

Лабораторная работа №5

Конфигурирование VLAN

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Информация

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Получить основные навыки по настройке VLAN на коммутаторах сети.

1. На коммутаторах сети настроить Trunk-порты на соответствующих интерфейсах (см. табл. 3.2 из раздела 3.3), связывающих коммутаторы между собой.
2. Коммутатор msk-donskaya-claudely-sw-1 настроить как VTP-сервер и прописать на нём номера и названия VLAN согласно табл. 3.1 из раздела 3.3.
3. Коммутаторы msk-donskaya-sw-2 — msk-donskaya-sw-4, msk-pavlovskaya-claudely-sw-1 настроить как VTP-клиенты, на интерфейсах указать принадлежность к соответствующему VLAN (см. табл. 3.3 из раздела 3.3).
4. На серверах прописать IP-адреса, как указано в табл. 3.2 из раздела 3.3.
5. На оконечных устройствах указать соответствующий адрес шлюза и прописать статические IP-адреса из диапазона соответствующей сети, следуя регламенту выделения ip-адресов (см. табл. 3.4 из раздела 3.3).
6. Проверить доступность устройств, принадлежащих одному VLAN, и недоступность устройств, принадлежащих разным VLAN.
7. При выполнении работы необходимо учитывать соглашение об именовании (см. раздел

В логической рабочей области Packet Tracer разместим коммутаторы и оконечные устройства согласно схеме сети L1 (схема приведена в лабораторной работе) и соединим их через соответствующие интерфейсы.

Откроем проект с названием lab_PT-04.pkt и сохраним под названием lab_PT-05.pkt. После чего откроем его для дальнейшего редактирования.



Рис. 1: Открытие проекта lab_PT-05.pkt

Используя приведённую в лабораторной работе последовательность команд из примера по конфигурации Trunk-порта на интерфейсе g0/1 коммутатора mskdonskaya-sw-1, настроим Trunk-порты на соответствующих интерфейсах всех коммутаторов

Выполнение лабораторной работы

```
msk-donskaya-claudely-sw-1
Physical Config CLI Attributes
IOS Command Line Interface

msk-donskaya-claudely-1>enable
Password:
msk-donskaya-claudely-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-1(config)#interface g0/1
msk-donskaya-claudely-1(config-if)#switchport mode trunk

msk-donskaya-claudely-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

msk-donskaya-claudely-1(config-if)#
msk-donskaya-claudely-1(config-if)#^Z
^
% Invalid input detected at '^' marker.

msk-donskaya-claudely-1(config-if)#exit
msk-donskaya-claudely-1(config)#interface g0/2
msk-donskaya-claudely-1(config-if)#switchport mode trunk

msk-donskaya-claudely-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

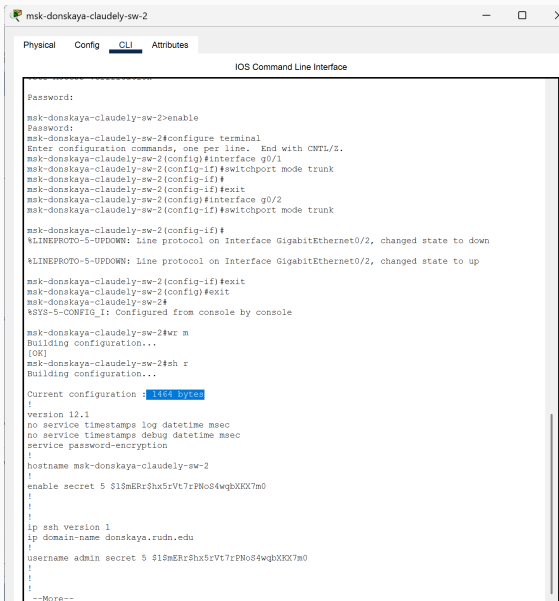
msk-donskaya-claudely-1(config-if)#exit
msk-donskaya-claudely-1(config)#interface f0/1
msk-donskaya-claudely-1(config-if)#switchport mode trunk
msk-donskaya-claudely-1(config-if)#
msk-donskaya-claudely-1(config-if)#exit
msk-donskaya-claudely-1(config)#interface f0/1
msk-donskaya-claudely-1(config-if)#switchport mode trunk
msk-donskaya-claudely-1(config-if)#
msk-donskaya-claudely-1(config-if)#wr m
^
% Invalid input detected at '^' marker.

msk-donskaya-claudely-1(config-if)#write memory
^
% Invalid input detected at '^' marker.

msk-donskaya-claudely-1(config-if)#exit
msk-donskaya-claudely-1(config)#exit
msk-donskaya-claudely-1#
%SYS-5-CONFIG_I: Configured from console by console

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

Выполнение лабораторной работы



