ОТЧЕТ

по лабораторной работе №1

по дисциплине «Сети и телкомуникации»

Тема: Настройка IP-адресов в сети.

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Цель работы.

Изучение и практическое освоение основ адресации, разрешения физических адресов и простейшей 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 узло 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 иR233: 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.

1. Был удален концентратор H5 из-за которого образовывался цикл, из за которого образовывался цикл. Его удаление обеспечило корректную доставку кадров по сети. (см на Рис. 1.)
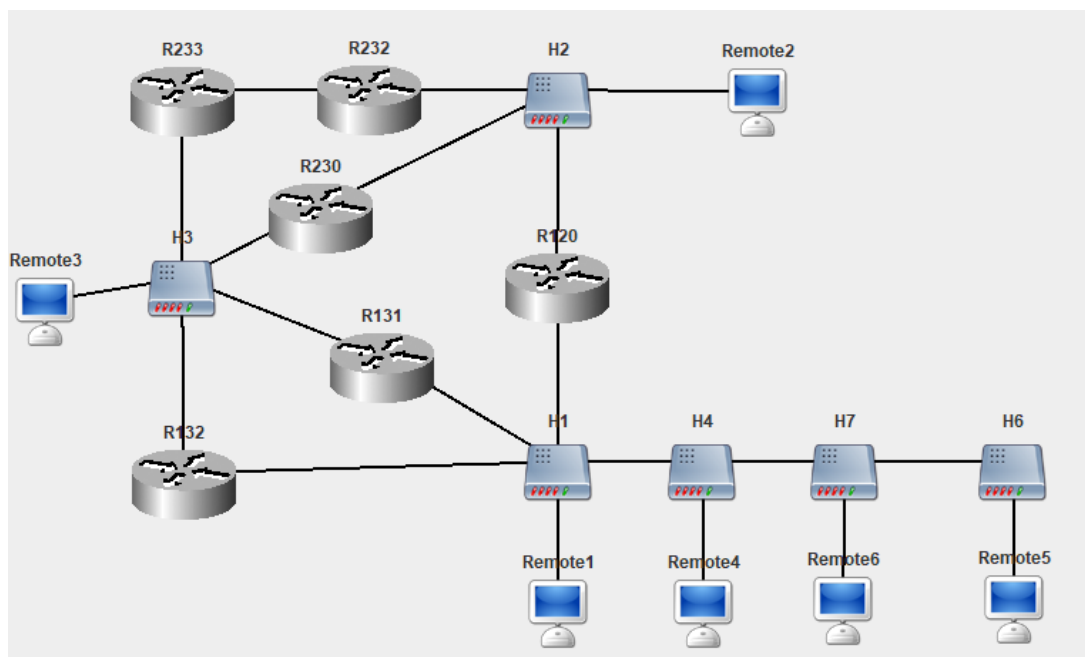
Рис. 1: Схема сети.

2. Были установлены следующие настройки узлов:

Имя узла	Интерфейс	IP	Маска	Шлюз
Remote1	eth0	172.31.127.0	255.255.128.0	172.31.0.120
Remote4	eth0	172.31.0.4	255.255.128.0	172.31.0.120
Remote5	eth0	172.31.0.5	255.255.128.0	172.31.0.120
Remote6	eth0	172.31.0.6	255.255.128.0	172.31.0.120
Remote2	eth0	172.31.200.1	255.255.128.0	172.31.128.120
Remote3	eth0	10.0.39.0	255.0.0.0	10.0.0.233
R120	eth0	172.31.0.120	255.255.128.0	172.31.0.131
	eth1	172.31.128.120	255.255.128.0	
R131	eth0	10.0.0.131	255.255.0.0	172.31.0.132
	eth1	172.31.0.131	255.255.128.0	
R132	eth0	10.0.0.132	255.255.0.0	10.0.0.230
	eth1	172.31.0.132	255.255.128.0	
R230	eth0	10.0.0.230	255.255.0.0	10.0.0.233
	eth1	172.31.128.230	255.255.128.0	
R232	eth0	10.10.0.232	255.255.0.0	172.31.128.120
	eth1	172.31.128.232	255.255.128.0	

| R233 | eth0 | 10.0.0.233 | 255.255.0.0 | 10.10.0.232 |
| | eth1 | 10.10.0.233 | 255.255.0.0 | |

Для корректной доставки пакетов было выделено четыре подсети. IP-адреса выбирались последовательно, все IP уникальны. Шлюзы по умолчанию замыкают цикл, что позволяет отправлять пакеты между любыми двумя подсетями.

