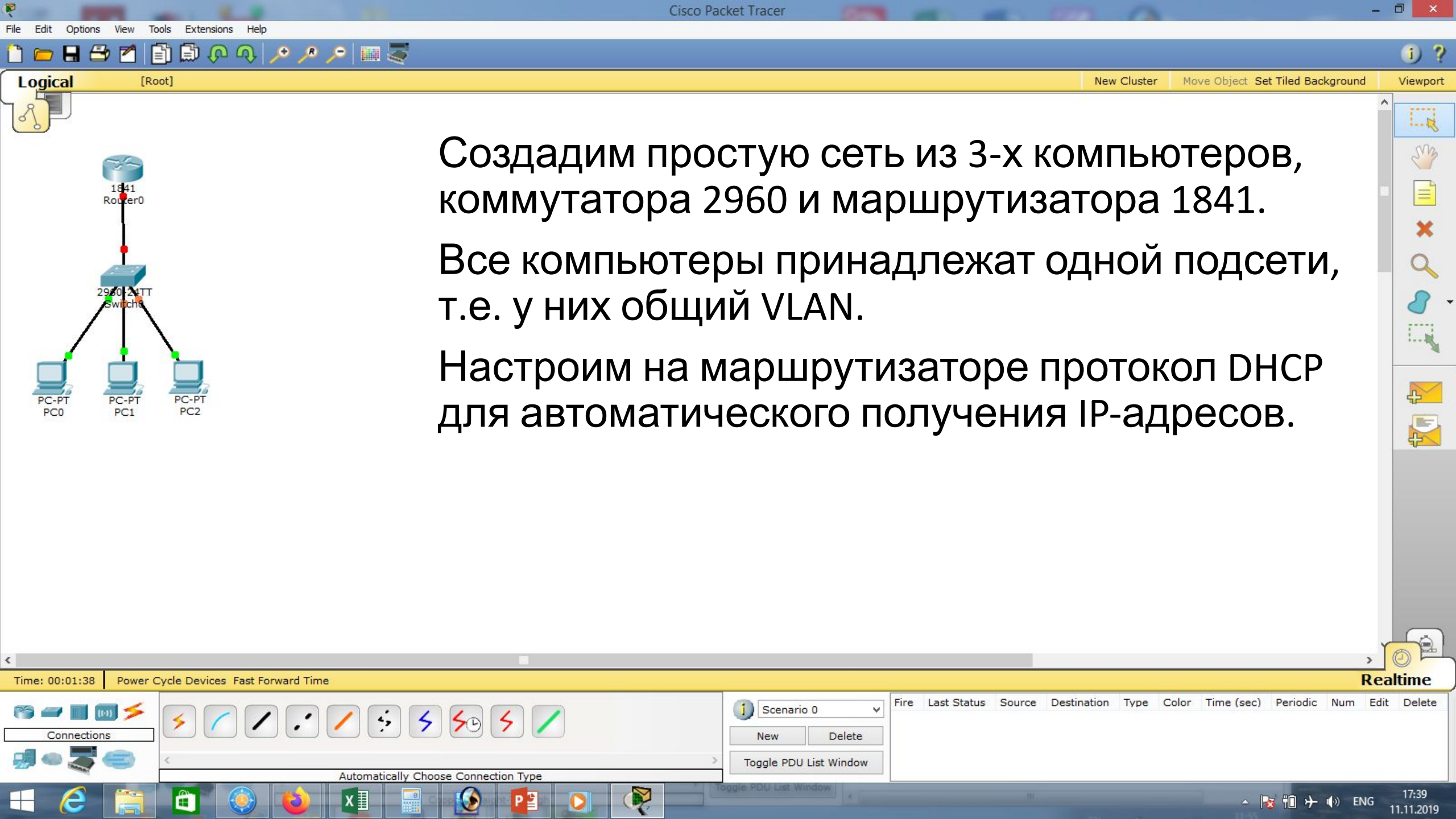
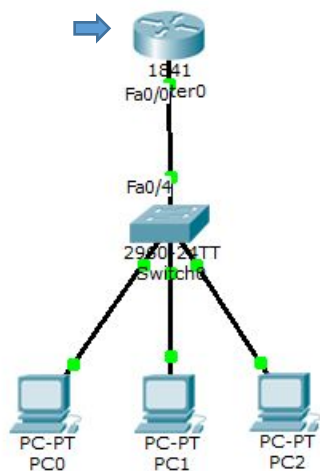


МДК.01.01
Организация, принципы
построения и функционирования
компьютерных сетей
3-курс

Практические занятия

Занятие 08





Настроим маршрутизатор 1841.
Входим в режим глобального
конфигурирования: «en», «conf t».
Настроим интерфейс Fa0/0: «int fa
0/0», «no shutdown», присваиваем ip-
адрес: «ip address 192.168.1.1
255.255.255.0», «exit», создадим
пространство ip-адресов с
именем DHCP (или др.), «ip dhcp pool
DHCP», укажем из какой сети
раздаём ip-адреса «network
192.168.1.0 255.255.255.0», в этой сети
сервером является роутер.

Router0

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#no sh
Router(config-if)#no shutdown

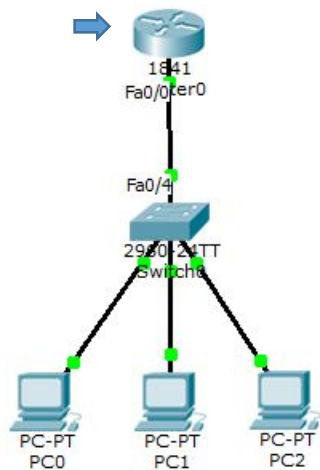
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#ip address 192.168.1.1
% Incomplete command.
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#exit
Router(config)#ip dhcp pool DHCP
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#ip dhcp ex
Router(config)#ip dhcp excluded-address 192.168.1.100
Router(config)#ip dhcp excluded-address 192.168.1.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr mem
Building configuration...
[OK]
Router#
```

Copy Paste



Компьютеру нужно выдать маршрут по умолчанию: «default-router 192.168.1.1» и DNS-сервер (в качестве примера зададим DNS google) «dns-server 8.8.8.8», «exit». Исключим несколько ip-адресов из выдачи в DHCP, один номер – для будущего сервера «ip dhcp excluded-address 192.168.1.100», другой – для нашего маршрутизатора «ip dhcp excluded-address 192.168.1.1», «exit », сохраним конфигурацию «wr mem».

```
Router0
Physical Config CLI
IOS Command Line Interface

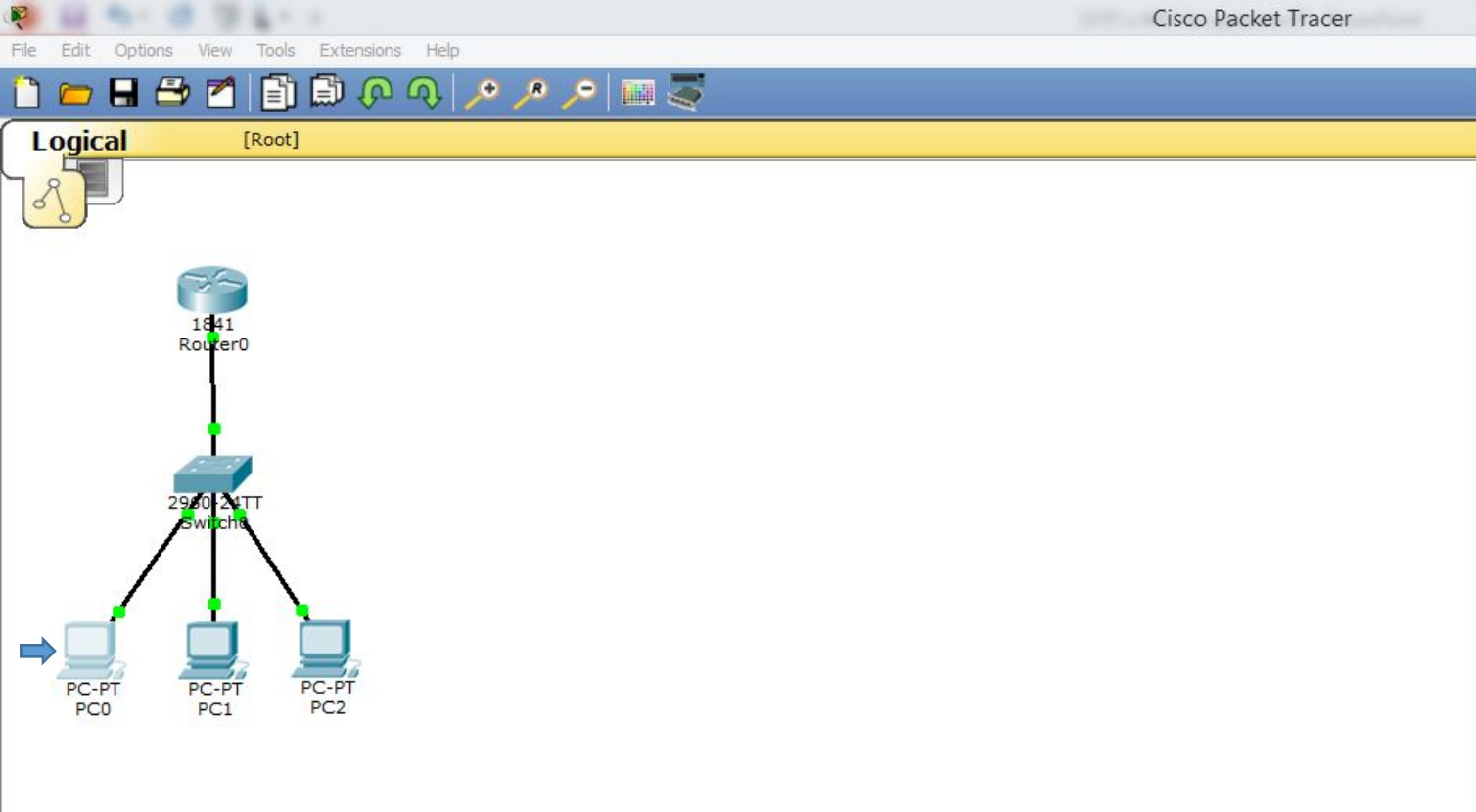
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#no sh
Router(config-if)#no shutdown

Router(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

Router(config-if)#ip address 192.168.1.1
% Incomplete command.
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#exit
Router(config)#ip dhcp pool DHCP
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#ip dhcp ex
Router(config)#ip dhcp excluded-address 192.168.1.100
Router(config)#ip dhcp excluded-address 192.168.1.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr mem
Building configuration...
[OK]
Router#
```



PC0

IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 192.168.1.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::260:2FFF:FEED:5987

IPv6 Gateway

IPv6 DNS Server

Web Browser

Cisco IP Communicator

Настроим компьютер PC0, выбираем **IP Configuration «DHCP»**.

Видим ip-address: 192.168.1.2, маршрут по умолчанию: 192.168.1.1, и DNS-Server: 8.8.8.8.

Time: 00:53:12 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

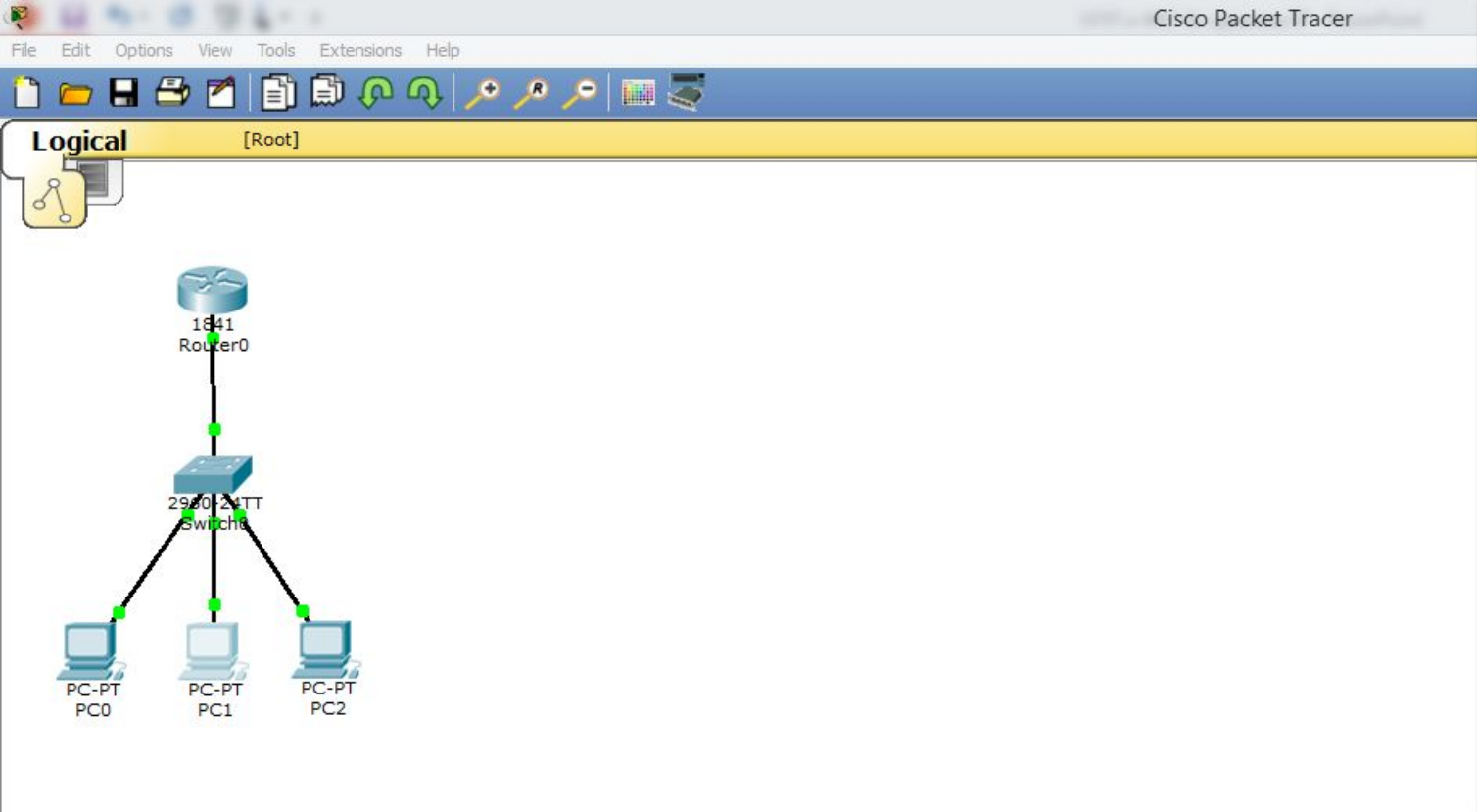
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Windows Taskbar: 18:30 11.11.2019



PC1

IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address: 192.168.1.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:FFFF:FEE2:4590

IPv6 Gateway:

IPv6 DNS Server:

Web Browser

Cisco IP Communicator

Аналогичные действия проводим для компьютеров PC1 и PC2.
Видим, что ip-адреса есть.

Time: 01:05:17 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

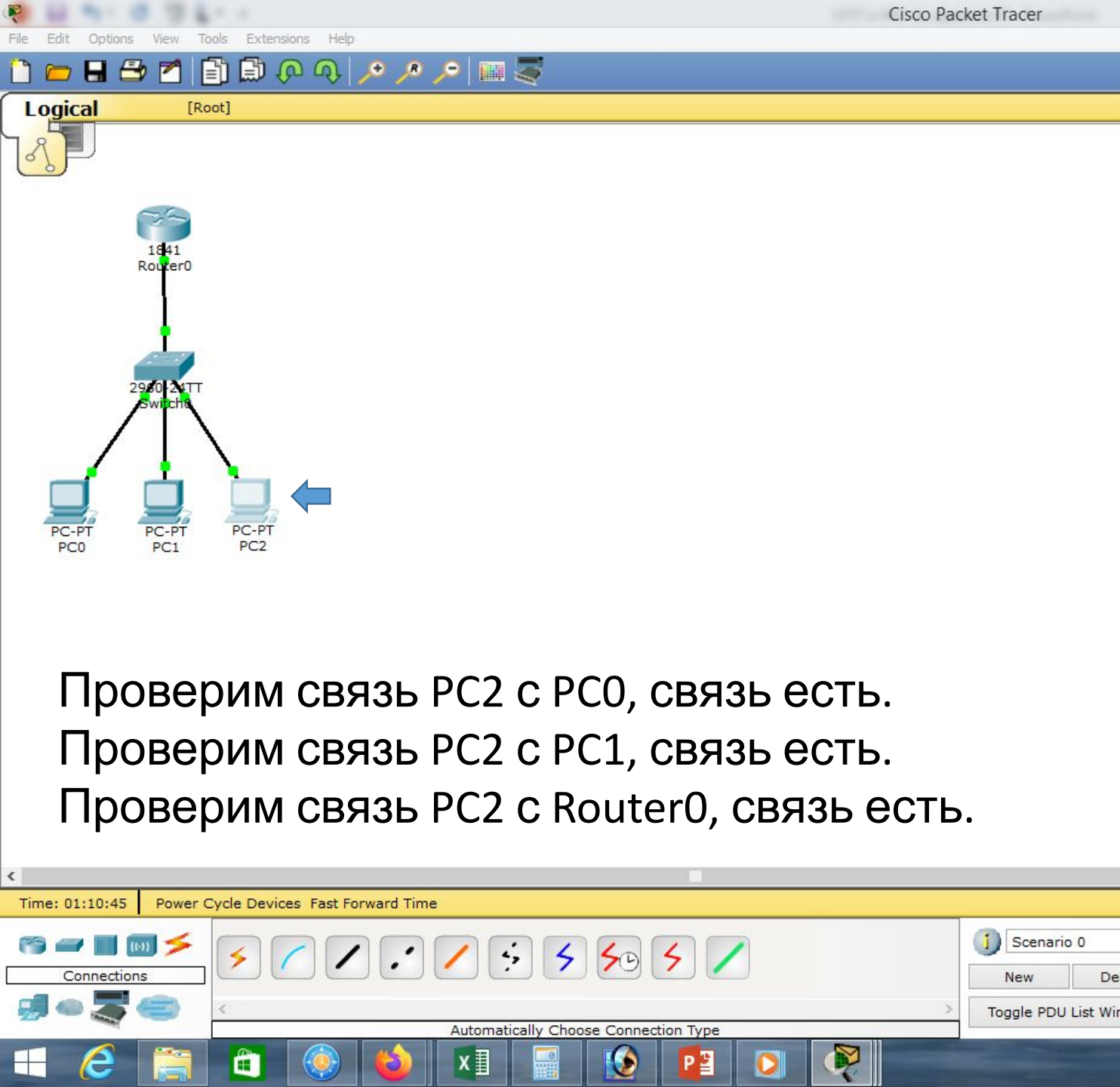
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Windows Taskbar: 18:43 11.11.2019



Проверим связь PC2 с PC0, связь есть.
Проверим связь PC2 с PC1, связь есть.
Проверим связь PC2 с Router0, связь есть.

PC2

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128
Reply from 192.168.1.2: bytes=32 time=0ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128
Reply from 192.168.1.3: bytes=32 time=0ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=13ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255
Reply from 192.168.1.1: bytes=32 time=0ms TTL=255

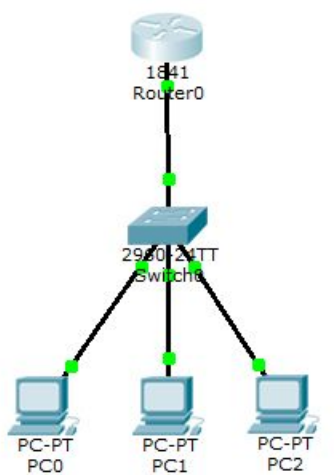
Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 13ms, Average = 3ms

PC>
```