```
msk-donskaya-claudely-sw-2
Physical Config CLI Attributes
IOS Command Line Interface

Password:
msk-donskaya-claudely-sw-2>enable
Password:
msk-donskaya-claudely-sw-2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-2(config)#interface g0/1
msk-donskaya-claudely-sw-2(config-if)#switchport mode trunk
msk-donskaya-claudely-sw-2(config-if)#
msk-donskaya-claudely-sw-2(config-if)#exit
msk-donskaya-claudely-sw-2(config)#interface g0/2
msk-donskaya-claudely-sw-2(config-if)#switchport mode trunk

msk-donskaya-claudely-sw-2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

msk-donskaya-claudely-sw-2(config-if)#exit
msk-donskaya-claudely-sw-2(config)#exit
msk-donskaya-claudely-sw-2#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-2#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-2#sh r
Building configuration...

Current configuration : 1464 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-2
!
enable secret 5 $1$mERr$hx5rVt7rPN0S4wqbXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPN0S4wqbXKX7m0
!
!
!
--More--
```

Выполнение лабораторной работы

```
msk-donskaya-claudely-sw-3

Physical Config CLI Attributes

IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed
down to up

User Access Verification

Password:

msk-donskaya-claudely-sw-3>enable
Password:
Password:
msk-donskaya-claudely-sw-3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-3(config)#interface g0/1
msk-donskaya-claudely-sw-3(config-if)#switchport mode trunk

% Invalid input detected at '^' marker.

msk-donskaya-claudely-sw-3(config-if)#switchport mode trunk
msk-donskaya-claudely-sw-3(config-if)#exit
msk-donskaya-claudely-sw-3(config)#exit
msk-donskaya-claudely-sw-3#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-3#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-3#sh -r

% Invalid input detected at '^' marker.

msk-donskaya-claudely-sw-3#sh r
Building configuration...

Current configuration : 1441 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-3
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXXKX7m0
```

Выполнение лабораторной работы



```
msk-donskaya-claudely-sw-4
Physical Config CLI Attributes
IOS Command Line Interface

User Access Verification
Password:
msk-donskaya-claudely-sw-4>enable
Password:
msk-donskaya-claudely-sw-4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-4(config)#interface g0/1
msk-donskaya-claudely-sw-4(config-if)#switchport mode trunk
msk-donskaya-claudely-sw-4(config-if)#exit
msk-donskaya-claudely-sw-4(config)#exit
msk-donskaya-claudely-sw-4#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-4#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-4#sh r
Building configuration...

Current configuration : 1441 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-4
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wgbXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wgbXKX7m0
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
```

Выполнение лабораторной работы

```
msk-pavlovskaya-claudely-sw-1
Physical Config CLI Attributes
IOS Command Line Interface
msk-pavlovskaya-claudely-sw-1>
msk-pavlovskaya-claudely-sw-1>enable
Password:
msk-pavlovskaya-claudely-sw-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-pavlovskaya-claudely-sw-1(config)#interface f0/24
msk-pavlovskaya-claudely-sw-1(config-if)#switchport mode trunk
msk-pavlovskaya-claudely-sw-1(config-if)#exit
msk-pavlovskaya-claudely-sw-1(config)#exit
msk-pavlovskaya-claudely-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-pavlovskaya-claudely-sw-1#wr m
Building configuration...
[OK]
msk-pavlovskaya-claudely-sw-1#sh r
Building configuration...

