
Компьютерные сети. Обучение в записи

Урок 4. Семинар. Технология Ethernet. Протокол IP

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Задача 1. Работа с IP сетями

Асинхронный семинар-2.1

Задача 1. Расчет IP-адреса сети

Выполнить ручной расчет IP-адреса сети, маски, Hostmin, Hostmax вручную для следующих значений. Затем проверьте себя на IP калькуляторе.

192.168.50.107/27
10.0.0.2/30
77.28.46.77/31
5.144.135.2/9

Поставьте видео на паузу и выполните задание

Ход выполнения задания 1:

192.168.50.107/27 (255.255.255.224)

IP-адрес: 1100 0000 1010 1000 0011 0010 0110 1011

Маска: 1111 1111 1111 1111 1111 1111 1111 0000

1100 0000 1010 1000 0011 0010 0110 0000

192.168.50.96 (+2⁵) => 192.168.50.127

Hostmin: 192.168.50.97 /27

Hostmax: 192.168.50.126 /27

IP калькулятор	
IP адрес: 192.168.50.107	Маска: 27 - 255.255.255.2
Подсчитать	
Значение	Бинарное значение
Address: 192.168.50.107	11000000.10101000.00110010.01101011
Bitmask: 27	
Netmask: 255.255.255.224 = 27	11111111.11111111.11111111.00000000
Wildcard: 0.0.0.31	00000000.00000000.00000000.00000000
Network: 192.168.50.96	11000000.10101000.00110010.01100000
Broadcast: 192.168.50.127	11000000.10101000.00110010.01111111
HostMin: 192.168.50.97	11000000.10101000.00110010.01100001
HostMax: 192.168.50.126	11000000.10101000.00110010.01111110
Hosts/Net: 30	(RFC-1918 Private Internet Address.)

10.0.0.2/30 (255.255.255.252)

IP-адрес: 0000 1010 0000 0000 0000 0000 0000 0010

Маска: 1111 1111 1111 1111 1111 1111 1111 1100

0000 1010 0000 0000 0000 0000 0000 0000

10.0.0.0 (+2²) => 10.0.0.3

Hostmin: 10.0.0.1 /30

Hostmax: 10.0.0.2 /30

IP калькулятор	
IP адрес: 10.0.0.2	Маска: 30 - 255.255.255.2
Подсчитать	
Значение	Бинарное значение
Address: 10.0.0.2	00001010.00000000.00000000.00000010
Bitmask: 30	
Netmask: 255.255.255.252 = 30	11111111.11111111.11111111.11111100
Wildcard: 0.0.0.3	00000000.00000000.00000000.00000011
Network: 10.0.0.0	00001010.00000000.00000000.00000000
Broadcast: 10.0.0.3	00001010.00000000.00000000.00000011
HostMin: 10.0.0.1	00001010.00000000.00000000.00000001
HostMax: 10.0.0.2	00001010.00000000.00000000.00000010
Hosts/Net: 2	(RFC-1918 Private Internet Address.)

77.28.46.77/31 (255.255.255.254)

IP-адрес: 0100 1101 0001 1100 0010 1110 0100 1101

Маска: 1111 1111 1111 1111 1111 1111 1111 1110

0100 1101 0001 1100 0010 1110 0100 1100

77.28.46.76 (+2¹) => 77.28.46.77

Hostmin: —

Hostmax: —

IP калькулятор	
IP адрес: 77.28.46.77	Маска: 31 - 255.255.255.2
Подсчитать	
Значение	Бинарное значение
Address: 77.28.46.77	01001101.00011100.00101110.01001101
Bitmask: 31	
Netmask: 255.255.255.254 = 31	11111111.11111111.11111111.11111110
Wildcard: 0.0.0.1	00000000.00000000.00000000.00000001
Network: 77.28.46.76	01001101.00011100.00101110.01001100
Broadcast: 77.28.46.77	01001101.00011100.00101110.01001101
HostMin: N/A	N/A
HostMax: N/A	N/A
Hosts/Net: N/A	