Cisco Packet Tracer - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функционирования компьютерных сетей\Практические работы\Работа 17.pkt

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object Set Tiled Background Viewport



Router0

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#show ip dhcp ?
    binding  DHCP address bindings
Router#show ip dhcp bin
Router#show ip dhcp binding
IP address      Client-ID/      Lease expiration    Type
                Hardware address
192.168.1.2      0060.2FED.5987  --                  Automatic
192.168.1.3      00D0.FFE2.4590  --                  Automatic
192.168.1.4      00E0.8FDD.6163  --                  Automatic
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
```

Copy Paste

В привилегированном режиме команда: «show ip dhcp binding» показывает, какой ip-адрес принадлежит каждому компьютеру.

Time: 04:26:38 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

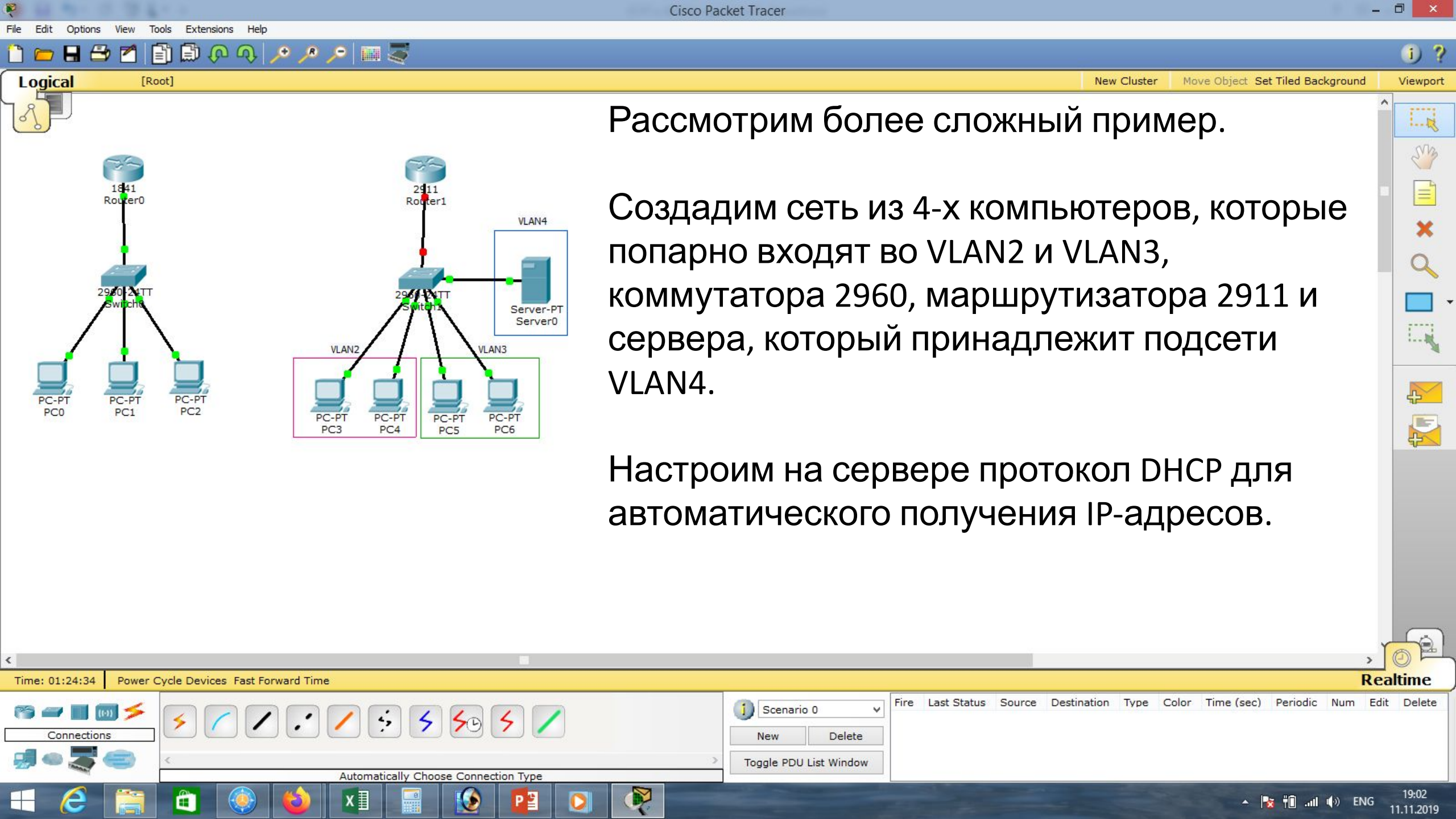
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

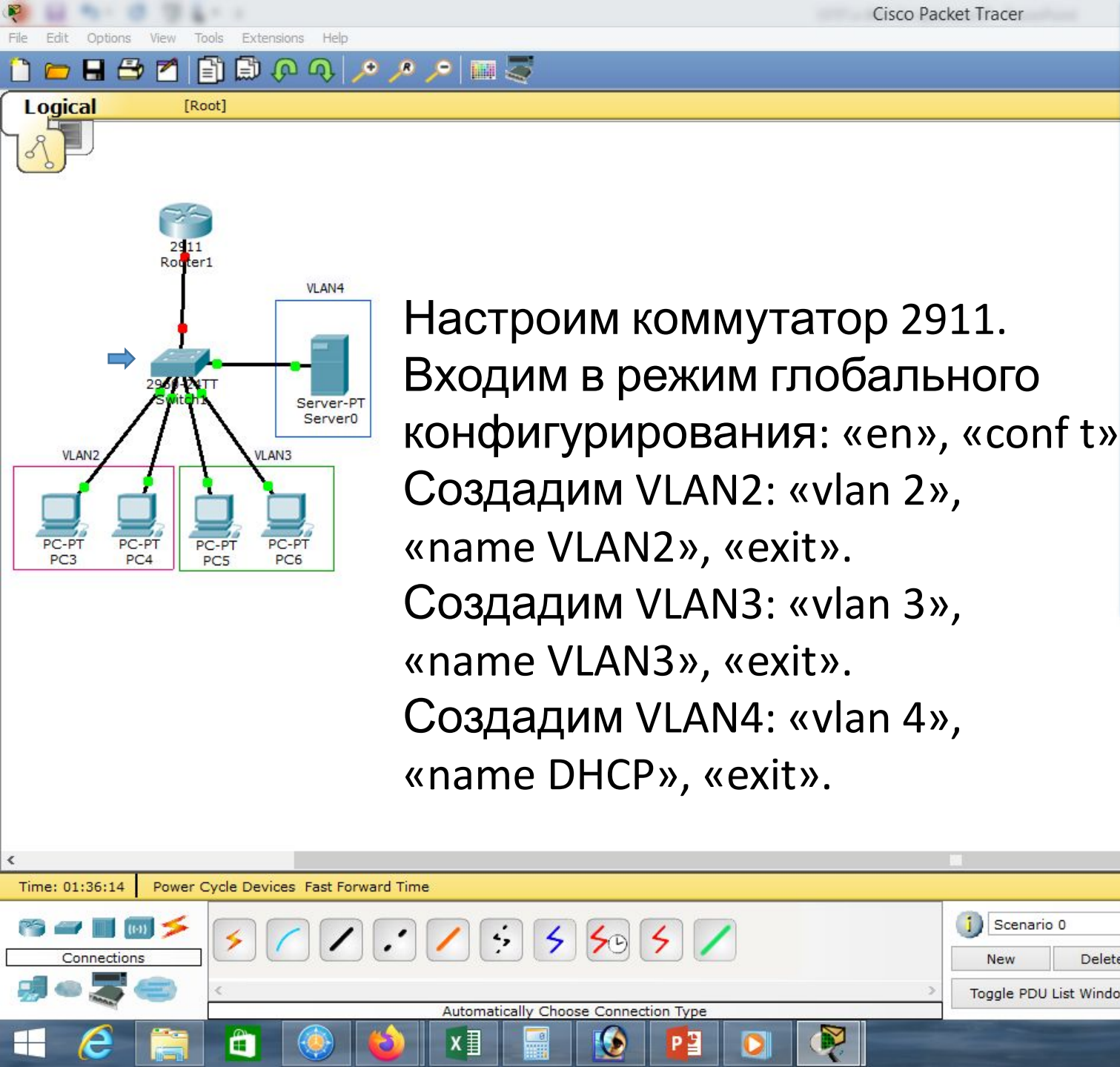
22:04 11.11.2019



Рассмотрим более сложный пример.

Создадим сеть из 4-х компьютеров, которые попарно входят во VLAN2 и VLAN3, коммутатора 2960, маршрутизатора 2911 и сервера, который принадлежит подсети VLAN4.

Настроим на сервере протокол DHCP для автоматического получения IP-адресов.



Настроим коммутатор 2911.
Входим в режим глобального
конфигурирования: «en», «conf t».
Создадим VLAN2: «vlan 2»,
«name VLAN2», «exit».
Создадим VLAN3: «vlan 3»,
«name VLAN3», «exit».
Создадим VLAN4: «vlan 4»,
«name DHCP», «exit».

Switch1

Physical Config CLI

IOS Command Line Interface

