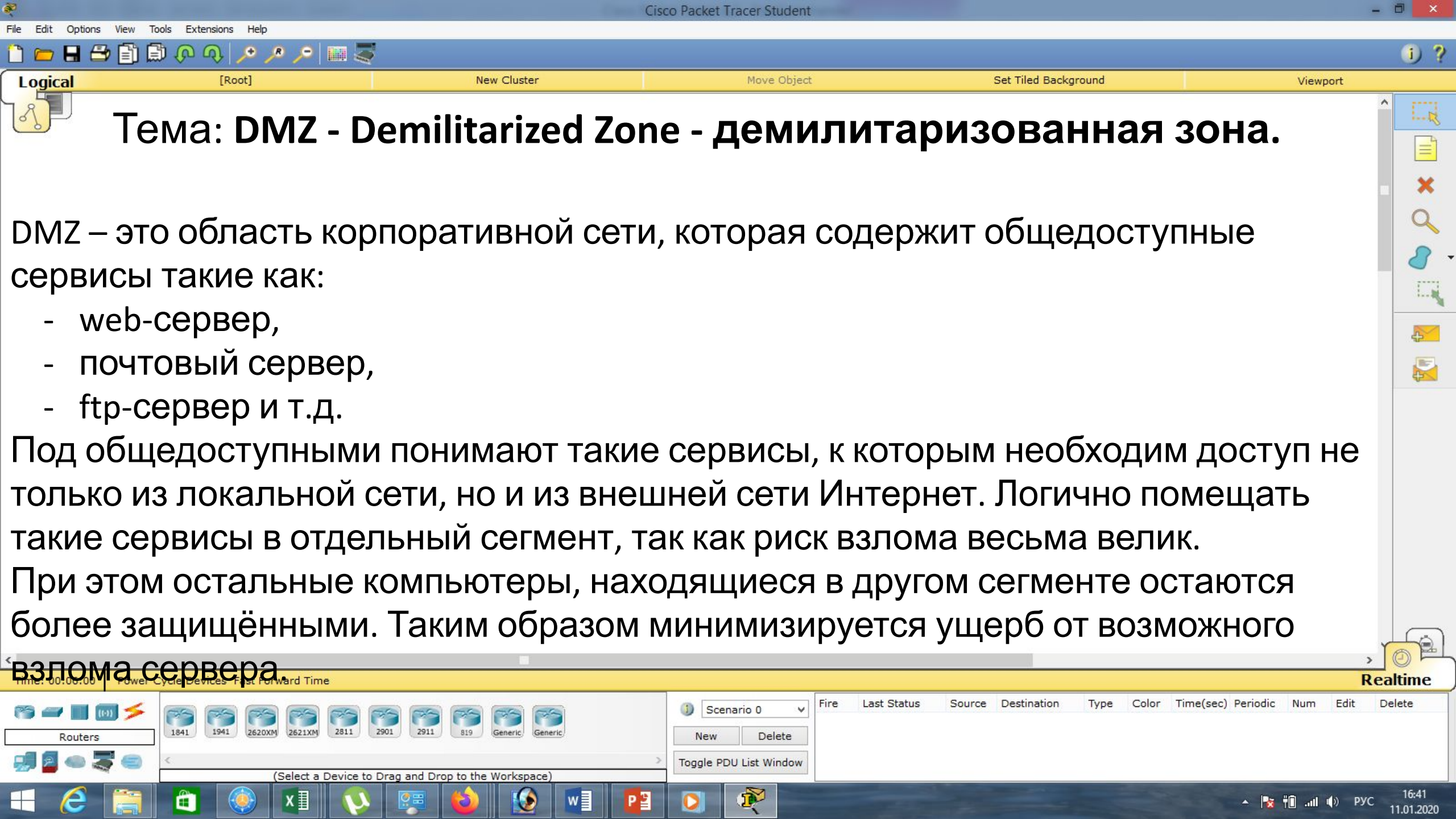
МДК.01.01

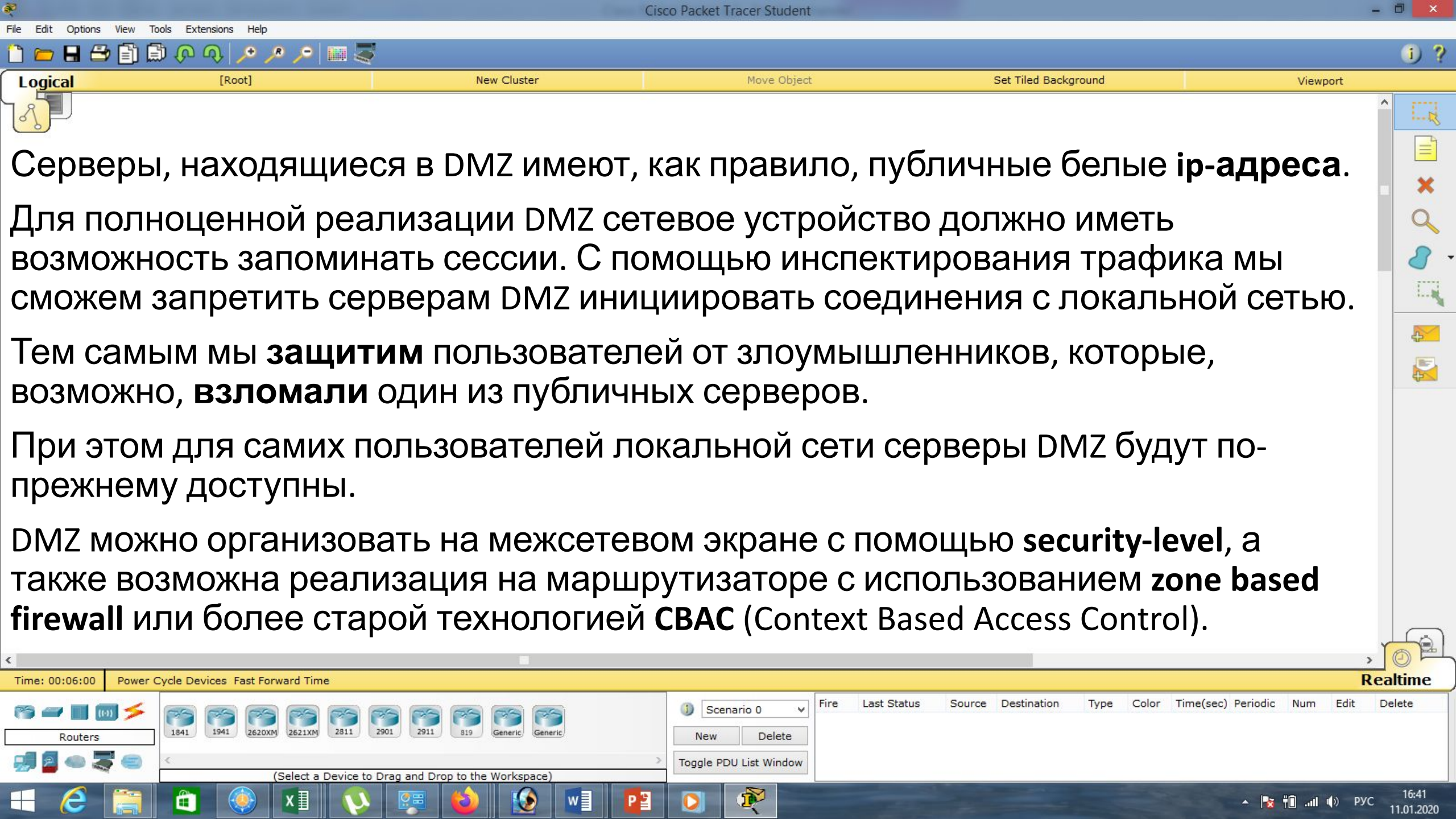
Организация, принципы построения и функционирования компьютерных сетей

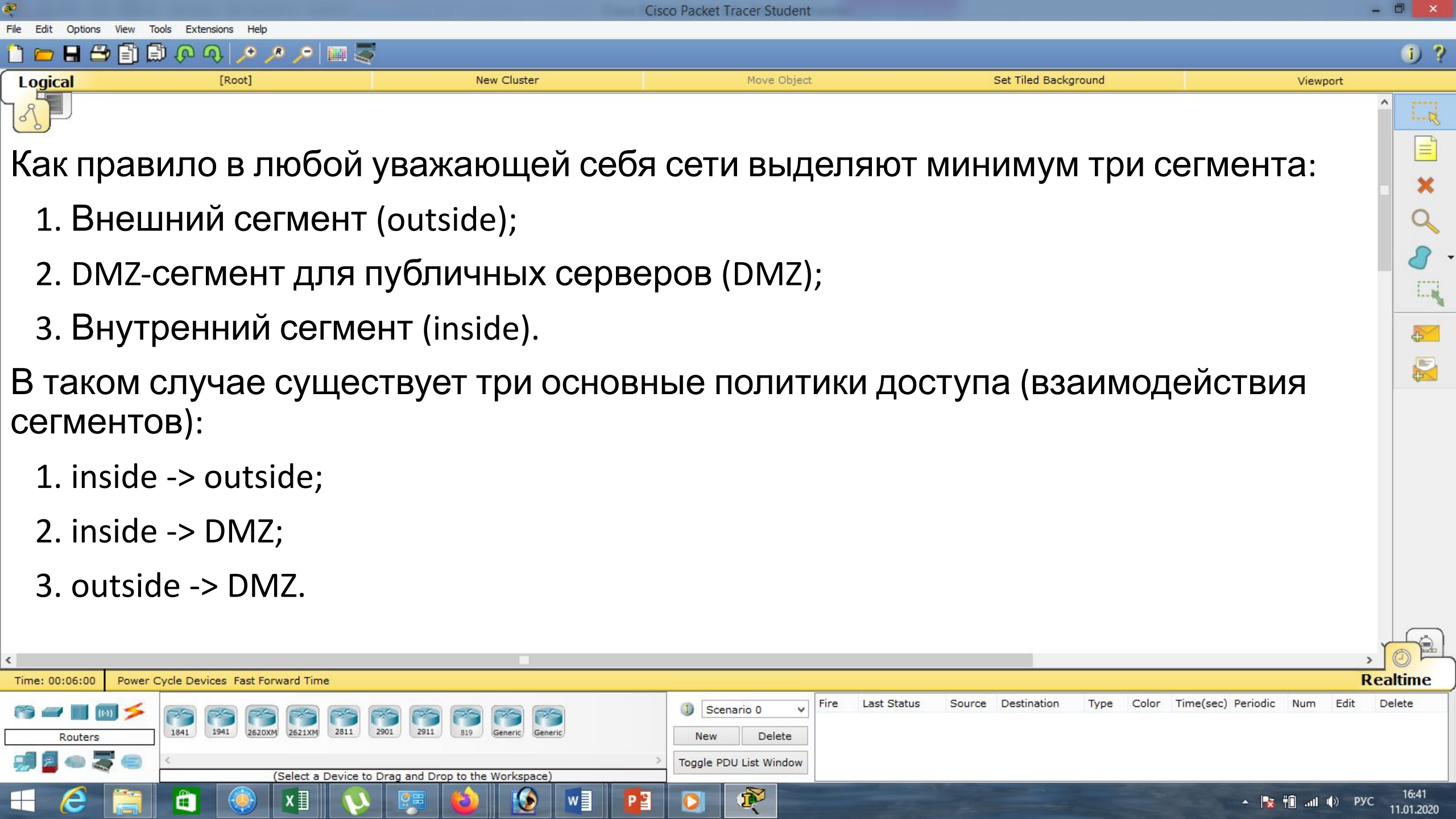
3-курс

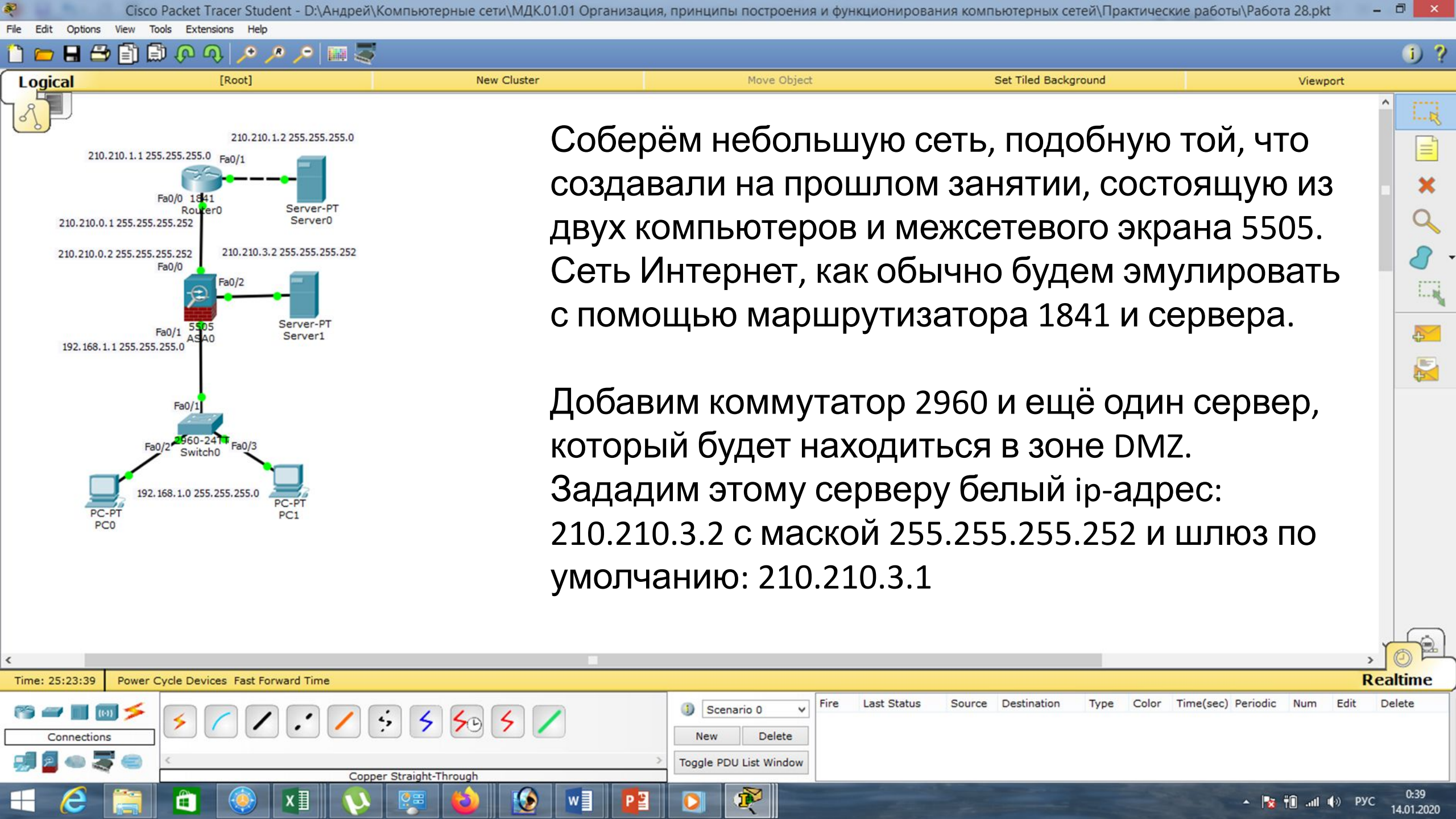
Практические занятия

Занятие 15


Cisco Packet Tracer Student
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Тема: DMZ - Demilitarized Zone - демилитаризованная зона.
DMZ – это область корпоративной сети, которая содержит общедоступные сервисы такие как:
- web-сервер,
- почтовый сервер,
- ftp-сервер и т.д.
Под общедоступными понимают такие сервисы, к которым необходим доступ не только из локальной сети, но и из внешней сети Интернет. Логично помещать такие сервисы в отдельный сегмент, так как риск взлома весьма велик.
При этом остальные компьютеры, находящиеся в другом сегменте остаются более защищёнными. Таким образом минимизируется ущерб от возможного взлома сервера.
Realtime
Routers
1841 1941 2620XM 2621XM 2811 2901 2911 819 Generic Generic
(Select a Device to Drag and Drop to the Workspace)
Scenario 0
New Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
РУС
16:41
11.01.2020


Cisco Packet Tracer Student
File Edit Options View Tools Extensions Help
Logical [Root] New Cluster Move Object Set Tiled Background Viewport
Серверы, находящиеся в DMZ имеют, как правило, публичные белые **ip-адреса**.
Для полноценной реализации DMZ сетевое устройство должно иметь возможность запоминать сессии. С помощью инспектирования трафика мы сможем запретить серверам DMZ инициировать соединения с локальной сетью.
Тем самым мы **защитим** пользователей от злоумышленников, которые, возможно, **взломали** один из публичных серверов.
При этом для самих пользователей локальной сети серверы DMZ будут по-прежнему доступны.
DMZ можно организовать на межсетевом экране с помощью **security-level**, а также возможна реализация на маршрутизаторе с использованием **zone based firewall** или более старой технологией **CBAC** (Context Based Access Control).
Time: 00:06:00 Power Cycle Devices Fast Forward Time
Realtime
Routers
1841 1941 2620XM 2621XM 2811 2901 2911 819 Generic Generic
(Select a Device to Drag and Drop to the Workspace)
Scenario 0
New Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
РУС 16:41 11.01.2020


Cisco Packet Tracer Student
File Edit Options View Tools Extensions Help
Logical [Root] New Cluster Move Object Set Tiled Background Viewport
Как правило в любой уважающей себя сети выделяют минимум три сегмента:
1. Внешний сегмент (outside);
2. DMZ-сегмент для публичных серверов (DMZ);
3. Внутренний сегмент (inside).
В таком случае существует три основные политики доступа (взаимодействия сегментов):
1. inside -> outside;
2. inside -> DMZ;
3. outside -> DMZ.
Time: 00:06:00 Power Cycle Devices Fast Forward Time Realtime
Routers
1841 1941 2620XM 2621XM 2811 2901 2911 819 Generic Generic
(Select a Device to Drag and Drop to the Workspace)
Scenario 0 New Delete Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
РУС 16:41 11.01.2020


Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функционирования компьютерных сетей\Практические работы\Работа 28.pkt
File Edit Options View Tools Extensions Help
Logical [Root] New Cluster Move Object Set Tiled Background Viewport
210.210.1.2 255.255.255.0
210.210.1.1 255.255.255.0
Fa0/1
Fa0/0
1841
Router0
Server-PT
Server0
210.210.0.1 255.255.255.252
210.210.0.2 255.255.255.252
Fa0/0
210.210.3.2 255.255.255.252
Fa0/2
Fa0/1
5505
ASA0
Server-PT
Server1
192.168.1.1 255.255.255.0
Fa0/1
Fa0/2
2960-24TT
Switch0
Fa0/3
192.168.1.0 255.255.255.0
PC-PT
PC0
PC-PT
PC1
Соберём небольшую сеть, подобную той, что создавали на прошлом занятии, состоящую из двух компьютеров и межсетевого экрана 5505. Сеть Интернет, как обычно будем эмулировать с помощью маршрутизатора 1841 и сервера.
Добавим коммутатор 2960 и ещё один сервер, который будет находиться в зоне DMZ. Зададим этому серверу белый ip-адрес: 210.210.3.2 с маской 255.255.255.252 и шлюз по умолчанию: 210.210.3.1
Time: 25:23:39 Power Cycle Devices Fast Forward Time
Realtime
Connections
Copper Straight-Through
Scenario 0
New Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
РУС
0:39
14.01.2020

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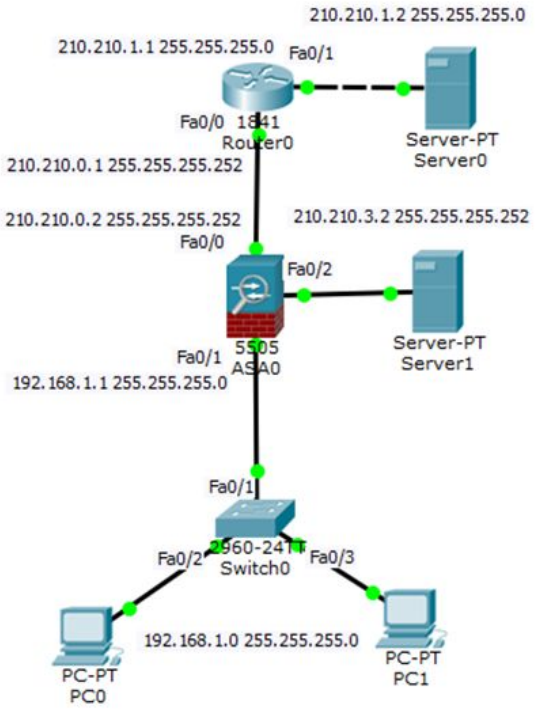
File Edit Options View Tools Extensions Help

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



Проведём предварительные настройки межсетевого экрана Cisco ASA***.***

Посмотреть эти настройки можно в предыдущей работе.

