МИНОБРНАУКИ РОССИИ

САНКТ-ПЕТЕРБУРГСКИЙ ГОСУДАРСТВЕННЫЙ

ЭЛЕКТРОТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

«ЛЭТИ» ИМ. В.И. УЛЬЯНОВА (ЛЕНИНА)

Кафедра МО ЭВМ

ОТЧЕТ

по лабораторной работе №1

по дисциплине «Сети и телекоммуникации»

Тема: Настройка IP-адресов в сети.

Студентка гр. 0382   Кривенцова Л.М.

Преподаватель   Фирсов М.А.

Санкт-Петербург

2022

Цель работы.

Изучить и практически освоить основы адресации, физических адресов, маршрутизации в IP-сетях.

Задание.

1. Исправить структуру сети (если это необходимо), обеспечив корректную доставку кадров на физическом уровне.

2. Задать IP-адреса, маски подсети и шлюзы по умолчанию для всех узлов сети, чтобы обеспечить корректную доставку Echo-запроса от K1 к K2 и Echo-ответа обратно. Обосновать свои установки.

3. Выполнить Echo-запрос с K1 на K2. Посмотреть вывод программы.

4. Добавить статическую запись ARP для K3 на K1 (или для ближайшего к K1 маршрутизатора, находящегося между K3 и K1). Подождать устаревания ARP-таблиц и выполнить Echo-запрос с K1 на K3. Объяснить результат.

5. Выполнить Echo-запрос на IP-адрес 200.100.0.1 с K1. Объяснить вывод программы.

6. Выполнить Echo-запросы с K1 и K2 на все узлы сети. Убедиться, что Echo-ответы приходят.

Вариант 13. Файл со схемой сети: lab1_var13.jfst. Сеть между маршрутизаторами R120, R230 и R232: 172.31.128.0. Сеть между маршрутизаторами R232 и R233: 10.10.0.0. Компьютер Remote1 имеет IP-адрес 172.31.127.0. Компьютер Remote2 имеет IP-адрес 172.31.200.1. Компьютер Remote3 имеет IP-адрес: 10.0.39.0. Обозначения в задании: K1 – Remote1, K2 – Remote2, K3 – Remote3.
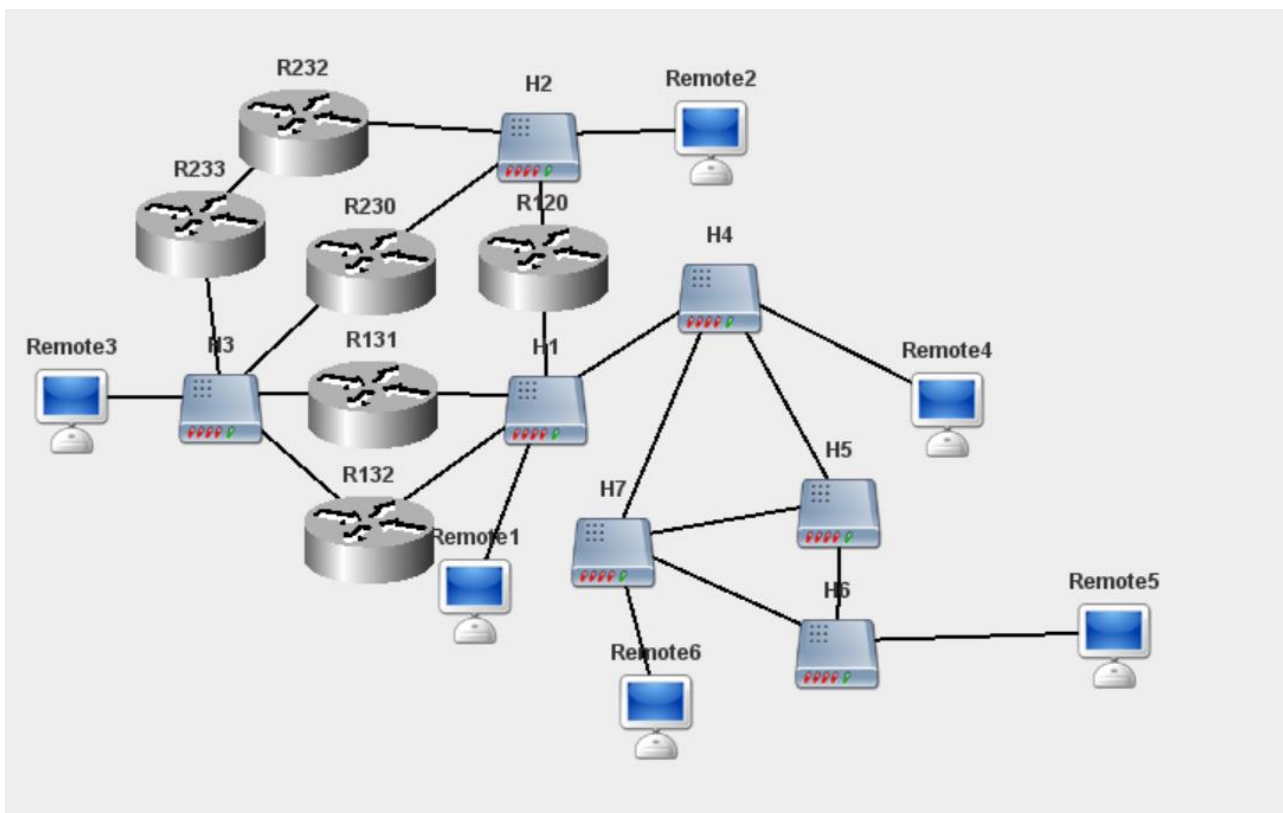
Выполнение работы.

