

МИНОБРНАУКИ РОССИИ

Федеральное государственное бюджетное образовательное учреждение высшего образования

НИЖЕГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ
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Кафедра вычислительные системы и технологии

Лабораторная работа № 2

ОТЧЕТ

по лабораторной работе

по дисциплине

Сети и телекоммуникации

РУКОВОДИТЕЛЬ:

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СТУДЕНТ:

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19-В-1

Работа защищена «__» _____

С оценкой _____

Нижний Новгород 2021

1. Задание

1. Смоделировать сеть
2. Расставить IP адреса и маски (у роутеров на интерфейсах ip адреса – из начала диапазона)
3. Добавить маршруты для прохождения пакетов между всеми частями сети (ipforwarding)
4. Сделать несколько маршрутов специфичных, показать, как это работает (удаляя и добавляя маршрут)
5. Показать пример удаления маршрута с демонстрацией отсутствия ring

Исходная схема

Вариант 9

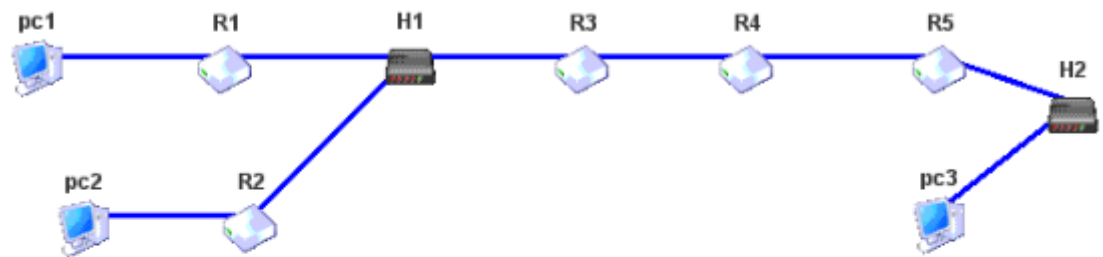
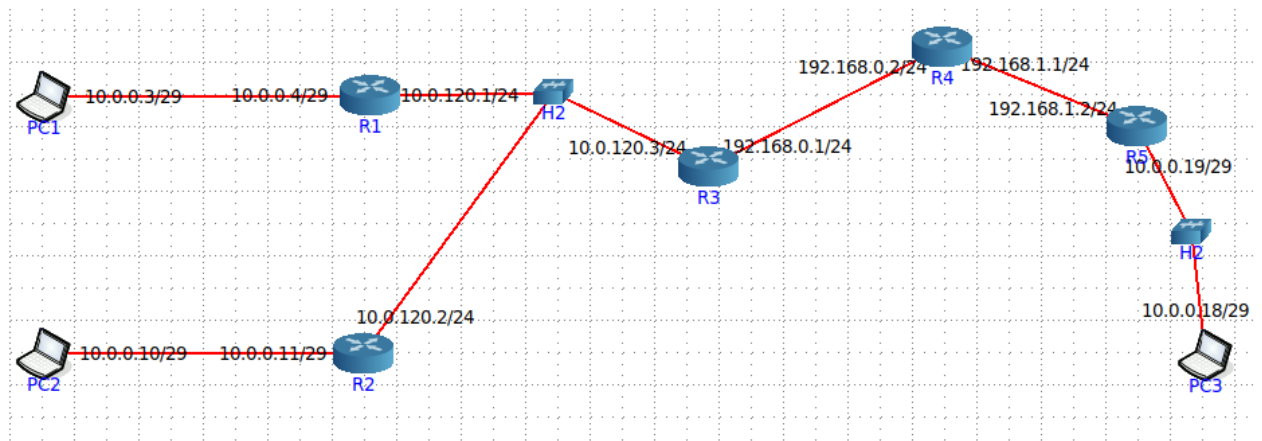


Рис. 2.10. Структура исследуемой сетевой архитектуры - вариант №9

- Файл со схемой сети: lab2_var9.jfst.
- Сеть между узлами R1, R2, R3: 10.0.120.0.
- Сеть между узлами R3 и R4: 192.168.0.0.
- Сеть между узлами R4 и R5: 192.168.1.0.
- Компьютер PC1 имеет IP-адрес 10.0.0.3.
- Компьютер PC2 имеет IP-адрес 10.0.0.10.
- Компьютер PC3 имеет IP-адрес 10.0.0.18.
- Обозначения в задании: K1 – PC1, K2 – PC2, K3 – PC3.