Без них не работает!!!

Можно предыдущую работу взять за основу или заново построить новую схему сети.

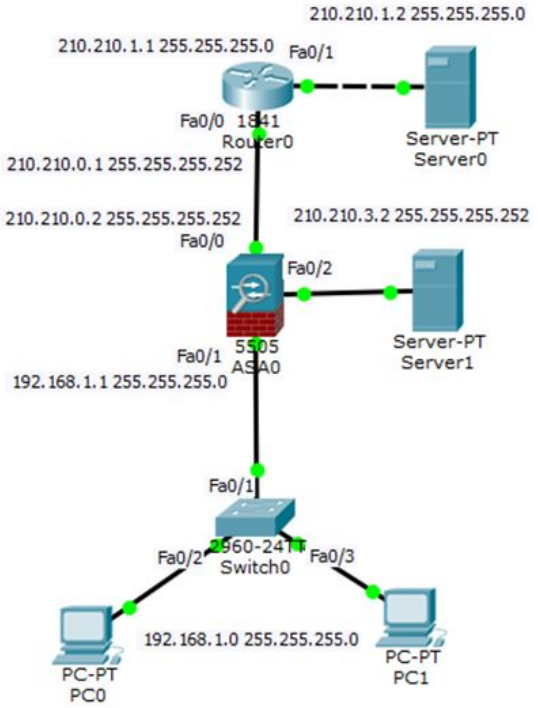
Time: 25:23:39 | Power Cycle Devices | Fast Forward Time | Realtime

Connections | Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

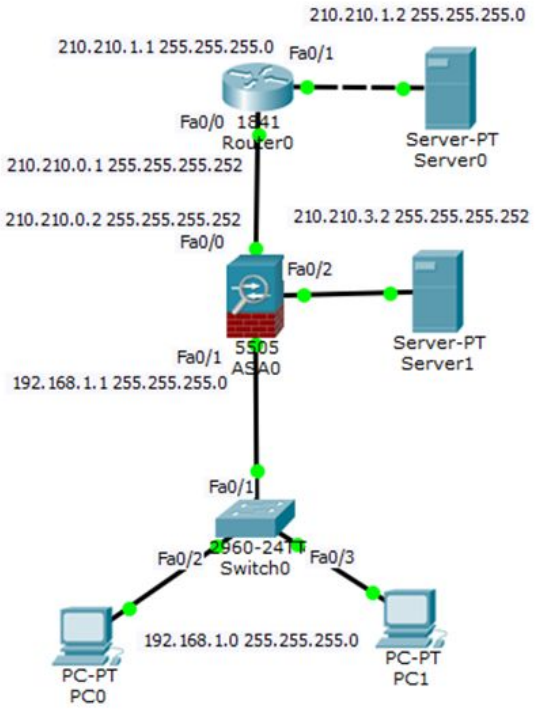
Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete

РУС 0:39 14.01.2020



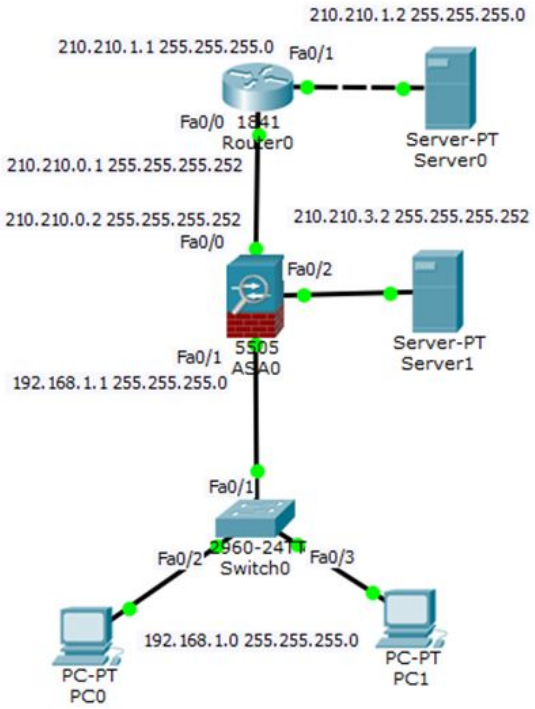
Чтобы ещё раз провести предварительные настройки на Cisco ASA ***приведём список необходимых команд:***

«en»,
Password: <Enter>,
«int vlan 2»,
«ip address 210.210.0.2 255.255.255.252»,
«exit»,
«int vlan 1»,
«security-level 95»,
«exit»,
«route outside 0.0.0.0 0.0.0.0 210.210.0.1».



Далее:

«class-map inspection_default»,
«match default-inspection-traffic»,
«exit»,
«policy-map global_policy»,
«class inspection_default»,
«inspect icmp»,
«inspect http»,
«exit»,
«service-policy global_policy global»,
«exit».



И ещё:

«object network FOR-NAT»,

«subnet 192.168.1.0 255.255.255.0»,

«nat (inside,outside) dynamic interface»,

«end»,

«wr mem».

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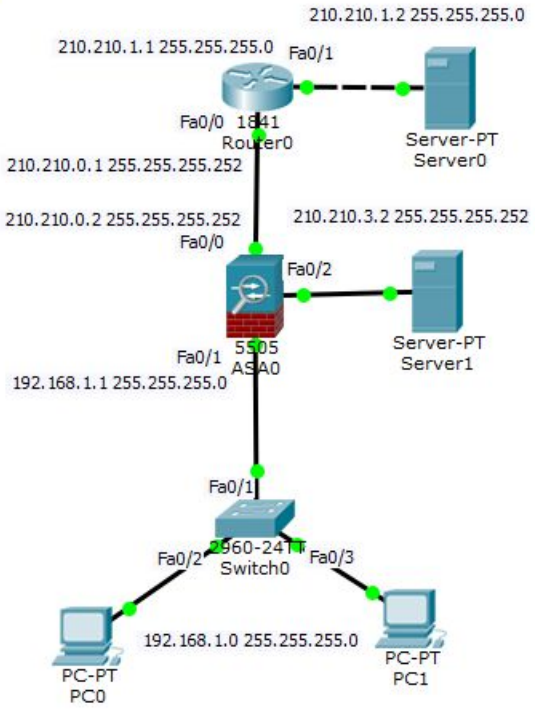
File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



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)#ip ro
Router(config)#ip route 210.210.3.0 255.255.255.252 210.210.0.2
Router(config)#
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Copy | Paste

После этого на маршрутизаторе провайдера надо прописать маршрут к нашему серверу: «en», «conf t»,
«ip route 210.210.3.0 255.255.255.252 210.210.0.2»,
«end», «wr mem».

Time: 25:38:39 | Power Cycle Devices | Fast Forward Time | Realtime

Connections

Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

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

РУС 0:54 14.01.2020

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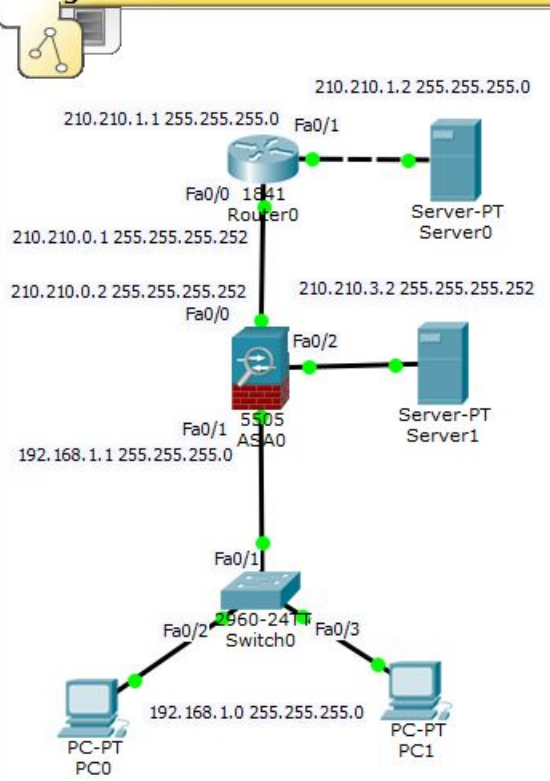
File Edit Options View Tools Extensions Help

Logical [Root] New Cluster



Настроим ASA***:.***

Хотим определить сервер во VLAN 3***:***

«conf t»,

«int eth0/2»

«switchport access vlan 3»,

«exit»,

«int vlan 3».

Хотим задать имя для VLAN 3***:***

«nameif dmz».

Видим ограничение в лицензии. На реальном оборудовании это сделать можно.

ASA0

Physical Config CLI

ASA Command Line Interface

```
ciscoasa(config-network-object)#subnet 192.168.1.0 255.255.255.0
ciscoasa(config-network-object)#nat (inside,outside) dynamic interface
ciscoasa(config-network-object)#end
ciscoasa#wr mem
Building configuration...
Cryptochecksum: 092b66b2 3f025d78 08c67d15 72197d01

1068  bytes copied in 1.019 secs (1048 bytes/sec)
[OK]
ciscoasa#conf t
ciscoasa(config)#int fa0/2
                   ^
% Invalid input detected at '^' marker.

ciscoasa(config)#int ?

configure mode commands/options:
  Ethernet  IEEE 802.3
  Vlan      Catalyst Vlans
ciscoasa(config)#int eth0/2
ciscoasa(config-if)#sw
ciscoasa(config-if)#switchport acss
ciscoasa(config-if)#switchport access vlan 3
ciscoasa(config-if)#exit
ciscoasa(config)#int vlan 3
ciscoasa(config-if)#nameif dmz
ERROR: This license does not allow configuring more than 2 interfaces with nameif
and without a "no forward" command on this interface or on 1 interface(s) with
nameif already configured.
ciscoasa(config-if)#
```

Copy Paste

Time: 25:57:58 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

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

РУС 1:13 14.01.2020

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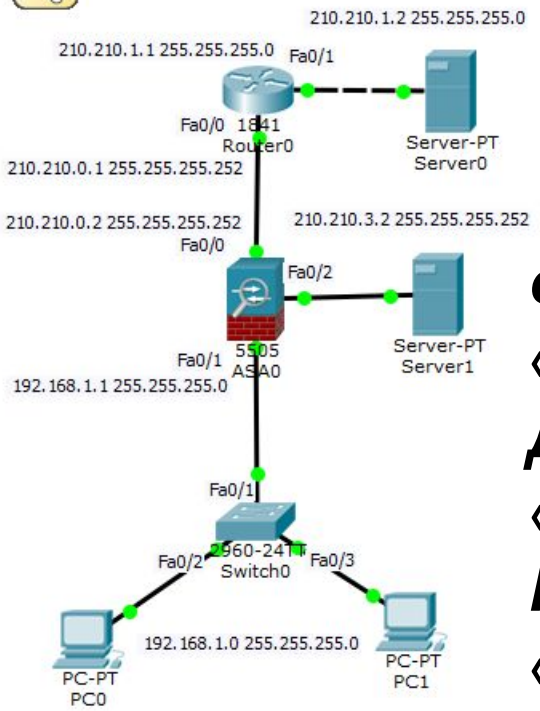
File Edit Options View Tools Extensions Help

Logical [Root] New Cluster



Запрещаем трафик в нашу сеть:

«no forward interface vlan 1».

Даём интерфейсу имя:

«nameif dmz».

Изменяем уровень доверия:

«security-level 50».

Задаём ip-адрес:

«ip address 210.210.3.1 255.255.255.252»,

«no shutdown», «exit».

ASA0

Physical Config CLI

ASA Command Line Interface

```
ciscoasa(config)#int eth0/2
ciscoasa(config-if)#sw
ciscoasa(config-if)#switchport acss
ciscoasa(config-if)#switchport access vlan 3
ciscoasa(config-if)#exit
ciscoasa(config)#int vlan 3
ciscoasa(config-if)#nameif dmz
ERROR: This license does not allow configuring more than 2 interfaces with nameif
and without a "no forward" command on this interface or on 1 interface(s) with
nameif already configured.
ciscoasa(config-if)#no for
ciscoasa(config-if)#no forward vlan 1
                                   ^
% Invalid input detected at '^' marker.

ciscoasa(config-if)#no forward interface vlan 1
ciscoasa(config-if)#nameif dmz
INFO: Security level for "dmz" set to 0 by default.
ciscoasa(config-if)#
ciscoasa(config-if)#sec
ciscoasa(config-if)#security-level 50
ciscoasa(config-if)#
ciscoasa(config-if)#ip add
ciscoasa(config-if)#ip address 210.210.3.1 255.255.255.252
ciscoasa(config-if)#
ciscoasa(config-if)#no sh
ciscoasa(config-if)#no shutdown
ciscoasa(config-if)#
ciscoasa(config-if)#exit
ciscoasa(config)#
```

Copy Paste

Time: 26:09:25 Power Cycle Devices Fast Forward Time Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

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

ENG 1:25 14.01.2020

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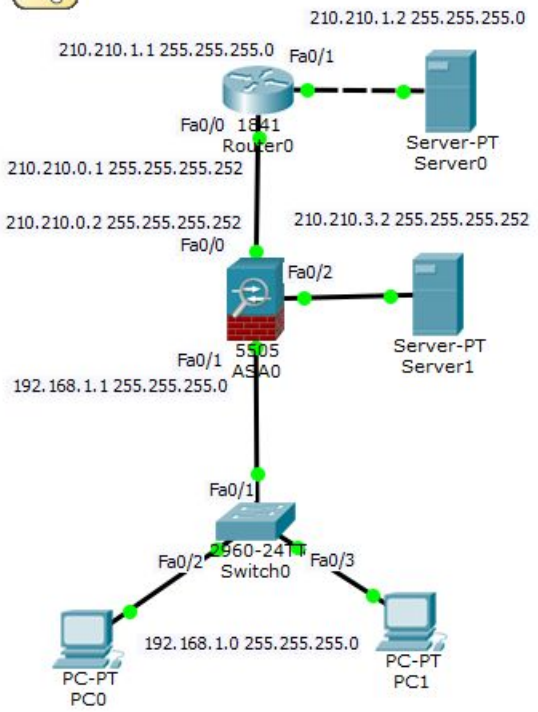
File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object



Проверяем связь ASA ***с сервером:***
«ping 210.210.3.2».

Связь уже есть!

ASA0

Physical Config CLI

ASA Command Line Interface

```
ERROR: This license does not allow configuring more than 2 interfaces with nameif
and without a "no forward" command on this interface or on 1 interface(s) with
nameif already configured.
ciscoasa(config-if)#no for
ciscoasa(config-if)#no forward vlan 1
                           ^
% Invalid input detected at '^' marker.

ciscoasa(config-if)#no forward interface vlan 1
ciscoasa(config-if)#nameif dmz
INFO: Security level for "dmz" set to 0 by default.
ciscoasa(config-if)#
ciscoasa(config-if)#sec
ciscoasa(config-if)#security-level 50
ciscoasa(config-if)#
ciscoasa(config-if)#ip add
ciscoasa(config-if)#ip address 210.210.3.1 255.255.255.252
ciscoasa(config-if)#
ciscoasa(config-if)#no sh
ciscoasa(config-if)#no shutdown
ciscoasa(config-if)#
ciscoasa(config-if)#exit
ciscoasa(config)#ping 210.210.3.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 210.210.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/2 ms

ciscoasa(config)#
```

Copy Paste

Time: 26:11:59 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

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

ENG 1:28 14.01.2020

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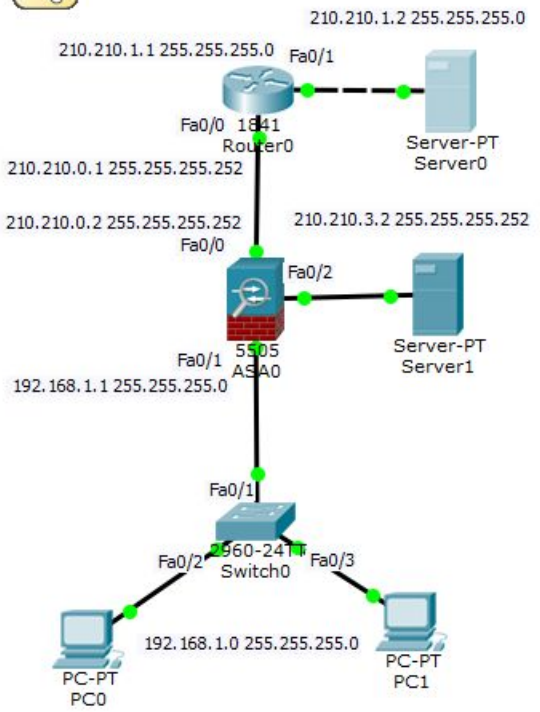
File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверяем связь сервера провайдера с нашим сервером «ping 210.210.3.2».

Связи нет, т.к. на входе в ASA (Fa0/0) ***уровень доверия равен*** 0 ***а на*** (Fa0/2) **–** 50**.**
Мы его установили сами.
Чтобы связь появилась, нужно прописать Access List**.**

Server0

Physical | Config | Services | Desktop | Custom Interface

Command Prompt

```
Packet Tracer SERVER Command Line 1.0
SERVER>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>
```

Time: 26:16:21 | Power Cycle Devices | Fast Forward Time | Realtime

Connections | Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

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

ENG 1:32 14.01.2020

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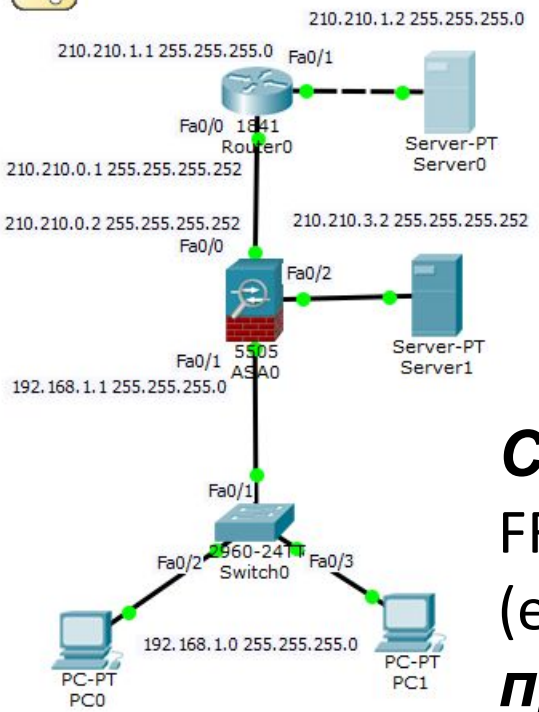
File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



ASA0

Physical | Config | CLI

ASA Command Line Interface

```
ciscoasa(config-if)#security-level 50
ciscoasa(config-if)#
ciscoasa(config-if)#ip add
ciscoasa(config-if)#ip address 210.210.3.1 255.255.255.252
ciscoasa(config-if)#
ciscoasa(config-if)#no sh
ciscoasa(config-if)#no shutdown
ciscoasa(config-if)#
ciscoasa(config-if)#exit
ciscoasa(config)#ping 210.210.3.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 210.210.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/2 ms

ciscoasa(config)#acc
ciscoasa(config)#access
ciscoasa(config)#access-l
ciscoasa(config)#access-list FROM-OUTSIDE ex
ciscoasa(config)#access-list FROM-OUTSIDE extended permit ?

configure mode commands/options:
  icmp
  icmp6
  object-group  Specify a service or protocol object-group after this keyword
  tcp           Transmission Control Protocol
  udp           User Datagram Protocol
ciscoasa(config)#access-list FROM-OUTSIDE extended permit icmp any host 210.210.3.2
ciscoasa(config)#
```

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Создадим Access List ***с именем*** FROM-OUTSIDE ***расширенный*** (extended)***, разрешим*** (permit) ***протокол*** (icmp) ***всем*** (any) ***на наш хост*** (host 210.210.3.2)***:*** «access-list FROM-OUTSIDE extended permit icmp any host 210.210.3.2».