5.144.135.2/9

(255.128.0.0)

IP-адрес:

0000 0101

1001 0000

1000 0111

0000 0010

Маска:

1111 1111

1000 0000

0000 0000

0000 0000

0000 0101

1000 0000

0000 0000

0000 0000

5.128.0.0 (+2²³) => 5.255.255.255

0000 0101

1000 0000

0000 0000

0000 0000

0000 0101

1111 1111

1111 1111

1111 1111

Hostmin:

5.128.0.1

Hostmax:

5.255.255.254

IP калькулятор

IP адрес:

5.144.135.2

Маска:

9 - 255.128.0.0

Подсчитать

Значение	Бинарное значение
Address: 5.144.135.2	00000101.1 0010000.10000111.00000010
Bitmask: 9	
Netmask: 255.128.0.0 = 9	11111111.1 0000000.0000000.00000000
Wildcard: 0.127.255.255	00000000.0 11111111.11111111.11111111
Network: 5.128.0.0	00000101.1 0000000.0000000.00000000 Class A
Broadcast: 5.255.255.255	00000101.1 11111111.11111111.11111111
HostMin: 5.128.0.1	00000101.1 0000000.0000000.00000001
HostMax: 5.255.255.254	00000101.1 11111111.11111111.11111110
Hosts/Net: 8388606	

Задача 2. Работа с СРТ

Задача 2. Знакомство с симуляцией

Необходимо собрать сеть по схеме.

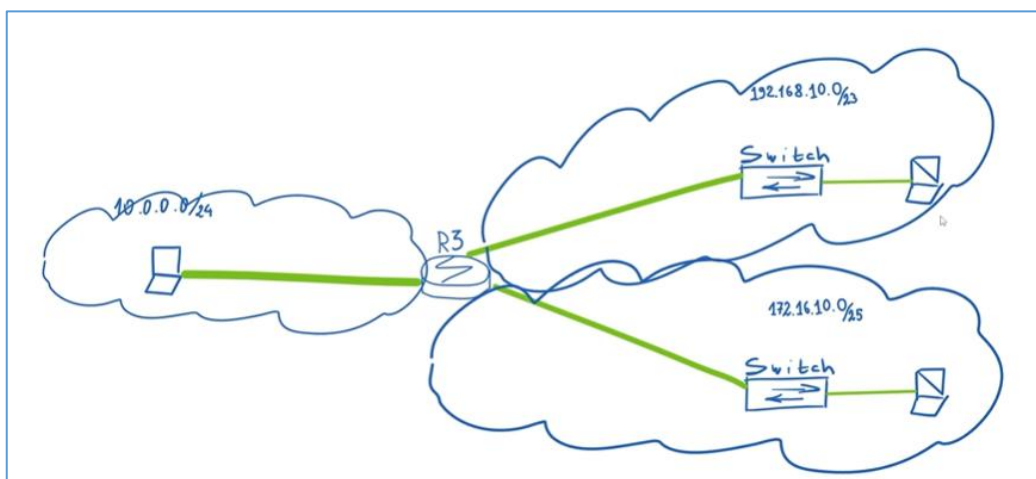
Схема: <https://disk.yandex.ru/i/AtvOy8uHJ9615w>

Необходимо связать сети 192.168.10.0/23, 10.0.0.0/24 и 172.16.10.0/25 между собой, чтобы компы пинговали друг друга. Показать успешный пинг.