```
o up

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

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

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name VLAN3
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name DHCP
Switch(config-vlan)#exit
Switch(config)#
```

Copy Paste

Time: 01:36:14 | Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

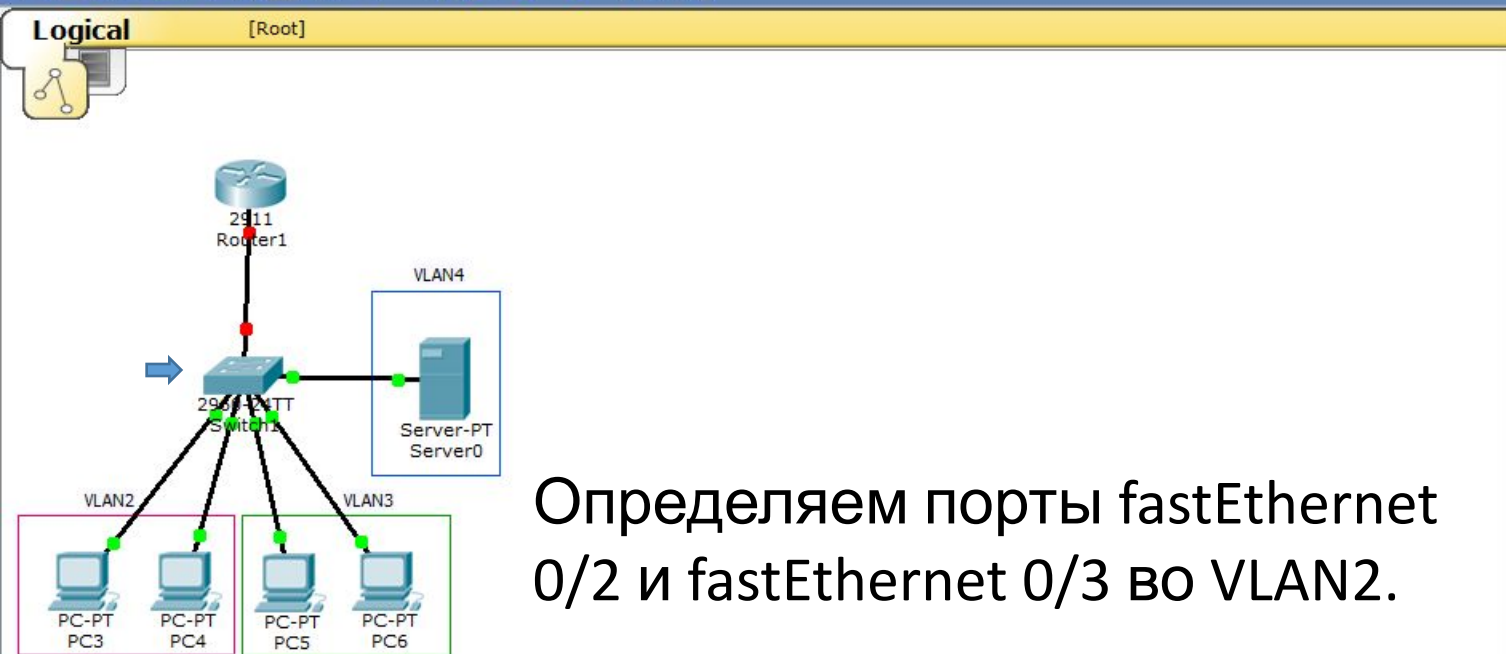
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Realtime

19:13 11.11.2019



Определяем порты fastEthernet 0/2 и fastEthernet 0/3 во VLAN2.

Для этого выбираем команду:
«int range fastEthernet 0/2-3»,
далее «switchport mode
access», «switchport access vlan
2», «exit».

Switch1

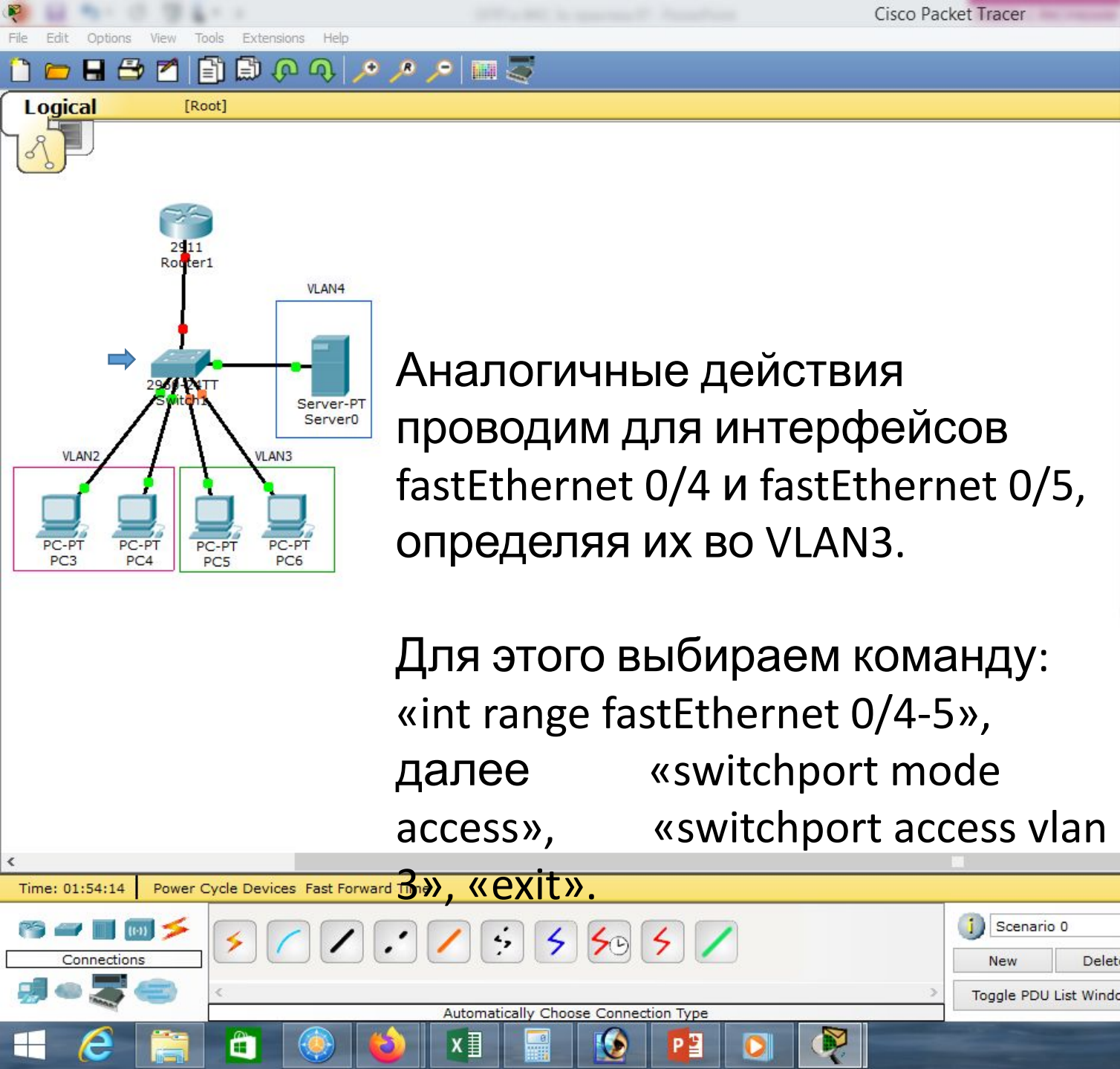
Physical Config CLI

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name VLAN3
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name DHCP
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range fa
Switch(config)#int range fastEthernet 0/2-3
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#exit
Switch(config)#
```

Copy Paste



Switch1

Physical Config CLI

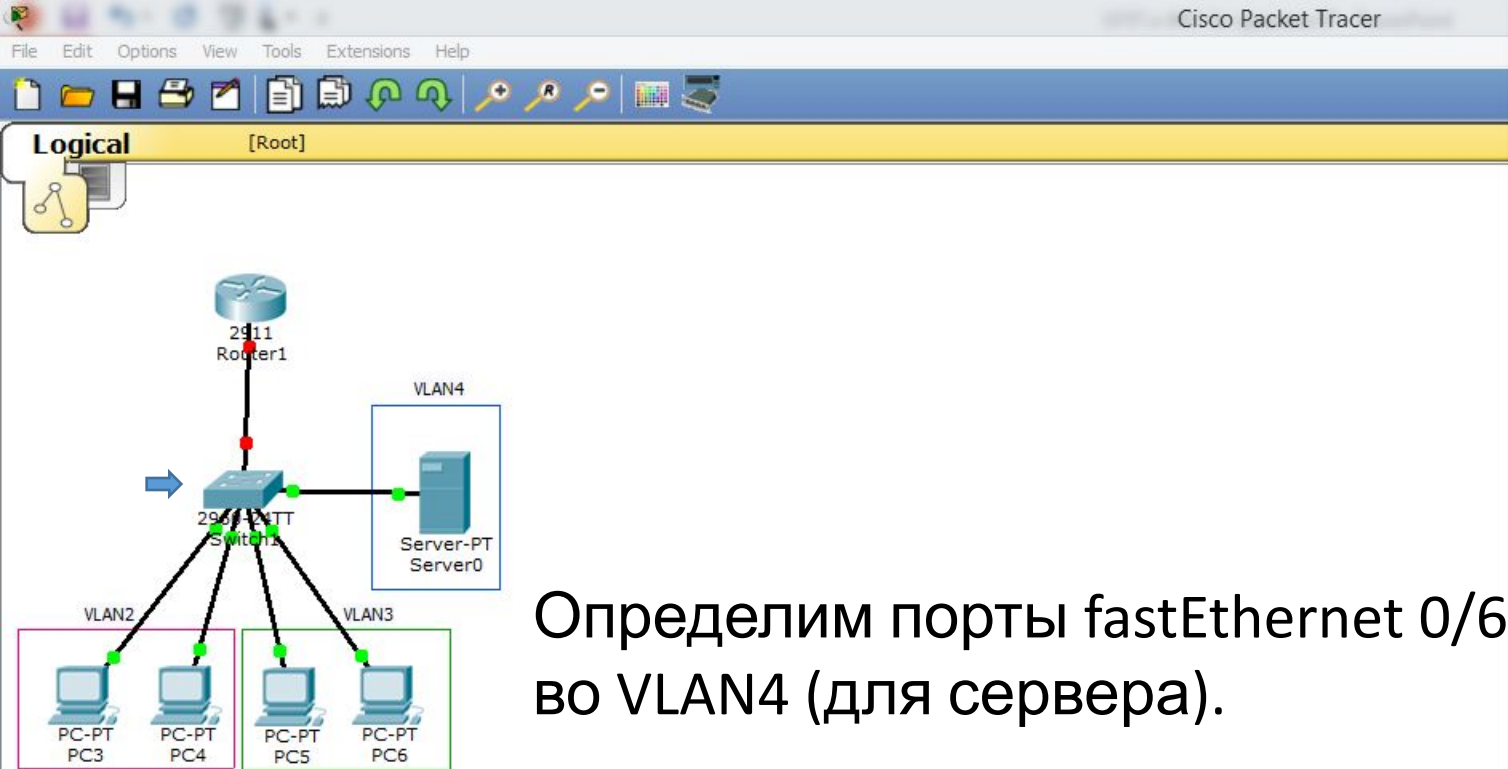
IOS Command Line Interface

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name VLAN3
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name DHCP
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range fa
Switch(config)#int range fastEthernet 0/2-3
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#exit
Switch(config)#int range fastEthernet 0/4-5
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#exit
Switch(config)#
```

Copy Paste



Realtime



Определим порты fastEthernet 0/6 во VLAN4 (для сервера).

Для этого выбираем команду:
«int fastEthernet 0/6», далее
«switchport mode access»,
«switchport access vlan 4», «exit».

Switch1

Physical Config CLI

IOS Command Line Interface

```
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name VLAN3
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name DHCP
Switch(config-vlan)#exit
Switch(config)#int ra
Switch(config)#int range fa
Switch(config)#int range fastEthernet 0/2-3
Switch(config-if-range)#sw
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#sw
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#exit
Switch(config)#int range fastEthernet 0/4-5
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#exit
Switch(config)#int fa 0/6
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 4
Switch(config-if)#exit
Switch(config)#
```

Copy Paste

Time: 01:58:41 | Power Cycle Devices Fast Forward Time



Automatically Choose Connection Type

Scenario 0

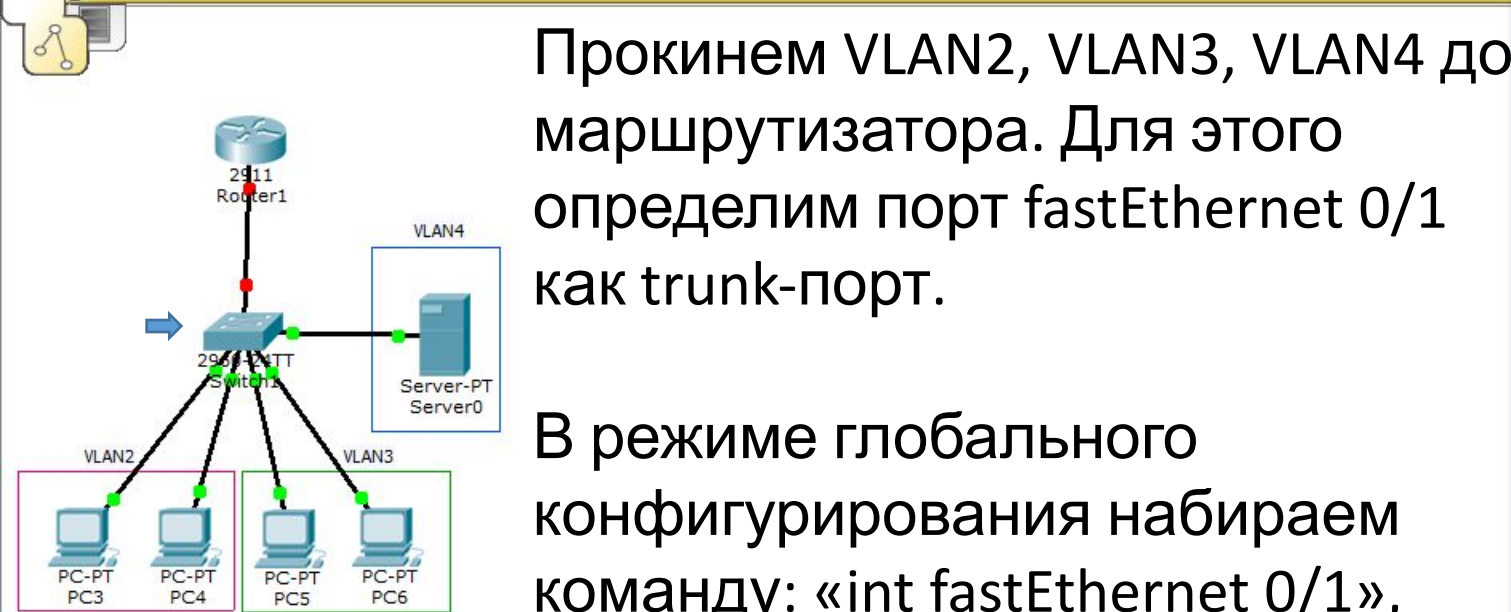
New Delete

Toggle PDU List Window

Fire Last Status Source Destination Type Color Time (sec) Periodic Num Edit Delete

Realtime





Прокинем VLAN2, VLAN3, VLAN4 до маршрутизатора. Для этого определим порт fastEthernet 0/1 как trunk-порт.

В режиме глобального конфигурирования набираем команду: «int fastEthernet 0/1», далее «switchport mode trunk», «switchport trunk allowed vlan 2,3,4», «exit», «end», сохраняем конфигурацию «wr mem».

Switch1

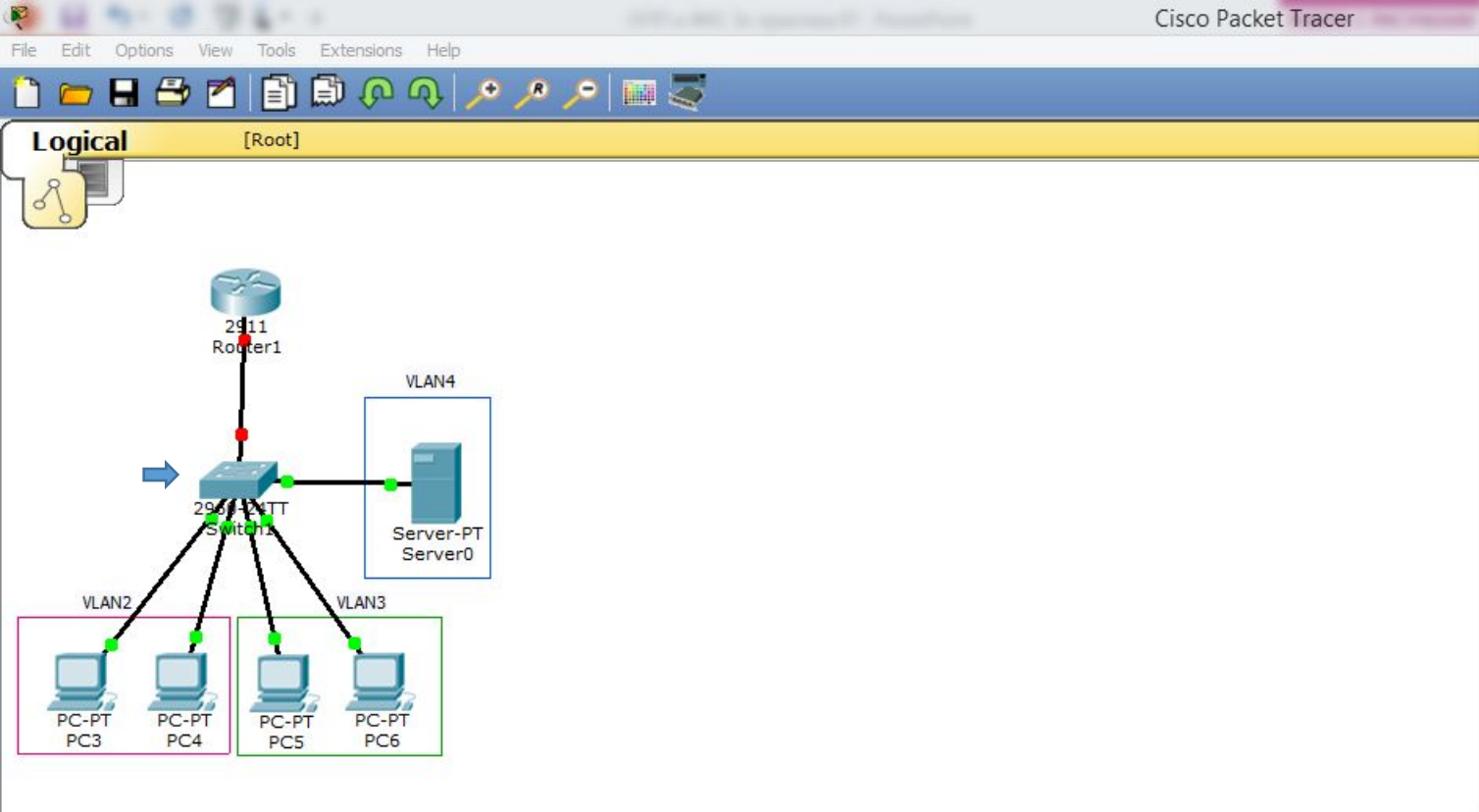
Physical Config CLI

IOS Command Line Interface