2. Собранная схема



3. Настройки элементов сети

PC1 DefaultRoute



DefaultRoute on node PC1 (n1)


DefaultRoute service



Meta-data:

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name:  

◆ Copy this source file: 

◆ Use text below for file contents:  

```
#!/bin/sh
# auto-generated by DefaultRoute service (utility.py)
ip route add default via 10.0.0.4
```

☒ only store values that have changed from their defaults

PC2 DefaultRoute



DefaultRoute on node PC2 (n2)


DefaultRoute service



Meta-data:

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name:  

◆ Copy this source file: 

◆ Use text below for file contents:  

```
#!/bin/sh
# auto-generated by DefaultRoute service (utility.py)
ip route add default via 10.0.0.11
```

☒ only store values that have changed from their defaults

PC2 DefaultRoute

DefaultRoute on node PC3 (n3)


DefaultRoute service



Meta-data: None

Files | Directories | Startup/shutdown

Config files and scripts that are generated for this service.

File name: defaultroute.sh

◆ Copy this source file: 

◆ Use text below for file contents:  

```
#!/bin/sh
# auto-generated by DefaultRoute service (utility.py)
ip route add default via 10.0.0.19
```

☒ only store values that have changed from their defaults

Apply Defaults Copy... Cancel

R1 StaticRoute

StaticRoute on node R1 (n4)


StaticRoute service



Meta-data: None

Files | Directories | Startup/shutdown

Config files and scripts that are generated for this service.

File name: staticroute.sh

◆ Copy this source file: 

◆ Use text below for file contents:  

```
#!/bin/sh
# auto-generated by StaticRoute service (utility.py)
#
# NOTE: this service must be customized to be of any use
#       Below are samples that you can uncomment and edit.
#
/sbin/ip route add 10.0.0.8/29 via 10.0.120.2
/sbin/ip route add 10.0.0.16/29 via 10.0.120.3
```

☒ only store values that have changed from their defaults

Apply Defaults Copy... Cancel

R2 StaticRoute

StaticRoute on node R2 (n5)

StaticRoute service

Meta-data

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name:

◆ Copy this source file:

◆ Use text below for file contents:

```
#!/bin/sh
# auto-generated by StaticRoute service (utility.py)
#
# NOTE: this service must be customized to be of any use
#       Below are samples that you can uncomment and edit.
#
/sbin/ip route add 10.0.0.0/29 via 10.0.120.1
/sbin/ip route add 10.0.0.16/29 via 10.0.120.3
```

☒ only store values that have changed from their defaults

R3 StaticRoute

StaticRoute on node R3 (n8)

StaticRoute service

Meta-data

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name:

◆ Copy this source file:

◆ Use text below for file contents:

```
#!/bin/sh
# auto-generated by StaticRoute service (utility.py)
#
# NOTE: this service must be customized to be of any use
#       Below are samples that you can uncomment and edit.
#
/sbin/ip route add 10.0.0.16/29 via 192.168.0.2

/sbin/ip route add 10.0.0.0/29 via 10.0.120.1
/sbin/ip route add 10.0.0.8/29 via 10.0.120.2
```

☒ only store values that have changed from their defaults

R4 StaticRoute

StaticRoute on node R4 (n9)

StaticRoute service

Meta-data: None

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name: staticroute.sh

◆ Copy this source file:

◆ Use text below for file contents:

```
#!/bin/sh
# auto-generated by StaticRoute service (utility.py)
#
# NOTE: this service must be customized to be of any use
#       Below are samples that you can uncomment and edit.
#
/sbin/ip route add 10.0.0.16/29 via 192.168.1.2

/sbin/ip route add 10.0.0.0/29 via 192.168.0.1
/sbin/ip route add 10.0.0.8/29 via 192.168.0.1
```

■ only store values that have changed from their defaults

Apply Defaults Copy... Cancel

R5 StaticRoute

StaticRoute on node R5 (n10)

StaticRoute service

Meta-data: None

Files Directories Startup/shutdown

Config files and scripts that are generated for this service.