1. Поднимите интерфейсы и настройте IP адреса.
2. Пропингуйте соседние устройства.
3. Изучите таблицы ARP и MAC Address table

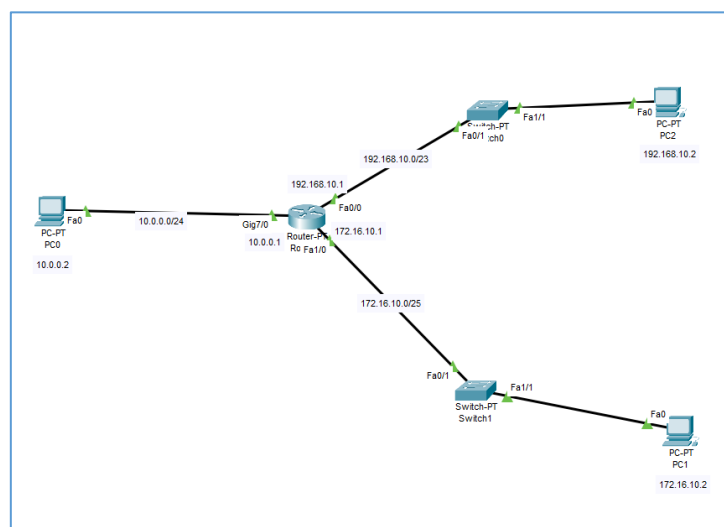


Поставьте видео на паузу
и выполните задание



Ход выполнения задания 2:

Задание 2.1



Задание 2.2

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```

ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=6ms TTL=127
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127
Reply from 192.168.10.2: bytes=32 time=6ms TTL=127

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=6ms TTL=127

```

Event List

Vis.	Time(sec)	Last Device
0.000	---	---
0.001	---	PC0
0.002	---	Router4
0.003	---	Switch0
0.004	---	PC2
0.005	---	Switch0
0.006	---	Router4
0.490	---	---

Reset Simulation Constant Delay Captured to: 0.490 s

Play Controls

Event List Filters - Visible Events

ACL Filter: ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, PSec, ISAKMP, IRT, IRT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, RAPI, POP3, PPP, PPPoE, PTP, RADIUS, RDP, RDPv6, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Event Log Realtime Simulation

ния задания 2:

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=6ms TTL=127

Ping statistics for 192.168.10.2:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

Control-C
^C
C:\>ping 172.16.10.2

Pinging 172.16.10.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.10.2: bytes=32 time=6ms TTL=127
Reply from 172.16.10.2: bytes=32 time=6ms TTL=127
Reply from 172.16.10.2: bytes=32 time=6ms TTL=127

Ping statistics for 172.16.10.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>

```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
7.507	---	Router4
7.508	---	Switch1
7.509	---	PC1
7.510	---	Switch1
7.511	---	Router4
8.489	---	---
8.490	---	Switch1
8.490	---	Switch1
8.495	---	---
8.496	---	Switch0
8.496	---	Switch0
8.513	---	---
8.514	---	PC0
8.515	---	Router4
8.516	---	Switch1
8.517	---	PC1
8.518	---	Switch1
8.519	---	Router4

Reset Simulation Constant Delay Captured to: 8.519 s

Play Controls

Event List Filters - Visible Events

ACL Filter: ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, PSec, ISAKMP, IRT, IRT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, RAPI, POP3, PPP, PPPoE, PTP, RADIUS, RDP, RDPv6, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=6ms TTL=127
Reply from 10.0.0.2: bytes=32 time=6ms TTL=127
Reply from 10.0.0.2: bytes=32 time=6ms TTL=127
Reply from 10.0.0.2: bytes=32 time=6ms TTL=127