```
Switch>
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int fa0/1
Switch(config-if)#sw
Switch(config-if)#switchport mode trunk
Switch(config-if)#sw
Switch(config-if)#switchport trunk allowed vlan 2,3,4
Switch(config-if)#exit
Switch(config)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#wr mem
Building configuration...
[OK]
Switch#
```

Copy Paste



Switch1

Physical Config CLI

IOS Command Line Interface

```
!
interface FastEthernet0/1
 switchport trunk allowed vlan 2-4
 switchport mode trunk
!
interface FastEthernet0/2
 switchport access vlan 2
 switchport mode access
!
interface FastEthernet0/3
 switchport access vlan 2
 switchport mode access
!
interface FastEthernet0/4
 switchport access vlan 3
 switchport mode access
!
interface FastEthernet0/5
 switchport access vlan 3
 switchport mode access
!
interface FastEthernet0/6
 switchport access vlan 4
 switchport mode access
!
interface FastEthernet0/7
```

Copy Paste

Проверим конфигурацию командой «show run», жмём <Пробел>, видим наши интерфейсы.

Time: 02:30:01 | Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

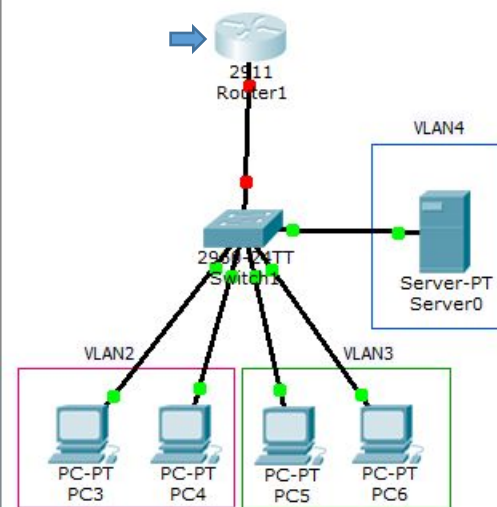
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Realtime

20:07 11.11.2019

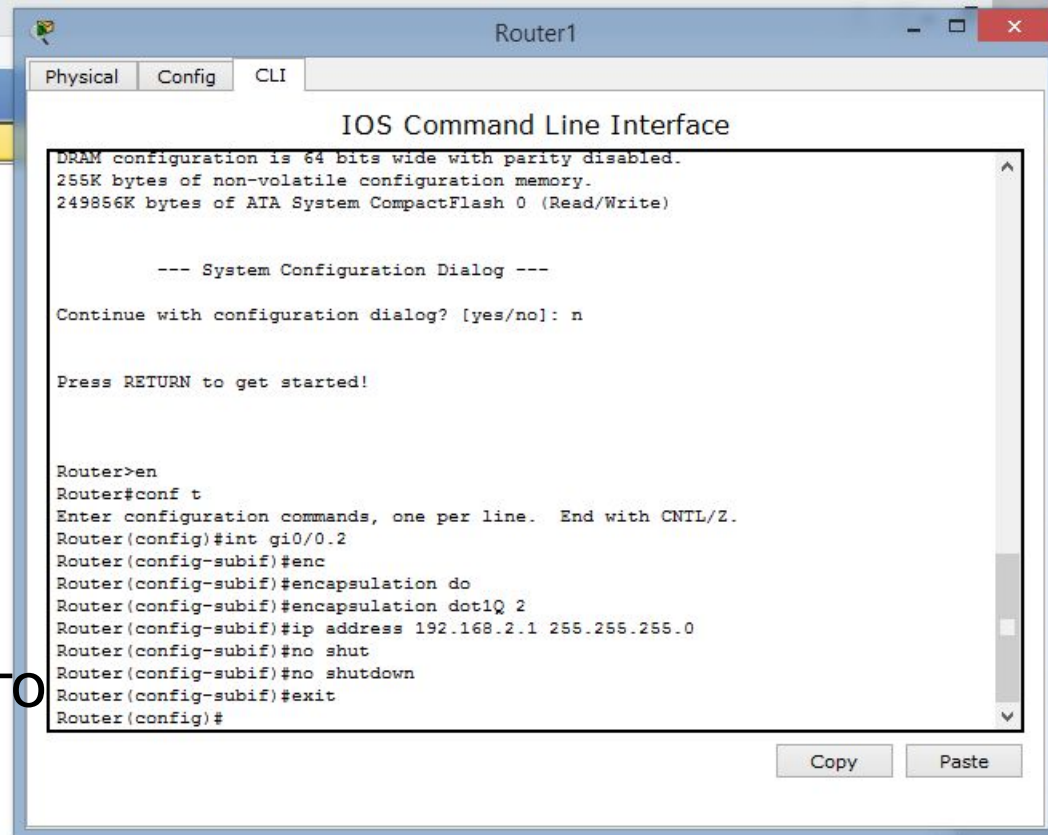


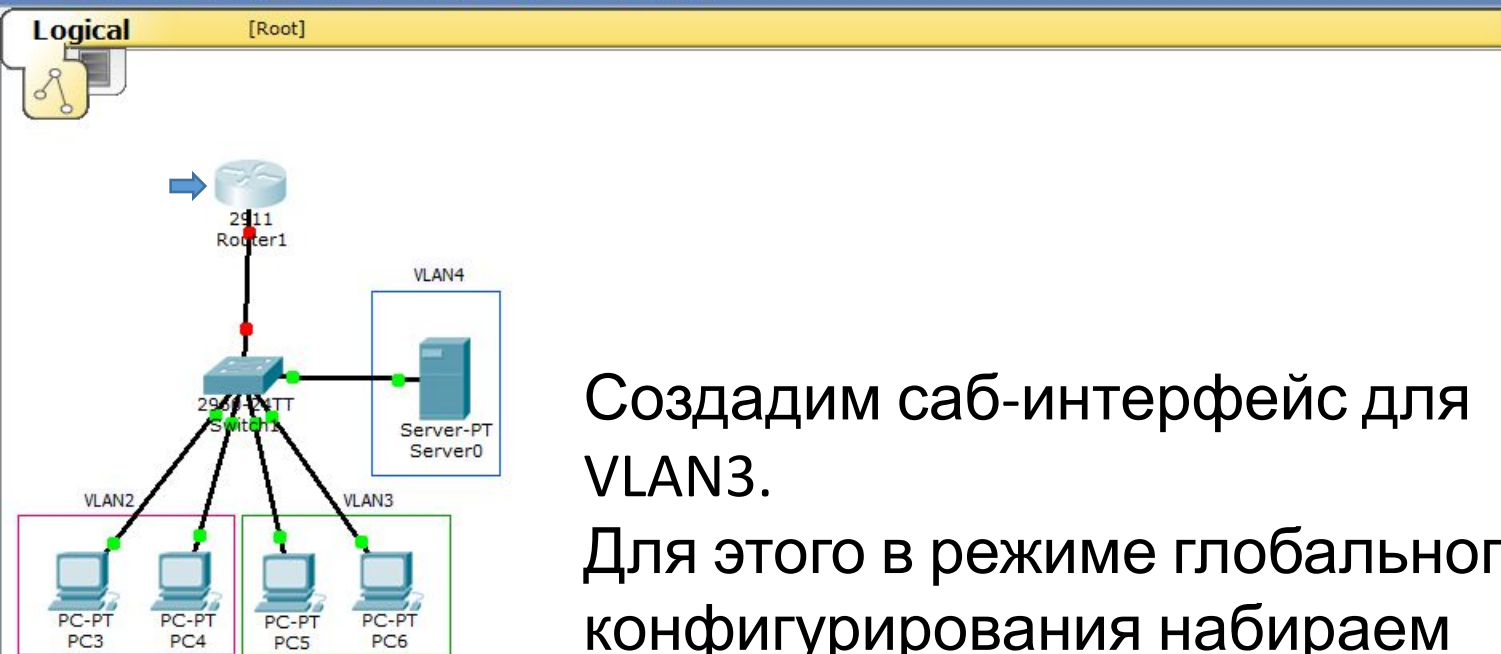
Настроим маршрутизатор.

Он соединён с коммутатором
через GigabitEthernet 0/0

Создадим суб-интерфейс для
VLAN2.

Для этого в режиме глобального
конфигурирования набираем
команду: «`int gi0/0.2`», далее
«`encapsulation dot1Q 2`», задаём
ip-адрес «`ip address 192.168.2.1 255.255.255.0`»,
«`no shutdown`», «`exit`».





Создадим саб-интерфейс для VLAN3.

Для этого в режиме глобального конфигурирования набираем команду: «int gi0/0.3», далее «encapsulation dot1Q 3», задаём ip-адрес «ip address 192.168.3.1 255.255.255.0», «no shutdown», «exit».

Router1

Physical Config CLI

IOS Command Line Interface

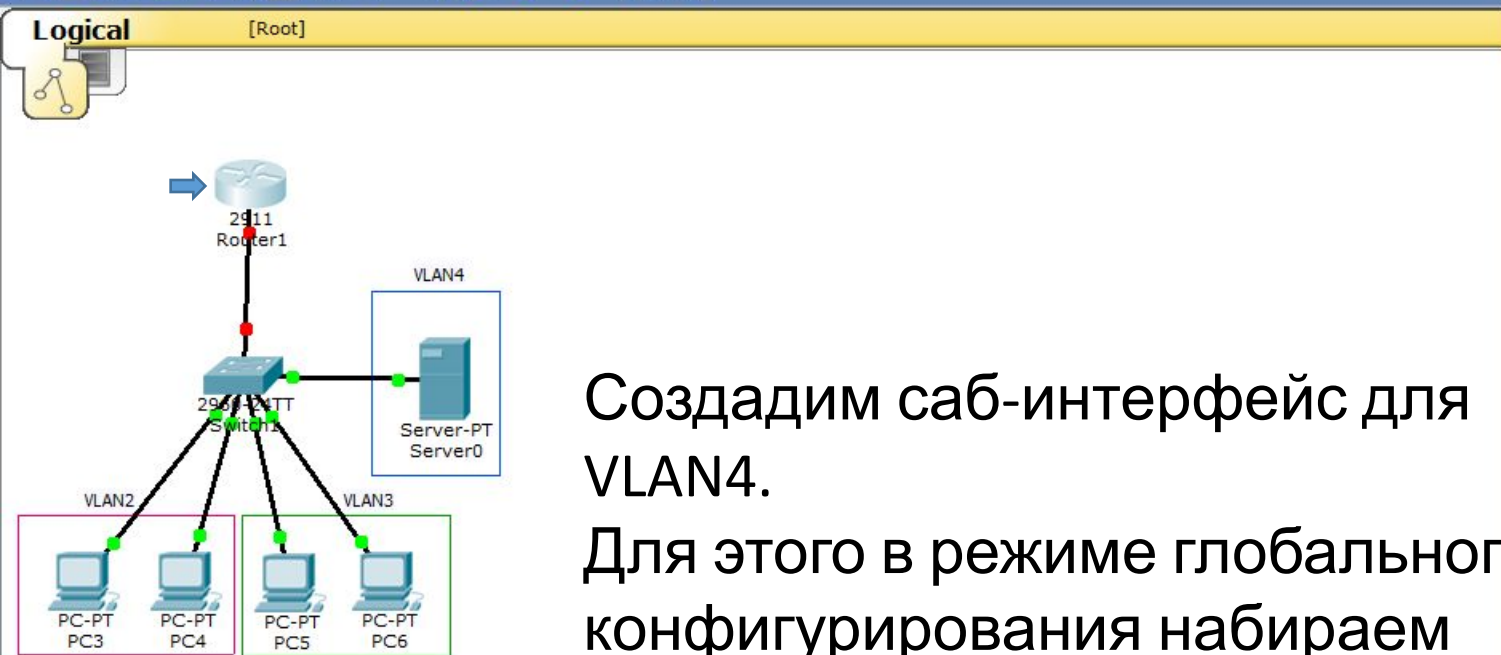
--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gi0/0.2
Router(config-subif)#enc
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#int gi0/0.3
Router(config-subif)#encapsulation dot1Q 3
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#
```

Copy Paste



Создадим саб-интерфейс для VLAN4.

Для этого в режиме глобального конфигурирования набираем команду: «int gi0/0.4», далее «encapsulation dot1Q 4», задаём ip-адрес «ip address 192.168.4.1 255.255.255.0», «no shutdown», «exit».

