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ОТЧЕТ

по лабораторной работе №2

по дисциплине «Сети и телекоммуникации»

Тема: Настройка таблиц маршрутизации

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Санкт-Петербург

2021

Цель работы.

Изучение методов статической маршрутизации в IP-сетях; овладение управлением таблицами маршрутизации на узлах сетевого уровня.

Постановка задачи.

В данной работе необходимо выполнить следующее задачи:

1. Для всех узлов сети установить IP-адреса, маски подсетей и шлюзы по умолчанию, чтобы добиться успешного выполнения Echo-запроса ближайших соседей (находящихся в одной подсети).

2. Настроить таблицы маршрутизации на маршрутизаторах, чтобы добиться доставки пакетов от узла K1 к узлу K2 и обратно, от узла K2 к K3 и обратно, от узла K3 к K1 и обратно. Пакеты должны доходить до узлов кратчайшим путём.

3. Настроить таблицы маршрутизации на узлах K1, K2 и K3, чтобы обеспечить кратчайшую доставку пакетов между этими узлами, если это невозможно было обеспечить в п. 2.

Вариант с заданием №3:

Файл со схемой сети: lab2_var3.jfst. Сеть между маршрутизаторами R1, R2, R3 и R4: 192.168.0.96. Сеть между маршрутизаторами R4 и R5: 172.168.4.0. Маршрутизатор R6 имеет адрес 10.120.0.1 на первом интерфейсе и 10.159.0.1 на втором интерфейсе. Сеть между маршрутизаторами R3 и R8: 11.0.0.0. Компьютер PC1 имеет IP-адрес 192.168.0.4. Компьютер PC3 имеет IP-адрес 192.168.0.34. Компьютер PC4 имеет IP-адрес: 192.168.0.250.

Выполнение работы.

Для сети, приведённой на рис. 1, были настроены IP-адреса, маски подсетей и шлюзы по умолчанию.

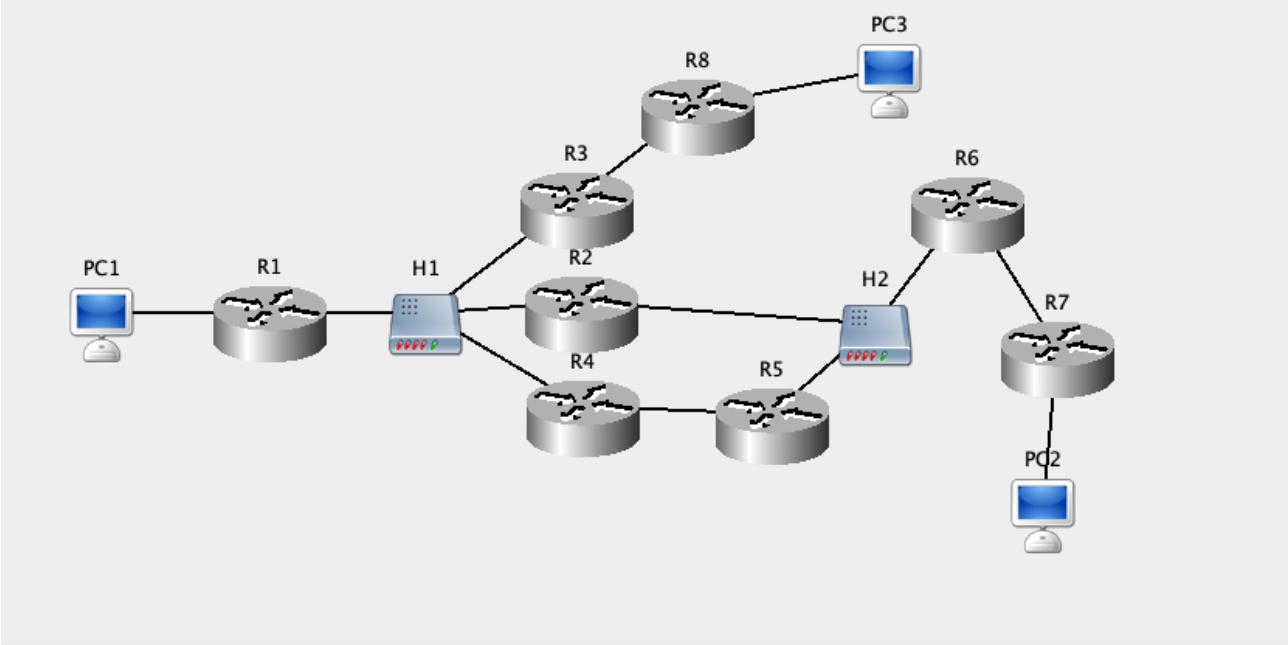

Рисунок 1 – «Схема сети»

Результаты настройки узлов см. рис. 2, 3.