Time: 26:27:48 | Power Cycle Devices | Fast Forward Time | Realtime

Connections

Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

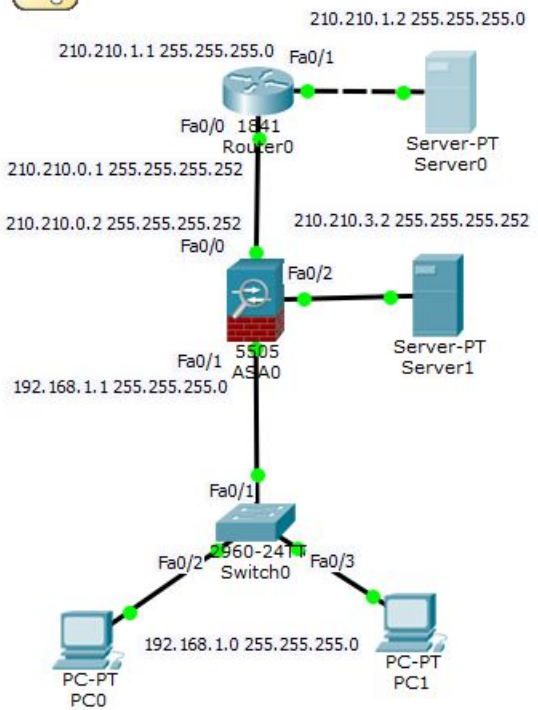
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

ENG 1:44 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построени

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Objec



ASA0

Physical Config CLI

ASA Command Line Interface

```
ciscoasa(config-if)#
ciscoasa(config-if)#exit
ciscoasa(config)#ping 210.210.3.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 210.210.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/2 ms

ciscoasa(config)#acc
ciscoasa(config)#access
ciscoasa(config)#access-l
ciscoasa(config)#access-list FROM-OUTSIDE ex
ciscoasa(config)#access-list FROM-OUTSIDE extended permit ?

configure mode commands/options:
  icmp
  icmp6
  object-group  Specify a service or protocol object-group after this keyword
  tcp           Transmission Control Protocol
  udp           User Datagram Protocol
ciscoasa(config)#access-list FROM-OUTSIDE extended permit icmp any host 210.210.3.2
ciscoasa(config)#
ciscoasa#
%SYS-5-CONFIG_I: Configured from console by console

ciscoasa#conf t
ciscoasa(config)#access-list FROM-OUTSIDE extended permit tcp any host 210.210.3.2 eq www
ciscoasa(config)#
```

Copy Paste

Добавим протокол (tcp) ***всем*** (any) ***на наш хост*** (host 210.210.3.2) ***через порт*** 80 (eq www)***:***

«access-list FROM-OUTSIDE extended permit tcp any host 210.210.3.2 eq www».

Time: 26:37:41 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

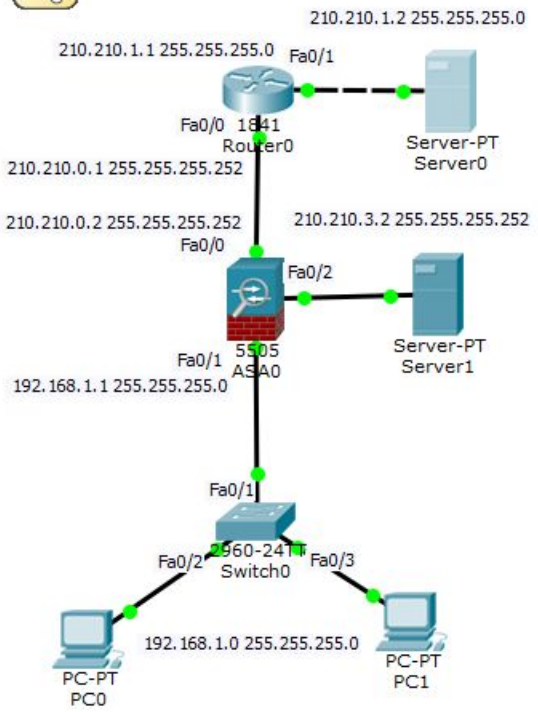
Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete

ENG 1:54 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построени

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Objec



ASA0

Physical Config CLI

ASA Command Line Interface

```
ciscoasa(config)#acc
ciscoasa(config)#access
ciscoasa(config)#access-l
ciscoasa(config)#access-list FROM-OUTSIDE ex
ciscoasa(config)#access-list FROM-OUTSIDE extended permit ?

configure mode commands/options:
  icmp
  icmp6
  object-group  Specify a service or protocol object-group after this keyword
  tcp           Transmission Control Protocol
  udp           User Datagram Protocol
ciscoasa(config)#access-list FROM-OUTSIDE extended permit icmp any host 210.210.3.2
ciscoasa(config)#
ciscoasa#
%SYS-5-CONFIG_I: Configured from console by console

ciscoasa#conf t
ciscoasa(config)#access-list FROM-OUTSIDE extended permit tcp any host 210.210.3.2 eq www
ciscoasa(config)#access -g
ciscoasa(config)#access-g
ciscoasa(config)#access-group FROM-OUTSIDE in interface outside
ciscoasa(config)#end
ciscoasa#wr mem
Building configuration...
Cryptochecksum: 092b66b2 3f025d78 08c67d15 72197d01

1363  bytes copied in 2.236 secs (609 bytes/sec)
[OK]
ciscoasa#
```

Copy Paste

Создадим Access Group ***с именем*** FROM-OUTSIDE ***на внешний интерфейс*** (in interface outside)***:***

«access-group FROM-OUTSIDE in interface outside»

«end»,

«wr mem».

Time: 26:51:22 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

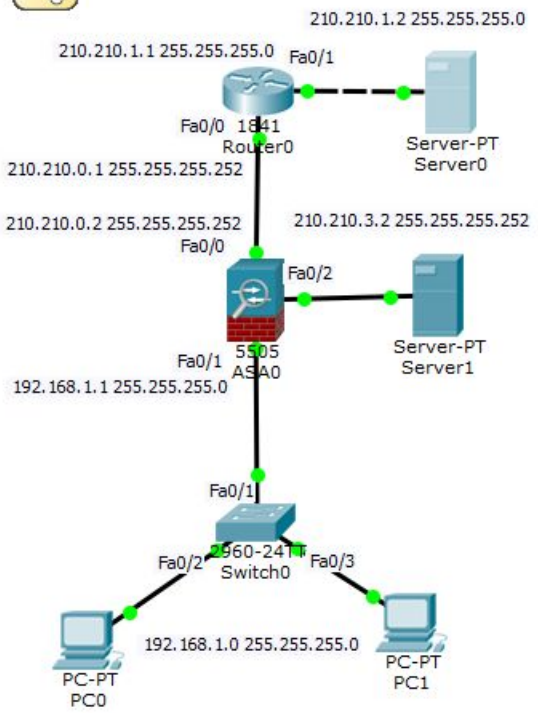
Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete

ENG 2:08 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверяем теперь связь сервера провайдера с нашим сервером:

«ping 210.210.3.2».

Связь есть!!!

Server0

Physical | Config | Services | Desktop | Custom Interface

Command Prompt X

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Reply from 210.210.3.2: bytes=32 time=13ms TTL=126
Reply from 210.210.3.2: bytes=32 time=11ms TTL=126
Reply from 210.210.3.2: bytes=32 time=0ms TTL=126
Reply from 210.210.3.2: bytes=32 time=1ms TTL=126

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 13ms, Average = 6ms

SERVER>
```

Time: 26:53:17 | Power Cycle Devices | Fast Forward Time | Realtime

Connections

Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

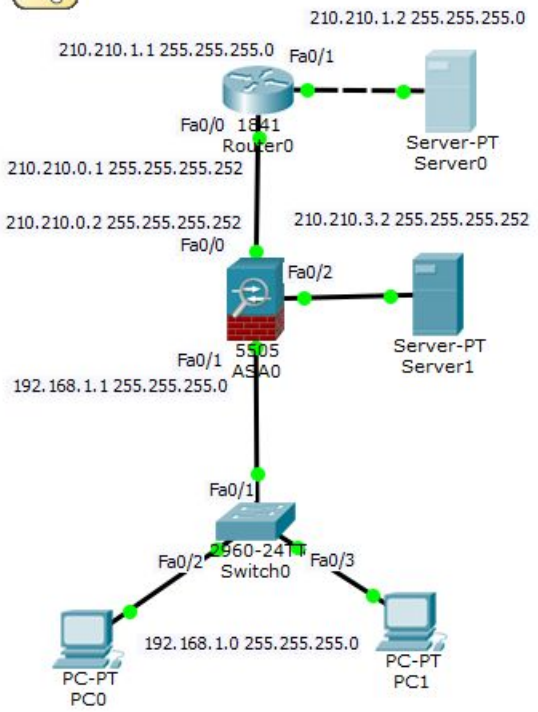
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

ENG 2:10 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверяем доступность Web-сервера*:* «ping 210.210.3.2».

Связь есть!!!

Server0

Physical | Config | Services | Desktop | Custom Interface

Web Browser X

< > URL http://210.210.3.2 Go Stop

Cisco Packet Tracer

Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.

Quick Links:
A small page
Copyrights
Image page
Image

Time: 26:56:11 | Power Cycle Devices | Fast Forward Time | Realtime

Connections

Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

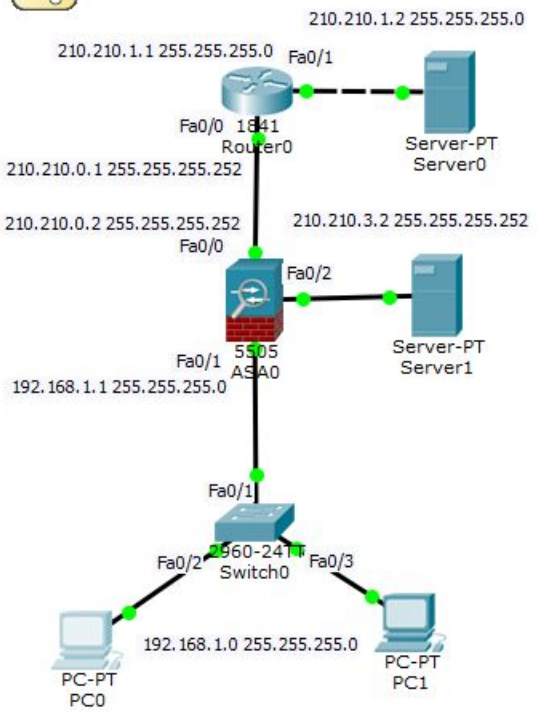
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

РУС 2:12 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object



Проверяем теперь связь Локального компьютера с нашим сервером:

«ping 210.210.3.2».

Связи нет!

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
    Minimum = 11ms, Maximum = 11ms, Average = 11ms

PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Reply from 210.210.1.2: bytes=32 time=24ms TTL=126
Reply from 210.210.1.2: bytes=32 time=11ms TTL=126
Reply from 210.210.1.2: bytes=32 time=10ms TTL=126
Reply from 210.210.1.2: bytes=32 time=3ms TTL=126

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 24ms, Average = 12ms

PC>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>
```

Time: 43:43:54 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

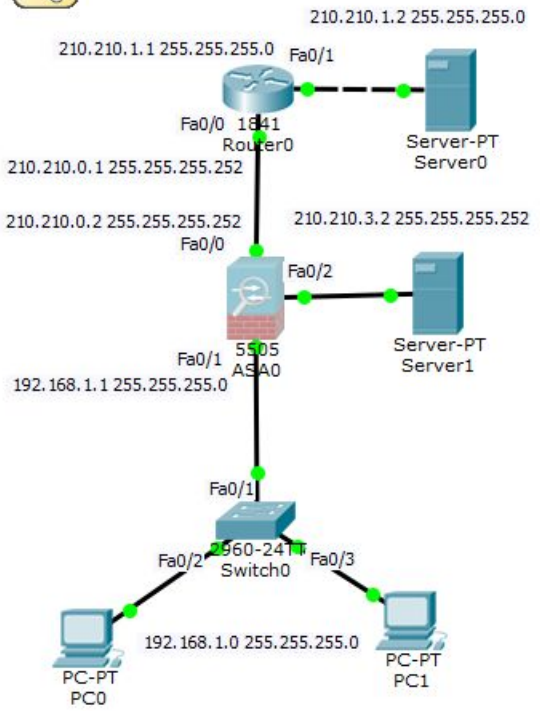
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete

РУС 19:00 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построени

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Objec



ASA0

Physical Config CLI

ASA Command Line Interface

```
!
interface Ethernet0/7
!
interface Vlan1
 nameif inside
 security-level 95
 ip address 192.168.1.1 255.255.255.0
!
interface Vlan2
 nameif outside
 security-level 0
 ip address 210.210.0.2 255.255.255.252
!
interface Vlan3
 no forward interface Vlan1
 nameif dmz
 security-level 50
 ip address 210.210.3.1 255.255.255.252
!
object network FOR-NAT
 subnet 192.168.1.0 255.255.255.0
!
<--- More --->
```

Copy Paste

Снова зайдём в настройки межсетевого экрана, наберём:

«show run».

Связи нет из-за строки «no forward interface Vlan1»**.**

На реальном оборудовании можно было бы убрать эту строку и проблема бы исчезла.

Таким образом, мы настроили DMZ ***только лишь указав уровень доверия*** «security-level 50» ***и прописав несколько*** Access List***-ов.***

Time: 43:47:47 Power Cycle Devices Fast Forward Time

Realtime

Connections

Copper Straight-Through

Scenario 0 New Delete Toggle PDU List Window

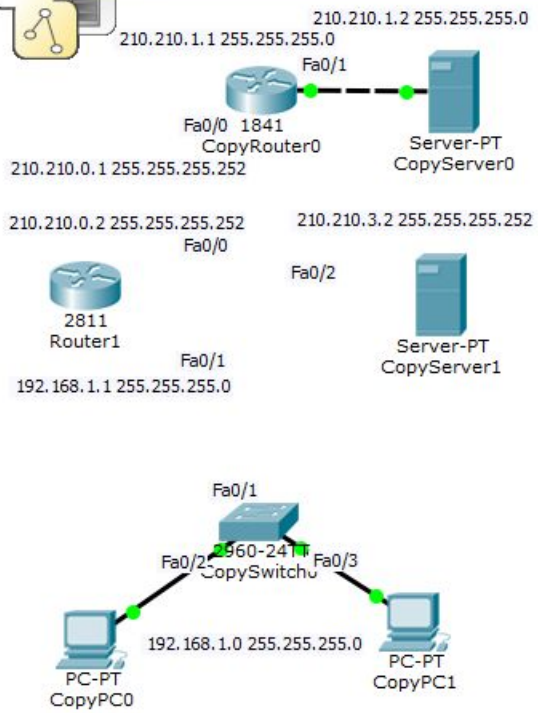
Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete

ENG 19:04 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

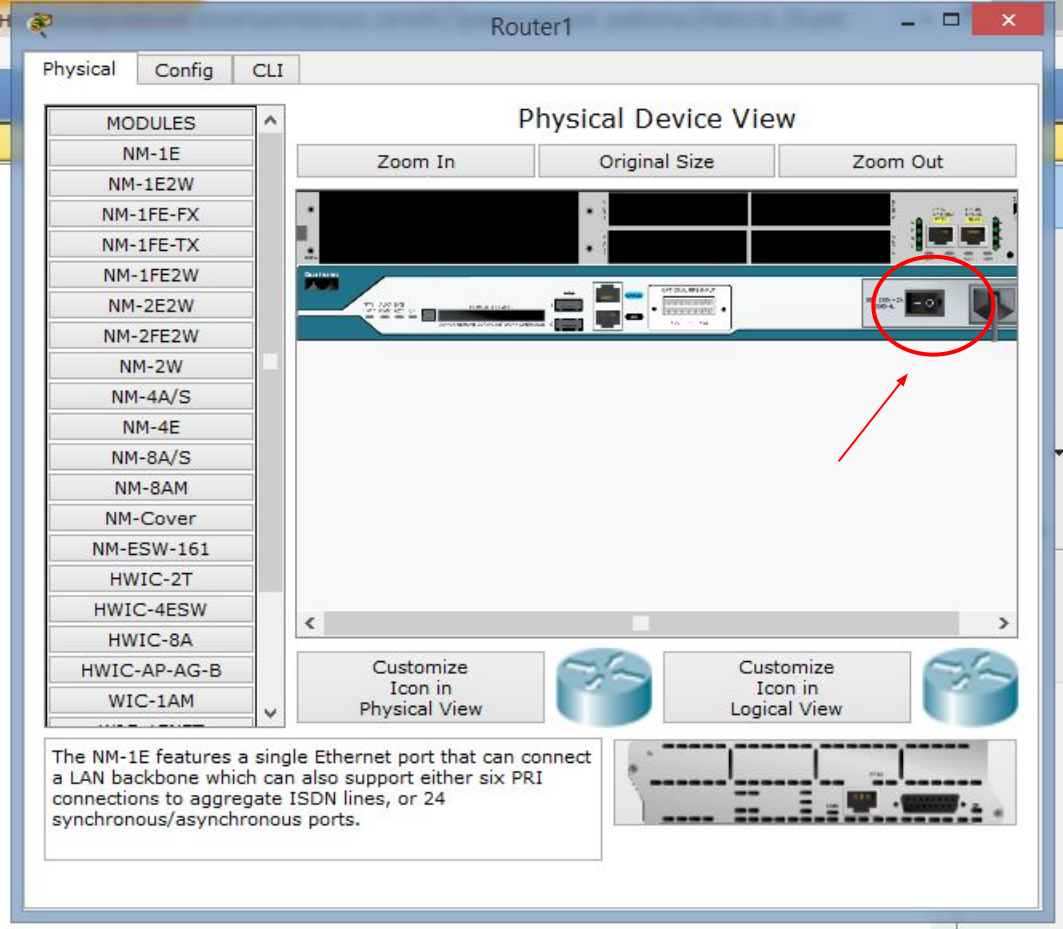
File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Попробуем реализовать ту же задачу, заменив ASA ***на маршрутизатор*** 2811.

У данного маршрутизатора имеется два сетевых интерфейса. Добавим третий. Для этого сначала выключим маршрутизатор.