3. Выполнен Echo-запрос с K1 на K2.

07:47:55-276	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.128.120
07:47:55-276	Remote1	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.128.120
07:47:55-276	Remote1	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
07:47:55-276	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
07:47:55-276	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 4D:88:2C:8D:68:82
07:47:55-276	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-276	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 17:AE:58:92:26:6F
07:47:55-276	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-277	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:96:C3:91:2F:9A
07:47:55-277	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-277	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
07:47:55-277	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-277	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:47:55-277	R120	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.127.0
07:47:55-277	R120	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
07:47:55-277	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
07:47:55-277	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:47:55-277	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:47:55-277	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:47:55-277	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:47:55-277	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
07:47:55-277	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
07:47:55-277	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-277	Remote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:47:55-277	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 7C:89:97:66:58:3E
07:47:55-277	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-277	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 49:4E:59:A0:81:8C
07:47:55-277	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-278	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.128.120).
07:47:55-278	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
07:47:55-278	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:47:55-281	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:47:55-281	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:47:55-281	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
07:47:55-281	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-281	R120	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:47:55-281	R120	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
07:47:55-281	R120	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
07:47:55-281	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
07:47:55-281	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:47:55-282	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:47:55-282	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:47:55-282	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:47:55-282	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
07:47:55-282	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
07:47:55-282	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:47:55-282	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:47:55-282	Remote1	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.120
07:47:55-282	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:47:55-282	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C

Рисунок 2 – Вывод программы после запроса с K1 на K2

4. Добавлена статическая запись ARP для ближайшего к K1 маршрутизатора (R120), находящегося между K3 и K1. Затем выполнен Echo-запрос с K1 на K3.

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ARP entries for :R120		
Internet Address	Physical Address	Type
172.31.127.0	63:4C:6C:63:1A:8E	Static

Рисунок 3 – ARP-таблица

07:58:37-720	Remote1	Echo Request Packet	Network	Created Echo Request packet to 10.0.39.0
07:58:37-720	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.120).
07:58:37-720	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
07:58:37-720	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:58:37-720	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:58:37-720	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:58:37-720	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
07:58:37-720	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-720	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
07:58:37-720	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.0.131).
07:58:37-720	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
07:58:37-720	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:58:37-720	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:58:37-720	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:58:37-720	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:58:37-720	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 49:4E:59:A0:81:8C
07:58:37-720	R131	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-720	R131	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
07:58:37-720	R131	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.0.39.0).
07:58:37-721	R131	Ethernet Packet	Link	Sending packet from interface B0:20:4E:4B:7F:5B
07:58:37-721	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:C3:64:7B:56:AC
07:58:37-721	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 4A:66:28:16:91:C3
07:58:37-721	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 43:18:28:60:13:C1
07:58:37-721	Remote3	Ethernet Packet	Link	Recieved and accepted packet at interface 4F:95:24:5C:A2:42
07:58:37-721	Remote3	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-721	Remote3	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:58:37-721	Remote3	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
07:58:37-721	Remote3	ICMP_packet	Network	Sending packet from ProtocolStack (to 10.0.0.233).
07:58:37-721	Remote3	Ethernet Packet	Link	Sending packet from interface 4F:95:24:5C:A2:42
07:58:37-721	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:C3:64:7B:56:AC
07:58:37-721	R131	Ethernet Packet	Link	Recieved and dropped packet at interface B0:20:4E:4B:7F:5B
07:58:37-721	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 4A:66:28:16:91:C3
07:58:37-721	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 43:18:28:60:13:C1
07:58:37-721	R233	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-721	R233	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
07:58:37-721	R233	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.10.0.232).
07:58:37-721	R233	Ethernet Packet	Link	Sending packet from interface C4:2B:43:5C:98:B2
07:58:37-721	R232	Ethernet Packet	Link	Recieved and accepted packet at interface 9F:63:82:75:11:30
07:58:37-721	R232	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-721	R232	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
07:58:37-721	R232	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.128.120).
07:58:37-721	R232	Ethernet Packet	Link	Sending packet from interface B4:66:87:64:3D:AB
07:58:37-721	R120	Ethernet Packet	Link	Recieved and accepted packet at interface B1:5E:5B:14:68:8F
07:58:37-721	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-721	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
07:58:37-721	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.127.0).
07:58:37-721	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
07:58:37-722	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
07:58:37-722	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
07:58:37-722	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
07:58:37-722	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:58:37-722	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
07:58:37-722	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E