Router1

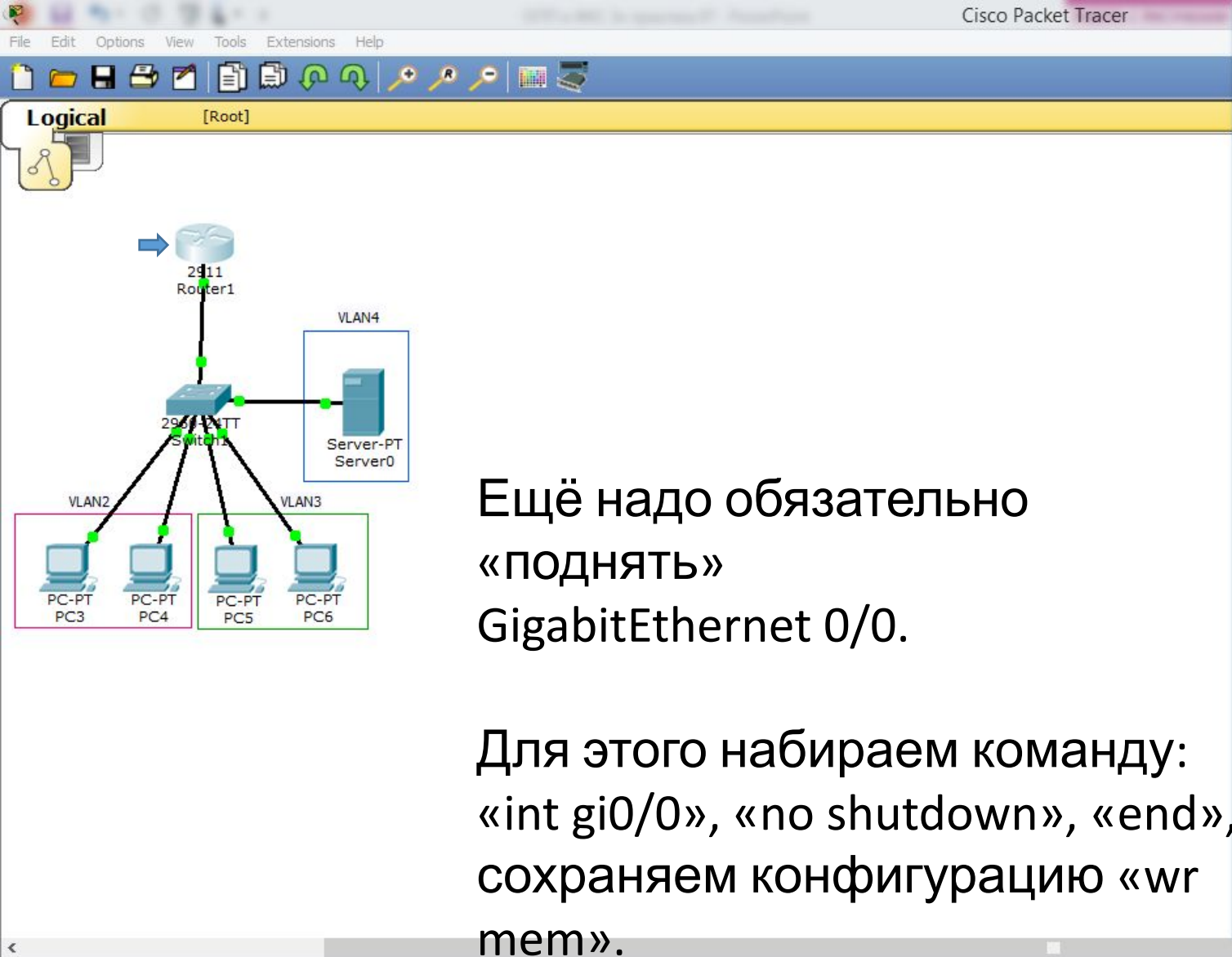
Physical Config CLI

IOS Command Line Interface

Press RETURN to get started!

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gi0/0.2
Router(config-subif)#encapsulation do
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#int gi0/0.3
Router(config-subif)#encapsulation dot1Q 3
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#int gi0/0.4
Router(config-subif)#encapsulation dot1Q 4
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#
```

Copy Paste



Router1

Physical Config CLI

IOS Command Line Interface

```
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#int gi0/0.4
Router(config-subif)#encapsulation dot1Q 4
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#int gi0/0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.2, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.3, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.4, changed state to up

Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr mem
Building configuration...
[OK]
Router#
```

Copy Paste

Time: 03:12:52 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

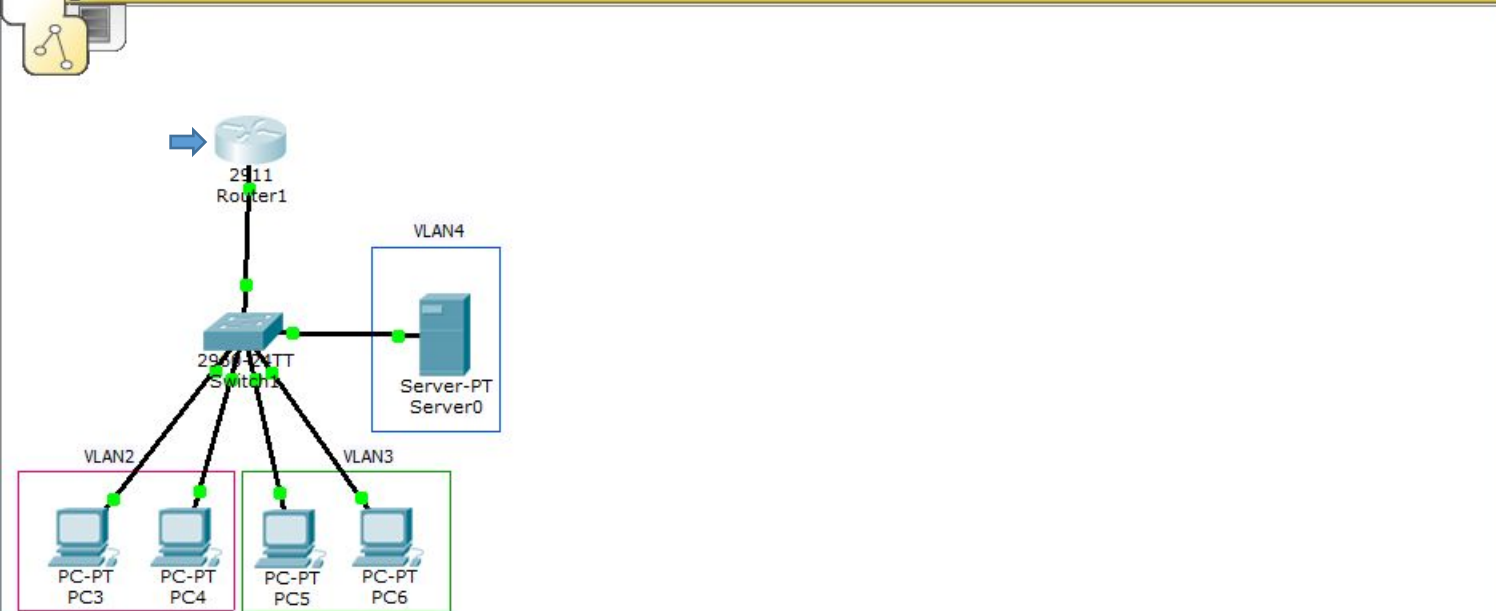
Automatically Choose Connection Type

Realtime

20:50 11.11.2019



Logical [Root]



Проверим конфигурацию командой «show run», жмём <Пробел>, видим наши интерфейсы.

Router1

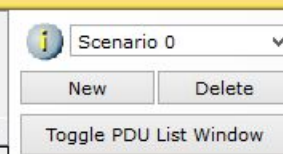
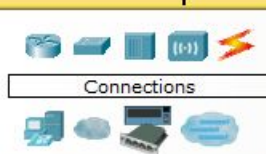
Physical Config CLI

IOS Command Line Interface

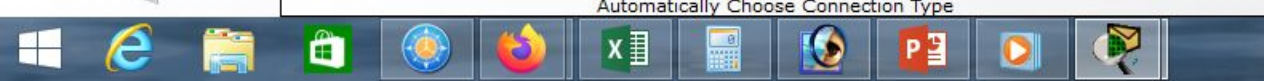
```
!
!
spanning-tree mode pvst
!
!
!
!
interface GigabitEthernet0/0
no ip address
duplex auto
speed auto
!
interface GigabitEthernet0/0.2
encapsulation dot1Q 2
ip address 192.168.2.1 255.255.255.0
!
interface GigabitEthernet0/0.3
encapsulation dot1Q 3
ip address 192.168.3.1 255.255.255.0
!
interface GigabitEthernet0/0.4
encapsulation dot1Q 4
ip address 192.168.4.1 255.255.255.0
!
interface GigabitEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface GigabitEthernet0/2
no ip address
duplex auto
speed auto
shutdown
!
interface Vlan1
no ip address
shutdown
!
```

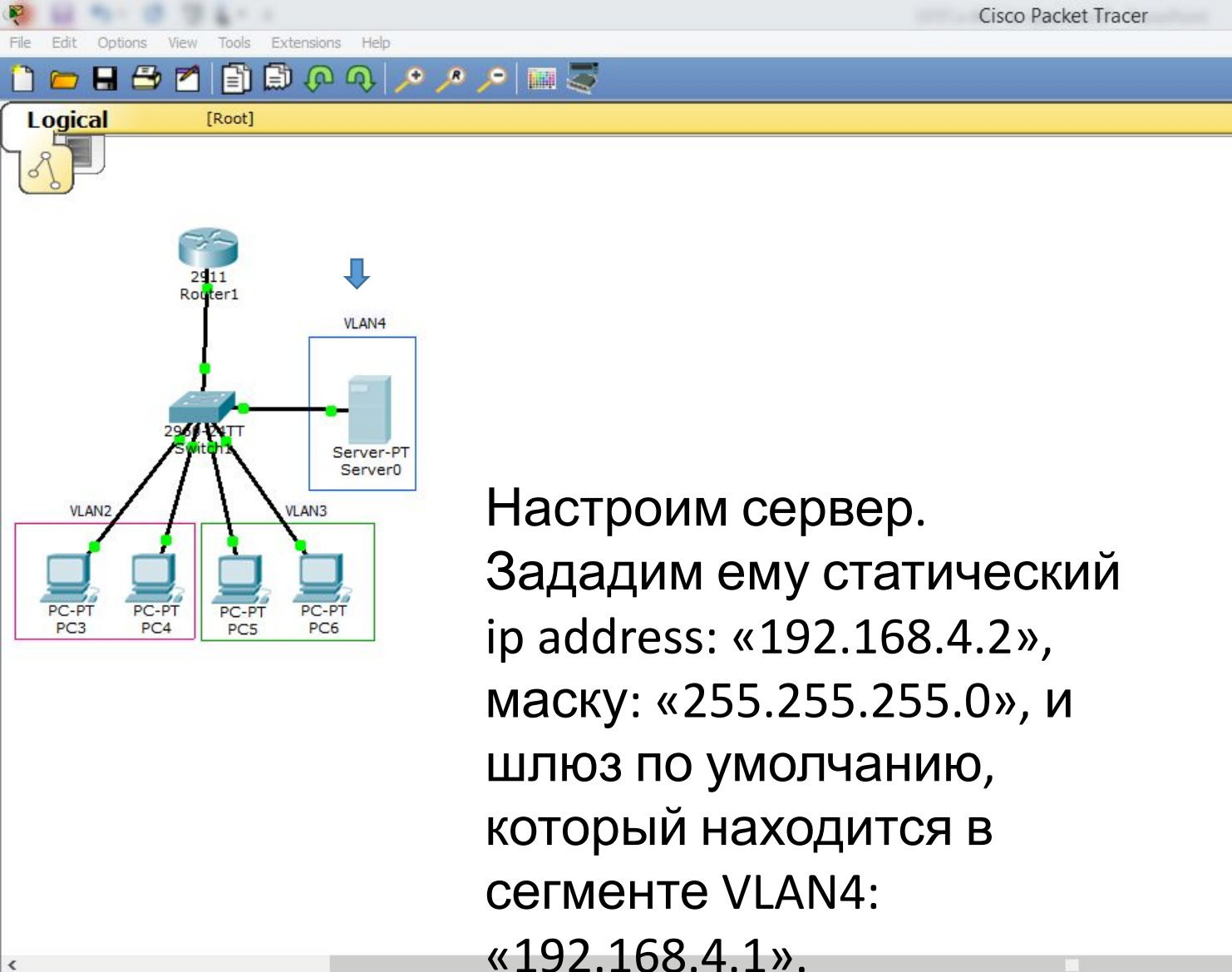
Copy Paste

Time: 03:20:41 Power Cycle Devices Fast Forward Time



Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete





Server0

Physical Config Desktop Custom Interface

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.4.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.4.1

DNS Server:

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::202:4AFF:FEB4:7A4B

IPv6 Gateway:

IPv6 DNS Server:

Web Browser

Time: 03:24:08 | Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

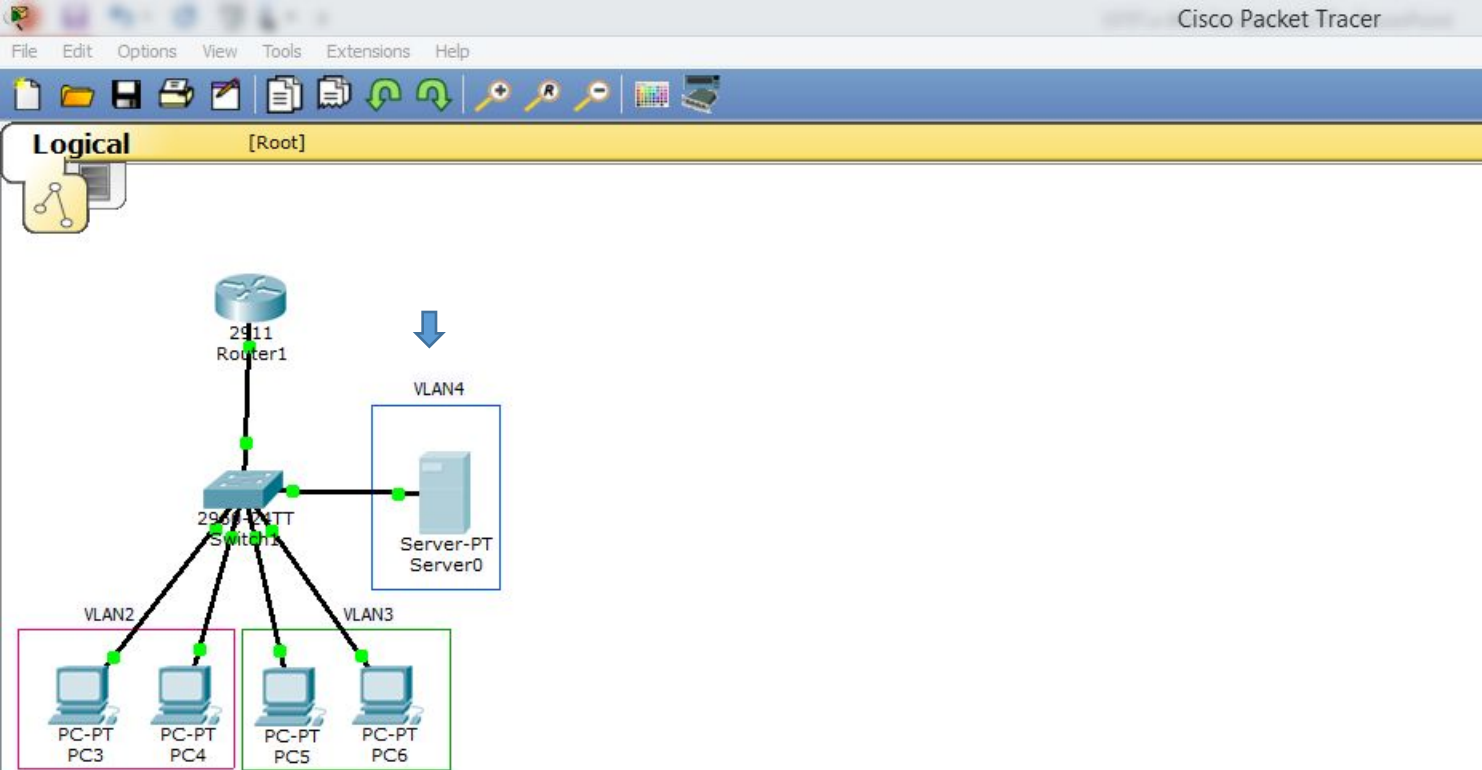
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Realtime

21:02 11.11.2019



Server0

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer SERVER Command Line 1.0
SERVER>ping 192.168.4.1

Pinging 192.168.4.1 with 32 bytes of data:

Reply from 192.168.4.1: bytes=32 time=1ms TTL=255
Reply from 192.168.4.1: bytes=32 time=0ms TTL=255
Reply from 192.168.4.1: bytes=32 time=0ms TTL=255
Reply from 192.168.4.1: bytes=32 time=0ms TTL=255

Ping statistics for 192.168.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

SERVER>
```

Проверим связь сервера с маршрутизатором, связь есть.