Time: 00:08:57 | Power Cycle Devices | Fast Forward Time | Realtime

Routers | 1841 | 1941 | 2620XM | 2621XM | 2811 | 2901 | 2911 | 819 | Generic | Generic

Router-PT

Scenario 0 | New | Delete | Toggle PDU List Window

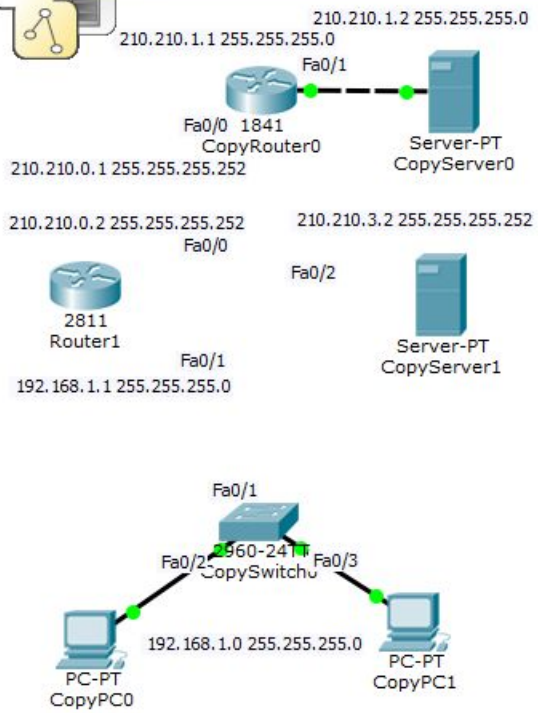
Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete

РУС 19:32 14.01.2020

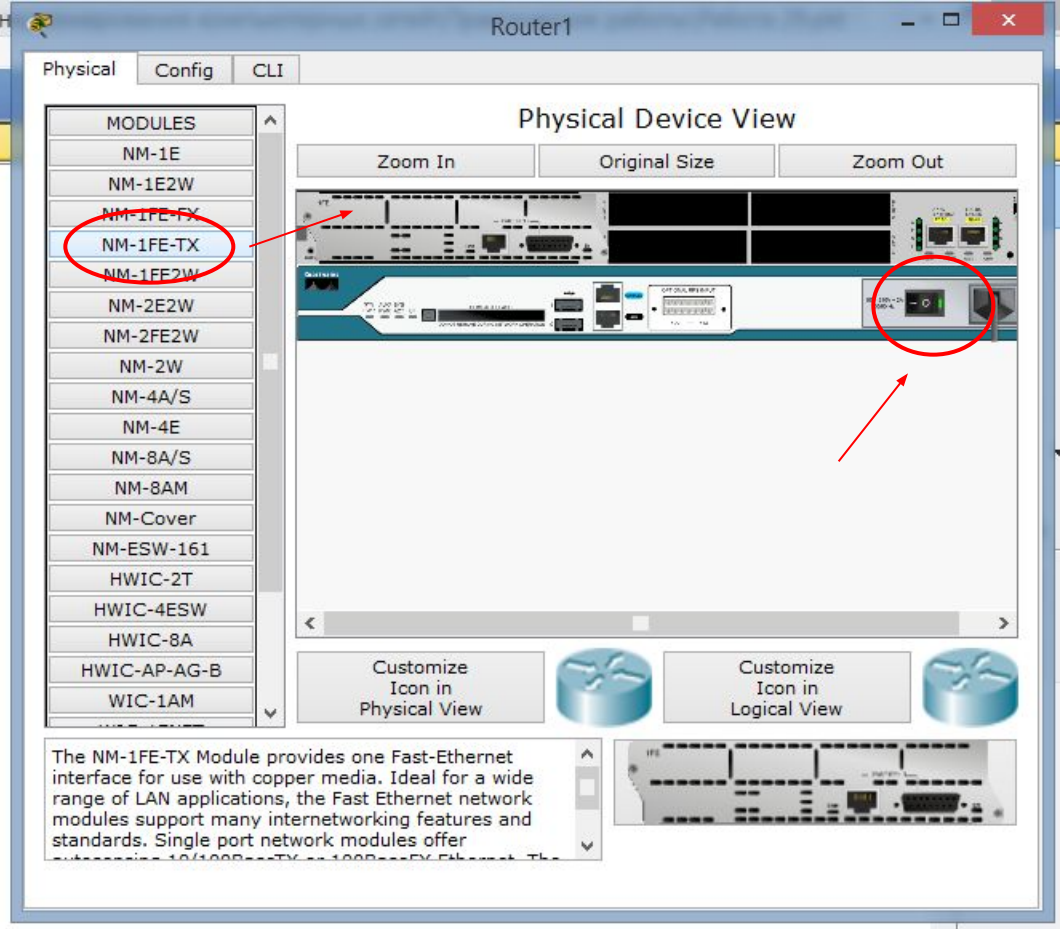
Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Перетаскиваем модуль на маршрутизатор. Снова включаем маршрутизатор. Переходим в CLI. Подключим кабели к маршрутизатору.



Time: 00:17:01 | Power Cycle Devices | Fast Forward Time | Realtime

Routers

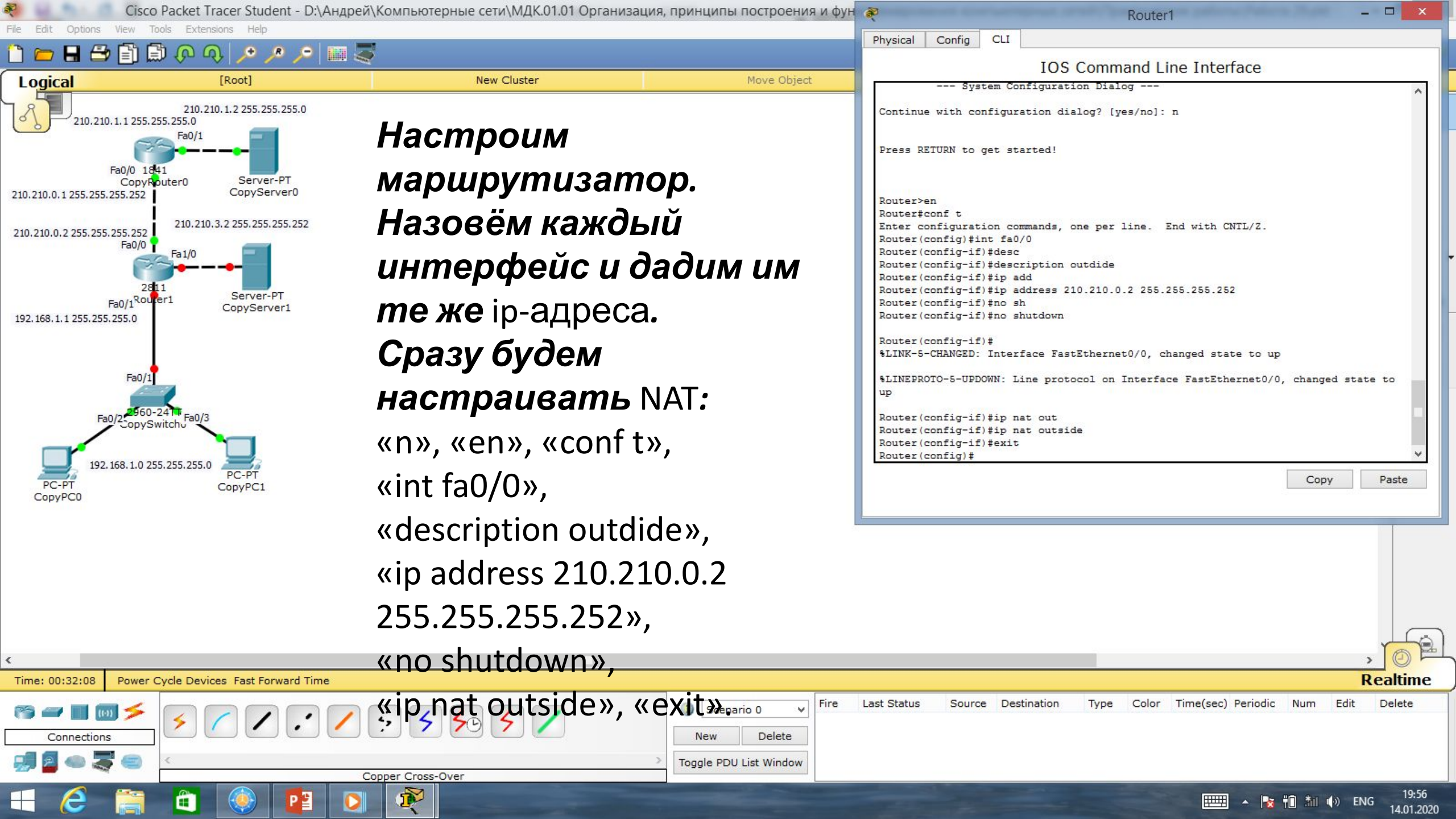
1841 1941 2620XM 2621XM 2811 2901 2911 819 Generic Generic

Router-PT

Scenario 0 | New | Delete | Toggle PDU List Window

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

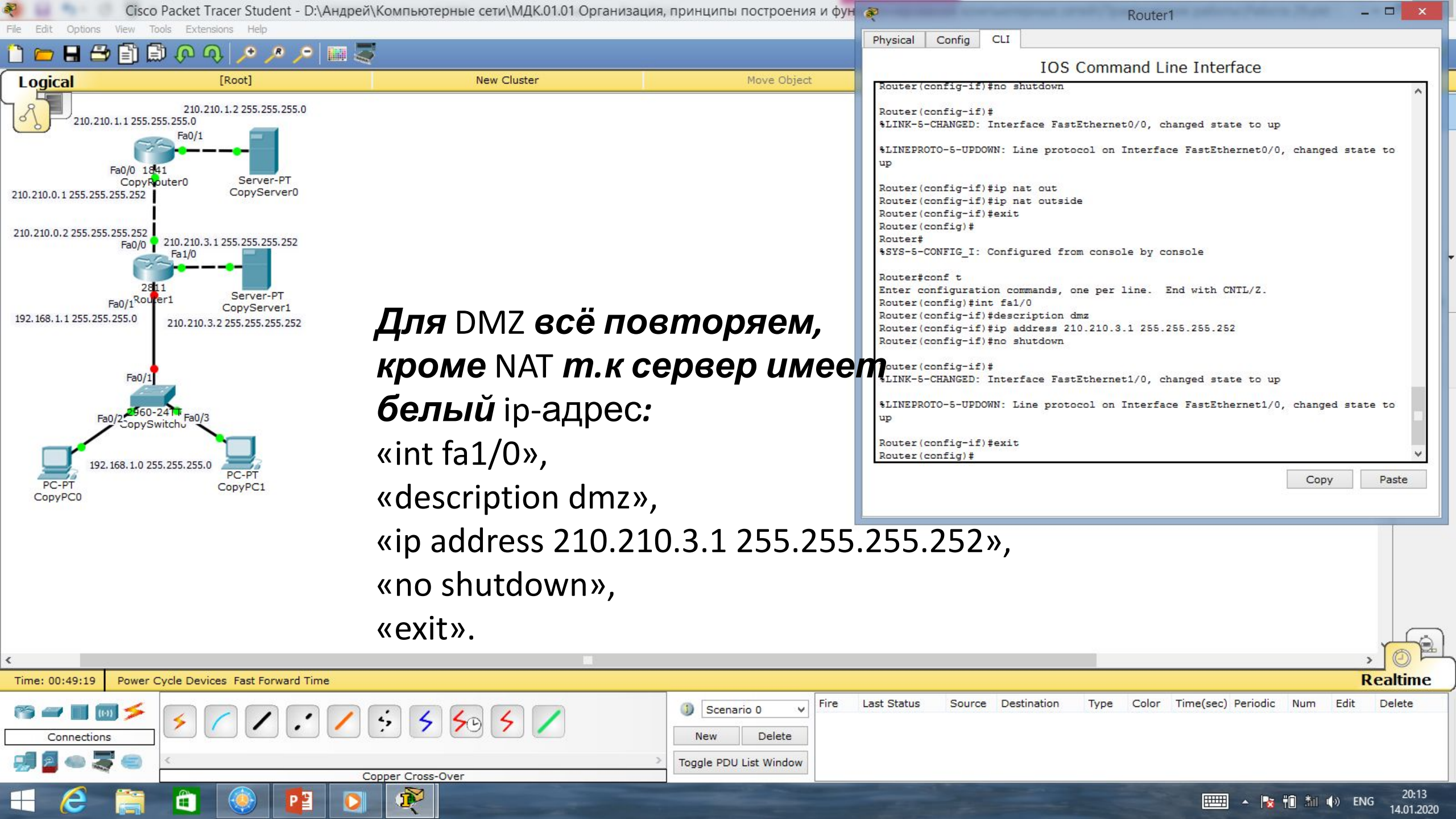
РУС 19:41 14.01.2020



Настроим маршрутизатор. Назовём каждый интерфейс и дадим им те же ip-адреса***.***

Сразу будем настраивать NAT***:***

«n», «en», «conf t»,
«int fa0/0»,
«description outdide»,
«ip address 210.210.0.2 255.255.255.252»,
«no shutdown»,
«ip nat outside», «exit»



Для DMZ ***всё повторяем, кроме*** NAT ***т.к сервер имеет белый*** ip-адрес***:***

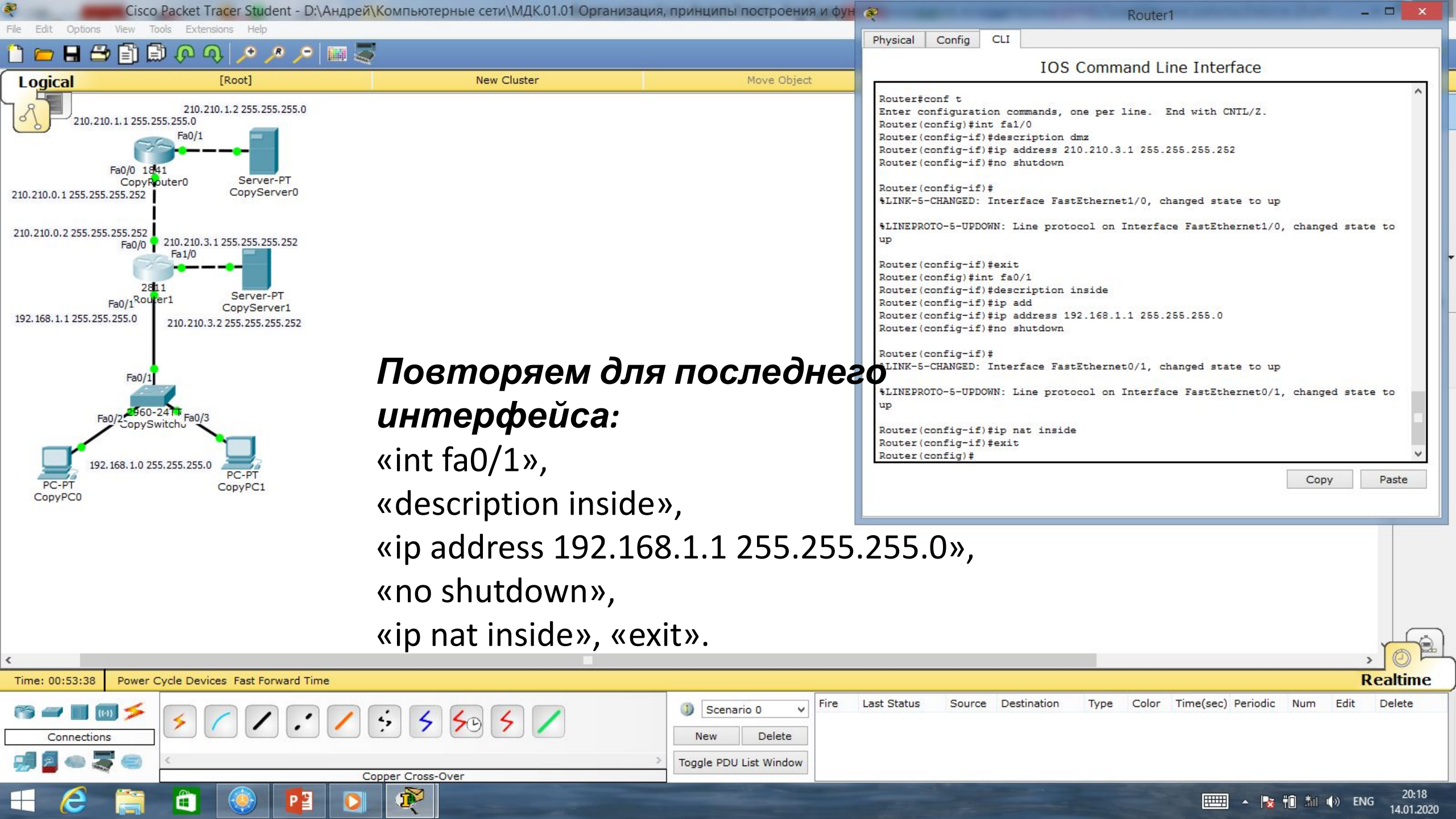
«int fa1/0»,

«description dmz»,

«ip address 210.210.3.1 255.255.255.252»,

«no shutdown»,

«exit».



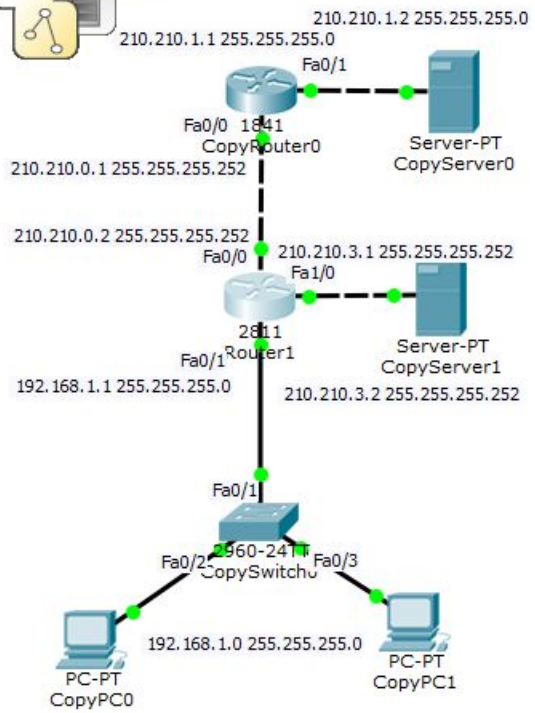
Повторяем для последнего интерфейса:

«int fa0/1»,
«description inside»,
«ip address 192.168.1.1 255.255.255.0»,
«no shutdown»,
«ip nat inside», «exit».

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Создадим разрешающий
Access List
с именем FOR-NAT***:***
«ip access-list standard FOR-NAT»,
«permit 192.168.1.0 0.0.0.255»,
«exit».