Current configuration : 1444 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-pavlovskaya-claudely-sw-1
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
```

Далее настроим коммутатор `msk-donskaya-claudely-sw-1` как VTP-сервер и пропишем на нём номера и названия VLAN.

Выполнение лабораторной работы

msk-donskaya-claudely-sw-1

Physical Config CLI Attributes

IOS Command Line Interface

```
msk-donskaya-claudely-1>enable
Password:
Password:
msk-donskaya-claudely-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-1(config)#vtp mode server
Device mode already VTP SERVER.
msk-donskaya-claudely-1(config)#vtp domain donskaya
Changing VTP domain name from NULL to donskaya
msk-donskaya-claudely-1(config)#vtp password cisco
Setting device VLAN database password to cisco
msk-donskaya-claudely-1(config)#vlan 2
msk-donskaya-claudely-1(config-vlan)#
%LINK-5-CHANGED: Interface Vlan2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan2, changed state to up

msk-donskaya-claudely-1(config-vlan)#
msk-donskaya-claudely-1(config-vlan)#name management
msk-donskaya-claudely-1(config-vlan)#vlan 3
msk-donskaya-claudely-1(config-vlan)#name servers
msk-donskaya-claudely-1(config-vlan)#vlan 101
msk-donskaya-claudely-1(config-vlan)#name dk
msk-donskaya-claudely-1(config-vlan)#vlan 102
msk-donskaya-claudely-1(config-vlan)#name departments
msk-donskaya-claudely-1(config-vlan)#vlan 103
msk-donskaya-claudely-1(config-vlan)#name adm
msk-donskaya-claudely-1(config-vlan)#vlan 104
msk-donskaya-claudely-1(config-vlan)#name other
msk-donskaya-claudely-1(config-vlan)#
msk-donskaya-claudely-1(config-vlan)#exit
msk-donskaya-claudely-1(config)#exit
msk-donskaya-claudely-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-1#wr m
Building configuration...
[OK]
msk-donskaya-claudely-1#sh v
% Ambiguous command: "sh v"
msk-donskaya-claudely-1#sh vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/2, Fa0/3, Fa0/4, Fa0/5 Fa0/6, Fa0/7, Fa0/8, Fa0/9 Fa0/10, Fa0/11, Fa0/12, Fa0/13 Fa0/14, Fa0/15, Fa0/16, Fa0/17 Fa0/18, Fa0/19, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24
2	management	active	
3	servers	active	
101	dk	active	

Теперь настроим коммутаторы `msk-donskaya-claudely-sw-2`, `msk-donskaya-claudely-sw-3`, `msk-donskaya-claudely-sw-4` и `msk-pavlovskaya-claudely-sw-1` как VTP-клиенты и на интерфейсах укажем принадлежность к VLAN

Выполнение лабораторной работы

```
msk-donskaya-claudely-sw-2

Physical Config CLI Attributes

IOS Command Line Interface

msk-donskaya-claudely-sw-2>enable
Password:
msk-donskaya-claudely-sw-2#configure terminal
^
% Invalid input detected at '^' marker.

msk-donskaya-claudely-sw-2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-2(config)#vtp mode client
Setting device to VTP CLIENT mode.
msk-donskaya-claudely-sw-2(config)#interface range f0/1 - 2
msk-donskaya-claudely-sw-2(config-if-range)#switchport mode access
msk-donskaya-claudely-sw-2(config-if-range)#switchport access vlan 101
msk-donskaya-claudely-sw-2(config-if-range)#switchport access vlan 3
msk-donskaya-claudely-sw-2(config-if-range)#exit
msk-donskaya-claudely-sw-2(config)#exit
msk-donskaya-claudely-sw-2#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-2#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-2#sh c
Building configuration...

Current configuration : 1564 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-2
!
enable secret 5 $1$mERr$hX5rVt7rPNoS4wqbXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hX5rVt7rPNoS4wqbXKX7m0
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 3
```