Рис. 1. – Исходная схема сети.

1. Исправлена структура сети обеспечив корректную доставку кадров на физическом уровне. Был исключён один из концентраторов (H5), задействованный в цикле.
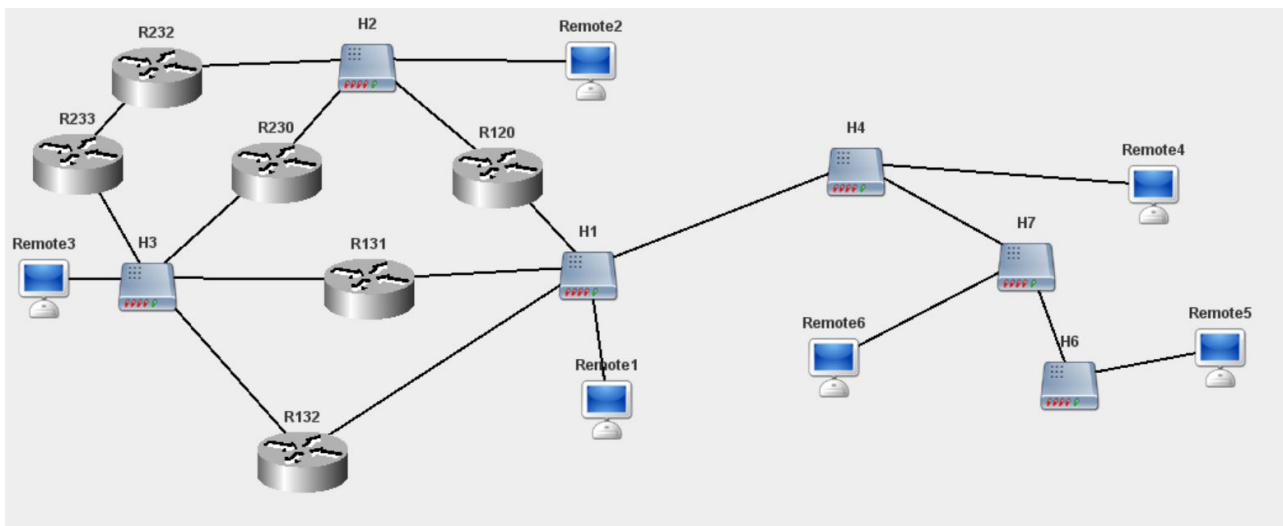

Рис. 2. – Исправленная схема сети.

2. Заданы IP-адреса, маски подсети и шлюзы по умолчанию для всех узлов сети, чтобы обеспечить корректную доставку Echo-запроса от K1 к K2 и Echo-ответа обратно.

Node name	Interface	IP-address	Subnet mask	Default Gateway
Remote1	eth0	172.31.127.0	255.255.128.0	172.31.129.0
R120	eth0	172.31.127.1	255.255.128.0	172.31.66.0
	eth1	172.31.129.0	255.255.128.0	
Remote2	eth0	172.31.200.1	255.255.128.0	172.31.66.0

Табл. 1. – Настройки протокола TCP/IP для отправки Echo-запроса от К1 к К2.

Для отправки пакетов было выделено 4 подсети: объединение К2-R120-R230-R232, К1-R120-R131-R132, R232-R233, R230-R233-R131-R132. Соответственно заданным IP-адресам К1 и К2 была определена маска: 255.255.128.0. Таким образом IP-адреса подсетей распознаются верно, без совпадений. Шлюзы по умолчанию распределены на ближайшие IP-адреса. Шлюзы по умолчанию замыкают цикл, содержащий маршрутизаторы всех подсетей. Таким образом обеспечивается корректная связь между всеми компьютерами (и маршрутизаторами). Шлюз по умолчанию маршрутизатора всегда располагается в той же подсети, что и он сам.

3. Выполнен Echo-запрос с К1 на К2.

Вывод программы:

20:38:48-946	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.200.1
20:38:48-946	Remote1	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.66.0
20:38:48-946	Remote1	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	Remote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
20:38:48-946	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
20:38:48-946	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.