Router1

Physical | Config | CLI

IOS Command Line Interface

```
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to
up

Router(config-if)#exit
Router(config)#int fa0/1
Router(config-if)#description inside
Router(config-if)#ip add
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(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

Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#ip acc
Router(config)#ip access-list st
Router(config)#ip access-list standard FOR-NAT
Router(config-std-nacl)#perm
Router(config-std-nacl)#permit 192.168.1.0 0.0.0.255
Router(config-std-nacl)#exit
Router(config)#
```

Copy | Paste

Time: 00:59:42 | Power Cycle Devices | Fast Forward Time

Realtime

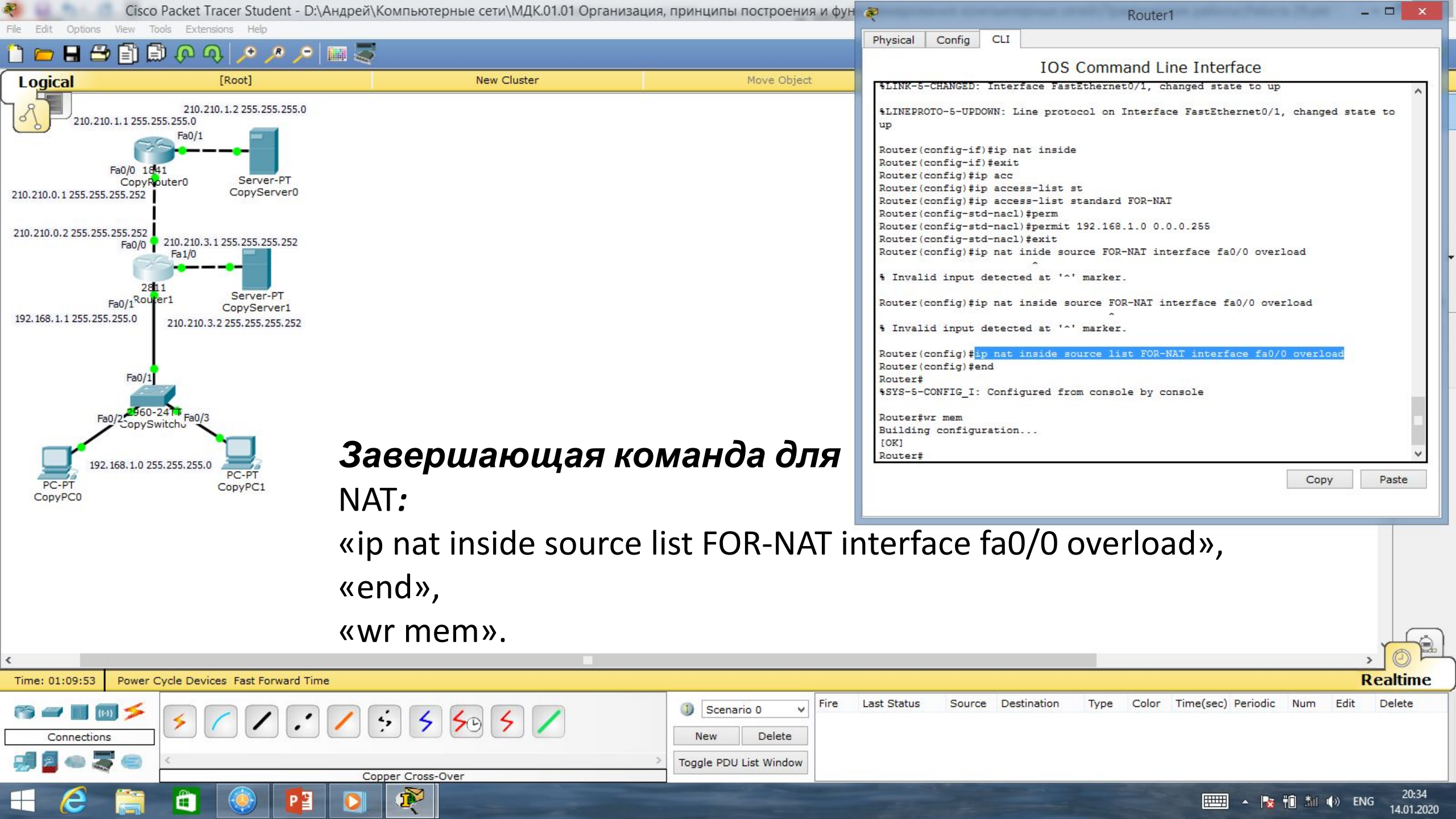
Connections

Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

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

ENG 20:24 14.01.2020

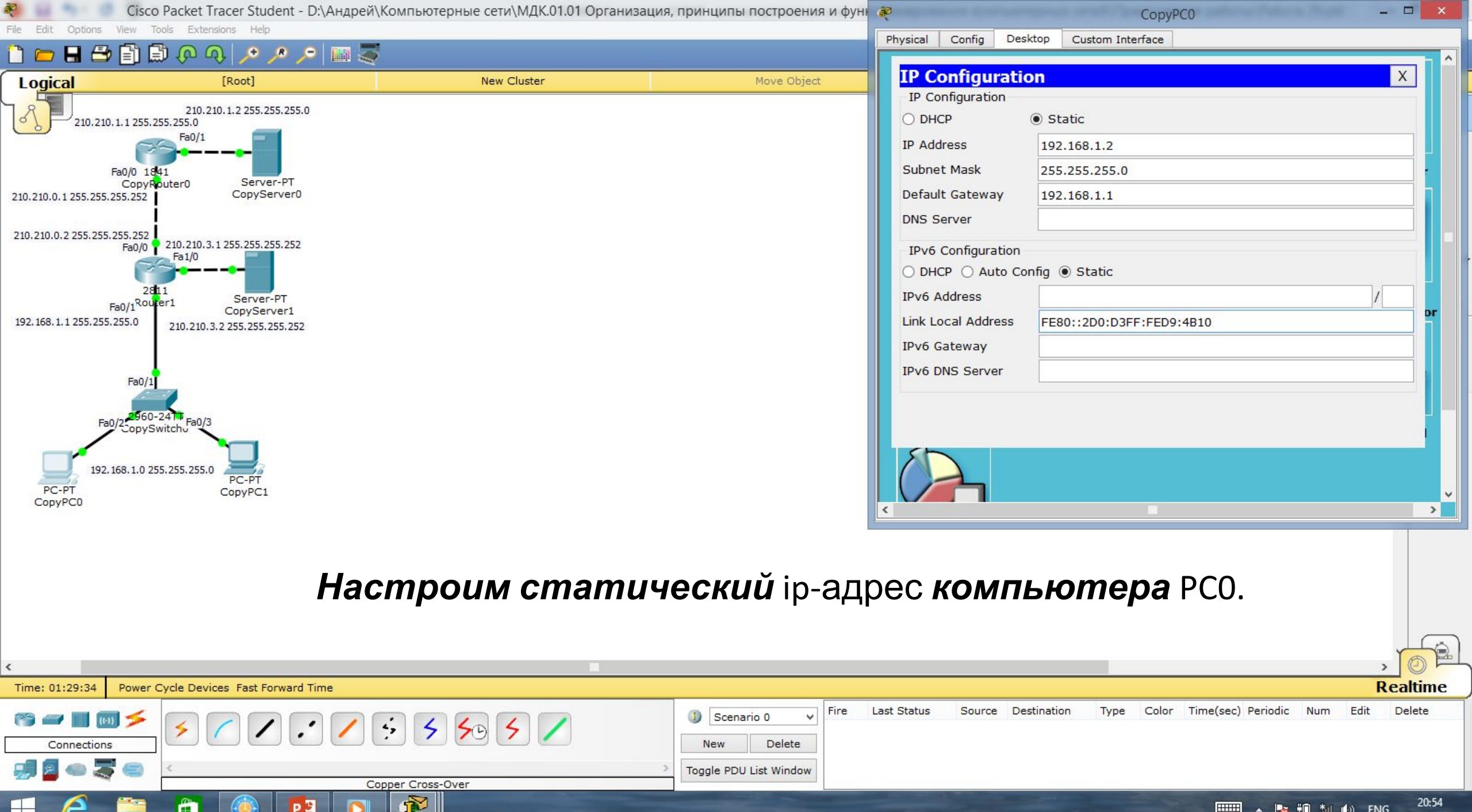


Завершающая команда для NAT***:***

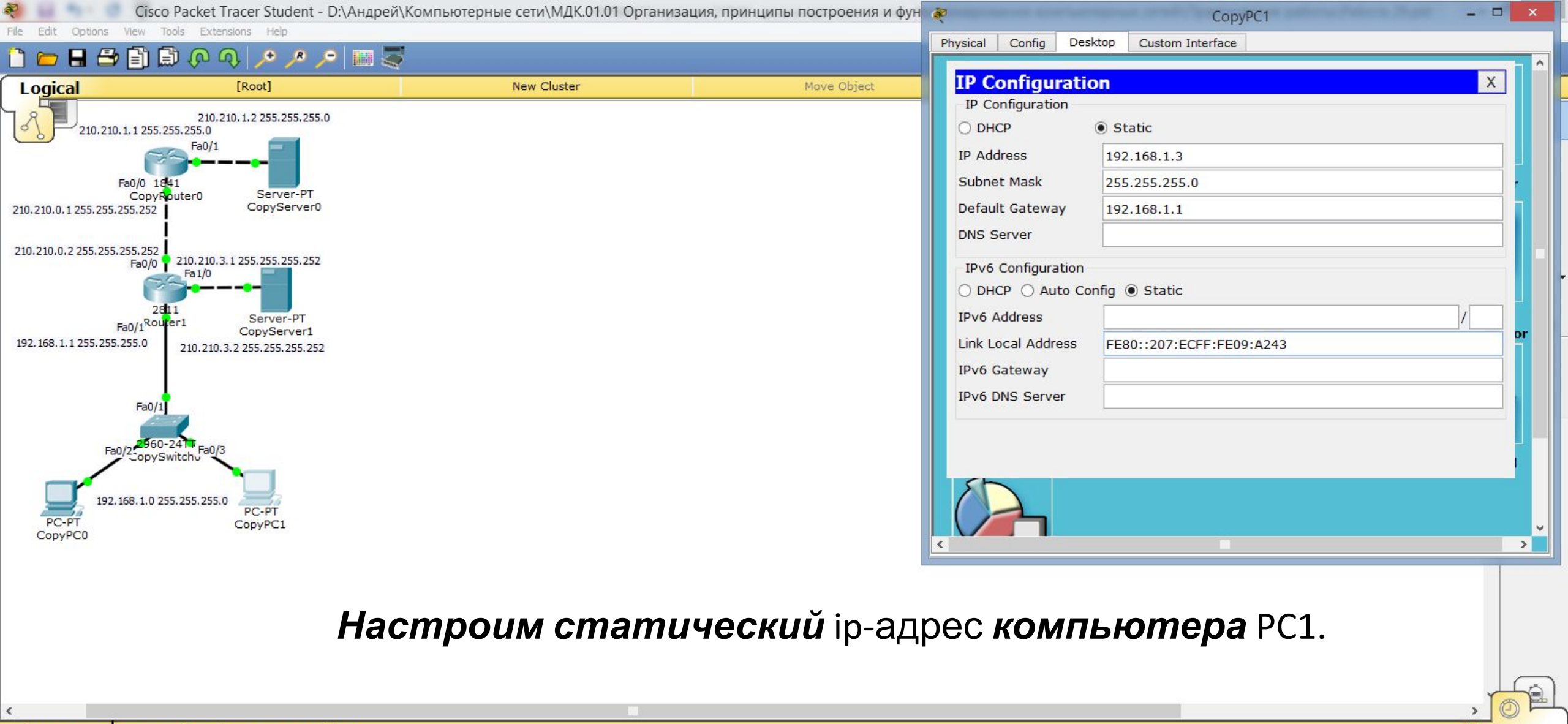
«ip nat inside source list FOR-NAT interface fa0/0 overload»,

«end»,

«wr mem».



Настроим статический ip-адрес ***компьютера*** PC0.

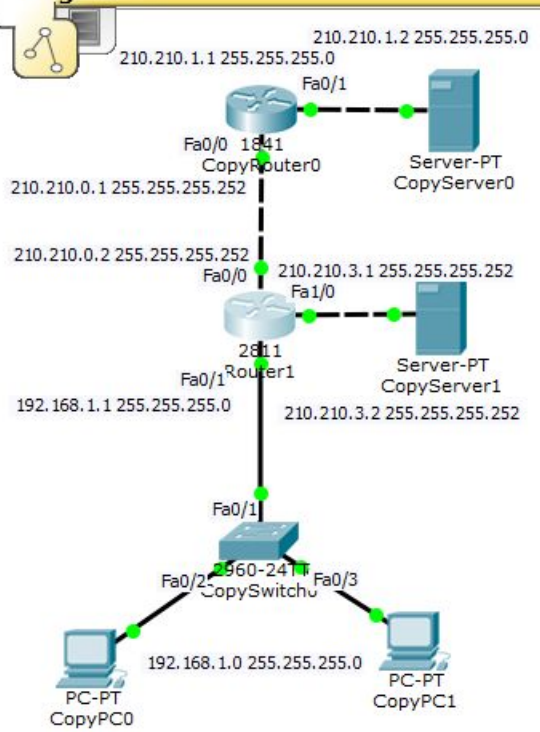


Настроим статический ip-адрес ***компьютера*** PC1.

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object



Проверим связь маршрутизатора со всеми узлами:

«ping 210.210.0.1».

Связь есть!

«ping 210.210.3.2»

Связь есть!

«ping 192.168.1.2»

Связь есть!

«ping 192.168.1.3»

Связь есть!

Router1

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#ping 210.210.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 210.210.0.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Router#ping 210.210.3.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 210.210.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/1/3 ms

Router#ping 192.168.1.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/1 ms

Router#ping 192.168.1.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/3 ms

Router#
```

Copy Paste

Time: 01:33:48 Power Cycle Devices Fast Forward Time

Realtime

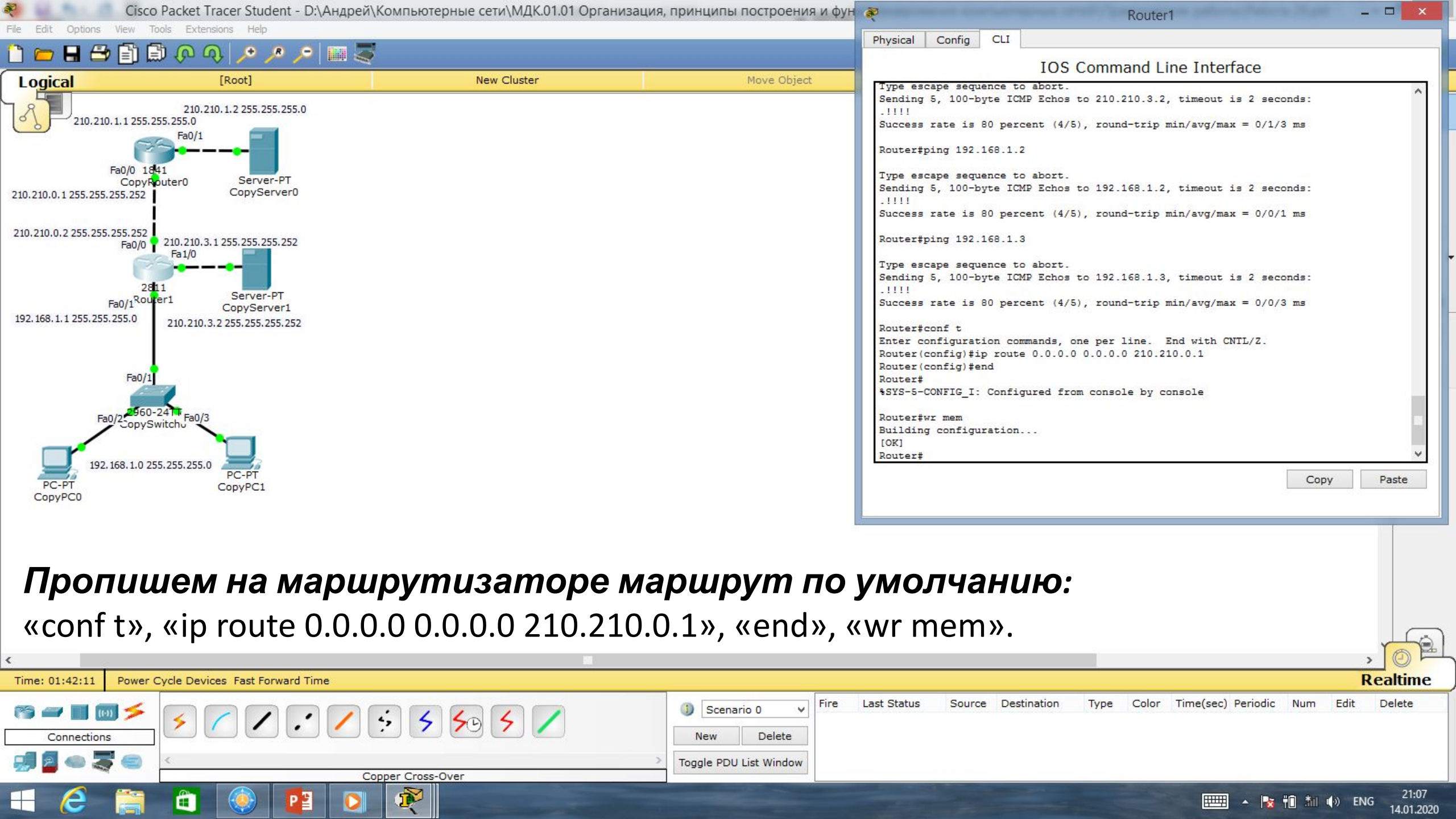
Connections

Copper Cross-Over

Scenario 0 New Delete Toggle PDU List Window

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

ENG 20:59 14.01.2020



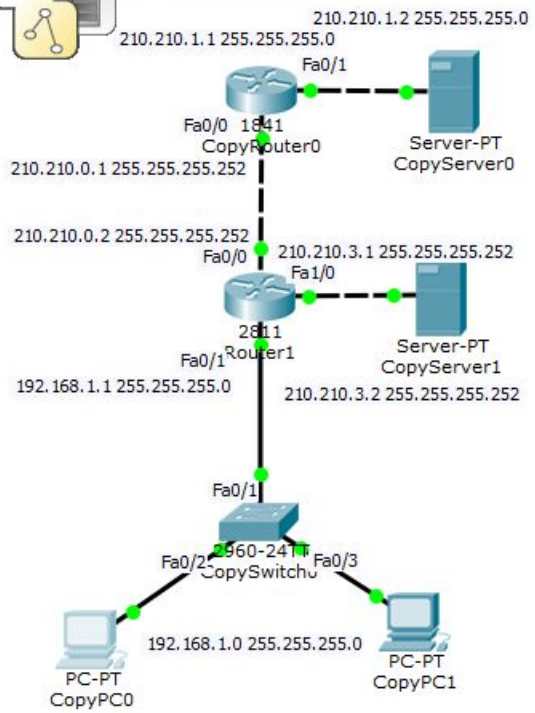
Пропишем на маршрутизаторе маршрут по умолчанию:

«conf t», «ip route 0.0.0.0 0.0.0.0 210.210.0.1», «end», «wr mem».

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверим связь компьютера с Интернет-сервером:

«ping 210.210.1.2».

Связь есть!

CopyPC0

Physical | Config | Desktop | Custom Interface

Command Prompt

```
PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Request timed out.
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Reply from 210.210.1.2: bytes=32 time=1ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

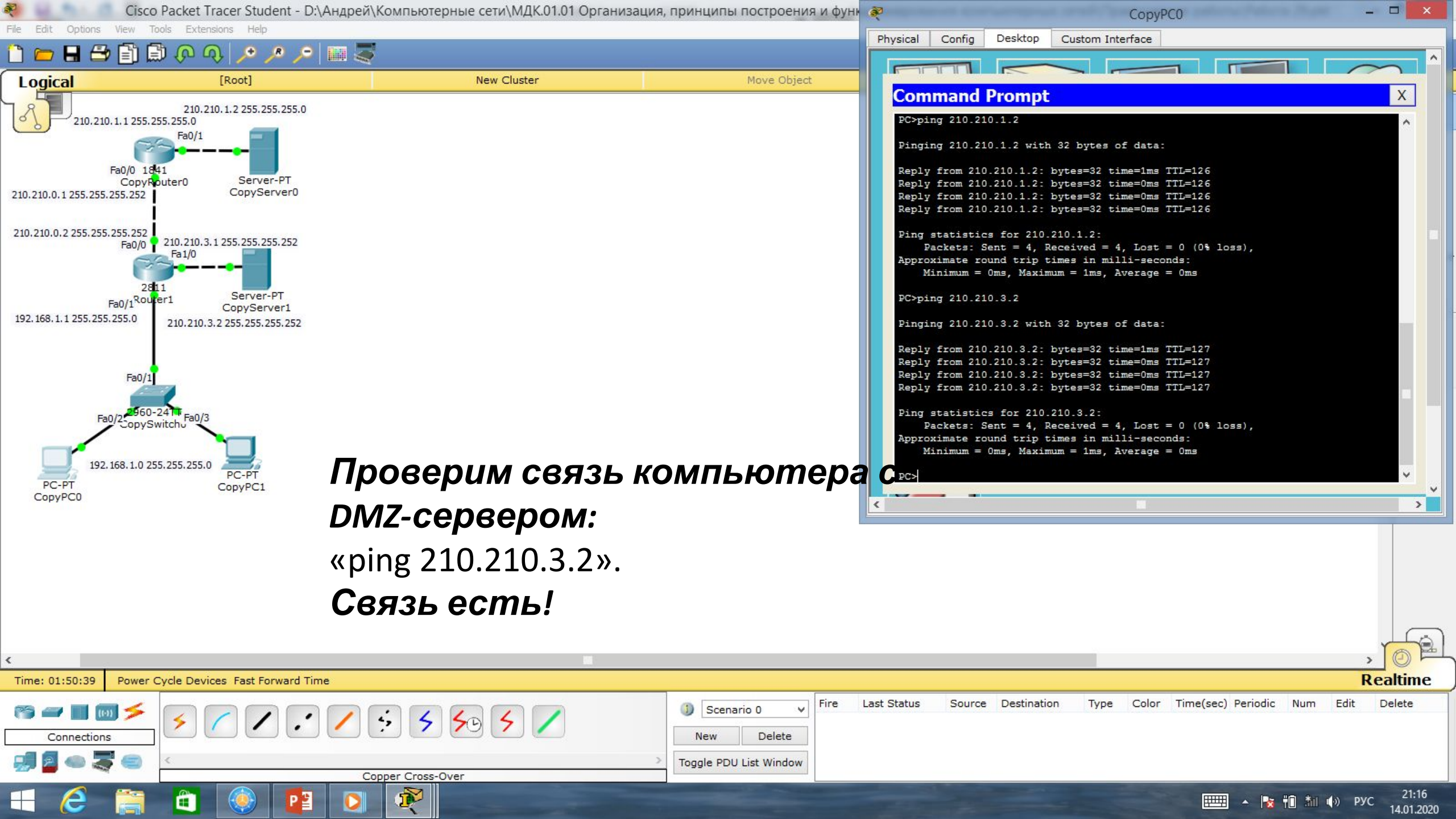
Time: 01:46:39 | Power Cycle Devices | Fast Forward Time | Realtime