07:58:37-722	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
07:58:37-722	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
07:58:37-722	Remote1	Echo Reply Packet	Network	Echo reply packet received from 10.0.39.0
07:58:37-722	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
07:58:37-722	Remote2	Ethernet Packet	Link	Recieved and dropped packet at interface 8A:76:34:3E:75:16
07:58:37-722	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
07:58:37-722	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
07:58:37-722	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C

Рисунок 4 – Вывод запроса после добавления записи

Echo-запрос с K1 на K3 был успешно выполнен. Также был замечен тот факт, что Echo-запрос с K1 на K3 прошел с меньшим количеством

запросов по сети, чем без добавления статической записи ARP для K3 на K1. Полученные результаты позволяют сделать вывод, что при наличии записей в ARP-таблице пакет отправляется напрямую к получателю. В случае отсутствия записей в ARP таблицах, создаются ARP запросы, которые по-сути захламляют сеть. При использовании сети неизменной конфигурации сети, было бы разумно добавлять статические записи в ARP таблицы.

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

08:13:28-811	Remote1	Echo Request Packet	Network	Created Echo Request packet to 200.100.0.1
08:13:28-811	Remote1	ARP Discovery Packet	DataLink	Created ARP discovery packet to source MAC address for IP 172.31.0.120
08:13:28-811	Remote1	ARP_packet	Network	Sending broadcast packet from ProtocolStack.
08:13:28-811	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
08:13:28-811	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 4D:88:2C:8D:68:82
08:13:28-811	Remote6	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 17:AE:58:92:26:6F
08:13:28-811	Remote5	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:96:C3:91:2F:9A
08:13:28-811	Remote4	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
08:13:28-811	R120	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	R120	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:13:28-811	R120	ARP Response Packet	DataLink	Created ARP Response packet to 172.31.127.0
08:13:28-811	R120	ARP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
08:13:28-811	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
08:13:28-811	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:13:28-811	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:13:28-811	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:13:28-811	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:13:28-811	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:13:28-811	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
08:13:28-811	Remote1	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	Remote1	ARP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:13:28-811	R132	Ethernet Packet	Link	Recieved and accepted packet at interface 7C:89:97:66:58:3E
08:13:28-811	R132	ARP_packet	Network	ProtocolStack received packet from local Interface.
08:13:28-811	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 49:4E:59:A0:81:8C
08:13:28-811	R131	ARP_packet	Network	ProtocolStack received packet from local Interface.

Рисунок 5 – Отправка на несуществующий адрес

Поскольку узла с таким IP-адресом нет в сети, пакет будет гулять по ней до тех пор, пока не истечёт его TTL. Далее в выводе идёт огромное множество дублирующихся строк, которые означают, что пакет попал в петлю из маршрутизаторов и находился в ней,пока не истекло время его жизни.