Выполнение лабораторной работы

```
msk-donskaya-claudely-sw-3

Physical Config CLI Attributes

IOS Command Line Interface

User Access Verification
Password:
msk-donskaya-claudely-sw-3>enable
Password:
msk-donskaya-claudely-sw-3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-3(config)#vtp mode client
Setting device to VTP CLIENT mode.
msk-donskaya-claudely-sw-3(config)#interface f0/1
msk-donskaya-claudely-sw-3(config-if)#exit
msk-donskaya-claudely-sw-3(config)#interface f0/1
msk-donskaya-claudely-sw-3(config-if)#switchport mode access
msk-donskaya-claudely-sw-3(config-if)#switchport access vlan 3
msk-donskaya-claudely-sw-3(config-if)#exit
msk-donskaya-claudely-sw-3(config)#exit
msk-donskaya-claudely-sw-3#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-3#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-3#sh r
Building configuration...

Current configuration : 1491 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-3
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
```

Выполнение лабораторной работы

```
msk-donskaya-claudely-sw-4
Physical Config CLI Attributes
IOS Command Line Interface

msk-donskaya-claudely-sw-4>enable
Password:
msk-donskaya-claudely-sw-4#
msk-donskaya-claudely-sw-4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-claudely-sw-4(config)#vtp mode client
Setting device to VTP CLIENT mode.
msk-donskaya-claudely-sw-4(config)#interface range f0/1 - 5
msk-donskaya-claudely-sw-4(config-if-range)#switchport mode access
msk-donskaya-claudely-sw-4(config-if-range)#switchport access vlan 101
msk-donskaya-claudely-sw-4(config-if-range)#
msk-donskaya-claudely-sw-4(config-if-range)#interface range f0/6 - 10
msk-donskaya-claudely-sw-4(config-if-range)#switchport access vlan 102
msk-donskaya-claudely-sw-4(config-if-range)#interface range f0/11 - 15
msk-donskaya-claudely-sw-4(config-if-range)#switchport mode access
msk-donskaya-claudely-sw-4(config-if-range)#switchport access vlan 103
msk-donskaya-claudely-sw-4(config-if-range)#interface range f0/16 - 24
msk-donskaya-claudely-sw-4(config-if-range)#switchport mode access
msk-donskaya-claudely-sw-4(config-if-range)#switchport access vlan 104
msk-donskaya-claudely-sw-4(config-if-range)#exit
msk-donskaya-claudely-sw-4(config)#exit
msk-donskaya-claudely-sw-4#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-claudely-sw-4#wr m
Building configuration...
[OK]
msk-donskaya-claudely-sw-4#sh :
Building configuration...

Current configuration : 2569 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-donskaya-claudely-sw-4
!
enable secret 5 $1$mERr$hx5rVt7rPN0S4wqbKXK7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hx5rVt7rPN0S4wqbKXK7m0
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
```

