**МИНОБРНАУКИ РОССИИ**

**Санкт-Петербургский государственный**

**электротехнический университет**

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**Кафедра МО ЭВМ**

отчет

**по лабораторной работе №1**

**по дисциплине «Сети и телекоммуникации»**

Тема:**Сетевой уровень: IP адресация**

|  |  |  |
| --- | --- | --- |
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Санкт-Петербург

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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

узлов сети, чтобы обеспечить корректную доставку эхо-запроса от

K1 к K2 и эхо-ответа обратно. Обосновать свои установки.

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

4. Добавить статическую запись ARP для K3 на K1 (или для ближайшего к К1 маршрутизатора, находящегося между К3 и К1). Подождать устаревания ARP-таблиц и выполнить эхо запрос с K1 на K3. Объяснить результат.

5. Выполнить эхо-запрос на IP-адрес 200.100.0.1 c K1. Объяснить вывод программы.

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

Вариант 12. Файл со схемой сети: lab1\_var12.jfst. Сеть между маршрутизаторами R-C-M и R-S-C: 172.168.128.0. Сеть между

маршрутизаторами R-C-M и R-M-S: 172.168.1.0. Сеть между

маршрутизаторами R-M-S и R-S-C: 172.168.0.64. Компьютер Chief

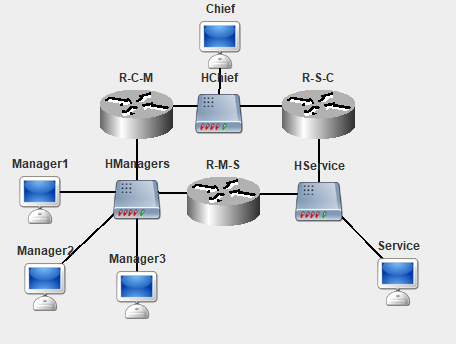
имеет IP-адрес 172.168.128.5. Компьютер Manager3 имеет IP-адрес

172.168.1.13. Компьютер Service имеет IP-адрес: 172.168.0.76.

Обозначения в задании: K1 - Manager3, K2 - Service, K3 - Chief.

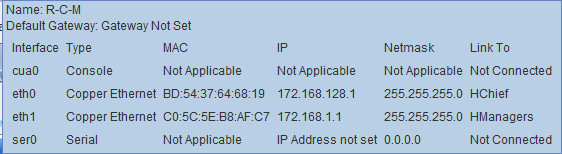
# Ход работы

Изначальная структура не требовала коррекции на физическом уровне и была представлена в виде

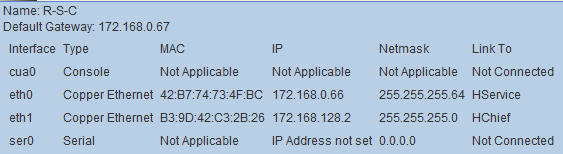


В ходе выполнения работы были установлены следующие параметры для узлов сети:

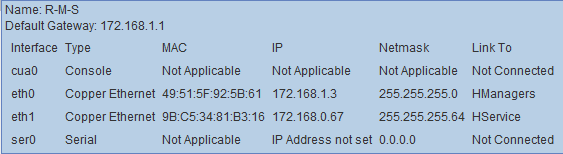
R-C-M:



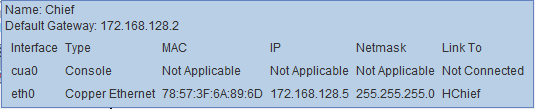
R-S-C:



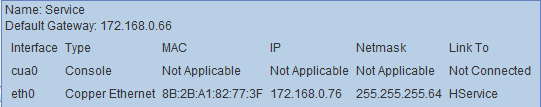
R-M-S:



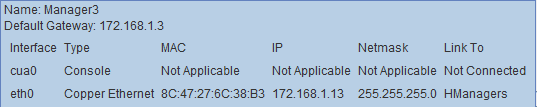
Chief:



Service:



Manager3:



В результате отправки эхо запроса Manager3-Service был получен следующий вывод:

## 00:29:14-661 Manager3 Echo Request Packet Network Created Echo Request packet to 172.168.0.76

## 00:29:14-661 Manager3 ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.3

## 00:29:14-661 Manager3 ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:29:14-661 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:29:14-662 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:29:14-662 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-662 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:29:14-662 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-662 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:29:14-662 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-662 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-663 R-M-S ARP Response Packet DataLink Created ARP Response packet to 172.168.1.13

## 00:29:14-663 R-M-S ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.13).

## 00:29:14-663 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:29:14-663 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:29:14-663 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-663 Manager3 ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-663 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:29:14-663 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:29:14-664 R-C-M Ethernet Packet Link Recieved and dropped packet at interface C0:5C:5E:B8:AF:C7

## 00:29:14-664 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:29:14-664 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-664 Manager3 ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.1.3).