Time: 03:30:44 | Power Cycle Devices Fast Forward Time

Connections

Scenario 0

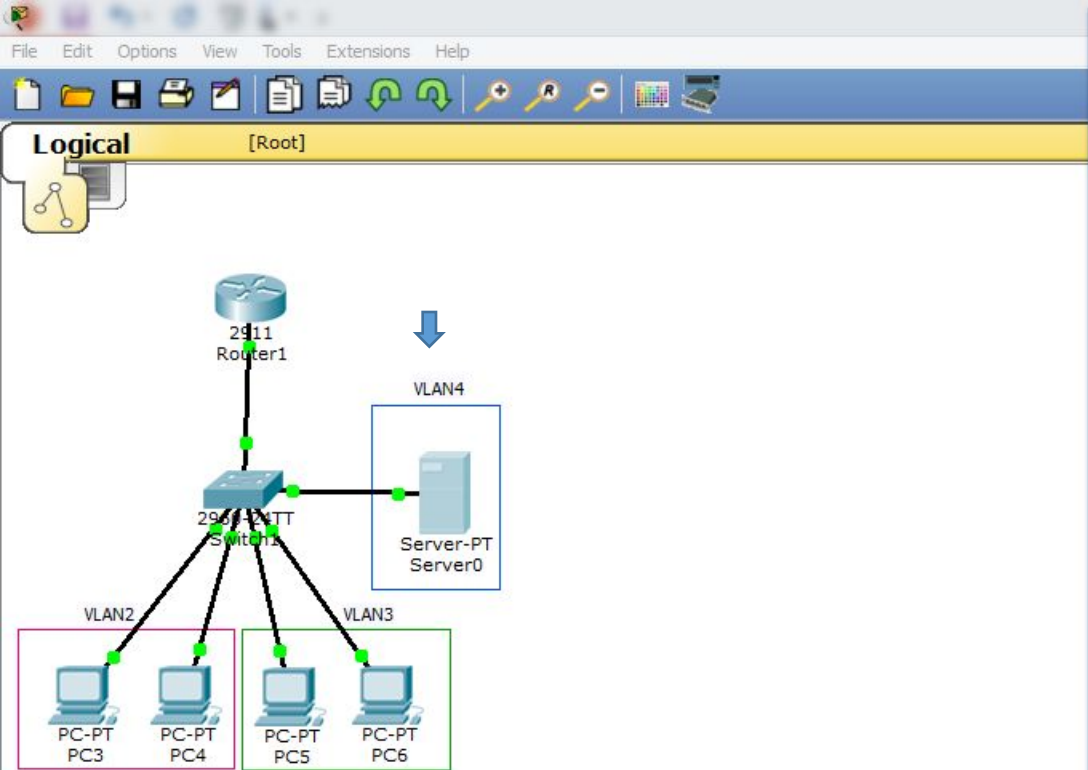
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Windows Taskbar: 21:08 11.11.2019



Server0

Physical Config Desktop Custom Interface

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

FIREWALL

IPv6 FIREWALL

INTERFACE

FastEthernet0

DHCP

Service ☐ On ☒ Off

Pool Name

Default Gateway

DNS Server

Start IP Address :

Subnet Mask:

Maximum number of Users :

TFTP Server:

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max Number	TFTP Sever
serverPool	0.0.0.0	0.0.0.0	192.168.4.0	255.255.255.0	512	0.0.0.0

Переходим на вкладку Config / DHCP, видим один ServerPool по умолчанию. Мы его оставляем и создаём новый.

Time: 03:34:10 | Power Cycle Devices Fast Forward Time

Connections

Automatically Choose Connection Type

Scenario 0

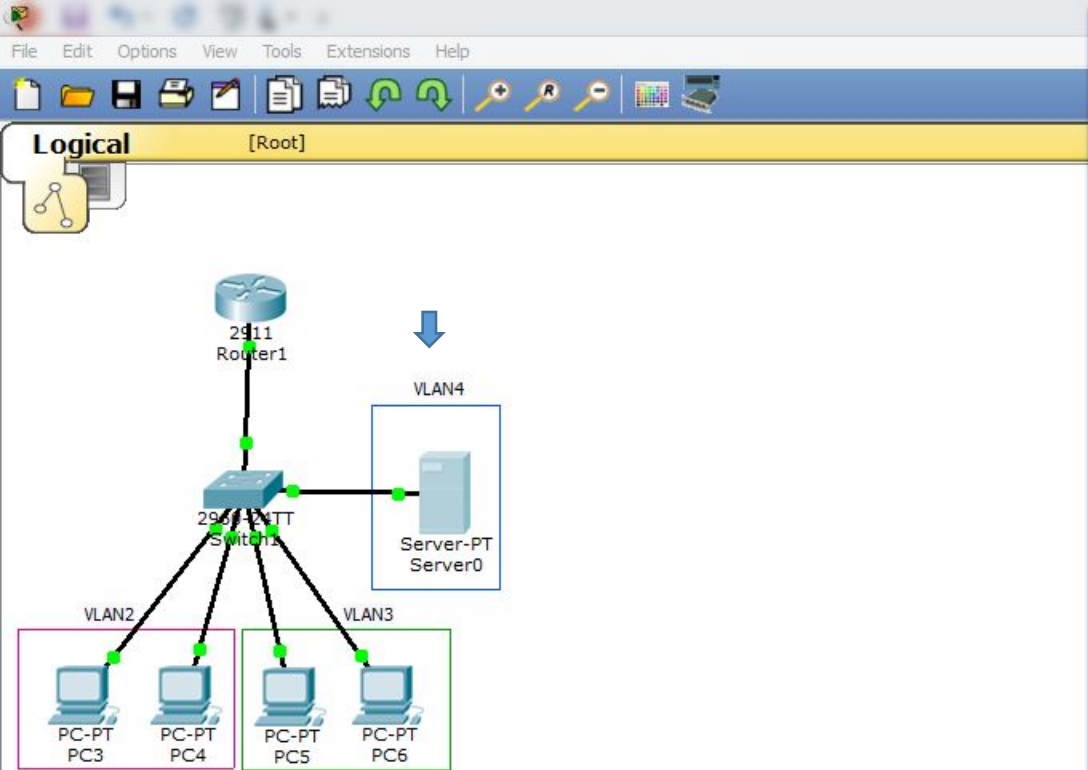
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Realtime

21:12 11.11.2019



Server0

Physical Config Desktop Custom Interface

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

FIREWALL

IPv6 FIREWALL

INTERFACE

FastEthernet0

DHCP

Service ☒ On ☐ Off

Pool Name DHCP-VLAN2

Default Gateway 192.168.2.1

DNS Server 8.8.8.8

Start IP Address : 192 168 2 0

Subnet Mask: 255 255 255 0

Maximum number of Users : 512

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max Number	TFTP Sever
serverPool	0.0.0.0	0.0.0.0	192.168.4.0	255.255.255.0	512	0.0.0.0

Для VLAN2 заполняем Pool Name: DHCP-VLAN2, шлюз по умолчанию: 192.168.2.1, DNS Server: 8.8.8.8, Start IP Address: 192.168.2.0, маску оставляем по умолчанию, выбираем <On> и жмём <Add>.

Time: 03:42:10 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

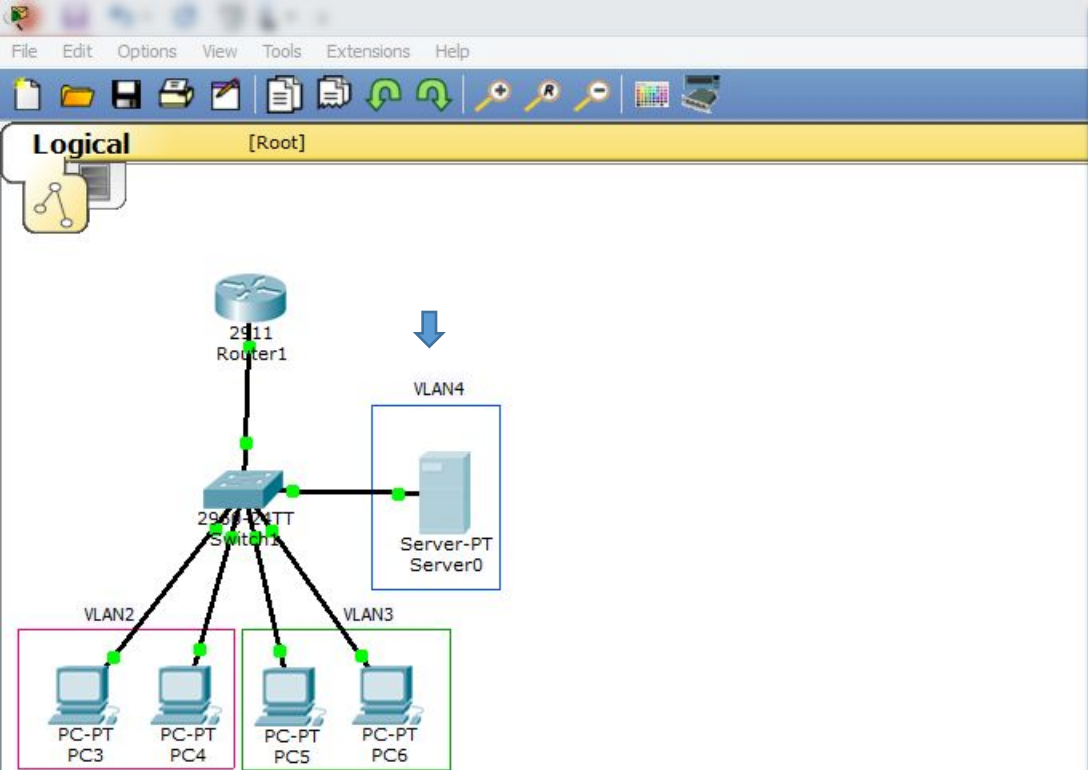
Toggle PDU List Window

Fire Last Status Source Destination Type Color Time (sec) Periodic Num Edit Delete

Realtime

Automatically Choose Connection Type

Windows taskbar: 21:20 11.11.2019



Server0

Physical Config Desktop Custom Interface

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

FIREWALL

IPv6 FIREWALL

INTERFACE

FastEthernet0

DHCP

Service ☒ On ☐ Off

Pool Name serverPool

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

Start IP Address : 192 168 4 0

Subnet Mask: 255 255 255 0

Maximum number of Users : 512

TFTP Server: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max Number	TFTP Server
serverPool	0.0.0.0	0.0.0.0	192.168.4.0	255.255.255.0	512	0.0.0.0
DHCP-VLAN2	192.168.2.1	8.8.8.8	192.168.2.0	255.255.255.0	256	0.0.0.0
DHCP-VLAN3	192.168.3.1	8.8.8.8	192.168.3.0	255.255.255.0	256	0.0.0.0

Для VLAN3 заполняем Pool Name: DHCP-VLAN3, шлюз по умолчанию: 192.168.3.1, DNS Server: 8.8.8.8, Start IP Address: 192.168.3.0, маску оставляем по умолчанию, выбираем <On> и жмём <Add>. Видим два новых сервис-пула.

Time: 03:52:52 | Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

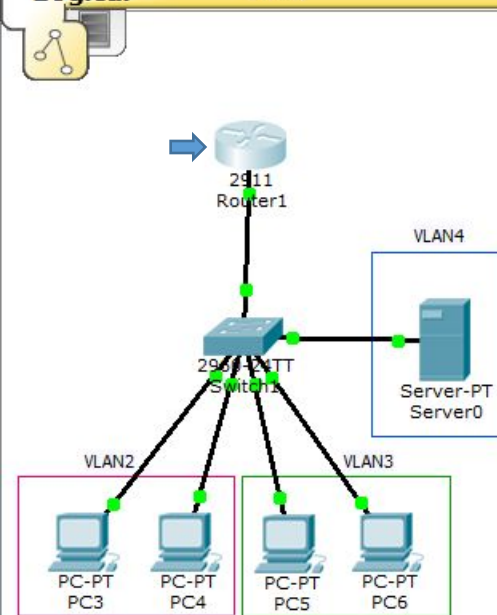
Automatically Choose Connection Type

Realtime

21:31 11.11.2019



Logical [Root]



Вернёмся к настройке маршрутизатора.

Нужно перенаправить DHCP-запросы из VLAN2 и VLAN3 с маршрутизатора на сервер.

Для этого в режиме глобального конфигурирования набираем команду: «int gi0/0.2», «ip helper-address 192.168.4.2», «exit», далее «int gi0/0.3», «ip helper-address 192.168.4.2», «end», «wr mem».