Name: R8	Default gateway: 192.168.0.34				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 71:BF:48:57:99:9E	IP address: 11.0.0.2	Subnet mask: 255.0.0.0	Link name: R3-TO-R8
Interface: eth1	Type: Copper Ethernet	MAC address: BB:97:9F:6C:33:76	IP address: 192.168.0.35	Subnet mask: 255.255.255.254	Link name: PC3-TO-R8
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R7	Default gateway: 192.168.0.250				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 5F:24:8C:AC:68:58	IP address: 10.159.0.25	Subnet mask: 255.255.0.0	Link name: R6-TO-R7
Interface: eth1	Type: Copper Ethernet	MAC address: 5B:5D:82:66:1A:C7	IP address: 192.168.0.249	Subnet mask: 255.255.255.252	Link name: PC2-TO-R7
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R6	Default gateway: 10.159.0.25				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: A1:50:6B:39:7A:AA	IP address: 10.120.0.1	Subnet mask: 255.255.0.0	Link name: H2-TO-R6
Interface: eth1	Type: Copper Ethernet	MAC address: 64:90:47:93:5D:BE	IP address: 10.159.0.1	Subnet mask: 255.255.0.0	Link name: R6-TO-R7
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R5	Default gateway: 10.120.0.1				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: A9:4F:90:54:A0:25	IP address: 172.168.4.2	Subnet mask: 255.255.255.0	Link name: R4-TO-R5
Interface: eth1	Type: Copper Ethernet	MAC address: 8D:97:55:6B:A0:B8	IP address: 10.120.0.27	Subnet mask: 255.255.0.0	Link name: R5-TO-H2
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R4	Default gateway: 172.168.4.2				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 26:A3:9E:29:99:6B	IP address: 192.168.0.100	Subnet mask: 255.255.255.224	Link name: H1-TO-R4
Interface: eth1	Type: Copper Ethernet	MAC address: AC:4F:7A:48:5A:9B	IP address: 172.168.4.1	Subnet mask: 255.255.255.0	Link name: R4-TO-R5
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R3	Default gateway: 11.0.0.2				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: B9:6C:30:C3:65:11	IP address: 192.168.0.99	Subnet mask: 255.255.255.224	Link name: H1-TO-R3
Interface: eth1	Type: Copper Ethernet	MAC address: 18:5A:B7:68:54:6D	IP address: 11.0.0.1	Subnet mask: 255.0.0.0	Link name: R3-TO-R8
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R2	Default gateway: 10.120.0.1				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 23:38:77:48:73:2A	IP address: 192.168.0.98	Subnet mask: 255.255.255.224	Link name: H1-TO-R2
Interface: eth1	Type: Copper Ethernet	MAC address: 3D:BF:18:AF:BC:8D	IP address: 10.120.0.140	Subnet mask: 255.255.0.0	Link name: R2-TO-H2
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected
Name: R1	Default gateway: 192.168.0.98				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 7D:3B:23:86:8F:74	IP address: 192.168.0.97	Subnet mask: 255.255.255.224	Link name: R1-TO-H1
Interface: eth1	Type: Copper Ethernet	MAC address: 1C:B7:30:15:79:AF	IP address: 192.168.0.5	Subnet mask: 255.255.255.252	Link name: PC1-TO-R1
Interface: ser0	Type: Serial	MAC address: Not Applicable	IP address: IP Address not set	Subnet mask: 0.0.0.0	Link name: Not Connected

Рисунок 2 – Настройка узлов.

Name: PC3	Default gateway: 192.168.0.35				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 6B:54:71:A8:B8:B8	IP address: 192.168.0.34	Subnet mask: 255.255.255.254	Link name: PC3-TO-R8
Name: PC2	Default gateway: 192.168.0.249				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: 14:5A:5B:43:29:4D	IP address: 192.168.0.250	Subnet mask: 255.255.255.252	Link name: PC2-TO-R7
Name: PC1	Default gateway: 192.168.0.5				
Interface: cua0	Type: Console	MAC address: Not Applicable	IP address: Not Applicable	Subnet mask: Not Applicable	Link name: Not Connected
Interface: eth0	Type: Copper Ethernet	MAC address: A8:90:1F:47:1B:2C	IP address: 192.168.0.4	Subnet mask: 255.255.255.252	Link name: PC1-TO-R1

Рисунок 3 – Настройка узлов.