## 00:29:14-664 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:29:14-664 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:29:14-664 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:29:14-664 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:29:14-664 R-M-S ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-664 R-M-S ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:29:14-665 R-M-S ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.0.76

## 00:29:14-665 R-M-S ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:29:14-665 R-M-S Ethernet Packet Link Sending packet from interface 9B:C5:34:81:B3:16

## 00:29:14-665 Service Ethernet Packet Link Recieved and accepted packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-665 Service ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-665 Service ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-665 Service ARP Response Packet DataLink Created ARP Response packet to 172.168.0.67

## 00:29:14-665 Service ARP\_packet Network Sending packet from ProtocolStack (to 172.168.0.67).

## 00:29:14-665 Service Ethernet Packet Link Sending packet from interface 8B:2B:A1:82:77:3F

## 00:29:14-665 R-S-C Ethernet Packet Link Recieved and dropped packet at interface 42:B7:74:73:4F:BC

## 00:29:14-666 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:29:14-666 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-666 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-666 R-S-C Ethernet Packet Link Recieved and accepted packet at interface 42:B7:74:73:4F:BC

## 00:29:14-666 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-666 R-M-S ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.0.76).

## 00:29:14-666 R-M-S Ethernet Packet Link Sending packet from interface 9B:C5:34:81:B3:16

## 00:29:14-666 Service Ethernet Packet Link Recieved and accepted packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-667 Service ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-667 Service ICMP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-667 Service Echo Reply Packet Network Created Echo Reply packet to 172.168.1.13

## 00:29:14-667 Service ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.0.66

## 00:29:14-667 Service ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:29:14-667 Service Ethernet Packet Link Sending packet from interface 8B:2B:A1:82:77:3F

## 00:29:14-667 R-S-C Ethernet Packet Link Recieved and accepted packet at interface 42:B7:74:73:4F:BC

## 00:29:14-667 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-668 R-S-C ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-668 R-S-C ARP Response Packet DataLink Created ARP Response packet to 172.168.0.76

## 00:29:14-668 R-S-C ARP\_packet Network Sending packet from ProtocolStack (to 172.168.0.76).

## 00:29:14-668 R-S-C Ethernet Packet Link Sending packet from interface 42:B7:74:73:4F:BC

## 00:29:14-668 Service Ethernet Packet Link Recieved and accepted packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-668 Service ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-668 Service ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-668 R-M-S Ethernet Packet Link Recieved and dropped packet at interface 9B:C5:34:81:B3:16

## 00:29:14-668 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:29:14-668 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-668 Service ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.0.66).

## 00:29:14-669 Service Ethernet Packet Link Sending packet from interface 8B:2B:A1:82:77:3F

## 00:29:14-669 R-S-C Ethernet Packet Link Recieved and accepted packet at interface 42:B7:74:73:4F:BC

## 00:29:14-669 R-S-C ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-669 R-S-C ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:29:14-669 R-S-C ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.0.67

## 00:29:14-669 R-S-C ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:29:14-669 R-S-C Ethernet Packet Link Sending packet from interface 42:B7:74:73:4F:BC

## 00:29:14-669 Service Ethernet Packet Link Recieved and accepted packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-669 Service ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-670 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:29:14-670 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-670 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-670 R-M-S ARP Response Packet DataLink Created ARP Response packet to 172.168.0.66

## 00:29:14-670 R-M-S ARP\_packet Network Sending packet from ProtocolStack (to 172.168.0.66).

## 00:29:14-670 R-M-S Ethernet Packet Link Sending packet from interface 9B:C5:34:81:B3:16

## 00:29:14-670 Service Ethernet Packet Link Recieved and dropped packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-670 R-S-C Ethernet Packet Link Recieved and accepted packet at interface 42:B7:74:73:4F:BC

## 00:29:14-670 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-670 R-S-C ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-671 R-S-C ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.0.67).

## 00:29:14-671 R-S-C Ethernet Packet Link Sending packet from interface 42:B7:74:73:4F:BC

## 00:29:14-671 Service Ethernet Packet Link Recieved and dropped packet at interface 8B:2B:A1:82:77:3F

## 00:29:14-671 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:29:14-671 R-M-S ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-671 R-M-S ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:29:14-671 R-M-S ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.1.13).