Connections | Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

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

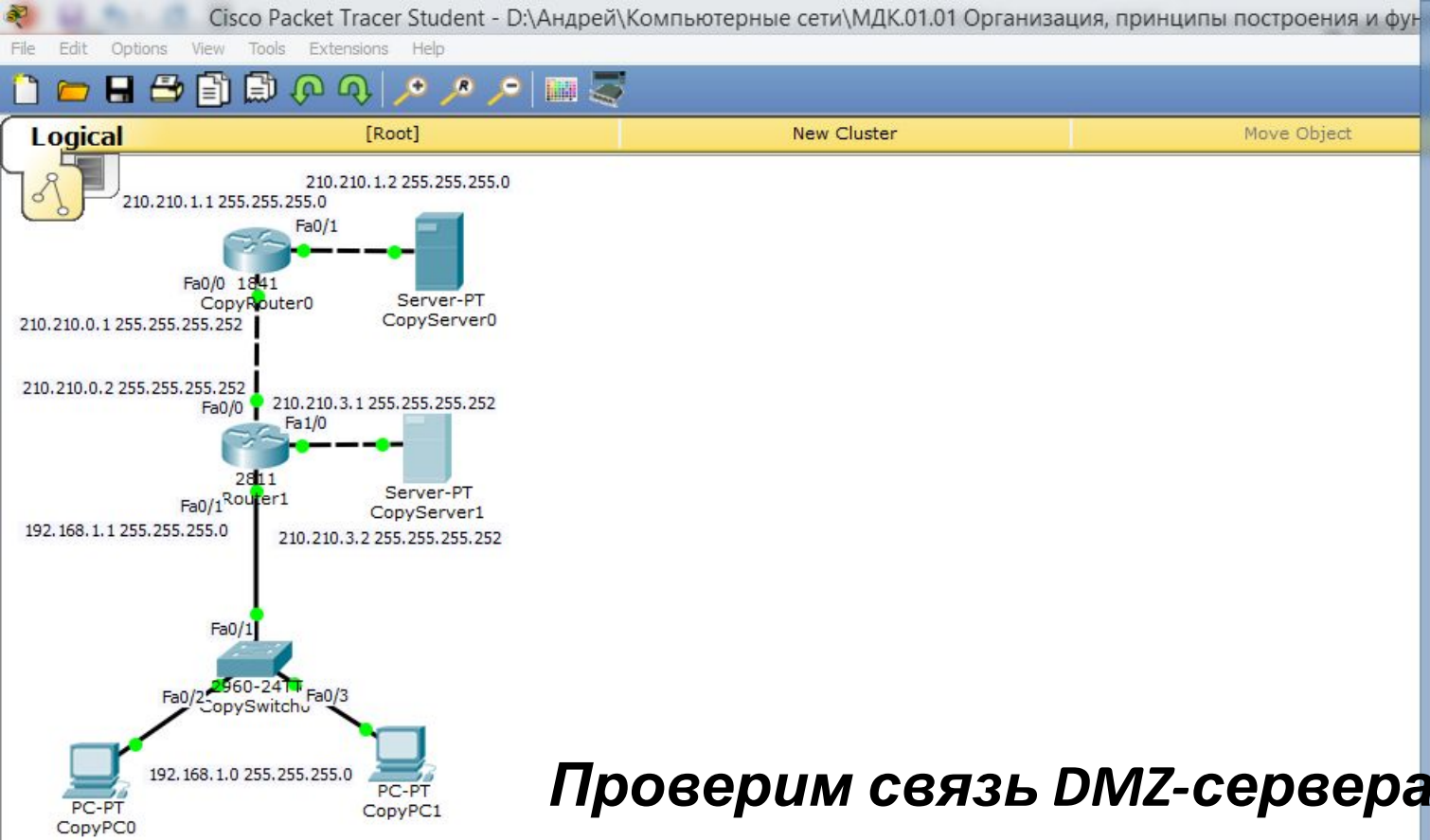
РУС 21:12 14.01.2020

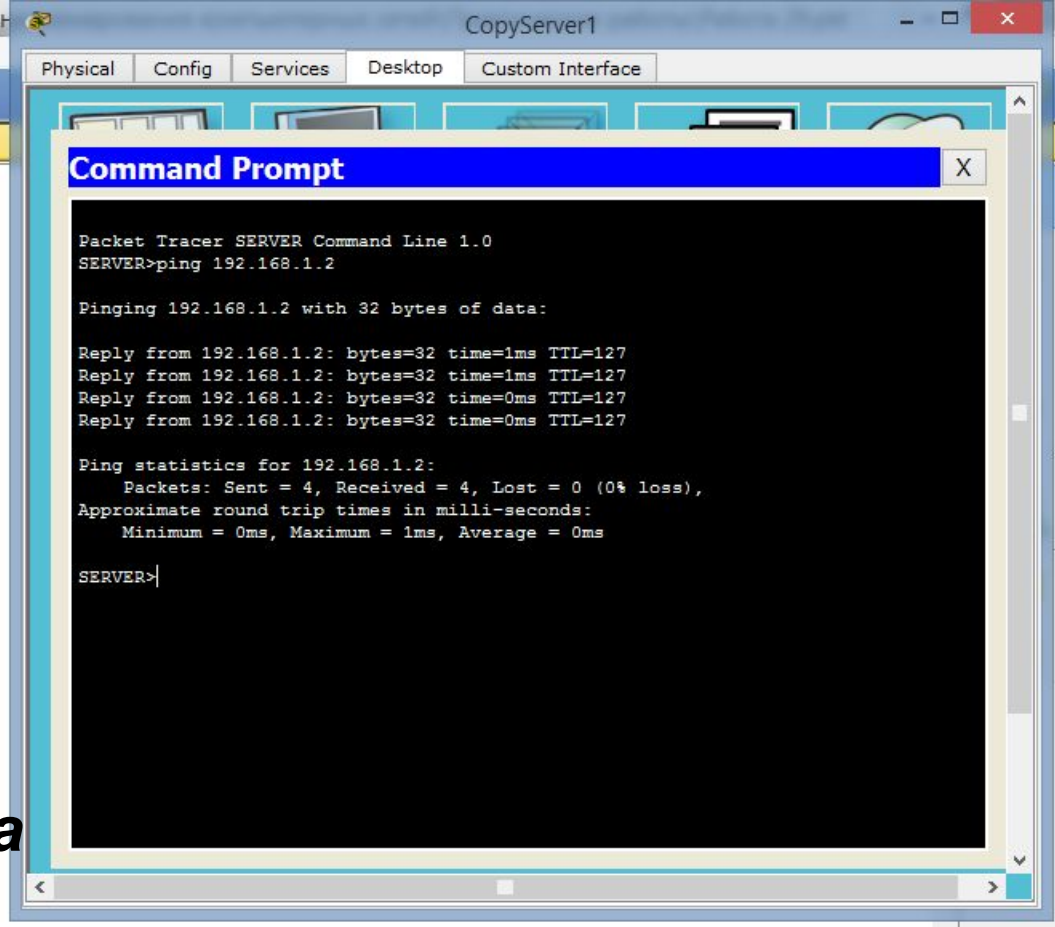


Проверим связь компьютера с DMZ-сервером:

«ping 210.210.3.2».

Связь есть!

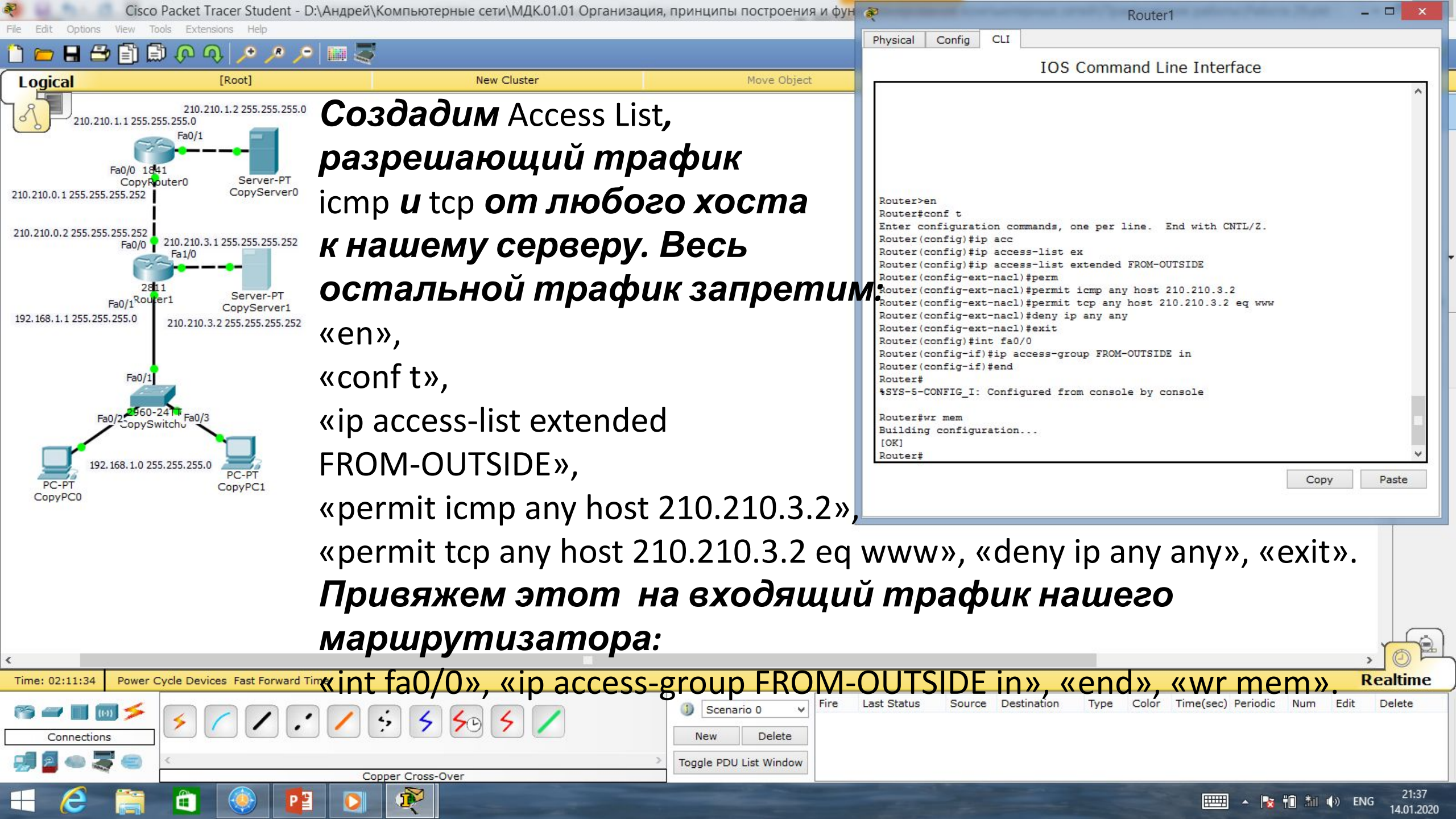




Проверим связь DMZ-сервера с компьютером:

«ping 192.168.1.2».

Связь тоже есть, а мы хотели защитить локальную сеть.



Создадим Access List***, разрешающий трафик*** icmp ***и*** tcp ***от любого хоста к нашему серверу. Весь остальной трафик запретим:***

«en»,

«conf t»,

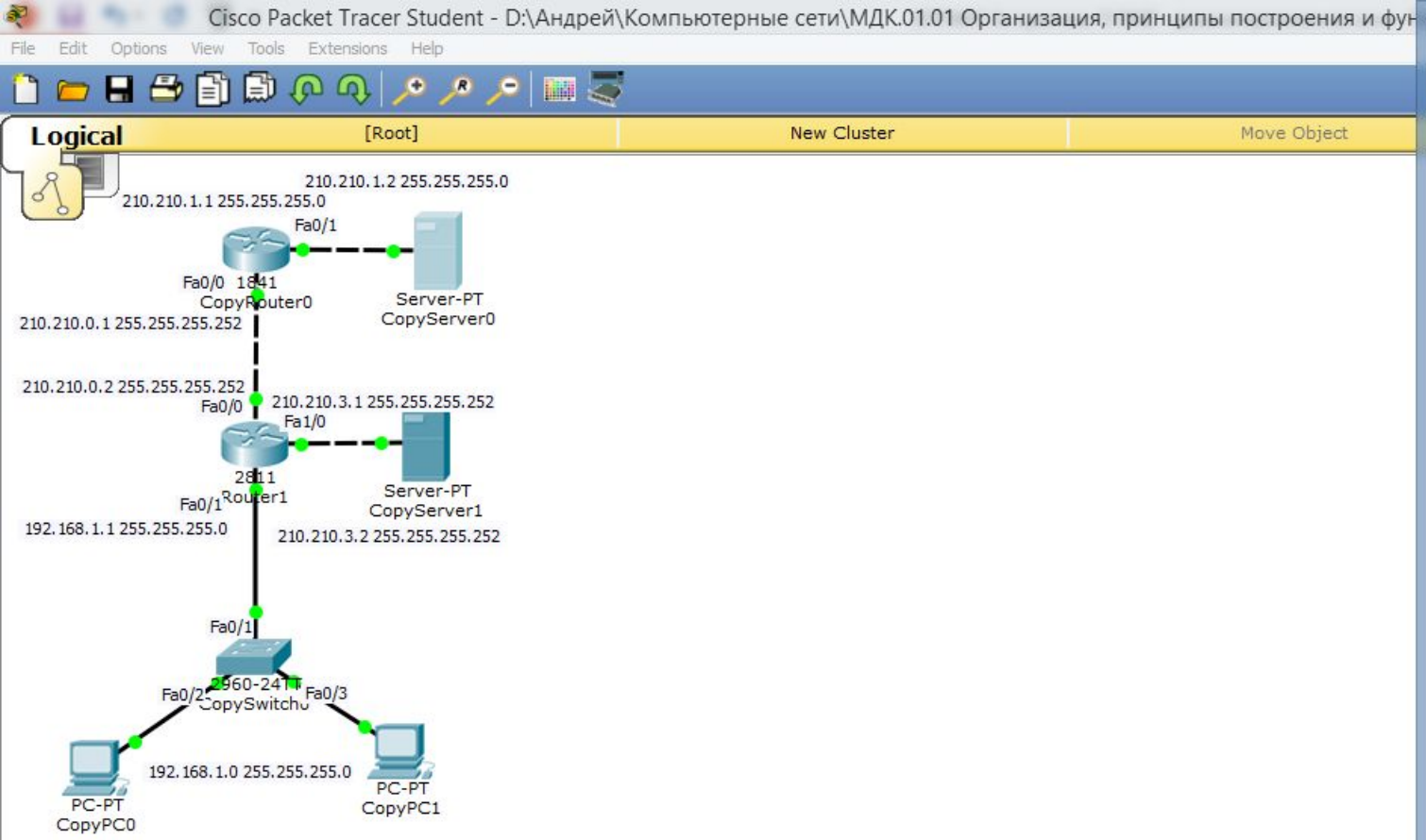
«ip access-list extended FROM-OUTSIDE»,

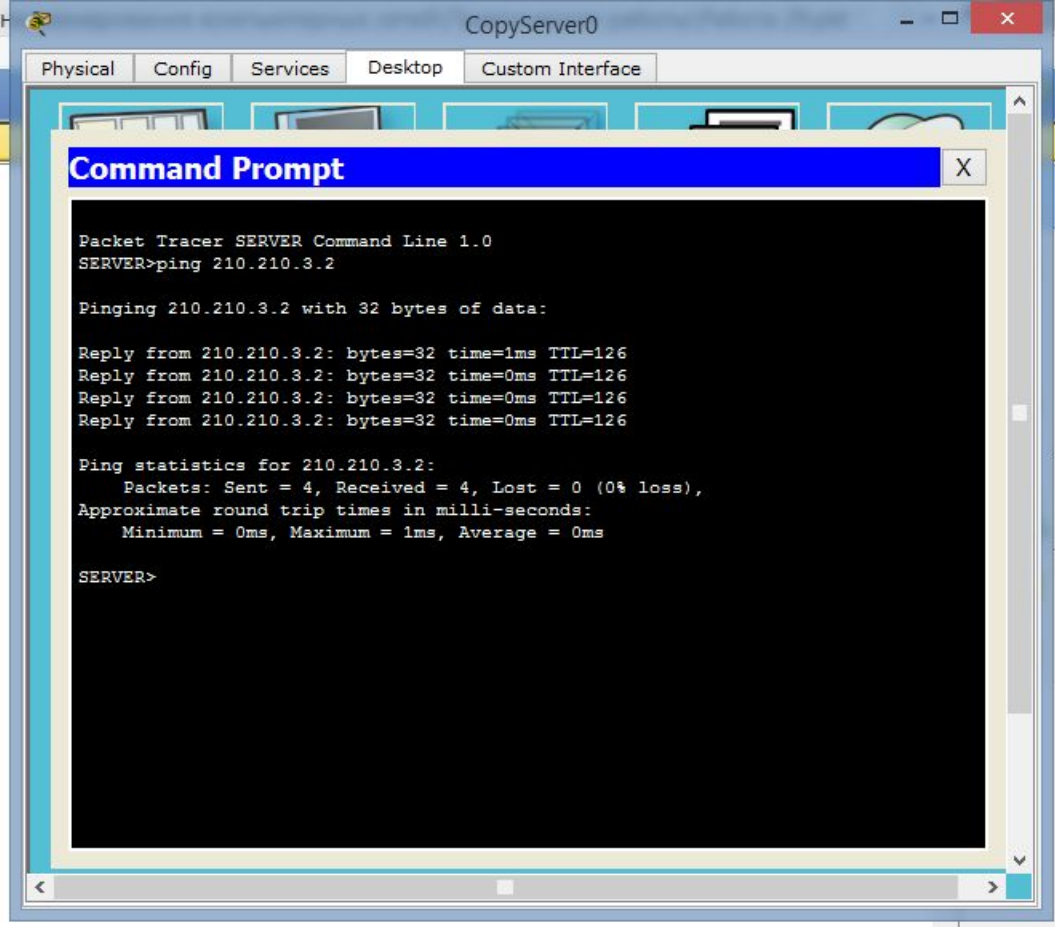
«permit icmp any host 210.210.3.2»,

«permit tcp any host 210.210.3.2 eq www», «deny ip any any», «exit».