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>

```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
10.495	---	---
10.496	---	Switch0
10.496	---	Switch0
10.538	---	---
10.539	---	PC2
10.540	---	Switch0
10.541	---	Router4
10.542	---	PC0
10.543	---	Router4
10.544	---	Switch0
11.547	---	---
11.548	---	PC2
11.549	---	Switch0
11.550	---	Router4
11.551	---	PC0
11.552	---	Router4
11.553	---	Switch0
12.487	---	---

Reset Simulation Constant Delay Captured to: 12.487 s

Play Controls

Event List Filters - Visible Events

ACL Filter: ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, PSec, ISAKMP, IRT, IRT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, RAPI, POP3, PPP, PPPoE, PTP, RADIUS, RDP, RDPv6, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Ping statistics for 172.168.10.2:
  Packets: Sent = 3, Received = 0, Lost = 3 (100% loss),

Control-C
^C
C:\>ping 172.16.10.2

Pinging 172.16.10.2 with 32 bytes of data:

Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127

Ping statistics for 172.16.10.2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 8ms, Average = 8ms

C:\>ping 172.16.10.2

Pinging 172.16.10.2 with 32 bytes of data:

Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127
Reply from 172.16.10.2: bytes=32 time=8ms TTL=127

Ping statistics for 172.16.10.2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 8ms, Average = 8ms

C:\>
```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	26.487	
	26.488	Switch1
	26.488	Switch1
	26.489	--
	26.490	Switch0
	26.553	--
	26.553	--
	26.553	--
	26.554	Router4
	26.554	Router4
	26.554	Router4
	26.486	--
	26.487	Switch1
	26.487	--
	26.488	Switch0
	26.488	Switch0

Reset Simulation ☒ Constant Delay Cap...

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPVAP, CDP, DHCP, DNS, IGRP, FastEthernet, GigabitEthernet, F...

Задание 2.3

Домашнее задание

Домашнее задание

Условие:

1. Настроить сеть согласно схеме в файле <https://disk.yandex.ru/d/1m4aUoqDm1SKBQ>
2. Проверить работоспособность соседних между собой сетей командой ping.
3. Обвести синим все broadcast домены



Компьютерные сети. Обучение в записи

Урок 4. Семинар. Технология Ethernet. Протокол IP

1. Настроить сеть согласно схеме в [файле](#).
2. Проверить работоспособность соседних между собой сетей командой ping.
3. Обвести синим все broadcast домены.
- 4*. Настроить loopback интерфейсы.

Скинуть скриншоты:

- с зелеными линиями;
- успешные пинги между парой-тройкой соседних сетей (соседние сети - это Connected сети к одному роутеру);
- вывод любой таблицы ARP.

(Задание со * являются заданиями с повышенной сложностью и требуют самостоятельного изучения. Если они не выполнены, это не влияет на оценку).

Ход выполнения домашнего задания:

