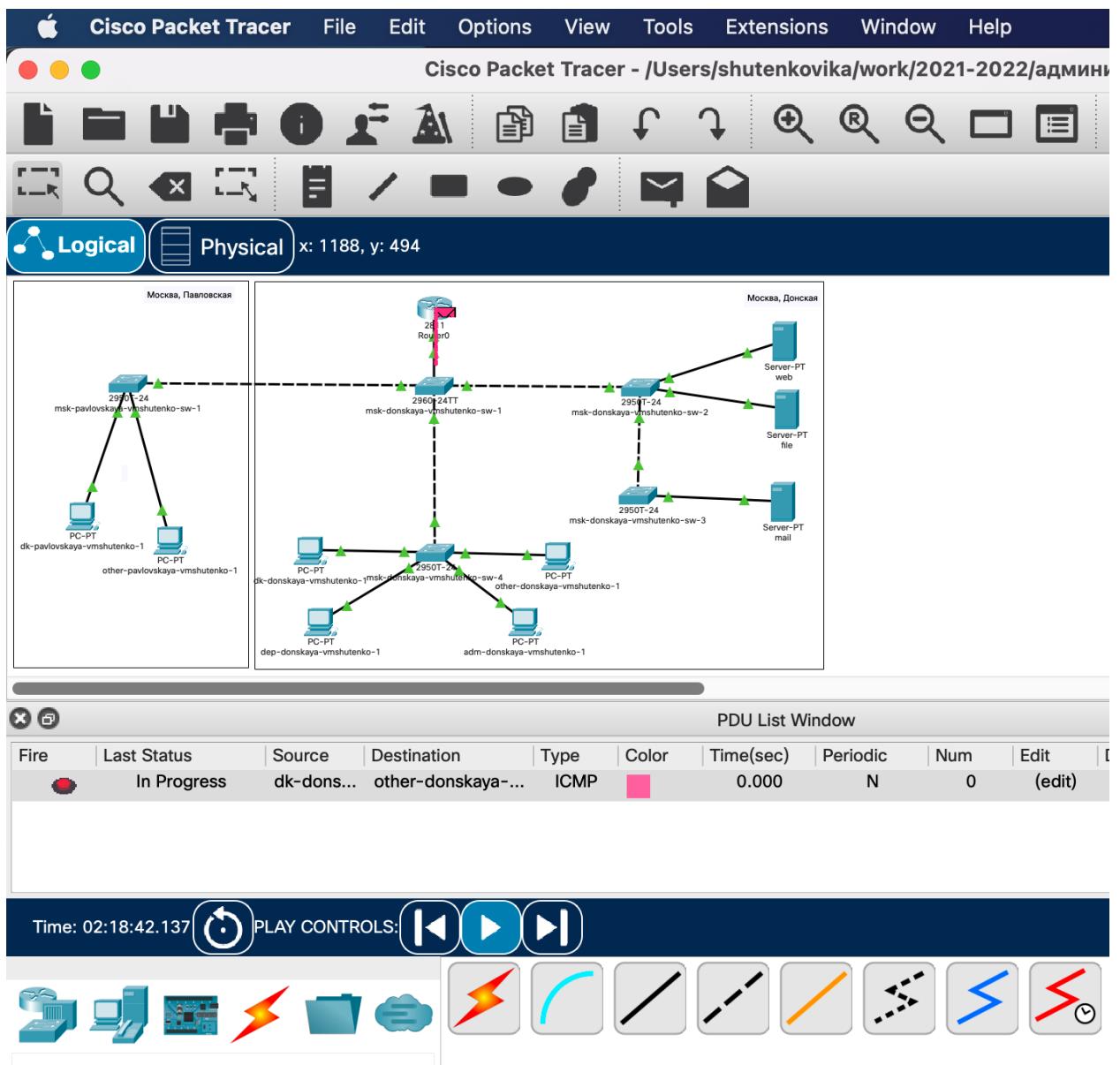


Рисунок 12. Процесс передвижения пакета ICMP по сети. Из одного VLAN в другой.