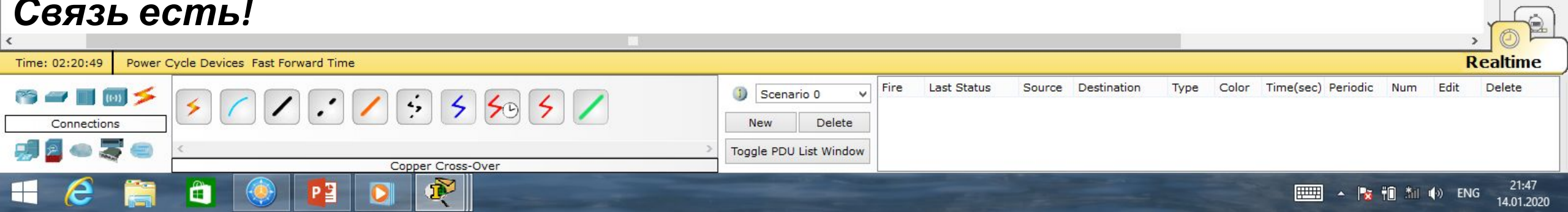
Привяжем этот на входящий трафик нашего маршрутизатора:

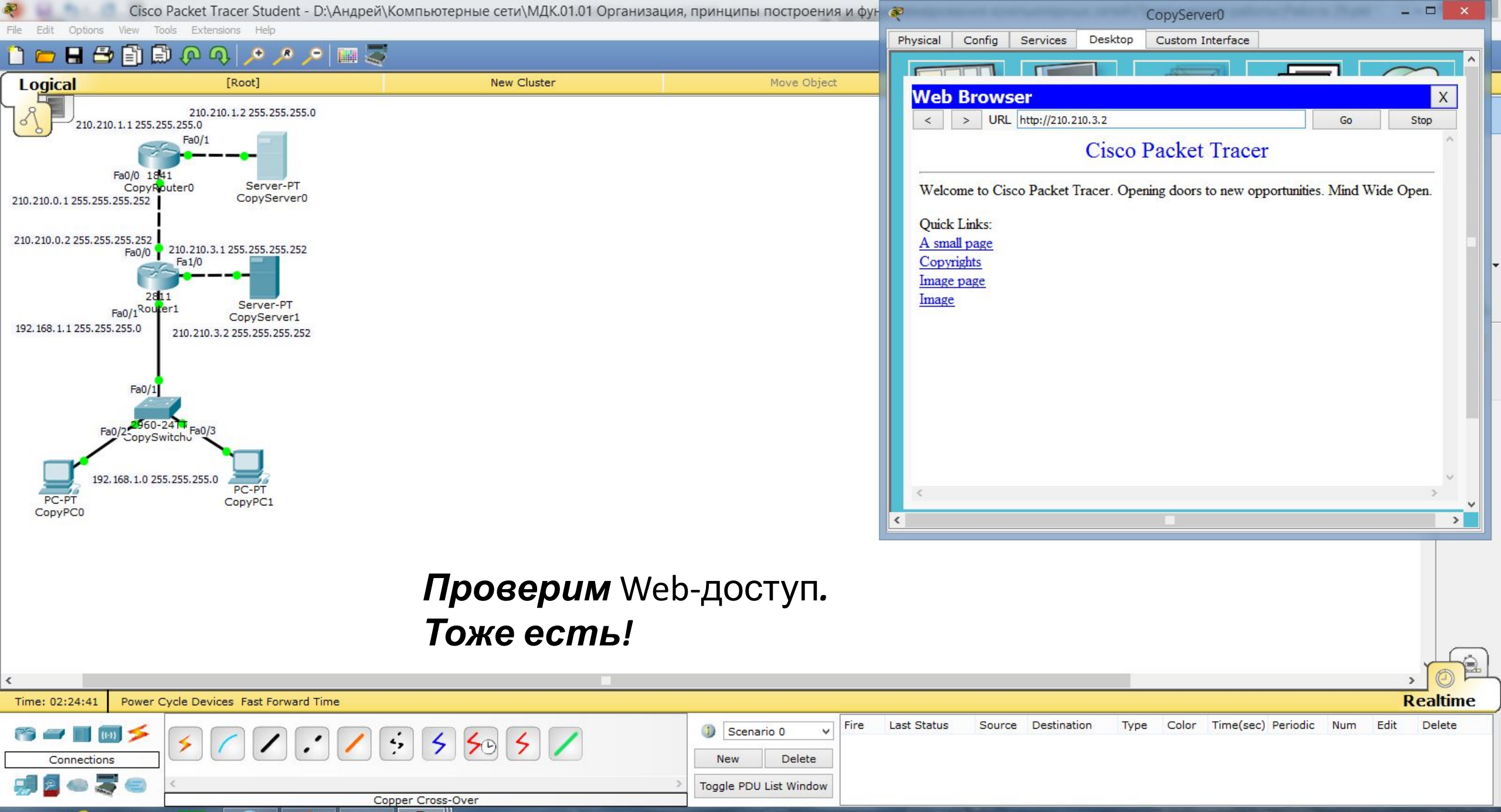
«int fa0/0», «ip access-group FROM-OUTSIDE in», «end», «wr mem».





Проверим связь Интернет-сервера ***с*** DMZ-сервером***:***
«ping 210.210.3.2».
Связь есть!



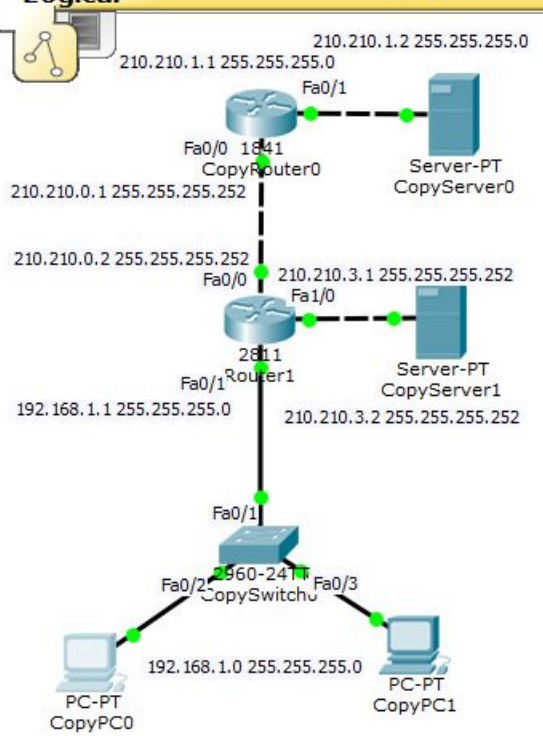


Проверим Web-доступ.
Тоже есть!

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фу

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Но при этом пропал доступ в Интернет:

«ping 210.210.1.2».

Связи нет.

Это связано с Access List***, которым мы разрешили Трафик только до публичного сервера.***

Применим технологию инспектирования трафика.

CopyPC0

Physical | Config | Desktop | Custom Interface

Command Prompt

```
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Reply from 210.210.3.2: bytes=32 time=1ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>
```

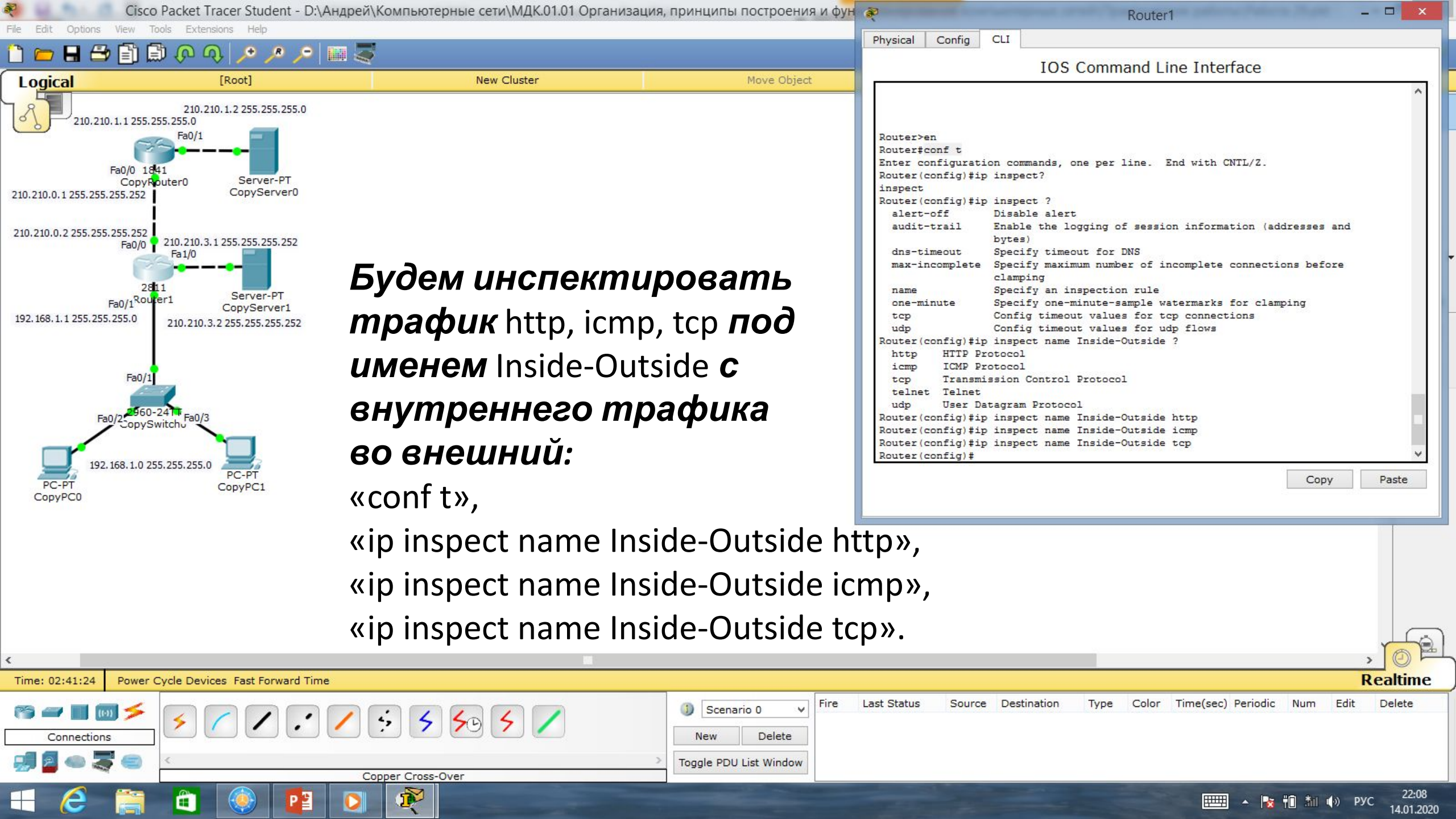
Time: 02:27:28 | Power Cycle Devices | Fast Forward Time | Realtime

Connections | Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

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

РУС 21:53 14.01.2020



Будем инспектировать трафик http, icmp, tcp ***под именем*** Inside-Outside ***с внутреннего трафика во внешний:***

«conf t»,

«ip inspect name Inside-Outside http»,

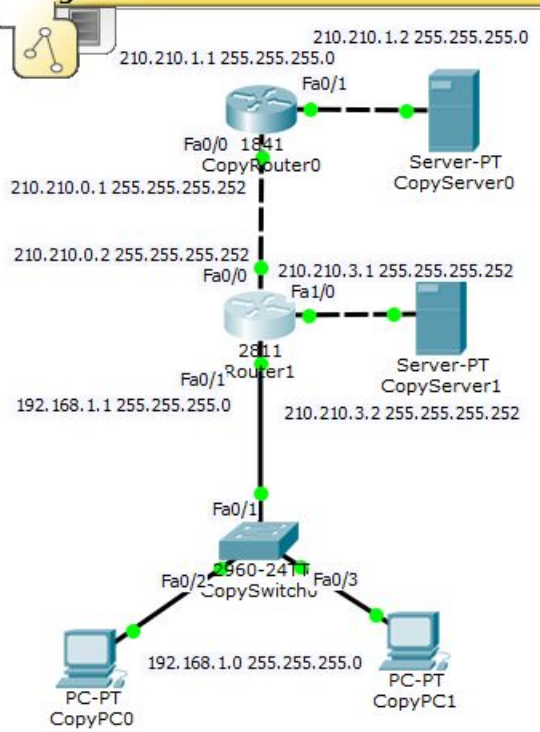
«ip inspect name Inside-Outside icmp»,

«ip inspect name Inside-Outside tcp».

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Укажем направление, в котором трафик нужно инспектировать:

«int fa0/0»,

«ip inspect Inside-Outside in»

«end», «wr mem».

Теперь трафик, который выходит из нашей сети заносится в таблицу маршрутизатора.

При возвращении запросов, маршрутизатор знает, что их нужно пропустить.

Router1

Physical | Config | CLI

IOS Command Line Interface

```
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#int fa0/1
Router(config-if)#ip inspect Inside-Outside in
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#
Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Copy | Paste

Time: 03:28:47 | Power Cycle Devices | Fast Forward Time | Realtime

Connections | Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

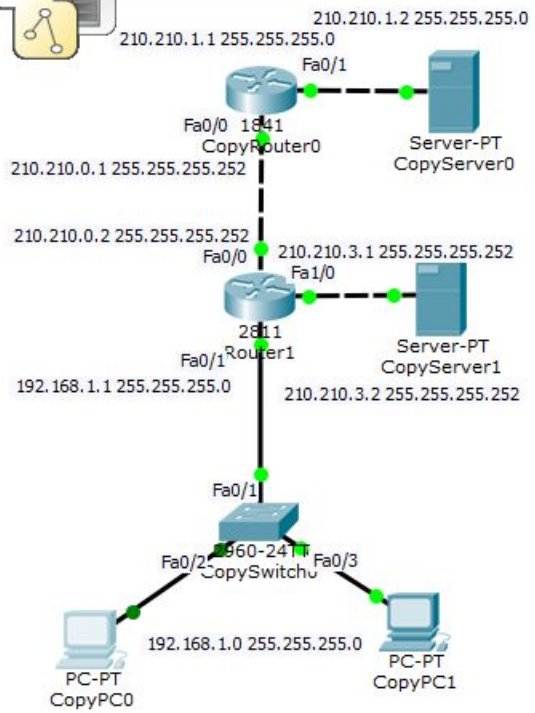
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

ENG 22:56 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Ещё раз проверим доступ в Интернет:

«ping 210.210.1.2».

Связь есть!!!

CopyPC0

Physical | Config | Desktop | Custom Interface

Command Prompt

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 210.210.1.2

Pinging 210.210.1.2 with 32 bytes of data:

Reply from 210.210.1.2: bytes=32 time=1ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=15ms TTL=126
Reply from 210.210.1.2: bytes=32 time=10ms TTL=126

Ping statistics for 210.210.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 15ms, Average = 6ms

PC>
```

Time: 03:30:33 | Power Cycle Devices | Fast Forward Time | Realtime

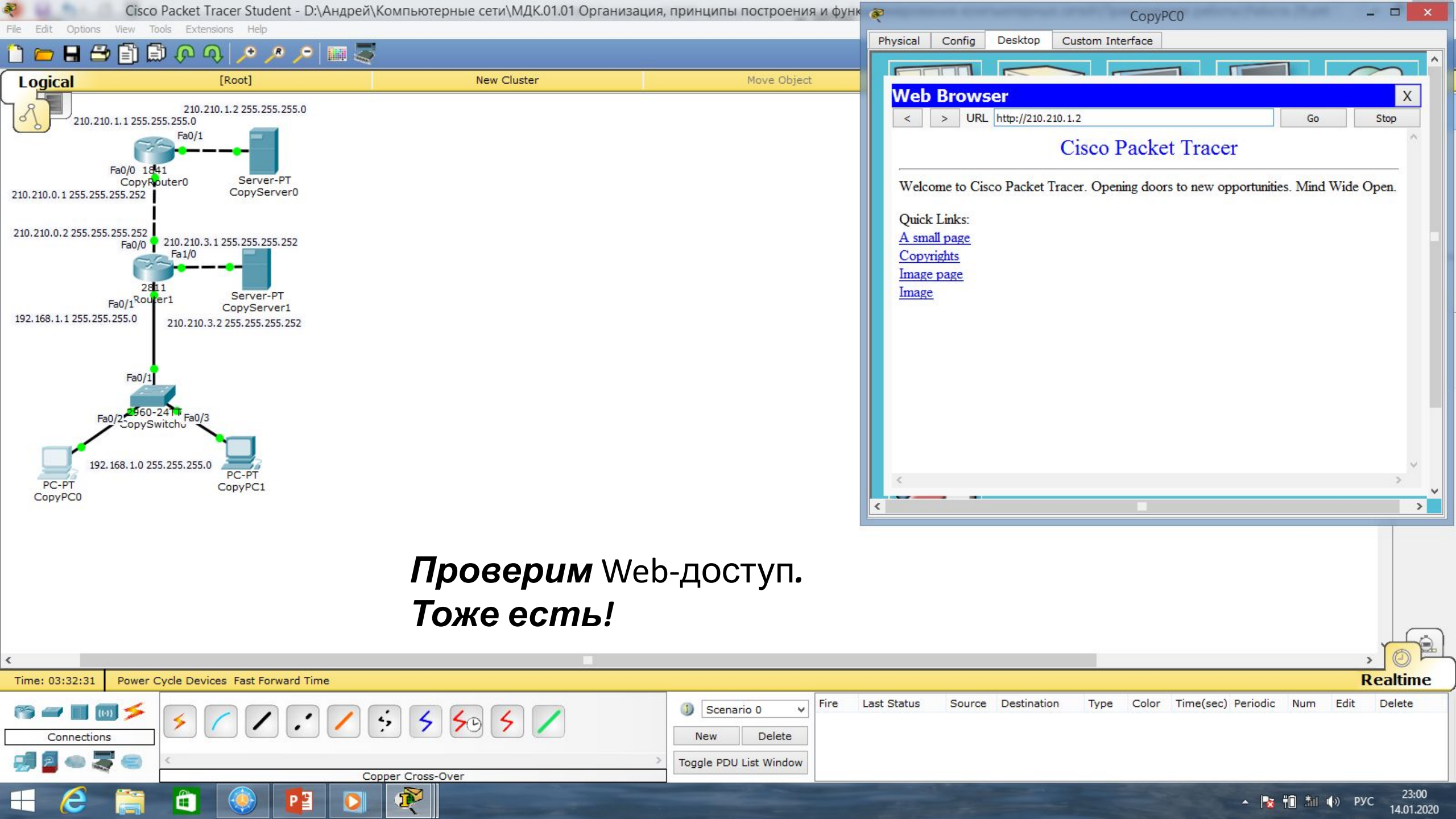
Connections

Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

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

ENG 22:58 14.01.2020

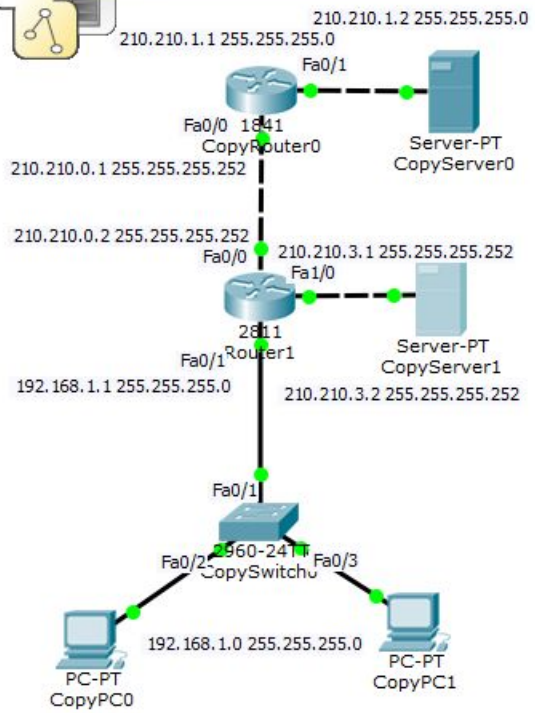


Проверим Web-доступ.
Тоже есть!