Router1

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gi0/0.2
Router(config-subif)#ip helpe
Router(config-subif)#ip helper-address 192.168.4.2
Router(config-subif)#exit
Router(config)#int gi0/0.3
Router(config-subif)#ip helper-address 192.168.4.2
Router(config-subif)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr mem
Building configuration...
[OK]
Router#
```

Copy Paste

Time: 04:00:50 Power Cycle Devices Fast Forward Time



Automatically Choose Connection Type

Scenario 0

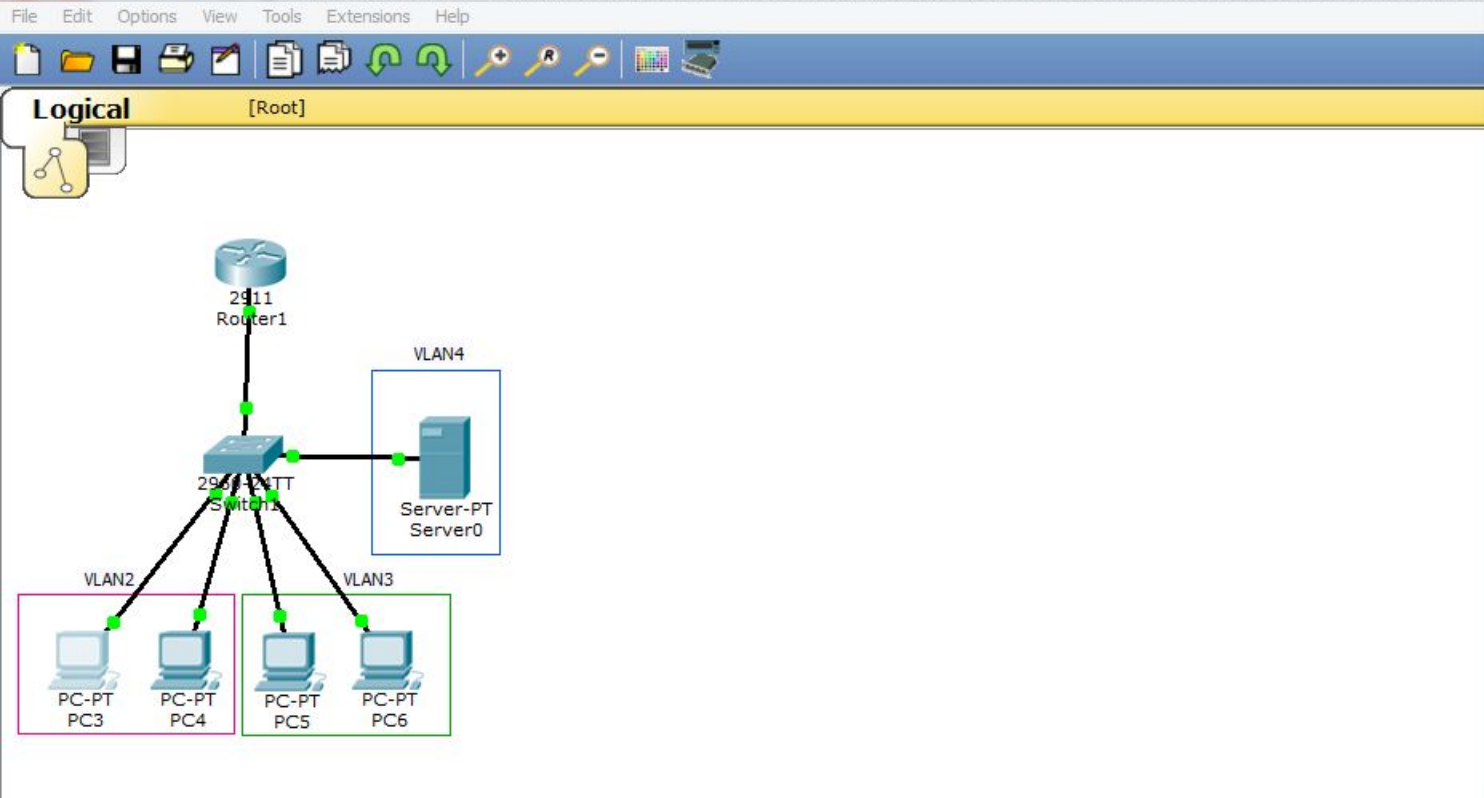
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Realtime





PC3

IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 192.168.2.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:BAFF:FE00:B546

IPv6 Gateway

IPv6 DNS Server

Web Browser

Cisco IP Communicator

Пробуем получить DNS-адрес, для компьютера PC3. Видим, что ip-адрес есть.

Time: 04:11:23 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

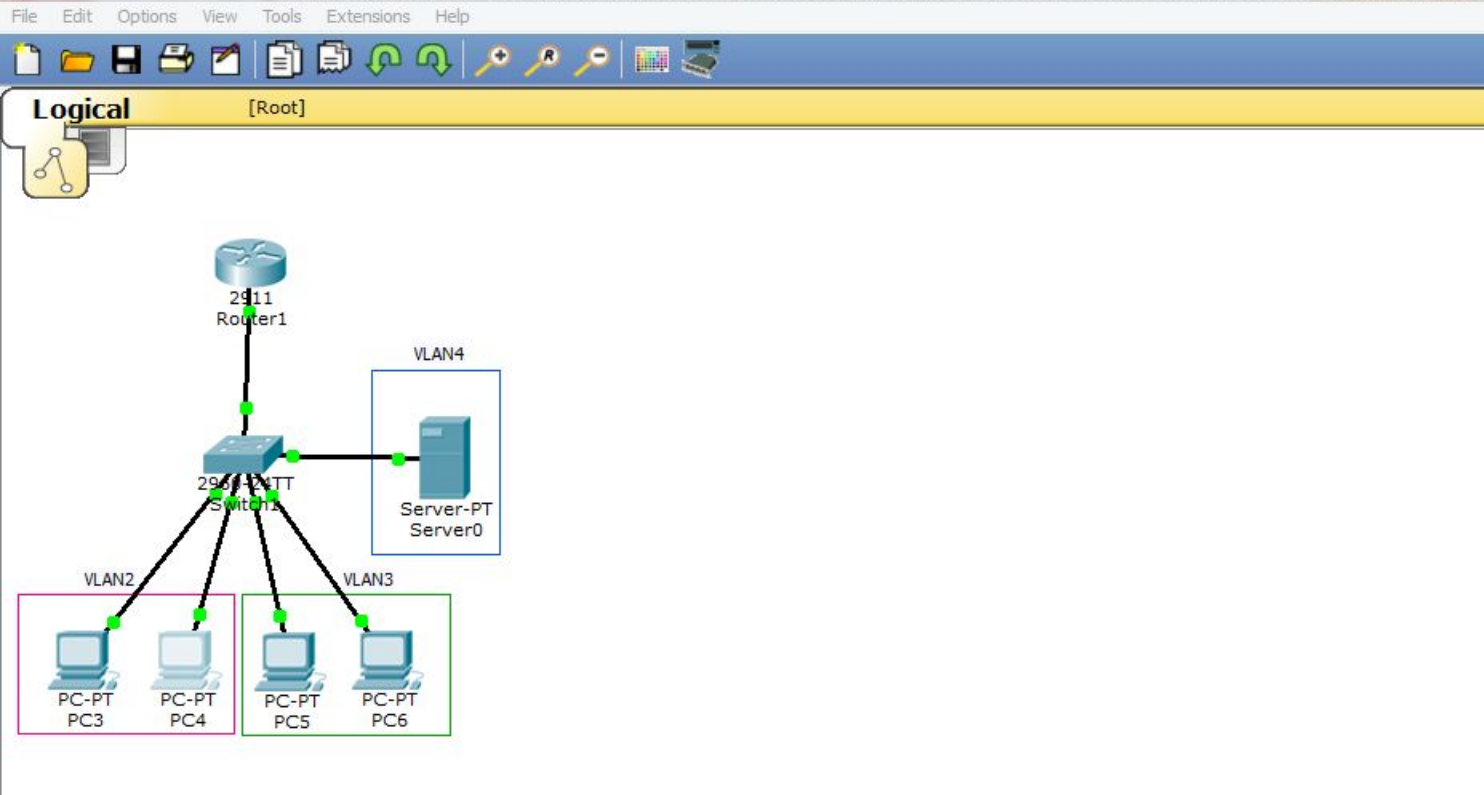
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Realtime

21:49 11.11.2019



IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 192.168.2.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:BCFF:FEA0:7AE3

IPv6 Gateway

IPv6 DNS Server

Web Browser

Cisco IP Communicator

Пробуем получить DNS-адрес, для компьютера PC4. Видим, что ip-адрес есть.

Time: 04:14:38 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

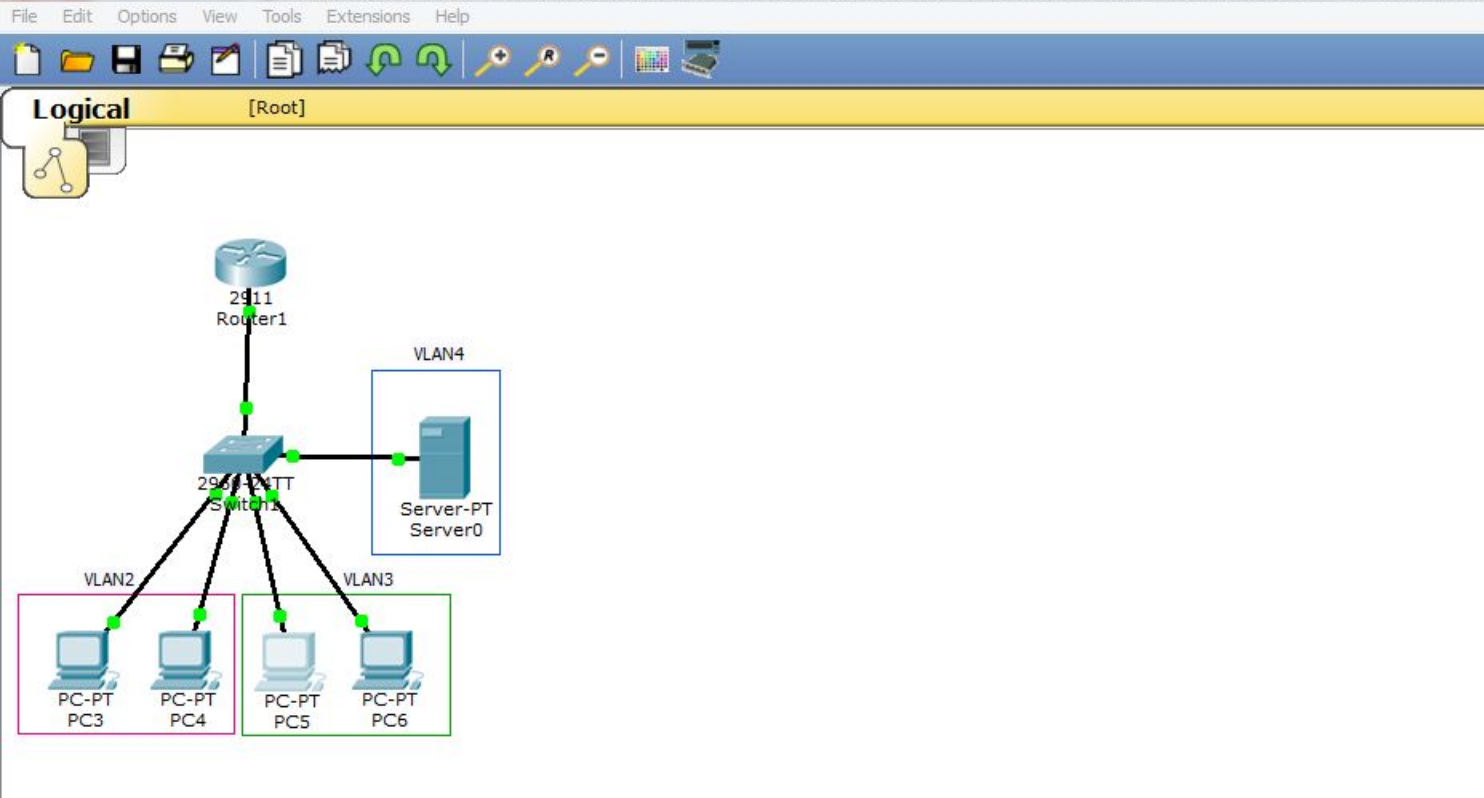
Toggle PDU List Window

Fire Last Status Source Destination Type Color Time (sec) Periodic Num Edit Delete

Automatically Choose Connection Type

Realtime

21:52 11.11.2019



IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address: 192.168.3.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.3.1

DNS Server: 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C7FF:FEC9:720C

IPv6 Gateway:

IPv6 DNS Server:

Web Browser

Cisco IP Communicator

Пробуем получить DNS-адрес, для компьютера PC5. Видим, что ip-адрес есть.

Time: 04:15:48 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

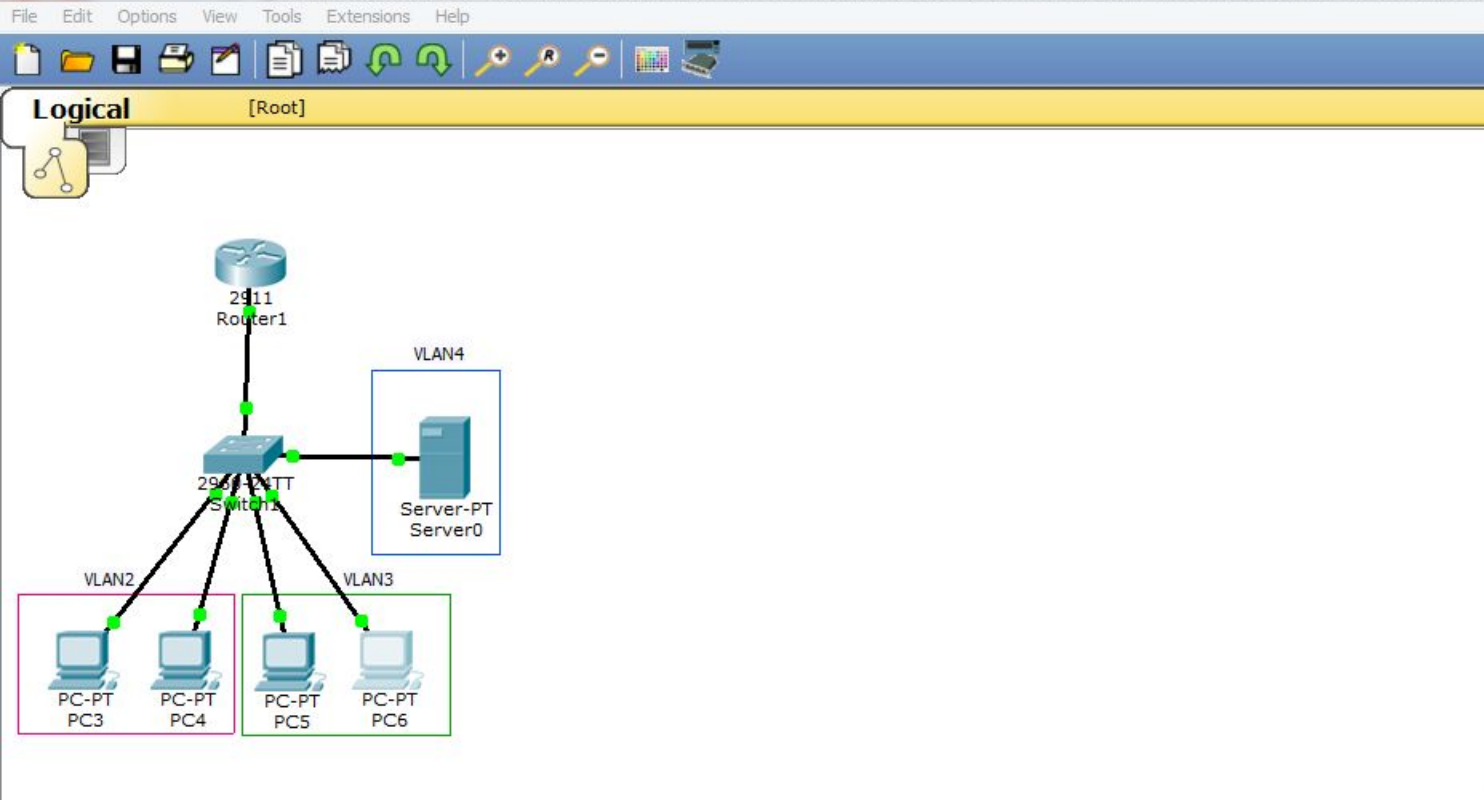
Toggle PDU List Window

Fire Last Status Source Destination Type Color Time (sec) Periodic Num Edit Delete

Automatically Choose Connection Type

Realtime

11.11.2019



IP Configuration

IP Configuration

☒ DHCP ☐ Static DHCP request successful.

IP Address 192.168.3.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.3.1

DNS Server 8.8.8.8

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::260:5CFF:FE81:233E

IPv6 Gateway

IPv6 DNS Server

Web Browser

Cisco IP Communicator

Пробуем получить DNS-адрес, для компьютера PC6. Видим, что ip-адрес есть.

Time: 04:17:15 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

New Delete

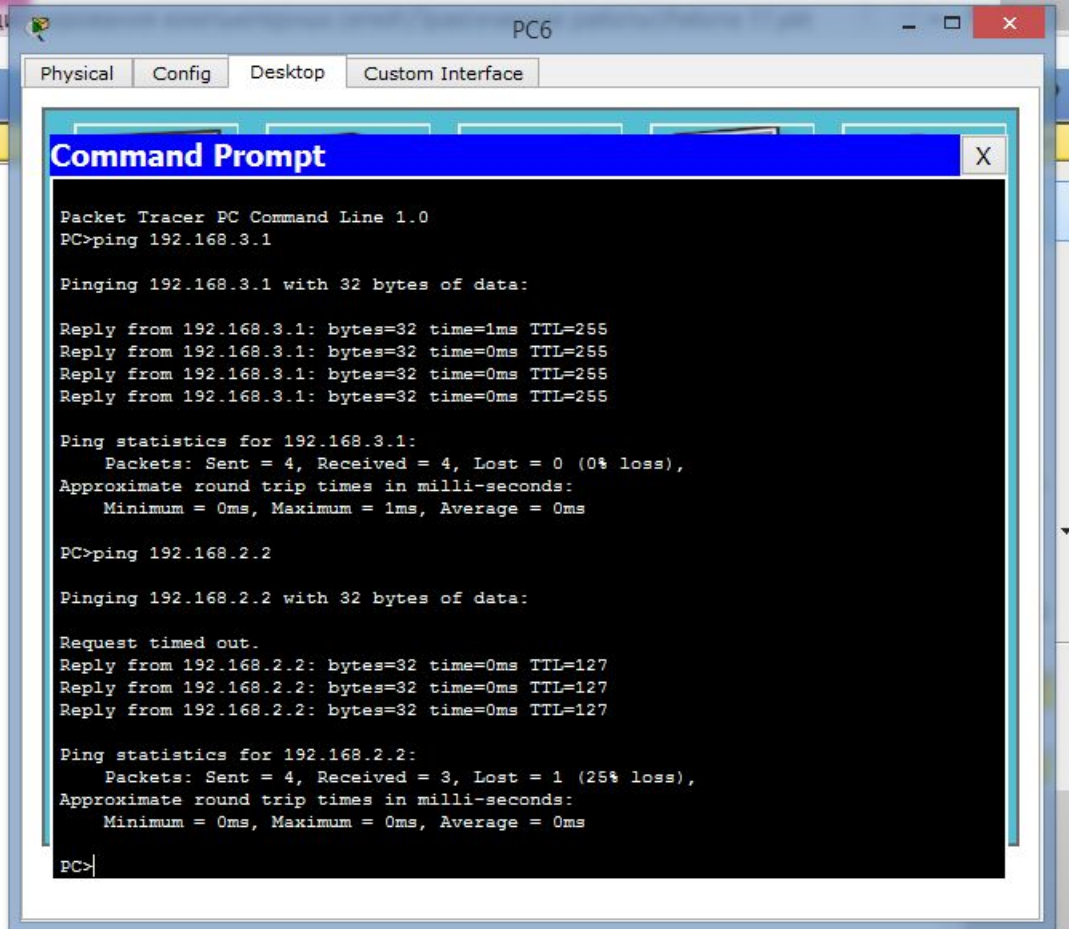
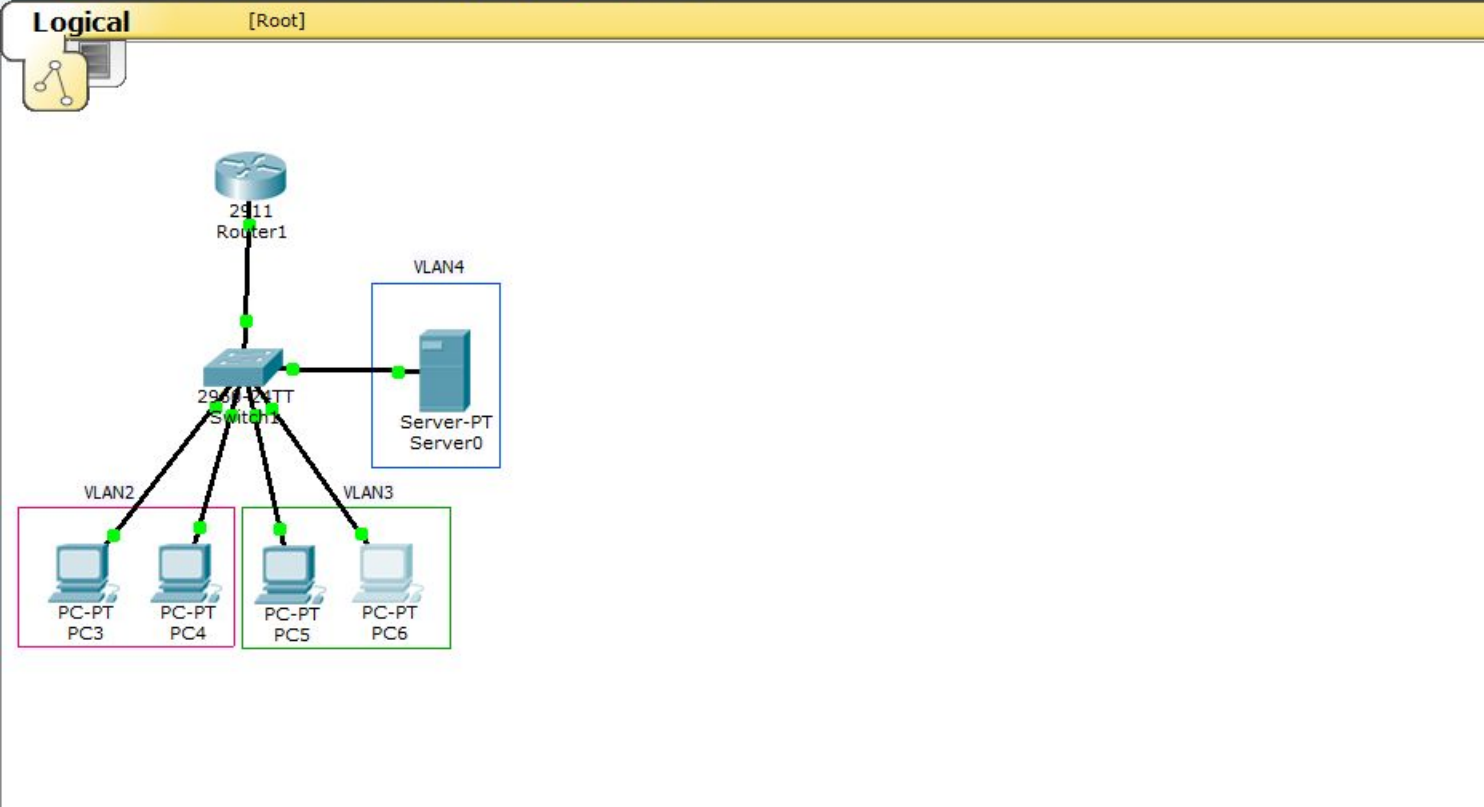
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Realtime

21:55 11.11.2019



Проверим связь PC6 со шлюзом, связь есть.

Проверим связь PC6 с другими PC, связь есть.

Time: 04:20:28 Power Cycle Devices Fast Forward Time

Connections

Scenario 0

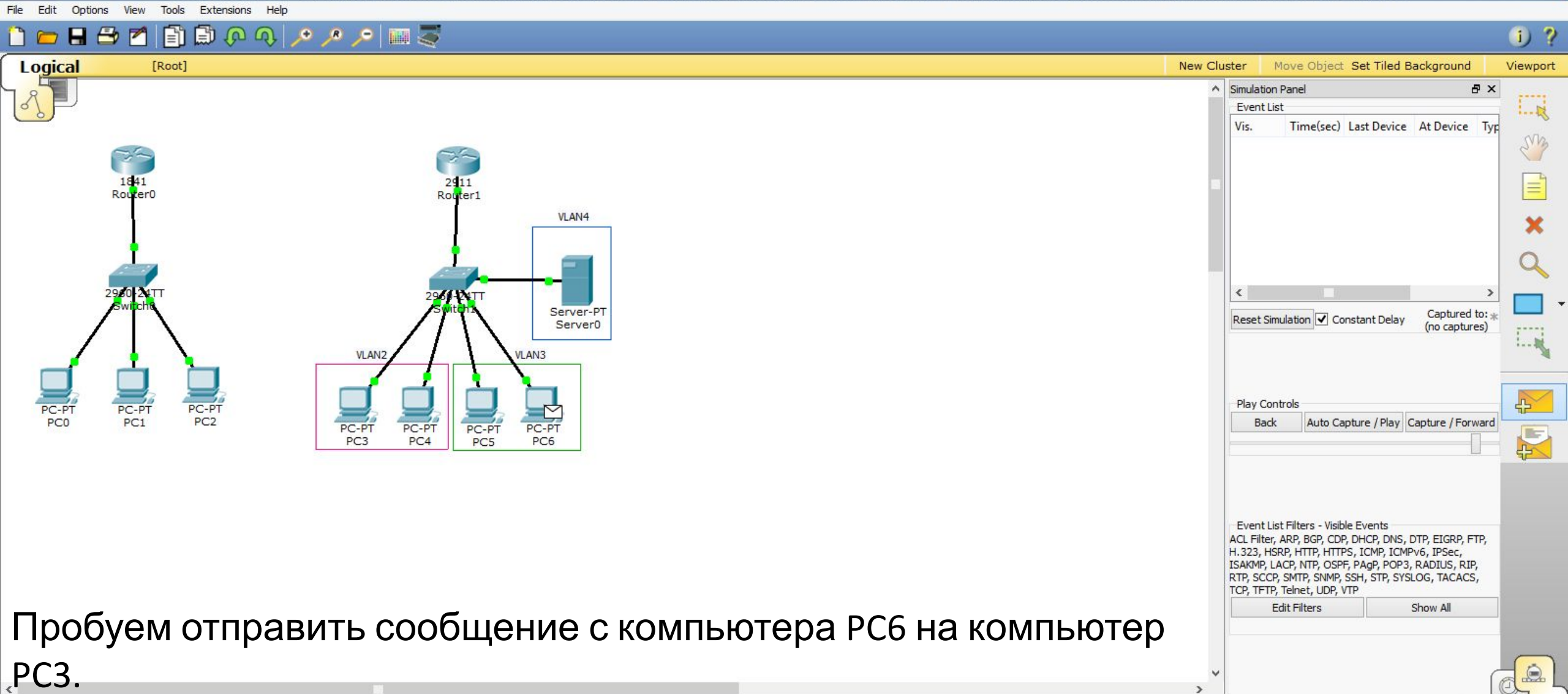