Time	Device	Packet Type	Layer	Description
20:38:48-946	R131	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.127.0
20:38:48-946	R131	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
20:38:48-946	R131	Ethernet Packet	Link	Sending packet from interface AE:C0:72:4F:24:52
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
20:38:48-946	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.66.0).
20:38:48-946	Remote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
20:38:48-946	R131	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
20:38:48-946	R131	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.67.0
20:38:48-946	R131	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	R131	Ethernet Packet	Link	Sending packet from interface AE:C0:72:4F:24:52
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
20:38:48-946	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R132	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.66.0
20:38:48-946	R132	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.66.0).
20:38:48-946	R132	Ethernet Packet	Link	Sending packet from interface 94:2F:7D:1E:AB:44
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F

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20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
20:38:48-946	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface B0:2D:46:52:34:2F
20:38:48-946	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
20:38:48-946	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.67.0).
20:38:48-946	R131	Ethernet Packet	Link	Sending packet from interface AE:C0:72:4F:24:52
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R132	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
20:38:48-946	R132	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 10.0.32.2
20:38:48-946	R132	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	R132	Ethernet Packet	Link	Sending packet from interface 8D:8A:3A:4D:A3:B7
20:38:48-946	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 46:2E:A6:6A:41:17
20:38:48-946	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 3A:15:51:C5:6A:AA
20:38:48-946	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R230	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R230	ARP Response Packet	DataLink	Created ARP Response packet to 10.0.32.4
20:38:48-946	R230	ARP_packet	Network	Sending packet from ProtocolStack (to 10.0.32.4).
20:38:48-946	R230	Ethernet Packet	Link	Sending packet from interface 3A:15:51:C5:6A:AA
20:38:48-946	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 8D:8A:3A:4D:A3:B7
20:38:48-946	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 46:2E:A6:6A:41:17
20:38:48-946	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:3A:74:5C:66:42
20:38:48-946	Remote3	Ethernet Packet	Link	Recieved and dropped packet at interface 65:38:B7:C1:1F:61
20:38:48-946	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:3A:74:5C:66:42
20:38:48-946	R233	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote3	Ethernet Packet	Link	Recieved and accepted packet at interface 65:38:B7:C1:1F:61
20:38:48-946	Remote3	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.0.32.2).
20:38:48-946	R132	Ethernet Packet	Link	Sending packet from interface 8D:8A:3A:4D:A3:B7

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20:38:48-946	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 46:2E:A6:6A:41:17
20:38:48-946	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 3A:15:51:C5:6A:AA
20:38:48-946	R230	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R230	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
20:38:48-946	R230	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.200.1
20:38:48-946	R230	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	R230	Ethernet Packet	Link	Sending packet from interface 84:B8:45:79:5D:1A
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
20:38:48-946	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R232	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C4:A0:85:4A:A6
20:38:48-946	R232	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 54:6E:34:90:AF:7E
20:38:48-946	Remote2	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote2	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	Remote2	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.130.0
20:38:48-946	Remote2	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.130.0).
20:38:48-946	Remote2	Ethernet Packet	Link	Sending packet from interface 54:6E:34:90:AF:7E
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 2A:92:29:4C:49:77
20:38:48-946	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 84:B8:45:79:5D:1A
20:38:48-946	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R230	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R232	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C4:A0:85:4A:A6
20:38:48-946	R230	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.200.1).
20:38:48-946	R230	Ethernet Packet	Link	Sending packet from interface 84:B8:45:79:5D:1A
20:38:48-946	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 2A:92:29:4C:49:77
20:38:48-946	R232	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C4:A0:85:4A:A6
20:38:48-946	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 54:6E:34:90:AF:7E
20:38:48-946	Remote2	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote2	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	Remote2	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
20:38:48-946	Remote2	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.129.0
20:38:48-946	Remote2	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	Remote2	Ethernet Packet	Link	Sending packet from interface 54:6E:34:90:AF:7E
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
20:38:48-946	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R120	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.200.1
20:38:48-946	R120	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.200.1).
20:38:48-946	R120	Ethernet Packet	Link	Sending packet from interface 2A:92:29:4C:49:77
20:38:48-946	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 84:B8:45:79:5D:1A
20:38:48-946	R232	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C4:A0:85:4A:A6