Задание 1: настройка сети и IP-адресов

Роутер (r2)

```
r2
Physical Config CLI Attributes
IOS Command Line Interface

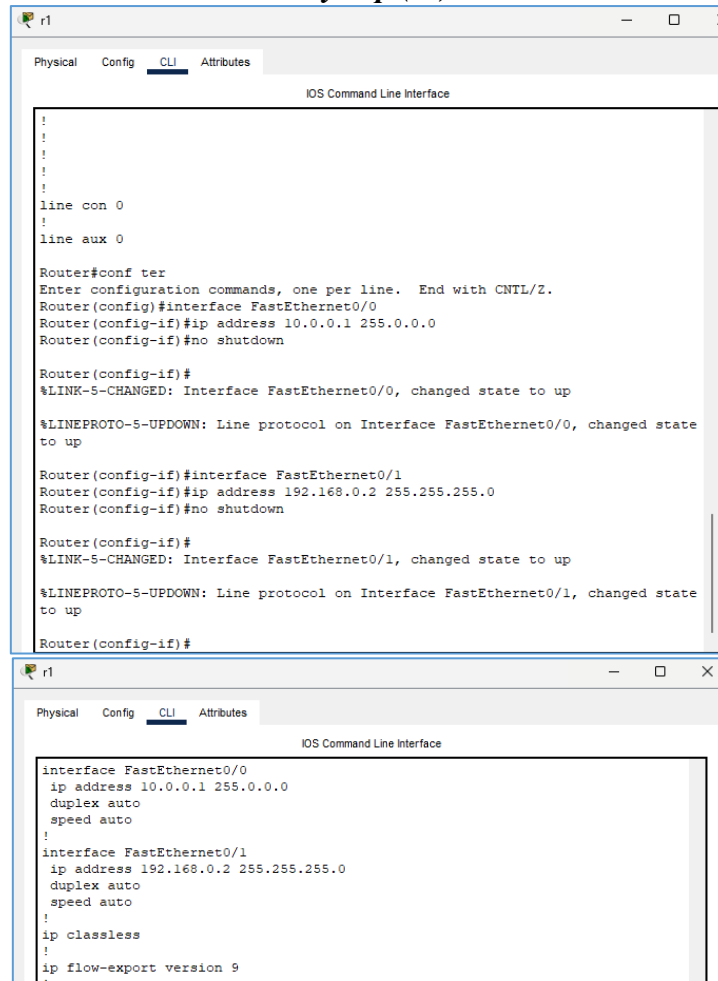
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 172.18.0.1 255.255.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

Router(config-if)#do sh run

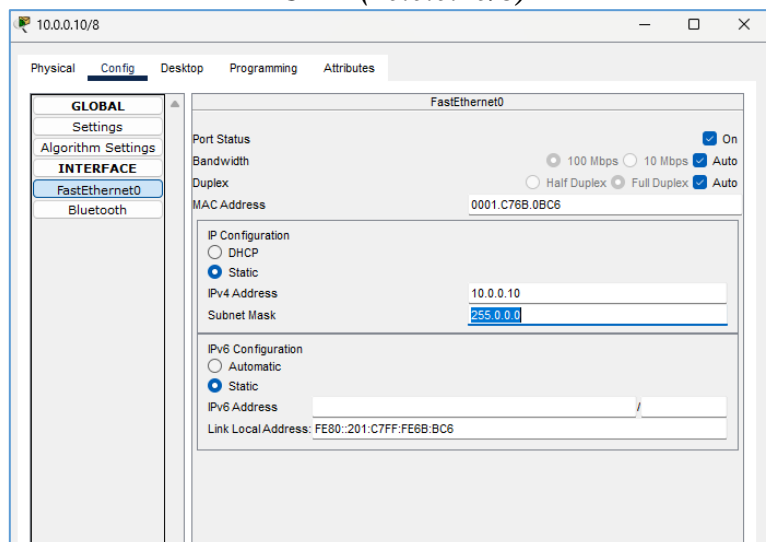
interface FastEthernet0/0
ip address 192.168.0.1 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 172.18.0.1 255.255.0.0
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.4.1 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet1/1
ip address 192.168.20.1 255.255.255.0
duplex auto
speed auto
```

Poymep (r1)