File name: staticroute.sh

◆ Copy this source file:

◆ Use text below for file contents:

```
#!/bin/sh
# auto-generated by StaticRoute service (utility.py)
#
# NOTE: this service must be customized to be of any use
#       Below are samples that you can uncomment and edit.
#
/sbin/ip route add 10.0.0.0/29 via 192.168.1.1
/sbin/ip route add 10.0.0.8/29 via 192.168.1.1
```

■ only store values that have changed from their defaults

Apply Defaults Copy... Cancel

4. Проверка проходимости командой Ping От PC1 к PC2

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC1:/tmp/pycore.39165/PC1.conf# ping -c3 10.0.0.10
PING 10.0.0.10 (10.0.0.10) 56(84) bytes of data.
64 bytes from 10.0.0.10: icmp_seq=1 ttl=62 time=0.126 ms
64 bytes from 10.0.0.10: icmp_seq=2 ttl=62 time=0.173 ms
64 bytes from 10.0.0.10: icmp_seq=3 ttl=62 time=0.174 ms

--- 10.0.0.10 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2031ms
rtt min/avg/max/mdev = 0.126/0.157/0.174/0.026 ms
root@PC1:/tmp/pycore.39165/PC1.conf#
```

От PC1 к PC3

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC1:/tmp/pycore.39165/PC1.conf# ping -c3 10.0.0.18
PING 10.0.0.18 (10.0.0.18) 56(84) bytes of data.
64 bytes from 10.0.0.18: icmp_seq=1 ttl=60 time=0.070 ms
64 bytes from 10.0.0.18: icmp_seq=2 ttl=60 time=0.231 ms
64 bytes from 10.0.0.18: icmp_seq=3 ttl=60 time=0.225 ms

--- 10.0.0.18 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2046ms
rtt min/avg/max/mdev = 0.070/0.175/0.231/0.075 ms
root@PC1:/tmp/pycore.39165/PC1.conf#
```

От PC2 к PC1

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC2:/tmp/pycore.39165/PC2.conf# ping -c3 10.0.0.3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
64 bytes from 10.0.0.3: icmp_seq=1 ttl=62 time=0.059 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=62 time=0.180 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=62 time=0.179 ms

--- 10.0.0.3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2055ms
rtt min/avg/max/mdev = 0.059/0.139/0.180/0.057 ms
root@PC2:/tmp/pycore.39165/PC2.conf#
```

От PC2 к PC3

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC2:/tmp/pycore.39165/PC2.conf# ping -c3 10.0.0.18
PING 10.0.0.18 (10.0.0.18) 56(84) bytes of data.
64 bytes from 10.0.0.18: icmp_seq=1 ttl=60 time=0.102 ms
64 bytes from 10.0.0.18: icmp_seq=2 ttl=60 time=0.232 ms
64 bytes from 10.0.0.18: icmp_seq=3 ttl=60 time=0.230 ms

--- 10.0.0.18 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2043ms
rtt min/avg/max/mdev = 0.102/0.188/0.232/0.060 ms
root@PC2:/tmp/pycore.39165/PC2.conf#
```

От PC3 к PC1

```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC3:/tmp/pycore.39165/PC3.conf# ping -c3 10.0.0.3
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data.
64 bytes from 10.0.0.3: icmp_seq=1 ttl=60 time=0.071 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=60 time=0.228 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=60 time=0.234 ms

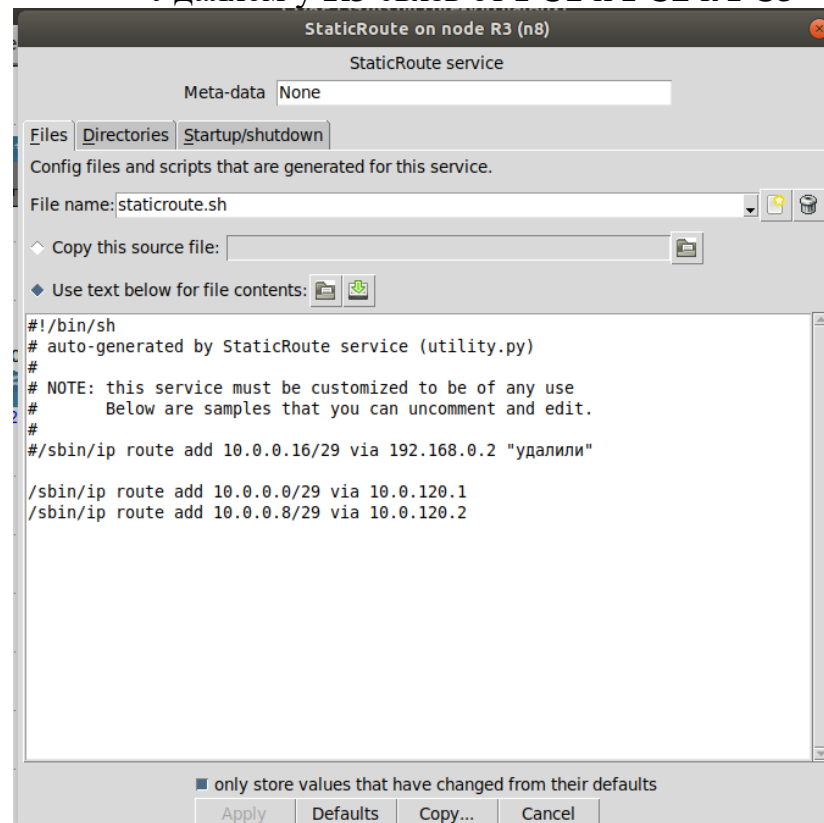
--- 10.0.0.3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2047ms
rtt min/avg/max/mdev = 0.071/0.177/0.234/0.077 ms
root@PC3:/tmp/pycore.39165/PC3.conf#
```