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20:38:48-946	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 54:6E:34:90:AF:7E
20:38:48-946	Remote2	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote2	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 84:B8:45:79:5D:1A
20:38:48-946	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R232	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C4:A0:85:4A:A6
20:38:48-946	R232	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote2	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.129.0).
20:38:48-946	Remote2	Ethernet Packet	Link	Sending packet from interface 54:6E:34:90:AF:7E
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
20:38:48-946	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
20:38:48-946	R120	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.127.0
20:38:48-946	R120	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
20:38:48-946	R120	Ethernet Packet	Link	Sending packet from interface A1:B8:19:4B:B2:61
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
20:38:48-946	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
20:38:48-946	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
20:38:48-946	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	Remote1	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.127.1
20:38:48-946	Remote1	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.1).
20:38:48-946	Remote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R120	Ethernet Packet	Link	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
20:38:48-946	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R131	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C0:72:4F:24:52
20:38:48-946	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.127.0).
20:38:48-946	R120	Ethernet Packet	Link	Sending packet from interface A1:B8:19:4B:B2:61

20:38:48-946	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
20:38:48-946	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
20:38:48-946	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
20:38:48-946	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
20:38:48-946	R131	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C0:72:4F:24:52
20:38:48-946	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
20:38:48-946	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
20:38:48-946	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
20:38:48-946	**Remote1**	**Echo Reply Packet**	**Network**	**Echo reply packet received from 172.31.200.1**
20:38:48-946	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 84:B8:45:79:5D:1A
20:38:48-946	R232	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C4:A0:85:4A:A6
20:38:48-946	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:3A:74:5C:66:42
20:38:48-946	Remote3	Ethernet Packet	Link	Recieved and dropped packet at interface 65:38:B7:C1:1F:61

4. Внесены необходимые параметры для K3:

Node name	Interface	IP-address	Subnet mask	Default Gateway
Remote3	eth0	10.0.39.0	255.255.0.0	10.0.32.1

Табл. 2. – Настройки протокола TCP/IP для отправки Echo-запроса от K1(Remote1) к K3(Remote3).

Добавлена статическая запись ARP для K3(Remote3) на ближайший к K1(Remote1) маршрутизатор.


```
ARP entries for :Remote3
Internet Address          Physical Address              Type

172.31.66.0               AE:C0:72:4F:24:52             Static
```

Рис.3. - ARP-таблица для K3 (Remote3). Статическая запись указывает на интерфейс маршрутизатора, ближайшего к K1 (Remote1), находящийся в одной подсети с K1.

Выполнен Echo-запрос с K3 на K1.

Вывод программы:

00:08:08-552	Re-mote3	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.0
00:08:08-552	Re-mote3	ICMP_packet	Network	Sending packet from ProtocolStack (to 10.0.32.1).
00:08:08-552	Re-mote3	Ethernet Packet	Link	Sending packet from interface 65:38:B7:C1:1F:61
00:08:08-552	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
00:08:08-552	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 46:2E:A6:6A:41:17
00:08:08-552	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
00:08:08-552	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:3A:74:5C:66:42
00:08:08-552	R233	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-552	R233	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
00:08:08-552	R233	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 162.10.31.13).
00:08:08-552	R233	Ethernet Packet	Link	Sending packet from interface 51:33:B6:95:13:BB
00:08:08-552	R232	Ethernet Packet	Link	Recieved and accepted packet at interface 7D:48:B6:7A:8D:54
00:08:08-552	R232	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-552	R232	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
00:08:08-552	R232	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.129.0).
00:08:08-552	R232	Ethernet Packet	Link	Sending packet from interface AE:C4:A0:85:4A:A6
00:08:08-552	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
00:08:08-552	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-552	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
00:08:08-552	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.127.0).
00:08:08-552	R120	Ethernet Packet	Link	Sending packet from interface A1:B8:19:4B:B2:61
00:08:08-552	Re-mote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
00:08:08-552	Re-mote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
00:08:08-552	Re-mote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
00:08:08-552	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
00:08:08-552	R131	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C0:72:4F:24:52
00:08:08-552	Re-mote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
00:08:08-552	Re-mote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-552	Re-mote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
00:08:08-552	Re-mote1	Echo Reply Packet	Network	Created Echo Reply packet to 10.0.39.0

00:08:08-552	Re-mote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.66.0).
00:08:08-552	Re-mote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
00:08:08-552	Re-mote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
00:08:08-552	Re-mote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
00:08:08-555	Re-mote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
00:08:08-555	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
00:08:08-555	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
00:08:08-556	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
00:08:08-556	R131	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-556	R131	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
00:08:08-556	R131	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.0.39.0).
00:08:08-556	R131	Ethernet Packet	Link	Sending packet from interface 46:2E:A6:6A:41:17
00:08:08-556	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
00:08:08-556	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
00:08:08-556	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:3A:74:5C:66:42
00:08:08-556	Re-mote3	Ethernet Packet	Link	Recieved and accepted packet at interface 65:38:B7:C1:1F:61
00:08:08-556	Re-mote3	ICMP_packet	Network	ProtocolStack received packet from local Interface.
00:08:08-556	Re-mote3	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
00:08:08-556	**Re-mote3**	**Echo Reply Packet**	**Net-work**	**Echo reply packet received from 172.31.127.0**
00:08:08-556	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 84:B8:45:79:5D:1A
00:08:08-557	Re-mote2	Ethernet Packet	Link	Recieved and dropped packet at interface 54:6E:34:90:AF:7E