6. Запросы с K1:

08:18:45-347	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.4
08:18:45-347	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.4).
08:18:45-347	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
08:18:45-347	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:18:45-347	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:18:45-347	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:96:C3:91:2F:9A
08:18:45-347	Remote4	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:18:45-347	Remote4	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:18:45-347	Remote4	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
08:18:45-347	Remote4	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
08:18:45-347	Remote4	Ethernet Packet	Link	Sending packet from interface 9B:96:C3:91:2F:9A
08:18:45-347	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:18:45-347	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:18:45-347	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:18:45-347	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:18:45-347	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:18:45-347	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
08:18:45-347	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:18:45-347	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:18:45-347	Remote1	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.4
08:18:45-348	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:18:45-348	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:18:45-348	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C

Рисунок 6 – Отправка запроса с K1 на Remote4

08:21:45-920	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.5
08:21:45-921	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.5).
08:21:45-921	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
08:21:45-921	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:21:45-921	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 17:AE:58:92:26:6F
08:21:45-921	Remote5	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:21:45-921	Remote5	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:21:45-921	Remote5	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
08:21:45-921	Remote5	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
08:21:45-921	Remote5	Ethernet Packet	Link	Sending packet from interface 17:AE:58:92:26:6F
08:21:45-921	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:21:45-921	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:21:45-921	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:21:45-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:21:45-921	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:21:45-921	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
08:21:45-921	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:21:45-921	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:21:45-921	Remote1	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.5
08:21:45-921	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:21:45-921	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:21:45-921	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:21:45-921	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C

Рисунок 7 – Отправка запроса с K1 на Remote5

08:23:12-582	Remote1	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.6
08:23:12-582	Remote1	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.6).
08:23:12-582	Remote1	Ethernet Packet	Link	Sending packet from interface 63:4C:6C:63:1A:8E
08:23:12-582	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 4D:88:2C:8D:68:82
08:23:12-582	Remote6	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:23:12-582	Remote6	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:23:12-582	Remote6	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.127.0
08:23:12-582	Remote6	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.127.0).
08:23:12-582	Remote6	Ethernet Packet	Link	Sending packet from interface 4D:88:2C:8D:68:82
08:23:12-582	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:23:12-582	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:23:12-582	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:23:12-582	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:23:12-582	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:23:12-582	Remote1	Ethernet Packet	Link	Recieved and accepted packet at interface 63:4C:6C:63:1A:8E
08:23:12-582	Remote1	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:23:12-582	Remote1	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:23:12-582	Remote1	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.6
08:23:12-582	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:23:12-582	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:23:12-582	R120	Ethernet Packet	Link	Recieved and dropped packet at interface 5C:3C:88:89:45:C5
08:23:12-582	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:23:12-582	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C

Рисунок 8 – Отправка запроса с K1 на Remote6

Запросы с K2:

08:24:57-850	Remote2	Echo Request Packet	Network	Created Echo Request packet to 10.0.39.0
08:24:57-851	Remote2	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.128.120).
08:24:57-851	Remote2	Ethernet Packet	Link	Sending packet from interface 8A:76:34:3E:75:16
08:24:57-851	R120	Ethernet Packet	Link	Recieved and accepted packet at interface B1:5E:5B:14:68:8F
08:24:57-851	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:24:57-851	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.0.131).
08:24:57-851	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
08:24:57-851	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:24:57-851	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:24:57-851	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:24:57-851	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:24:57-851	R131	Ethernet Packet	Link	Recieved and accepted packet at interface 49:4E:59:A0:81:8C
08:24:57-851	R131	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	R131	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:24:57-851	R131	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.0.39.0).
08:24:57-851	R131	Ethernet Packet	Link	Sending packet from interface B0:20:4E:4B:7F:5B
08:24:57-851	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:C3:64:7B:56:AC
08:24:57-851	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 4A:66:28:16:91:C3
08:24:57-851	R233	Ethernet Packet	Link	Recieved and dropped packet at interface 43:18:28:60:13:C1
08:24:57-851	Remote3	Ethernet Packet	Link	Recieved and accepted packet at interface 4F:95:24:5C:A2:42
08:24:57-851	Remote3	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	Remote3	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:24:57-851	Remote3	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.200.1
08:24:57-851	Remote3	ICMP_packet	Network	Sending packet from ProtocolStack (to 10.0.0.233).
08:24:57-851	Remote3	Ethernet Packet	Link	Sending packet from interface 4F:95:24:5C:A2:42
08:24:57-851	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 3A:C3:64:7B:56:AC
08:24:57-851	R131	Ethernet Packet	Link	Recieved and dropped packet at interface B0:20:4E:4B:7F:5B
08:24:57-851	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 4A:66:28:16:91:C3
08:24:57-851	R233	Ethernet Packet	Link	Recieved and accepted packet at interface 43:18:28:60:13:C1
08:24:57-851	R233	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	R233	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:24:57-851	R233	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 10.10.0.232).
08:24:57-851	R233	Ethernet Packet	Link	Sending packet from interface C4:2B:43:5C:98:B2
08:24:57-851	R232	Ethernet Packet	Link	Recieved and accepted packet at interface 9F:63:82:75:11:30
08:24:57-851	R232	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	R232	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:24:57-851	R232	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.200.1).
08:24:57-851	R232	Ethernet Packet	Link	Sending packet from interface B4:66:87:64:3D:AB
08:24:57-851	R120	Ethernet Packet	Link	Recieved and dropped packet at interface B1:5E:5B:14:68:8F
08:24:57-851	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:24:57-851	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 8A:76:34:3E:75:16
08:24:57-851	Remote2	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:24:57-851	Remote2	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:24:57-851	Remote2	Echo Reply Packet	Network	Echo reply packet received from 10.0.39.0
08:24:57-851	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:24:57-851	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:24:57-851	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB