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и фун

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object



Сделаем аналогичные действия для DMZ***, то есть запретим трафик во внутреннюю сеть:***

«conf t»,
«ip access-list extended FROM-DMZ»,
«deny ip host 210.210.3.2 192.168.1.0 0.0.0.255»,
«permit ip any any», «exit»,
«ip access-group FROM-DMZ in», «end», «wr mem».

Router1

Physical Config CLI

IOS Command Line Interface

```
Router#
Router#
Router#
Router#
Router#
Router#
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip acc
Router(config)#ip access-list ex
Router(config)#ip access-list extended FROM-DMZ
Router(config-ext-nacl)#deny ip host 210.210.3.2 192.168.1.0 ?
  A.B.C.D  Destination wildcard bits
Router(config-ext-nacl)#deny ip host 210.210.3.2 192.168.1.0 0.0.0.255
Router(config-ext-nacl)#per
Router(config-ext-nacl)#permit ip any any
Router(config-ext-nacl)#
Router(config-ext-nacl)#exit
Router(config)#int fa1/0
Router(config-if)#ip acc
Router(config-if)#ip access-group FROM-DMZ in
Router(config-if)#
Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Copy Paste

Time: 04:00:25 Power Cycle Devices Fast Forward Time

Realtime

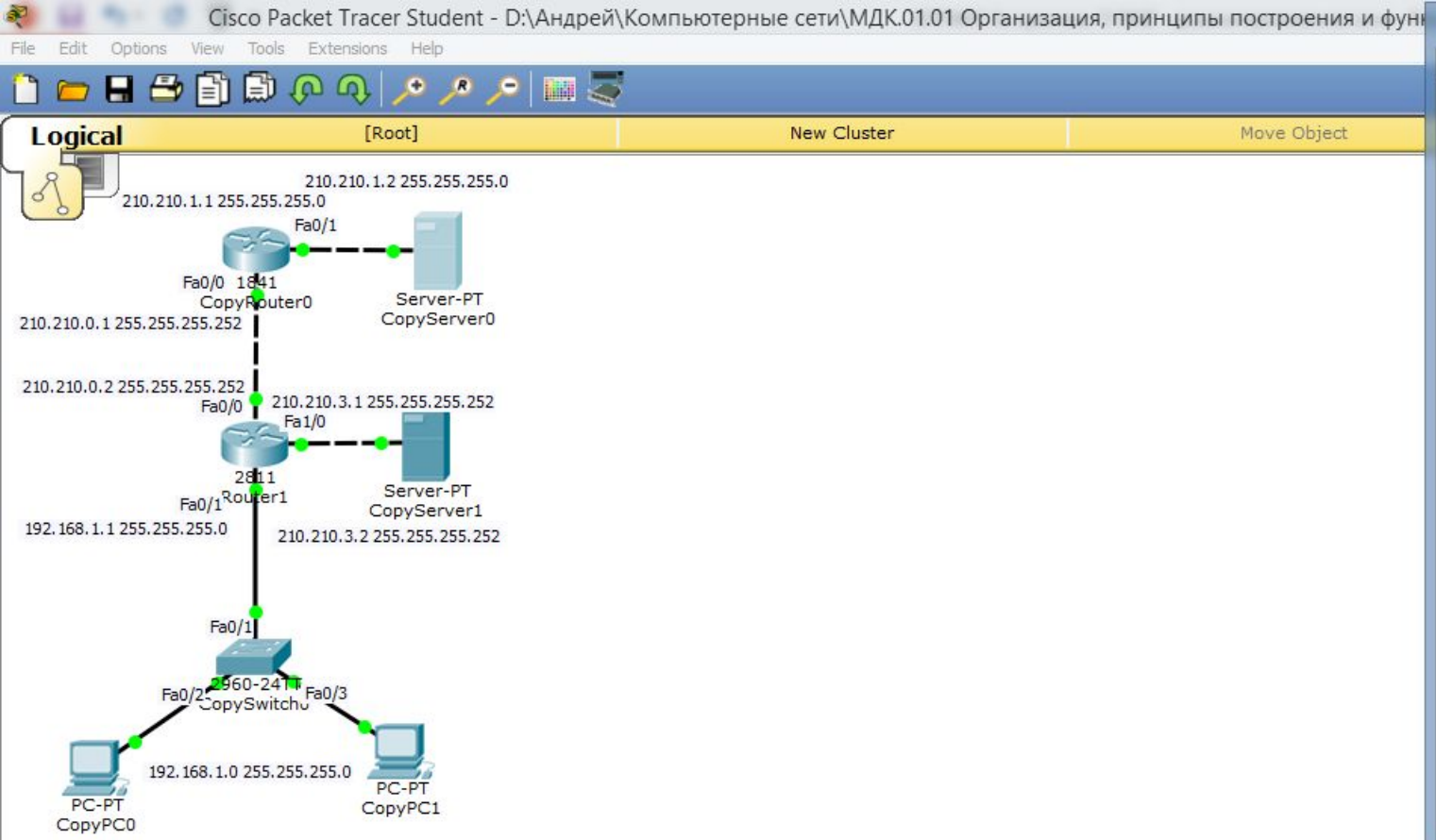
Connections

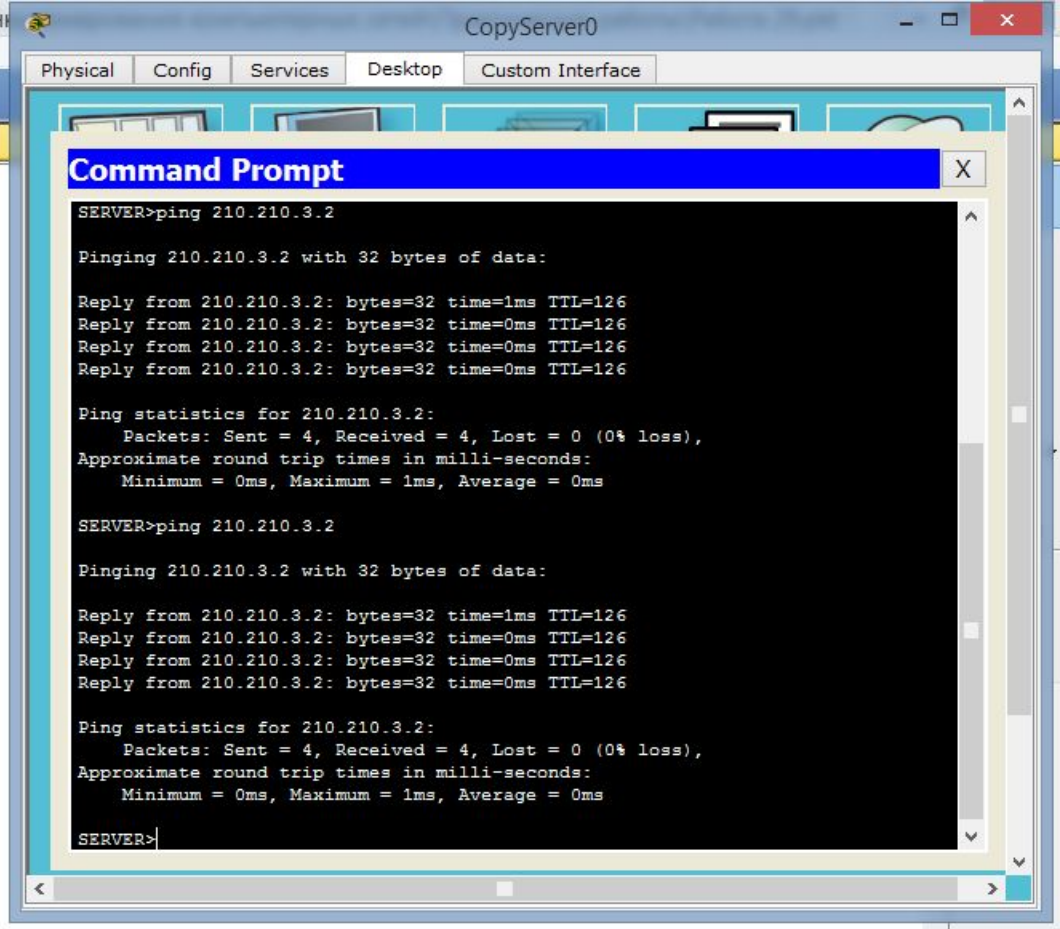
Copper Cross-Over

Scenario 0 New Delete Toggle PDU List Window

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

ENG 23:28 14.01.2020





Ещё раз проверим связь Интернет-сервера ***с*** DMZ-сервером***:***

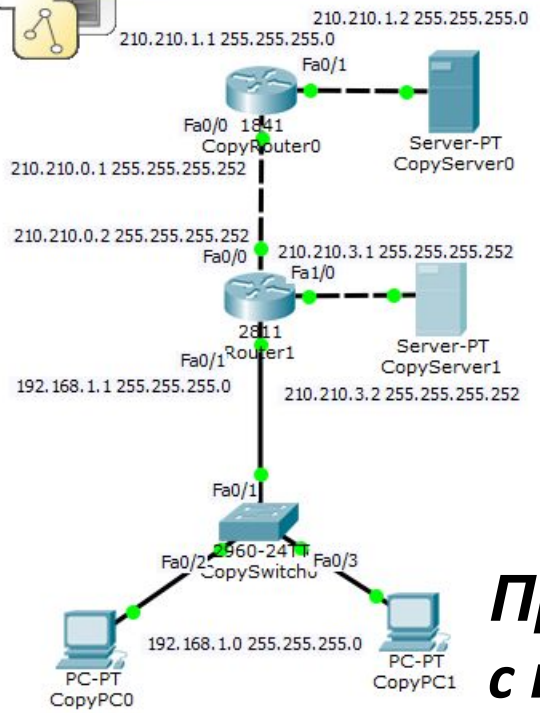
«ping 210.210.3.2».

Связь по прежнему есть!

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical [Root] New Cluster Move Object



Проверим связь DMZ-сервера с компьютером:

«ping 192.168.1.2».

Связи нет!!!

CopyServer1

Physical Config Services Desktop Custom Interface

Command Prompt X

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

SERVER>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.
Reply from 210.210.3.1: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>
```

Time: 04:08:33 Power Cycle Devices Fast Forward Time Realtime

Connections

Copper Cross-Over

Scenario 0 New Delete Toggle PDU List Window

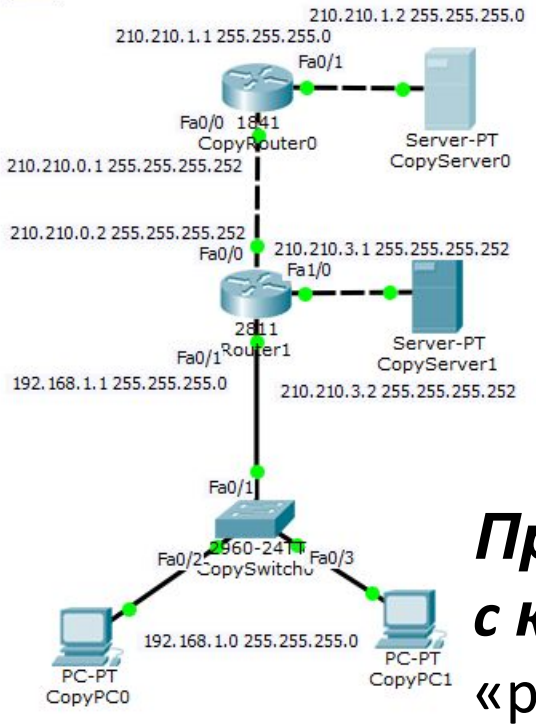
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

РУС 23:36 14.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверим связь Интернет-серве
с компьютером:
«ping 192.168.1.2».
Связи нет!!!

CopyServer0

Physical | Config | Services | Desktop | Custom Interface

Command Prompt X

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

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.
Reply from 210.210.1.1: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>
```

Time: 00:03:37 | Power Cycle Devices | Fast Forward Time | Realtime

Routers

1841 1941 2620XM 2621XM 2811 2901 2911 819 Generic Generic

2621XM

Scenario 0 | New | Delete | Toggle PDU List Window

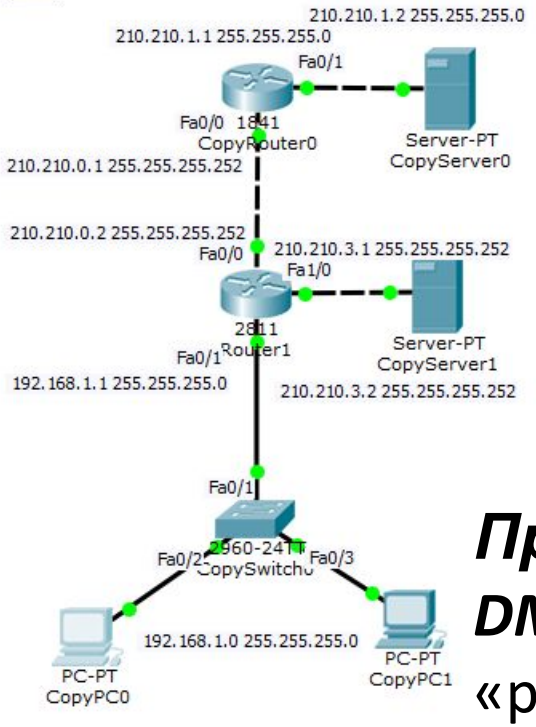
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete

ENG 7:07 15.01.2020

Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ

File Edit Options View Tools Extensions Help

Logical | [Root] | New Cluster | Move Object



Проверим связь компьютеров с DMZ-сервером:

«ping 210.210.3.2».

Связь по прежнему есть!!!

CopyPC0

Physical | Config | Desktop | Custom Interface

Command Prompt X

```
PC>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Request timed out.
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127
Reply from 210.210.3.2: bytes=32 time=4ms TTL=127

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

PC>ping 210.210.3.2

Pinging 210.210.3.2 with 32 bytes of data:

Reply from 210.210.3.2: bytes=32 time=1ms TTL=127
Reply from 210.210.3.2: bytes=32 time=1ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127
Reply from 210.210.3.2: bytes=32 time=0ms TTL=127

Ping statistics for 210.210.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Time: 00:01:31 | Power Cycle Devices | Fast Forward Time | Realtime

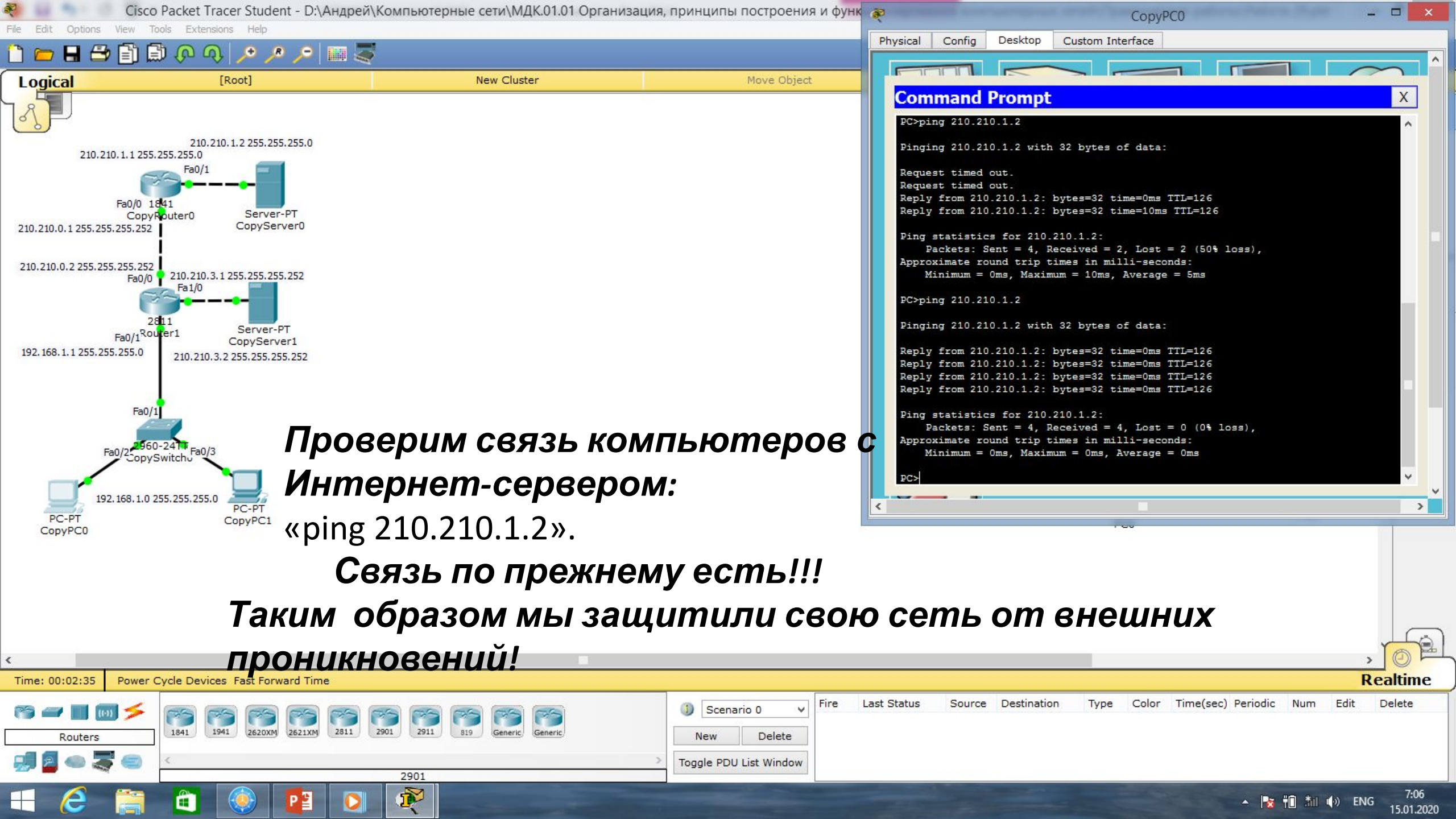
Routers | 1841 | 1941 | 2620XM | 2621XM | 2811 | 2901 | 2911 | 819 | Generic | Generic

Router-PT

Scenario 0 | New | Delete | Toggle PDU List Window

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

ENG 7:04 15.01.2020


Cisco Packet Tracer Student - D:\Андрей\Компьютерные сети\МДК.01.01 Организация, принципы построения и функ
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
210.210.1.2 255.255.255.0
210.210.1.1 255.255.255.0
Fa0/1
Fa0/0
1841
CopyRouter0
Server-PT
CopyServer0
210.210.0.1 255.255.255.252
210.210.0.2 255.255.255.252
Fa0/0
210.210.3.1 255.255.255.252
Fa1/0
2811
Router1
Fa0/1
Server-PT
CopyServer1
192.168.1.1 255.255.255.0
210.210.3.2 255.255.255.252
Fa0/1
2960-24TT
Fa0/2
CopySwitch0
Fa0/3
192.168.1.0 255.255.255.0
PC-PT
CopyPC0
PC-PT
CopyPC1
CopyPC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
PC>ping 210.210.1.2
Pinging 210.210.1.2 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=10ms TTL=126
Ping statistics for 210.210.1.2:
Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 10ms, Average = 5ms
PC>ping 210.210.1.2
Pinging 210.210.1.2 with 32 bytes of data:
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Reply from 210.210.1.2: bytes=32 time=0ms TTL=126
Ping statistics for 210.210.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
PC>
Проверим связь компьютеров с Интернет-сервером:
«ping 210.210.1.2».
Связь по прежнему есть!!!
Таким образом мы защитили свою сеть от внешних проникновений!
Time: 00:02:35
Power Cycle Devices Fast Forward Time
Realtime
Routers
1841
1941
2620XM
2621XM
2811
2901
2911
819
Generic
Generic
2901
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
ENG
7:06
15.01.2020

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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