Echo-запрос с Remote3 на Remote1 после устаревания ARP-таблиц:

14:41:23-890	Re-mote3	Echo Request Packet	Network	Created Echo Request packet to 172.31.127.0
14:41:23-890	Re-mote3	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 10.0.32.1
14:41:23-890	Re-mote3	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-890	Re-mote3	Ethernet Packet	Link	Sending packet from interface 65:38:B7:C1:1F:61
14:41:23-890	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-890	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 46:2E:A6:6A:41:17

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Time	Device	Packet	Layer	Message
14:41:23-890	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 3A:15:51:C5:6A:AA
14:41:23-890	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:3A:74:5C:66:42
14:41:23-890	R233	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	R233	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-890	R233	ARP Response Packet	Data-Link	Created ARP Response packet to 10.0.39.0
14:41:23-890	R233	ARP_packet	Network	Sending packet from ProtocolStack (to 10.0.39.0).
14:41:23-890	R233	Ethernet Packet	Link	Sending packet from interface 9B:3A:74:5C:66:42
14:41:23-890	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-890	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 46:2E:A6:6A:41:17
14:41:23-890	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
14:41:23-890	Re-mote3	Ethernet Packet	Link	Recieved and accepted packet at interface 65:38:B7:C1:1F:61
14:41:23-890	Re-mote3	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	Re-mote3	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-890	Re-mote3	ICMP_packet	Network	Sending packet from ProtocolStack (to 10.0.32.1).
14:41:23-890	Re-mote3	Ethernet Packet	Link	Sending packet from interface 65:38:B7:C1:1F:61
14:41:23-890	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-890	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 46:2E:A6:6A:41:17
14:41:23-890	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
14:41:23-890	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:3A:74:5C:66:42
14:41:23-890	R233	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-890	R233	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
14:41:23-890	R233	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 162.10.31.13
14:41:23-890	R233	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-891	R233	Ethernet Packet	Link	Sending packet from interface 51:33:B6:95:13:BB
14:41:23-891	R232	Ethernet Packet	Link	Recieved and accepted packet at interface 7D:48:B6:7A:8D:54
14:41:23-891	R232	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-891	R232	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-891	R232	ARP Response Packet	Data-Link	Created ARP Response packet to 162.10.31.12

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14:41:23-891	R232	ARP_packet	Network	Sending packet from ProtocolStack (to 162.10.31.12).
14:41:23-891	R232	Ethernet Packet	Link	Sending packet from interface 7D:48:B6:7A:8D:54
14:41:23-891	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 51:33:B6:95:13:BB
14:41:23-891	R233	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-891	R233	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-891	R233	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 162.10.31.13).
14:41:23-891	R233	Ethernet Packet	Link	Sending packet from interface 51:33:B6:95:13:BB
14:41:23-891	R232	Ethernet Packet	Link	Recieved and accepted packet at interface 7D:48:B6:7A:8D:54
14:41:23-891	R232	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-891	R232	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
14:41:23-891	R232	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 172.31.129.0
14:41:23-891	R232	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-891	R232	Ethernet Packet	Link	Sending packet from interface AE:C4:A0:85:4A:A6
14:41:23-891	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
14:41:23-891	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-891	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-891	R120	ARP Response Packet	Data-Link	Created ARP Response packet to 172.31.131.0
14:41:23-891	R120	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.131.0).
14:41:23-891	R120	Ethernet Packet	Link	Sending packet from interface 2A:92:29:4C:49:77
14:41:23-891	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 84:B8:45:79:5D:1A
14:41:23-891	R232	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C4:A0:85:4A:A6
14:41:23-921	R232	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R232	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	Re-mote2	Ethernet Packet	Link	Recieved and dropped packet at interface 54:6E:34:90:AF:7E
14:41:23-921	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 84:B8:45:79:5D:1A
14:41:23-921	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote2	Ethernet Packet	Link	Recieved and accepted packet at interface 54:6E:34:90:AF:7E
14:41:23-921	Re-mote2	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R232	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.129.0).
14:41:23-921	R232	Ethernet Packet	Link	Sending packet from interface AE:C4:A0:85:4A:A6

14:41:23-921	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 2A:92:29:4C:49:77
14:41:23-921	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
14:41:23-921	R120	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 172.31.127.0
14:41:23-921	R120	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-921	R120	Ethernet Packet	Link	Sending packet from interface A1:B8:19:4B:B2:61
14:41:23-921	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 2C:95:53:96:79:84
14:41:23-921	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
14:41:23-921	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
14:41:23-921	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
14:41:23-921	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Remote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	Remote1	ARP Response Packet	Data-Link	Created ARP Response packet to 172.31.127.1
14:41:23-921	Remote1	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.1).
14:41:23-921	Remote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
14:41:23-921	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
14:41:23-921	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
14:41:23-921	R120	Ethernet Packet	Link	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
14:41:23-921	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	R131	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C0:72:4F:24:52