## 00:29:14-671 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:29:14-671 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:29:14-672 Manager3 ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:29:14-672 Manager3 ICMP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:29:14-672 Manager3 Echo Reply Packet Network Echo reply packet received from 172.168.0.76

Можно увидеть, что эхо запрос был успешно доставлен до Service и обратно до Manager3. При этом происходило активное формирование Arp-таблиц на всех устройствах, участвовавших в пересылке пакетов.

После этого на роутер R-M-S была добавлена статическая Arp запись с ip и mac адресом компьютера Manager3. После устаревания таблиц Arp (для ускорения процесса все устройства были банально перезагружены) при отправке эхо запроса от Chief к Manager3 был получен следующий вывод:

## 00:32:50-582 Chief Echo Request Packet Network Created Echo Request packet to 172.168.1.13

## 00:32:50-582 Chief ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.128.2

## 00:32:50-583 Chief ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:32:50-583 Chief Ethernet Packet Link Sending packet from interface 78:57:3F:6A:89:6D

## 00:32:50-583 R-S-C Ethernet Packet Link Recieved and accepted packet at interface B3:9D:42:C3:2B:26

## 00:32:50-583 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-583 R-S-C ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-584 R-S-C ARP Response Packet DataLink Created ARP Response packet to 172.168.128.5

## 00:32:50-584 R-S-C ARP\_packet Network Sending packet from ProtocolStack (to 172.168.128.5).

## 00:32:50-584 R-S-C Ethernet Packet Link Sending packet from interface B3:9D:42:C3:2B:26

## 00:32:50-584 R-C-M Ethernet Packet Link Recieved and dropped packet at interface BD:54:37:64:68:19

## 00:32:50-584 Chief Ethernet Packet Link Recieved and accepted packet at interface 78:57:3F:6A:89:6D

## 00:32:50-584 Chief ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-584 Chief ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-584 R-C-M Ethernet Packet Link Recieved and accepted packet at interface BD:54:37:64:68:19

## 00:32:50-585 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-585 Chief ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.128.2).

## 00:32:50-585 Chief Ethernet Packet Link Sending packet from interface 78:57:3F:6A:89:6D

## 00:32:50-585 R-S-C Ethernet Packet Link Recieved and accepted packet at interface B3:9D:42:C3:2B:26

## 00:32:50-585 R-S-C ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-585 R-S-C ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:32:50-585 R-S-C ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.0.67

## 00:32:50-585 R-S-C ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:32:50-585 R-S-C Ethernet Packet Link Sending packet from interface 42:B7:74:73:4F:BC

## 00:32:50-585 Service Ethernet Packet Link Recieved and accepted packet at interface 8B:2B:A1:82:77:3F

## 00:32:50-586 Service ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-586 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:32:50-586 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-586 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-586 R-M-S ARP Response Packet DataLink Created ARP Response packet to 172.168.0.66

## 00:32:50-586 R-M-S ARP\_packet Network Sending packet from ProtocolStack (to 172.168.0.66).

## 00:32:50-586 R-M-S Ethernet Packet Link Sending packet from interface 9B:C5:34:81:B3:16

## 00:32:50-586 Service Ethernet Packet Link Recieved and dropped packet at interface 8B:2B:A1:82:77:3F

## 00:32:50-587 R-S-C Ethernet Packet Link Recieved and accepted packet at interface 42:B7:74:73:4F:BC

## 00:32:50-587 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-587 R-S-C ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-587 R-S-C ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.0.67).

## 00:32:50-587 R-S-C Ethernet Packet Link Sending packet from interface 42:B7:74:73:4F:BC

## 00:32:50-587 Service Ethernet Packet Link Recieved and dropped packet at interface 8B:2B:A1:82:77:3F

## 00:32:50-587 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 9B:C5:34:81:B3:16

## 00:32:50-587 R-M-S ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-587 R-M-S ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:32:50-588 R-M-S ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.1.13).

## 00:32:50-588 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:32:50-588 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:32:50-588 Manager3 ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-588 Manager3 ICMP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-588 Manager3 Echo Reply Packet Network Created Echo Reply packet to 172.168.128.5

## 00:32:50-588 Manager3 ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.3

## 00:32:50-588 Manager3 ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:32:50-588 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:32:50-589 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:32:50-589 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-589 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-589 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-589 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:32:50-589 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-589 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-589 R-M-S ARP Response Packet DataLink Created ARP Response packet to 172.168.1.13

## 00:32:50-589 R-M-S ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.13).

## 00:32:50-590 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:32:50-590 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:32:50-590 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-590 Manager3 ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-590 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:32:50-590 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-590 R-C-M Ethernet Packet Link Recieved and dropped packet at interface C0:5C:5E:B8:AF:C7

## 00:32:50-590 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:32:50-590 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-590 Manager3 ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.1.3).