Результаты настройки таблицы маршрутизации см. рис. 4, 5, 6, 7, 8, 9.

```
javaNetSim console v0.42, 2005 - 2009
R1# show ip route
Codes: C - connected, S - static, R - RIP,
B - BGP, O - OSPF, * - candidate default

S*  default/0.0.0.0[0]  via 192.168.0.98 (eth0)
S   192.168.0.34/255.255.255.254[0]  via 192.168.0.99 (eth0)
C   192.168.0.5/255.255.255.252 is directly connected, eth1
C   192.168.0.97/255.255.255.224 is directly connected, eth0

R1#
```

Рисунок 4 – Таблица маршрутизации R1.

```
javaNetSim console v0.42, 2005 - 2009
R2# show ip route
Codes: C - connected, S - static, R - RIP,
B - BGP, O - OSPF, * - candidate default

S   192.168.0.34/255.255.255.254[0]  via 192.168.0.99 (eth0)
S*  default/0.0.0.0[0]  via 10.120.0.1 (eth0)
S   192.168.0.4/255.255.255.252[0]  via 192.168.0.97 (eth0)
C   10.120.0.140/255.255.0.0 is directly connected, eth1
C   192.168.0.98/255.255.255.224 is directly connected, eth0

R2#
```

Рисунок 5 – Таблица маршрутизации R2.

```
javaNetSim console v0.42, 2005 - 2009
R3# show ip route
Codes: C - connected, S - static, R - RIP,
B - BGP, O - OSPF, * - candidate default

S   192.168.0.248/255.255.255.252[0]  via 192.168.0.98 (eth0)
S*  default/0.0.0.0[0]  via 11.0.0.2 (eth0)
S   192.168.0.4/255.255.255.252[0]  via 192.168.0.97 (eth0)
C   11.0.0.1/255.0.0.0 is directly connected, eth1
C   192.168.0.99/255.255.255.224 is directly connected, eth0

R3#
```

Рисунок 6 – Таблица маршрутизации R3.

```
javaNetSim console v0.42, 2005 - 2009
R6# show ip route
Codes: C - connected, S - static, R - RIP,
B - BGP, O - OSPF, * - candidate default

S*  default/0.0.0.0[0]  via 10.159.0.25 (eth0)
S   192.168.0.4/255.255.255.252[0]  via 10.120.0.140 (eth0)
S   192.168.0.34/255.255.255.254[0]  via 10.120.0.140 (eth0)
C   10.159.0.1/255.255.0.0 is directly connected, eth1
C   10.120.0.1/255.255.0.0 is directly connected, eth0

R6#
```

Рисунок 7 – Таблица маршрутизации R6.

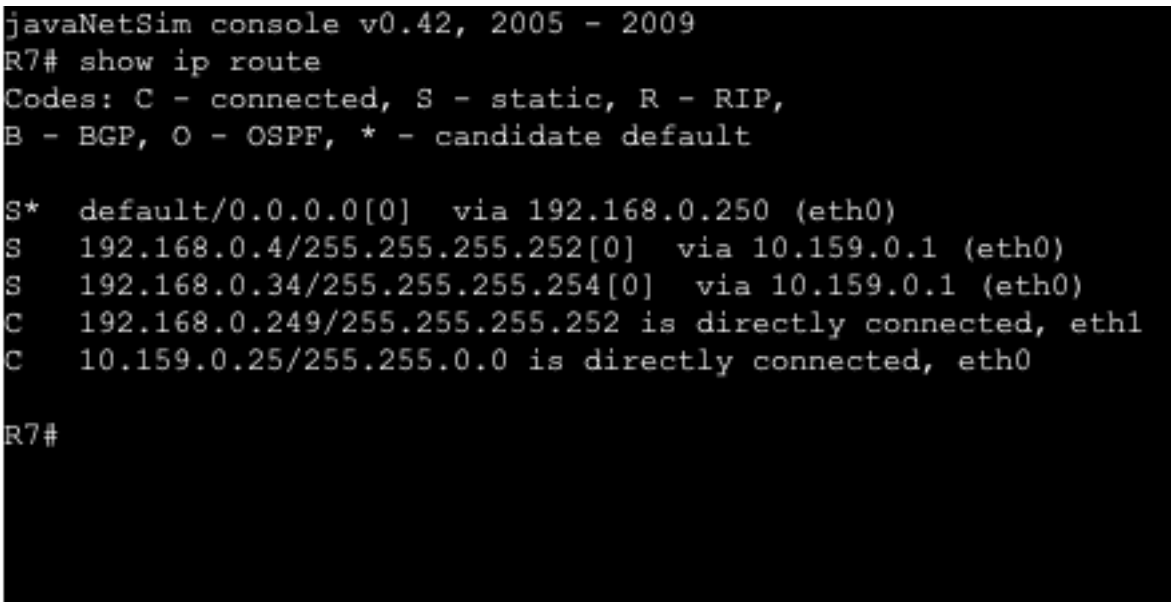

Рисунок 8 – Таблица маршрутизации R7.