New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Automatically Choose Connection Type

Windows taskbar: 21:58 11.11.2019



Пробуем отправить сообщение с компьютера PC6 на компьютер PC3.

Time: 04:44:41.869 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward

Connections

Automatically Choose Connection Type

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
------	-------------	--------	-------------	------	-------	------------	----------	-----	------	--------

Event List Simulation

22:23 11.11.2019

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object Set Tiled Background Viewport

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC6	ICMP
	0.001	PC6	Switch1	ICMP
	0.002	Switch1	Router1	ICMP
	0.003	Router1	Switch1	ICMP
	0.004	Switch1	PC3	ICMP

Reset Simulation ☒ Constant Delay Capturing...

Play Controls

Back Auto Capture / Play Capture / Forward

Event List Filters - Visible Events

ACL Filter, ARP, BGP, CDP, DHCP, DNS, DTP, EIGRP, FTP, H.323, HSRP, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, LACP, NTP, OSPF, PAgP, POP3, RADIUS, RIP, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP

Edit Filters Show All

Сообщение проходит и отправляется ответ.

Time: 04:44:41.872 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward

Connections

Automatically Choose Connection Type

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time (sec)	Periodic	Num	Edit	Delete
	In Progress	PC6	PC3	ICMP		0.000	N	0	(edit)	(delete)

Event List Simulation

22:25 11.11.2019

Маска подсети	Маска в двоичной системе	Префикс	Количество адресов	Обратная маска
255.255.255.255	11111111.11111111.11111111.11111111	/32	1	0.0.0.0
255.255.255.254	11111111.11111111.11111111.11111110	/31	2	0.0.0.1
255.255.255.252	11111111.11111111.11111111.11111100	/30	4	0.0.0.3
255.255.255.248	11111111.11111111.11111111.11111000	/29	8	0.0.0.7
255.255.255.240	11111111.11111111.11111111.11110000	/28	16	0.0.0.15
255.255.255.224	11111111.11111111.11111111.11100000	/27	32	0.0.0.31
255.255.255.192	11111111.11111111.11111111.11000000	/26	64	0.0.0.63
255.255.255.128	11111111.11111111.11111111.10000000	/25	128	0.0.0.127
255.255.255.0	11111111.11111111.11111111.00000000	/24	256	0.0.0.255
255.255.254.0	11111111.11111111.11111110.00000000	/23	512	0.0.1.255
255.255.252.0	11111111.11111111.11111100.00000000	/22	1024	0.0.3.255
255.255.248.0	11111111.11111111.11111000.00000000	/21	2048	0.0.7.255
255.255.240.0	11111111.11111111.11110000.00000000	/20	4096	0.0.15.255
255.255.224.0	11111111.11111111.11100000.00000000	/19	8192	0.0.31.255
255.255.192.0	11111111.11111111.11000000.00000000	/18	16384	0.0.63.255
255.255.128.0	11111111.11111111.10000000.00000000	/17	32768	0.0.127.255
255.255.0.0	11111111.11111111.00000000.00000000	/16	65536	0.0.255.255
255.254.0.0	11111111.11111110.00000000.00000000	/15	131072	0.1.255.255
255.252.0.0	11111111.11111100.00000000.00000000	/14	262144	0.3.255.255
255.248.0.0	11111111.11111000.00000000.00000000	/13	524288	0.7.255.255
255.240.0.0	11111111.11110000.00000000.00000000	/12	1048576	0.15.255.255

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Спасибо за внимание!

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