## 00:32:50-591 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:32:50-591 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:32:50-591 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-591 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:32:50-591 R-M-S ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-591 R-M-S ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:32:50-591 R-M-S ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.1

## 00:32:50-591 R-M-S ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:32:50-591 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:32:50-592 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:32:50-592 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-592 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:32:50-592 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-592 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-592 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-592 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:32:50-592 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-592 R-C-M ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-592 R-C-M ARP Response Packet DataLink Created ARP Response packet to 172.168.1.3

## 00:32:50-592 R-C-M ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.3).

## 00:32:50-592 R-C-M Ethernet Packet Link Sending packet from interface C0:5C:5E:B8:AF:C7

## 00:32:50-593 Manager3 Ethernet Packet Link Recieved and dropped packet at interface 8C:47:27:6C:38:B3

## 00:32:50-593 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:32:50-593 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-593 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:32:50-593 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-593 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-593 R-M-S ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.1.1).

## 00:32:50-593 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:32:50-593 Manager3 Ethernet Packet Link Recieved and dropped packet at interface 8C:47:27:6C:38:B3

## 00:32:50-593 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:32:50-594 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:32:50-594 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:32:50-594 R-C-M ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-594 R-C-M ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:32:50-594 R-C-M ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.128.5

## 00:32:50-594 R-C-M ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:32:50-594 R-C-M Ethernet Packet Link Sending packet from interface BD:54:37:64:68:19

## 00:32:50-594 R-S-C Ethernet Packet Link Recieved and accepted packet at interface B3:9D:42:C3:2B:26

## 00:32:50-594 R-S-C ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-594 Chief Ethernet Packet Link Recieved and accepted packet at interface 78:57:3F:6A:89:6D

## 00:32:50-595 Chief ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-595 Chief ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-595 Chief ARP Response Packet DataLink Created ARP Response packet to 172.168.128.1

## 00:32:50-595 Chief ARP\_packet Network Sending packet from ProtocolStack (to 172.168.128.1).

## 00:32:50-595 Chief Ethernet Packet Link Sending packet from interface 78:57:3F:6A:89:6D

## 00:32:50-595 R-S-C Ethernet Packet Link Recieved and dropped packet at interface B3:9D:42:C3:2B:26

## 00:32:50-595 R-C-M Ethernet Packet Link Recieved and accepted packet at interface BD:54:37:64:68:19

## 00:32:50-595 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-595 R-C-M ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-595 R-C-M ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.128.5).

## 00:32:50-596 R-C-M Ethernet Packet Link Sending packet from interface BD:54:37:64:68:19

## 00:32:50-596 R-S-C Ethernet Packet Link Recieved and dropped packet at interface B3:9D:42:C3:2B:26

## 00:32:50-596 Chief Ethernet Packet Link Recieved and accepted packet at interface 78:57:3F:6A:89:6D

## 00:32:50-597 Chief ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:32:50-597 Chief ICMP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:32:50-597 Chief Echo Reply Packet Network Echo reply packet received from 172.168.1.13

Как можно заметить, при отправке пакета от роутера R-M-S к Manager3 не было создано Arp запроса, т.к. запись с соответствующим ip уже была в Arp таблице.

Далее был отправлен ping запрос на ip 200.100.0.1 с компьютера Manager3:

## 00:36:34-134 Manager3 Echo Request Packet Network Created Echo Request packet to 200.100.0.1

## 00:36:34-134 Manager3 ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.3

## 00:36:34-134 Manager3 ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:36:34-134 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:36:34-134 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:36:34-135 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-135 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-135 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-135 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:36:34-135 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-135 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-135 R-M-S ARP Response Packet DataLink Created ARP Response packet to 172.168.1.13

## 00:36:34-135 R-M-S ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.13).

## 00:36:34-135 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:36:34-136 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:36:34-136 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-136 Manager3 ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-136 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:36:34-136 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-136 R-C-M Ethernet Packet Link Recieved and dropped packet at interface C0:5C:5E:B8:AF:C7

## 00:36:34-137 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:36:34-137 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-137 Manager3 ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.1.3).