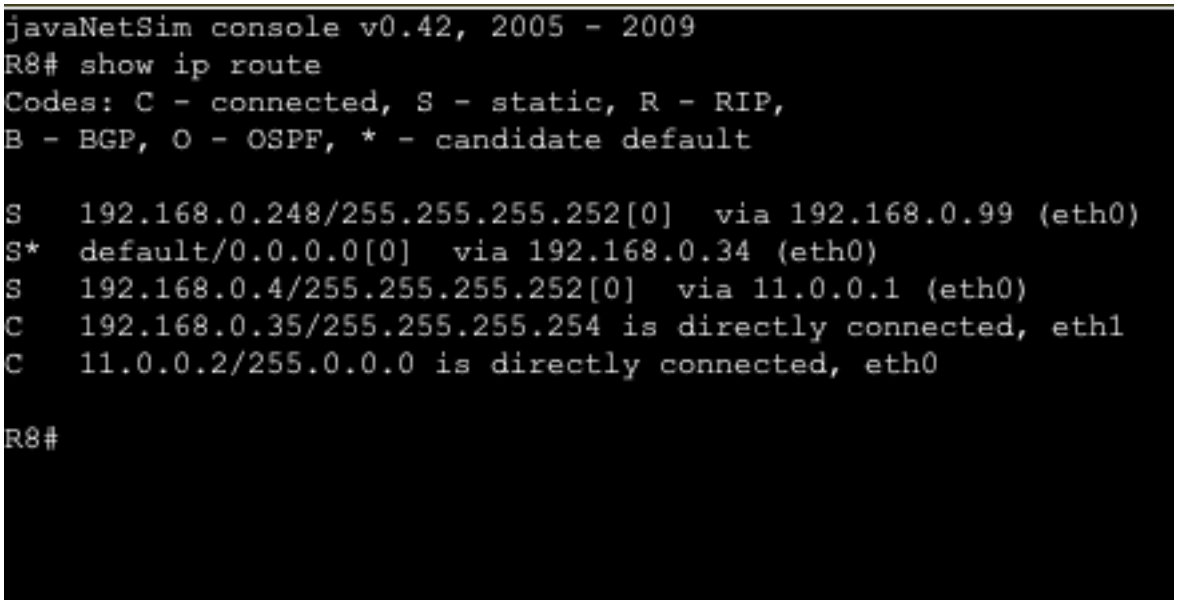

Рисунок 9 – Таблица маршрутизации R8.

Таблица 1 – Echo-запрос с pc1 на pc2.

13:38:40-433	PC1 Echo Request Packet	Network Created Echo Request packet to 192.168.0.250
13:38:40-437	PC2 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.4
13:38:40-438	PC1 Echo Reply Packet	Network Echo reply packet received from 192.168.0.250

Таблица 2 – Echo-запрос с pc1 на pc3.

13:39:45-673	PC1 Echo Request Packet	Network Created Echo Request packet to 192.168.0.34
13:39:45-675	PC3 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.4
13:39:45-676	PC1 Echo Reply Packet	Network Echo reply packet received from 192.168.0.34

Таблица 3 – Echo-запрос с pc2 на pc1.

13:41:38-137	PC2 Echo Request Packet	Network Created Echo Request packet to 192.168.0.4
13:41:38-138	PC1 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.250
13:41:38-138	PC2 Echo Reply Packet	Network Echo reply packet received from 192.168.0.4

Таблица 4 – Echo-запрос с pc2 на pc3.

13:42:23-711	PC2 Echo Request Packet	Network Created Echo Request packet to 192.168.0.34
13:42:23-712	PC3 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.250
13:42:23-713	PC2 Echo Reply Packet	Network Echo reply packet received from 192.168.0.34

Таблица 5 – Echo-запрос с pc3 на pc1.

13:42:51-380	PC3 Echo Request Packet	Network Created Echo Request packet to 192.168.0.4
13:42:51-380	PC1 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.34
13:42:51-380	PC3 Echo Reply Packet	Network Echo reply packet received from 192.168.0.4

Таблица 6 – Echo-запрос с pc3 на pc2.

13:43:23-366	PC3 Echo Request Packet	Network Created Echo Request packet to 192.168.0.250
13:43:23-367	PC2 Echo Reply Packet	Network Created Echo Reply packet to 192.168.0.34
13:43:23-367	PC3 Echo Reply Packet	Network Echo reply packet received from 192.168.0.250

Вывод

Были успешно изучены и практически опробованы методы статической маршрутизации в IP-сетях и методы управления таблицами маршрутизации на узлах сетевого уровня. Была настроена и протестирована простейшая IP сеть с использованием среды JavaNetSim. Для работы сети были настроены таблицы

статической маршрутизации .Была разосланы Echo-запросы на все компьютеры в сети и успешно получены ответы от них.