14:41:23-921	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.127.0).
14:41:23-921	R120	Ethernet Packet	Link	Sending packet from interface A1:B8:19:4B:B2:61
14:41:23-921	Re-mote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
14:41:23-921	Re-mote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Re-mote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	R131	Ethernet Packet	Link	Recieved and dropped packet at interface AE:C0:72:4F:24:52
14:41:23-921	Re-mote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
14:41:23-921	Re-mote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	Re-mote1	Echo Reply Packet	Network	Created Echo Reply packet to 10.0.39.0
14:41:23-921	Re-mote1	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 172.31.66.0
14:41:23-921	Re-mote1	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-921	Re-mote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
14:41:23-921	Re-mote6	Ethernet Packet	Link	Recieved and accepted packet at interface 2C:95:53:96:79:84
14:41:23-921	Re-mote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote5	Ethernet Packet	Link	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Re-mote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote4	Ethernet Packet	Link	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
14:41:23-921	Re-mote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R120	Ethernet Packet	Link	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
14:41:23-921	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
14:41:23-921	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R131	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	R131	ARP Response Packet	Data-Link	Created ARP Response packet to 172.31.127.0
14:41:23-921	R131	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
14:41:23-921	R131	Ethernet Packet	Link	Sending packet from interface AE:C0:72:4F:24:52

14:41:23-921	Re-mote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
14:41:23-921	Re-mote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Re-mote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
14:41:23-921	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	Re-mote1	Ethernet Packet	Link	Recieved and accepted packet at interface B0:2D:46:52:34:2F
14:41:23-921	Re-mote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	Re-mote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.66.0).
14:41:23-921	Re-mote1	Ethernet Packet	Link	Sending packet from interface B0:2D:46:52:34:2F
14:41:23-921	Re-mote6	Ethernet Packet	Link	Recieved and dropped packet at interface 2C:95:53:96:79:84
14:41:23-921	Re-mote5	Ethernet Packet	Link	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
14:41:23-921	Re-mote4	Ethernet Packet	Link	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
14:41:23-921	R120	Ethernet Packet	Link	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
14:41:23-921	R131	Ethernet Packet	Link	Recieved and accepted packet at interface AE:C0:72:4F:24:52
14:41:23-921	R131	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R131	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
14:41:23-921	R131	ARP Discovery Packet	Data-Link	Created ARP discovery packet to source MAC address for IP 10.0.39.0
14:41:23-921	R131	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
14:41:23-921	R131	Ethernet Packet	Link	Sending packet from interface 46:2E:A6:6A:41:17
14:41:23-921	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-921	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R230	Ethernet Packet	Link	Recieved and accepted packet at interface 3A:15:51:C5:6A:AA
14:41:23-921	R230	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:3A:74:5C:66:42
14:41:23-921	R233	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote3	Ethernet Packet	Link	Recieved and accepted packet at interface 65:38:B7:C1:1F:61
14:41:23-921	Re-mote3	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote3	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.

Time	Device	Packet Type	Layer	Description
14:41:23-921	Re-mote3	ARP Response Packet	Data-Link	Created ARP Response packet to 10.0.32.3
14:41:23-921	Re-mote3	ARP_packet	Network	Sending packet from ProtocolStack (to 10.0.32.3).
14:41:23-921	Re-mote3	Ethernet Packet	Link	Sending packet from interface 65:38:B7:C1:1F:61
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-921	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 46:2E:A6:6A:41:17
14:41:23-921	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	R131	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
14:41:23-921	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:3A:74:5C:66:42
14:41:23-921	R131	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.0.39.0).
14:41:23-921	R131	Ethernet Packet	Link	Sending packet from interface 46:2E:A6:6A:41:17
14:41:23-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 8D:8A:3A:4D:A3:B7
14:41:23-921	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:15:51:C5:6A:AA
14:41:23-921	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:3A:74:5C:66:42
14:41:23-921	Re-mote3	Ethernet Packet	Link	Recieved and accepted packet at interface 65:38:B7:C1:1F:61
14:41:23-921	Re-mote3	ICMP_packet	Network	ProtocolStack received packet from local Interface.
14:41:23-921	Re-mote3	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
14:41:23-921	Re-mote3	Echo Reply Packet	Network	Echo reply packet received from 172.31.127.0
14:41:23-921	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 84:B8:45:79:5D:1A
14:41:23-921	Re-mote2	Ethernet Packet	Link	Recieved and dropped packet at interface 54:6E:34:90:AF:7E

Следовательно, когда физический адрес известен узлу, сигнал отсылается напрямую (когда добавлена статическая запись).