Выполнение лабораторной работы

```
msk-pavlovskaya-claudely-sw-1

Physical Config CLI Attributes

IOS Command Line Interface

User Access Verification
Password:

msk-pavlovskaya-claudely-sw-1>enable
Password:
msk-pavlovskaya-claudely-sw-1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
msk-pavlovskaya-claudely-sw-1(config)#vtp mode client
Setting device to VTP CLIENT mode.
msk-pavlovskaya-claudely-sw-1(config)#interface range f0/1 - 15
msk-pavlovskaya-claudely-sw-1(config-if-range)#switchport mode access
msk-pavlovskaya-claudely-sw-1(config-if-range)#switchport access vlan 101
msk-pavlovskaya-claudely-sw-1(config-if-range)#interface f0/20
msk-pavlovskaya-claudely-sw-1(config-if)#switchport mode access
msk-pavlovskaya-claudely-sw-1(config-if)#switchport access vlan 104
msk-pavlovskaya-claudely-sw-1(config-if)#exit
msk-pavlovskaya-claudely-sw-1(config)#exit
msk-pavlovskaya-claudely-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-pavlovskaya-claudely-sw-1#wr m
Building configuration...
[OK]
msk-pavlovskaya-claudely-sw-1#sh r
Building configuration...

Current configuration : 2276 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-pavlovskaya-claudely-sw-1
!
enable secret 5 $1$mERr$hX5rVt7rPNoS4wqbXXK7m0
!
!
!
ip ssh version 1
ip domain-name donskeya.rudn.edu
!
username admin secret 5 $1$mERr$hX5rVt7rPNoS4wqbXXK7m0
!
!
!
spanning-tree mode pvst
```

Затем требуется указать статические IP-адреса на оконечных устройствах

Выполнение лабораторной работы

web

Physical **Config** Services Desktop Programming Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

FastEthernet0

Global Settings

Display Name

Gateway/DNS IPv4

☐ DHCP

☒ Static

Default Gateway

DNS Server

Gateway/DNS IPv6

☐ Automatic

☒ Static

Default Gateway

DNS Server

Выполнение лабораторной работы

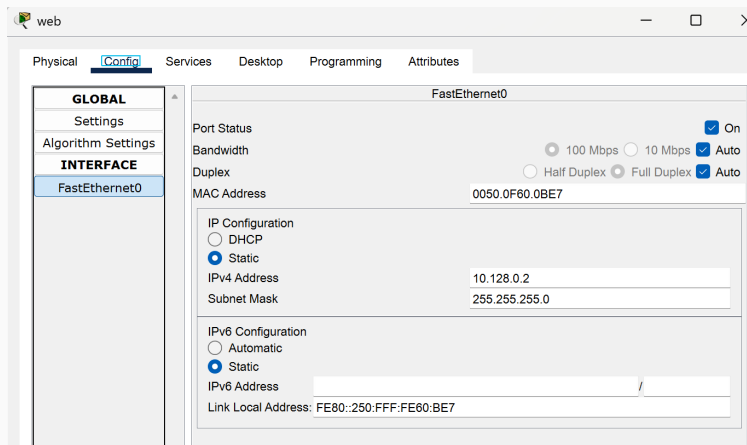


Рис. 13: Пример указания статического IP-адреса на оконечном устройстве (IP Configuration).

Используя режим симуляции в Packet Tracer, изучим процесс передвижения пакета ICMP по сети

Выполнение лабораторной работы

0.429	--	msk-donskaya-claudely-sw-1	STP
0.429	msk-donskaya-claudely-sw-1	msk-pavlovskaya-claudely-sw-1	STP
0.429	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-4	STP
0.429	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-2	STP
0.429	--	msk-donskaya-claudely-sw-1	STP
0.430	msk-donskaya-claudely-sw-1	msk-pavlovskaya-claudely-sw-1	STP
0.430	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-4	STP
0.430	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-2	STP
0.595	--	msk-donskaya-claudely-sw-1	STP
0.596	msk-donskaya-claudely-sw-1	msk-pavlovskaya-claudely-sw-1	STP
0.596	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-4	STP
0.596	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-2	STP
0.598	--	msk-donskaya-claudely-sw-1	STP
0.599	msk-donskaya-claudely-sw-1	msk-pavlovskaya-claudely-sw-1	STP
0.599	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-4	STP
0.599	msk-donskaya-claudely-sw-1	msk-donskaya-claudely-sw-2	STP
0.958		msk-donskaya-claudely-sw-3	STP

Рис. 14: Изучение процесса передвижения пакета ICMP по сети в режиме симуляции в Packet Tracer.

Выводы

В ходе выполнения лабораторной работы мы получили основные навыки по настройке VLAN на коммутаторах сети.