## 00:36:34-137 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:36:34-137 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:36:34-137 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-137 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:36:34-137 R-M-S ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-137 R-M-S ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:36:34-137 R-M-S ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.1

## 00:36:34-138 R-M-S ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:36:34-138 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:36:34-138 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:36:34-138 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-138 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:36:34-138 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-138 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-138 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-138 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:36:34-138 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-138 R-C-M ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-139 R-C-M ARP Response Packet DataLink Created ARP Response packet to 172.168.1.3

## 00:36:34-139 R-C-M ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.3).

## 00:36:34-139 R-C-M Ethernet Packet Link Sending packet from interface C0:5C:5E:B8:AF:C7

## 00:36:34-139 Manager3 Ethernet Packet Link Recieved and dropped packet at interface 8C:47:27:6C:38:B3

## 00:36:34-139 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:36:34-139 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-139 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:36:34-139 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-139 R-M-S ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-139 R-M-S ICMP\_packet Network Forwarding packet from ProtocolStack(to 172.168.1.1).

## 00:36:34-139 R-M-S Ethernet Packet Link Sending packet from interface 49:51:5F:92:5B:61

## 00:36:34-140 Manager3 Ethernet Packet Link Recieved and dropped packet at interface 8C:47:27:6C:38:B3

## 00:36:34-140 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:36:34-140 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-140 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:36:34-140 R-C-M ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-140 R-C-M ICMP\_packet Network Packet Received: Network Layer Device is Routable forwarding packet.

## 00:36:34-140 R-C-M ICMP Dst Unreach Network Sending ICMP Destination Unreacheable to 172.168.1.13

## 00:36:34-140 R-C-M ARP Discovery Packet DataLink Created ARP discovery packet to source MAC address for IP 172.168.1.13

## 00:36:34-140 R-C-M ARP\_packet Network Sending broadcast packet from ProtocolStack.

## 00:36:34-140 R-C-M Ethernet Packet Link Sending packet from interface C0:5C:5E:B8:AF:C7

## 00:36:34-140 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:36:34-141 Manager3 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-141 Manager3 ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-141 Manager3 ARP Response Packet DataLink Created ARP Response packet to 172.168.1.1

## 00:36:34-141 Manager3 ARP\_packet Network Sending packet from ProtocolStack (to 172.168.1.1).

## 00:36:34-141 Manager3 Ethernet Packet Link Sending packet from interface 8C:47:27:6C:38:B3

## 00:36:34-141 Manager2 Ethernet Packet Link Recieved and dropped packet at interface 52:42:67:55:11:77

## 00:36:34-141 Manager1 Ethernet Packet Link Recieved and dropped packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-141 R-M-S Ethernet Packet Link Recieved and dropped packet at interface 49:51:5F:92:5B:61

## 00:36:34-141 R-C-M Ethernet Packet Link Recieved and accepted packet at interface C0:5C:5E:B8:AF:C7

## 00:36:34-141 R-C-M ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-141 R-C-M ARP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-141 Manager2 Ethernet Packet Link Recieved and accepted packet at interface 52:42:67:55:11:77

## 00:36:34-142 Manager2 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-142 Manager1 Ethernet Packet Link Recieved and accepted packet at interface 4D:8B:1B:4D:8B:B0

## 00:36:34-142 Manager1 ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-142 R-M-S Ethernet Packet Link Recieved and accepted packet at interface 49:51:5F:92:5B:61

## 00:36:34-142 R-M-S ARP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-142 R-C-M ICMP\_packet Network Sending packet from ProtocolStack (to 172.168.1.13).

## 00:36:34-142 R-C-M Ethernet Packet Link Sending packet from interface C0:5C:5E:B8:AF:C7

## 00:36:34-142 Manager3 Ethernet Packet Link Recieved and accepted packet at interface 8C:47:27:6C:38:B3

## 00:36:34-142 Manager3 ICMP\_packet Network ProtocolStack received packet from local Interface.

## 00:36:34-142 Manager3 ICMP\_packet Network Confirmed Packet is for this Network Layer Device.

## 00:36:34-142 Manager3 ICMP Dst Unreach Network Recieved ICMP Destination Unreacheable from 172.168.1.1

Как видно, получен ответ “Destination Unreacheable” с роутера R-C-M. Можно проследить путь пакета (не будем учитывать отправку Arp запросов): Manager3 отправил пакет роутеру R-M-S, тот, не найдя соответствующей подсети в своем списке, отправил его на роутер R-C-M (который указан как дефолтный шлюз), а роутер R-C-M, не найдя подходящей подсети и не имея дефолтного шлюза, отправил ответ о невозможности достижения требуемого Ip адреса .

# Вывод

В первой лабораторной работе были изучены основные принципы ip адресации. В программе javaNetSim построена (точнее, настроена) схема, включающая в себя несколько различных подсетей и позволяющая корректно доставлять пакеты на все узлы схемы. Получены знания о настройке arp таблиц, о том, как работают и какую функцию выполняют arp запросы и когда именно они отсылаются. Изучены основные проблемы, которые могут возникнуть при настройке небольших подсетей.