5. Выполнен Echo-запрос на IP-адрес 200.100.0.1 с K1. Вывод программы:

Time	Device	Description
21:52:51-975	Remote1	Created Echo Request packet to 200.100.0.1
21:52:51-975	Remote1	Created ARP discovery packet to source MAC address for IP 172.31.66.0
21:52:51-975	Remote1	Sending broadcast packet from ProtocolStack.
21:52:51-975	Remote1	Sending packet from interface B0:2D:46:52:34:2F
21:52:51-975	Remote6	Recieved and accepted packet at interface 2C:95:53:96:79:84
21:52:51-975	Remote6	ProtocolStack received packet from local Interface.
21:52:51-975	Remote5	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
21:52:51-975	Remote5	ProtocolStack received packet from local Interface.
21:52:51-975	Remote4	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
21:52:51-975	Remote4	ProtocolStack received packet from local Interface.
21:52:51-975	R120	Recieved and accepted packet at interface A1:B8:19:4B:B2:61

21:52:51-975	R120	ProtocolStack received packet from local Interface.
21:52:51-975	R132	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
21:52:51-975	R132	ProtocolStack received packet from local Interface.
21:52:51-975	R131	Recieved and accepted packet at interface AE:C0:72:4F:24:52
21:52:51-975	R131	ProtocolStack received packet from local Interface.
21:52:51-975	R131	Confirmed Packet is for this Network Layer Device.
21:52:51-975	R131	Created ARP Response packet to 172.31.127.0
21:52:51-975	R131	Sending packet from ProtocolStack (to 172.31.127.0).
21:52:51-975	R131	Sending packet from interface AE:C0:72:4F:24:52
21:52:51-975	Remote6	Recieved and dropped packet at interface 2C:95:53:96:79:84
21:52:51-975	Remote5	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
21:52:51-975	Remote4	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
21:52:51-975	R120	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
21:52:51-975	R132	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
21:52:51-975	Remote1	Recieved and accepted packet at interface B0:2D:46:52:34:2F
21:52:51-975	Remote1	ProtocolStack received packet from local Interface.
21:52:51-975	Remote1	Confirmed Packet is for this Network Layer Device.
21:52:51-975	Remote1	Sending packet from ProtocolStack (to 172.31.66.0).
21:52:51-975	Remote1	Sending packet from interface B0:2D:46:52:34:2F
21:52:51-975	Remote6	Recieved and dropped packet at interface 2C:95:53:96:79:84
21:52:51-975	Remote5	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
21:52:51-975	Remote4	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
21:52:51-975	R120	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
21:52:51-975	R132	Recieved and dropped packet at interface 94:2F:7D:1E:AB:44
21:52:51-975	R131	Recieved and accepted packet at interface AE:C0:72:4F:24:52
21:52:51-975	R131	ProtocolStack received packet from local Interface.
21:52:51-975	R131	Packet Received: Network Layer Device is Routable forwarding packet.
21:52:51-975	R131	Created ARP discovery packet to source MAC address for IP 172.31.67.0
21:52:51-975	R131	Sending broadcast packet from ProtocolStack.
21:52:51-975	R131	Sending packet from interface AE:C0:72:4F:24:52
21:52:51-975	Remote6	Recieved and accepted packet at interface 2C:95:53:96:79:84
21:52:51-975	Remote6	ProtocolStack received packet from local Interface.
21:52:51-975	Remote5	Recieved and accepted packet at interface 25:71:1D:A9:AD:3F
21:52:51-975	Remote5	ProtocolStack received packet from local Interface.
21:52:51-975	Remote4	Recieved and accepted packet at interface 65:9B:C5:41:14:A0
21:52:51-975	Remote4	ProtocolStack received packet from local Interface.
21:52:51-975	R120	Recieved and accepted packet at interface A1:B8:19:4B:B2:61
21:52:51-975	R120	ProtocolStack received packet from local Interface.
21:52:51-975	R132	Recieved and accepted packet at interface 94:2F:7D:1E:AB:44
21:52:51-975	R132	ProtocolStack received packet from local Interface.
21:52:51-975	R132	Confirmed Packet is for this Network Layer Device.
21:52:51-975	R132	Created ARP Response packet to 172.31.66.0
21:52:51-975	R132	Sending packet from ProtocolStack (to 172.31.66.0).
21:52:51-975	R132	Sending packet from interface 94:2F:7D:1E:AB:44
21:52:51-975	Remote6	Recieved and dropped packet at interface 2C:95:53:96:79:84
21:52:51-975	Remote5	Recieved and dropped packet at interface 25:71:1D:A9:AD:3F
21:52:51-975	Remote4	Recieved and dropped packet at interface 65:9B:C5:41:14:A0
21:52:51-975	R120	Recieved and dropped packet at interface A1:B8:19:4B:B2:61
21:52:51-975	R131	Recieved and accepted packet at interface AE:C0:72:4F:24:52
21:52:51-975	R131	ProtocolStack received packet from local Interface.
21:52:51-975	R131	Confirmed Packet is for this Network Layer Device.
21:52:51-975	Remote1	Recieved and dropped packet at interface B0:2D:46:52:34:2F
21:52:51-975	Remote1	Recieved and accepted packet at interface B0:2D:46:52:34:2F