От PC3 к PC2

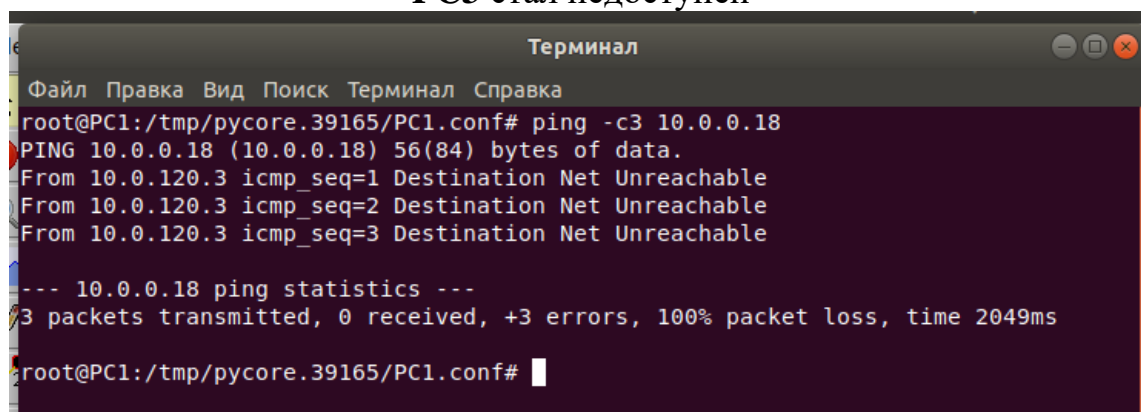
```
Терминал
Файл Правка Вид Поиск Терминал Справка
root@PC3:/tmp/pycore.39165/PC3.conf# ping -c3 10.0.0.10
PING 10.0.0.10 (10.0.0.10) 56(84) bytes of data.
64 bytes from 10.0.0.10: icmp_seq=1 ttl=60 time=0.074 ms
64 bytes from 10.0.0.10: icmp_seq=2 ttl=60 time=0.079 ms
64 bytes from 10.0.0.10: icmp_seq=3 ttl=60 time=0.224 ms

--- 10.0.0.10 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2030ms
rtt min/avg/max/mdev = 0.074/0.125/0.224/0.070 ms
root@PC3:/tmp/pycore.39165/PC3.conf#
```

5. Проверка проходимости командой Ping при удалении пути Удаляем у R3 связь от PC1 и PC2 к PC3



PC3 стал недоступен



```
Файл Правка Вид Поиск Терминал Справка
root@PC1:/tmp/pycore.39165/PC1.conf# ping -c3 10.0.0.18
PING 10.0.0.18 (10.0.0.18) 56(84) bytes of data.
From 10.0.120.3 icmp_seq=1 Destination Net Unreachable
From 10.0.120.3 icmp_seq=2 Destination Net Unreachable
From 10.0.120.3 icmp_seq=3 Destination Net Unreachable

--- 10.0.0.18 ping statistics ---
3 packets transmitted, 0 received, +3 errors, 100% packet loss, time 2049ms

root@PC1:/tmp/pycore.39165/PC1.conf#
```

Вывод: в ходе выполнения данной работы была собрана схема сети, добавлены маршруты для прохождения пакетов между всеми частями сети и осуществлена проверка проходимости при помощи команды Ping. Получены навыки ручной настройки проходимости внутри сети.