Рисунок 9 – Отправка запроса с K2 на Remote3

08:26:02-462	Remote2	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.4
08:26:02-462	Remote2	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.128.120).
08:26:02-462	Remote2	Ethernet Packet	Link	Sending packet from interface 8A:76:34:3E:75:16
08:26:02-462	R120	Ethernet Packet	Link	Recieved and accepted packet at interface B1:5E:5B:14:68:8F
08:26:02-462	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:02-462	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:26:02-462	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.0.4).
08:26:02-462	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
08:26:02-462	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:26:02-462	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:26:02-462	Remote4	Ethernet Packet	Link	Recieved and accepted packet at interface 9B:96:C3:91:2F:9A
08:26:02-462	Remote4	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:02-462	Remote4	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:26:02-462	Remote4	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.200.1
08:26:02-462	Remote4	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.120).
08:26:02-462	Remote4	Ethernet Packet	Link	Sending packet from interface 9B:96:C3:91:2F:9A
08:26:02-462	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:26:02-462	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:26:02-462	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
08:26:02-462	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:02-462	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:26:02-462	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.200.1).
08:26:02-462	R120	Ethernet Packet	Link	Sending packet from interface B1:5E:5B:14:68:8F
08:26:02-462	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:26:02-462	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB
08:26:02-462	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 8A:76:34:3E:75:16
08:26:02-462	Remote2	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:02-462	Remote2	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:26:02-462	Remote2	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.4
08:26:02-462	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:26:02-462	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:26:02-462	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:26:02-462	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:26:02-462	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:26:02-462	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:26:02-462	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:26:02-462	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB

Рисунок 10 – Отправка запроса с K2 на Remote4

08:26:44-914	Remote2	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.5
08:26:44-914	Remote2	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.128.120).
08:26:44-914	Remote2	Ethernet Packet	Link	Sending packet from interface 8A:76:34:3E:75:16
08:26:44-914	R120	Ethernet Packet	Link	Recieved and accepted packet at interface B1:5E:5B:14:68:8F
08:26:44-914	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:44-914	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:26:44-914	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.0.5).
08:26:44-914	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
08:26:44-914	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:26:44-914	Remote5	Ethernet Packet	Link	Recieved and accepted packet at interface 17:AE:58:92:26:6F
08:26:44-914	Remote5	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:44-914	Remote5	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:26:44-914	Remote5	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.200.1
08:26:44-914	Remote5	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.120).
08:26:44-914	Remote5	Ethernet Packet	Link	Sending packet from interface 17:AE:58:92:26:6F
08:26:44-914	Remote6	Ethernet Packet	Link	Recieved and dropped packet at interface 4D:88:2C:8D:68:82
08:26:44-914	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:26:44-914	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
08:26:44-914	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:44-914	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:26:44-914	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.200.1).
08:26:44-914	R120	Ethernet Packet	Link	Sending packet from interface B1:5E:5B:14:68:8F
08:26:44-914	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:26:44-914	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB
08:26:44-914	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 8A:76:34:3E:75:16
08:26:44-914	Remote2	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:26:44-914	Remote2	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:26:44-914	Remote2	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.5
08:26:44-914	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:26:44-914	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:26:44-914	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:26:44-914	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:26:44-914	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:26:44-914	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:26:44-914	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:26:44-914	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:26:44-914	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB

Рисунок 11 – Отправка запроса с K2 на Remote5

08:27:23-953	Remote2	Echo Request Packet	Network	Created Echo Request packet to 172.31.0.6
08:27:23-953	Remote2	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.128.120).
08:27:23-953	Remote2	Ethernet Packet	Link	Sending packet from interface 8A:76:34:3E:75:16
08:27:23-953	R120	Ethernet Packet	Link	Recieved and accepted packet at interface B1:5E:5B:14:68:8F
08:27:23-953	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:27:23-953	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:27:23-953	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.0.6).
08:27:23-953	R120	Ethernet Packet	Link	Sending packet from interface 5C:3C:88:89:45:C5
08:27:23-953	Remote6	Ethernet Packet	Link	Recieved and accepted packet at interface 4D:88:2C:8D:68:82
08:27:23-953	Remote6	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:27:23-953	Remote6	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:27:23-953	Remote6	Echo Reply Packet	Network	Created Echo Reply packet to 172.31.200.1
08:27:23-953	Remote6	ICMP_packet	Network	Sending packet from ProtocolStack (to 172.31.0.120).
08:27:23-953	Remote6	Ethernet Packet	Link	Sending packet from interface 4D:88:2C:8D:68:82
08:27:23-953	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:27:23-953	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:27:23-953	R120	Ethernet Packet	Link	Recieved and accepted packet at interface 5C:3C:88:89:45:C5
08:27:23-953	R120	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:27:23-953	R120	ICMP_packet	Network	Packet Received: Network Layer Device is Routable forwarding packet.
08:27:23-953	R120	ICMP_packet	Network	Forwarding packet from ProtocolStack(to 172.31.200.1).
08:27:23-953	R120	Ethernet Packet	Link	Sending packet from interface B1:5E:5B:14:68:8F
08:27:23-953	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:27:23-953	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB
08:27:23-953	Remote2	Ethernet Packet	Link	Recieved and accepted packet at interface 8A:76:34:3E:75:16
08:27:23-953	Remote2	ICMP_packet	Network	ProtocolStack received packet from local Interface.
08:27:23-953	Remote2	ICMP_packet	Network	Confirmed Packet is for this Network Layer Device.
08:27:23-953	Remote2	Echo Reply Packet	Network	Echo reply packet received from 172.31.0.6
08:27:23-953	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:27:23-953	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:27:23-953	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:27:23-953	Remote5	Ethernet Packet	Link	Recieved and dropped packet at interface 17:AE:58:92:26:6F
08:27:23-953	Remote4	Ethernet Packet	Link	Recieved and dropped packet at interface 9B:96:C3:91:2F:9A
08:27:23-953	R132	Ethernet Packet	Link	Recieved and dropped packet at interface 7C:89:97:66:58:3E
08:27:23-953	R131	Ethernet Packet	Link	Recieved and dropped packet at interface 49:4E:59:A0:81:8C
08:27:23-953	Remote1	Ethernet Packet	Link	Recieved and dropped packet at interface 63:4C:6C:63:1A:8E
08:27:23-953	R230	Ethernet Packet	Link	Recieved and dropped packet at interface 67:22:81:C5:3C:99
08:27:23-953	R232	Ethernet Packet	Link	Recieved and dropped packet at interface B4:66:87:64:3D:AB

Рисунок 12 – Отправка запроса с K2 на Remote6

Выполнен Echo-запросы с K1 и K2 на все узлы сети. Все пакеты успешно доходят до адресата.

Выводы.

В ходе выполнения лабораторной работы и были изучены и освоены основы адресации, разрешения физических адресов и простейшей маршрутизации в IP-сетях. Для выполнения лабораторной работы были изучены протоколы IP, ARP.