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| 14:00:26-942 | R132 | Recieved and accepted packet at interface 94:2F:7D:1E:AB:44 |
| 14:00:26-942 | R132 | ProtocolStack received packet from local Interface. |

14:00:26-942 R132 Packet Received: Network Layer Device is Routable forwarding packet.
14:00:26-942 R132 Forwarding packet from ProtocolStack(to 10.0.32.2).
14:00:26-942 R132 Sending packet from interface 8D:8A:3A:4D:A3:B7
14:00:26-942 R131 Recieved and dropped packet at interface 46:2E:A6:6A:41:17
14:00:26-942 R230 Recieved and accepted packet at interface 3A:15:51:C5:6A:AA
14:00:26-942 R230 ProtocolStack received packet from local Interface.
14:00:26-942 R230 Packet Dropped: Hop count exceeded. Host 200.100.0.1 Unreachable

Цикл образуется за счёт того, что К1 напрямую связан только с хабом, который рассылает сигнал по всем узлам, связанным с ним. Таким образом сигнал попадает в следующие хабы, в свою очередь связанные с К4, К5 и К6. Именно эти узлы получают сигнал в первую очередь. Не найдя там подходящий адрес, сигнал через первый хаб отправляется по связанным с ним маршрутизаторам – R120, R131, R132. В конце концов истекает TTL, так и не найдя для К1 узел с данным адресом.

6. Были выполнены Echo-запросы с К1 и К2 на все узлы сети. Echo-ответы успешно приходят.

К1-К2, К1-К3	См. выше			
К1- К4	Re-mote1	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.14
	Re-mote1	Echo Reply Packet	Net-work	Echo reply packet received from 172.31.127.14
К1-К5	Re-mote1	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.15
	Re-mote1	Echo Reply Packet	Net-work	Echo reply packet received from 172.31.127.15
К1-К6	Re-mote1	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.11
	Re-mote1	Echo Reply Packet	Net-work	Echo reply packet received from 172.31.127.11
К2-К1	Re-mote2	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.0
	Re-mote2	Echo Reply Packet	Net-work	Echo reply packet received from 172.31.127.0
К2-К3	Re-mote2	Echo Request Packet	Net-work	Created Echo Request packet to 10.0.39.0
	Re-mote2	Echo Reply Packet	Net-work	Echo reply packet received from 10.0.39.0
К2-К4	Re-mote2	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.14
	Re-mote2	Echo Reply Packet	Net-work	Echo reply packet received from 172.31.127.14
К2-К5	Re-mote2	Echo Request Packet	Net-work	Created Echo Request packet to 172.31.127.15

	Remote2	Echo Reply Packet	Network	Echo reply packet received from 172.31.127.15
К2-К6	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.127.11
	Remote1	Echo Reply Packet	Network	Echo reply packet received from 172.31.127.11

Node name	Interface	IP-address	Subnet mask	Default Gateway
Remote1	eth0	172.31.127.0	255.255.128.0	172.31.129.0
R120	eth0	172.31.127.1	255.255.128.0	172.31.66.0
	eth1	172.31.129.0	255.255.128.0	
R131	eth0	10.0.32.3	255.255.0.0	172.31.67.0
	eth1	172.31.66.0	255.255.128.0	
R132	eth0	10.0.32.4	255.255.0.0	10.0.32.2
	eth1	172.31.67.0	255.255.128.0	
Remote3	eth0	10.0.39.0	255.255.0.0	10.0.32.1
R230	eth0	10.0.32.2	255.255.0.0	10.0.32.1
	eth1	172.31.130.0	255.255.128.0	
R232	eth0	162.10.31.13	255.255.0.0	172.31.129.0
	eth1	172.31.131.0	255.255.128.0	
R233	eth0	10.0.32.1	255.255.0.0	162.10.31.13
	eth1	162.10.31.12	255.255.0.0	
Remote4	eth0	172.31.127.14	255.255.128.0	172.31.66.0
Remote5	eth0	172.31.127.15	255.255.128.0	172.31.66.0
Remote6	eth0	172.31.127.11	255.255.128.0	172.31.66.0

Табл. 3. – Настройки протокола TCP/IP для всех узлов.

Выводы.

Были изучены и практически освоены основы адресации, физических адресов, маршрутизации в IP-сетях.