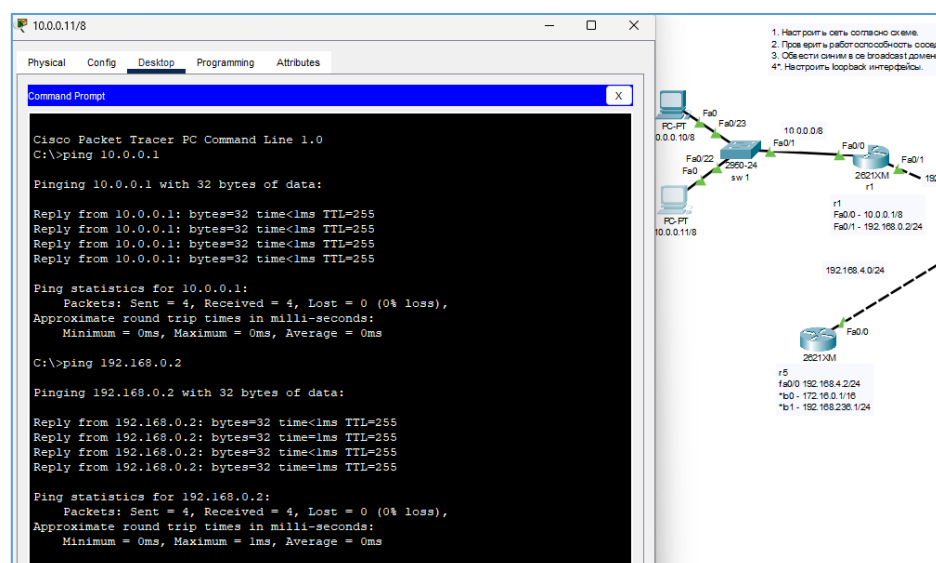
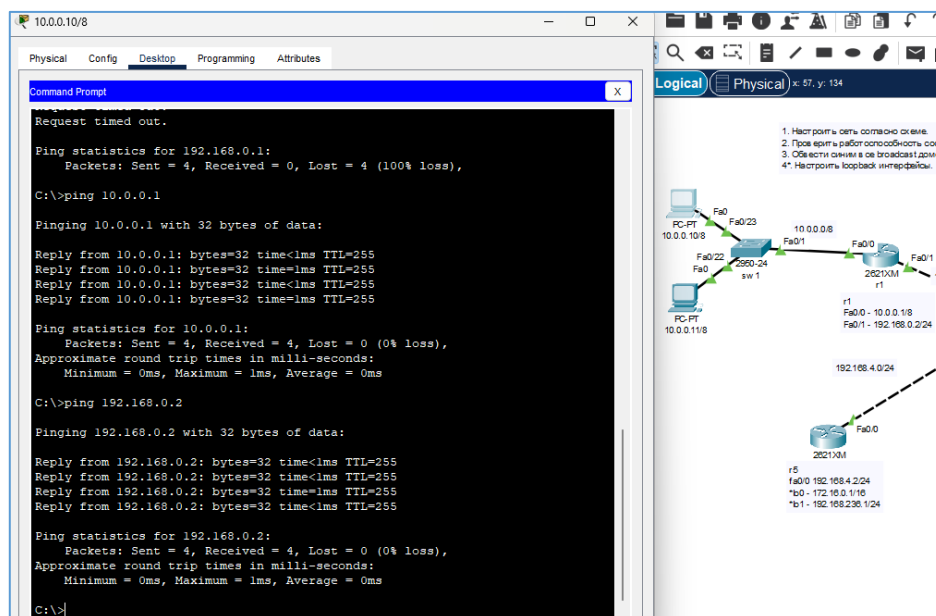
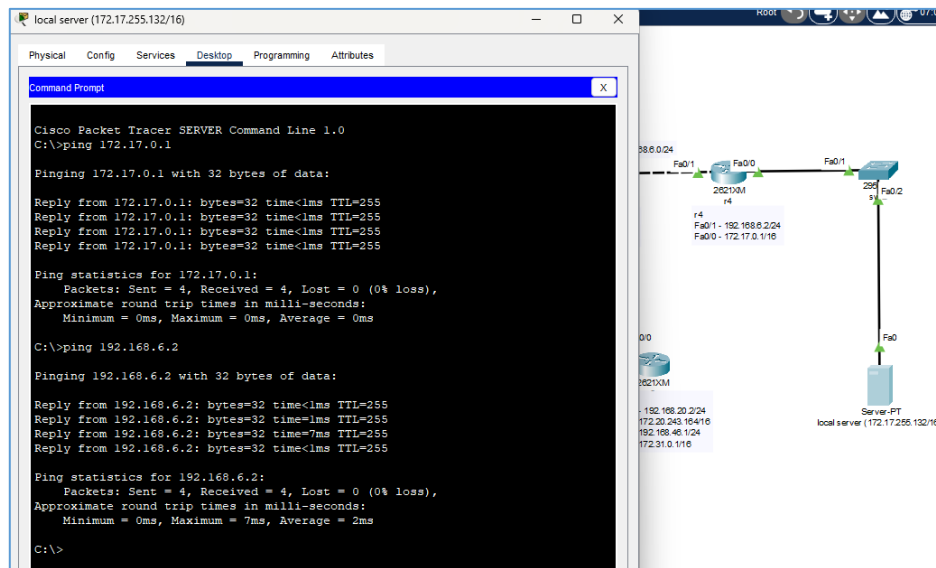
u m.đ. ...

PC-PT (10.0.0.10/8)

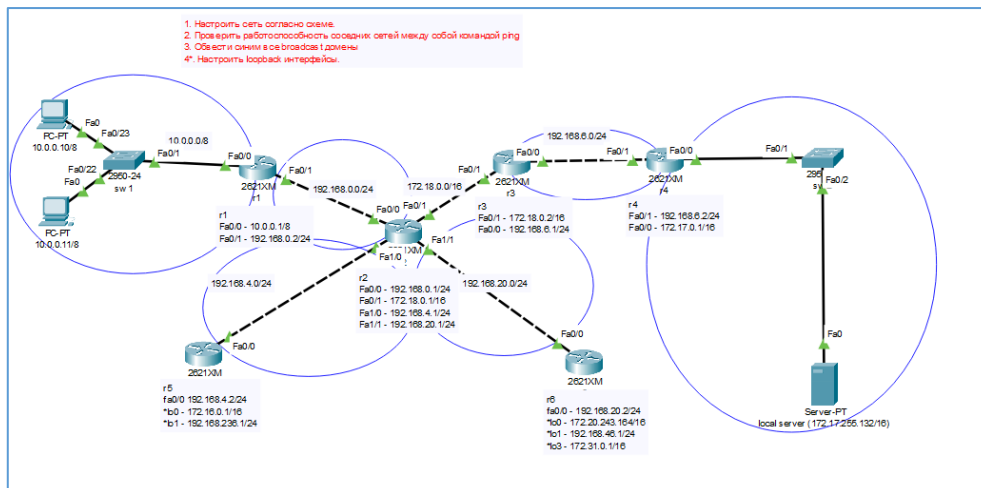


u m.đ. ...

Задание 2: Проверить работоспособность соседних сетей между собой командой `ping`



Задание 3: Обвести синим все broadcast домены



Задание 4*: Настроить loopback-интерфейсы.

Роутер (r6)

```

r6
Physical Config CLI Attributes
IOS Command Line Interface
Router#en
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int
Router(config)#interface loop
Router(config)#interface loopback ?
<0-2147483647> Loopback interface number
Router(config)#interface loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 172.20.243.164 255.255.0.0
Router(config-if)#interface loopback 1

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

Router(config-if)#ip address 192.168.46.1 255.255.255.0
Router(config-if)#interface loopback 3

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3, changed state to up

Router(config-if)#ip address 172.31.0.1 255.255.0.0
Router(config-if)#ex
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip int
Router#show ip interface bri
Router#show ip interface brief
Interface IP-Address OK? Method Status
Protocol
FastEthernet0/0 192.168.20.2 YES manual up
FastEthernet0/1 unassigned YES unset administratively down down
Loopback0 172.20.243.164 YES manual up
Loopback1 192.168.46.1 YES manual up
Loopback3 172.31.0.1 YES manual up
Router#
    
```

Поимей (r5)

1. Настроить сеть согласно
2. Проверить работоспособность
3. Обвести ссылки в сеть
4. Настроить loopback и

r1
Fa0/0 - 10.0.0.1/8
Fa0/1 - 192.168.0.1/24

r5
Fa0/0 - 192.168.4.2/24
Fa0/1 - 172.16.0.1/16
Fa0/2 - 192.168.236.1/24

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int loop
Router(config)#int loopback 0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 172.16.0.1 255.255.0.0
Router(config-if)#int loopback 1

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

Router(config-if)#ip address 192.168.236.1 255.255.255.0
Router(config-if)#ex
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh ip int
Router#sh ip interface bri
Router#sh ip interface brief
Interface                IP-Address      OK? Method Status
Protocol
FastEthernet0/0          192.168.4.2     YES manual up
FastEthernet0/1          unassigned      YES unset  administratively down down
Loopback0                172.16.0.1     YES manual up
Loopback1                192.168.236.1  YES manual up
Router#
```

Copy Paste

Top

Ссылка на репозиторий:

<https://github.com/olgashenkel/GeekBrains-specialization-ELECTIVES/tree/main/08.%20Computer%20networks>