Федеральное государственное автономное образовательное учреждение высшего образования

Университет ИТМО

Лабораторная работа №2

по дисциплине Администрирование систем и сетей

"Адресация и маршрутизация IPv4"

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Оглавление

Цель работы:

Лабораторная работа помогает получить практические навыки по изучению следующих тем:

- Процедура настройки IPv4-адреса на интерфейсе
- Функции и значение loopback-интерфейсов
- Принципы генерирования прямых маршрутов
- Процедура настройки статических маршрутов и условия, при которых используется статические маршруты
- Процедура проверки возможности установления соединения сетевого уровня с помощью инструмента ping
- Процедура настройки статических маршрутов и сценарии их применения

Топология сети:
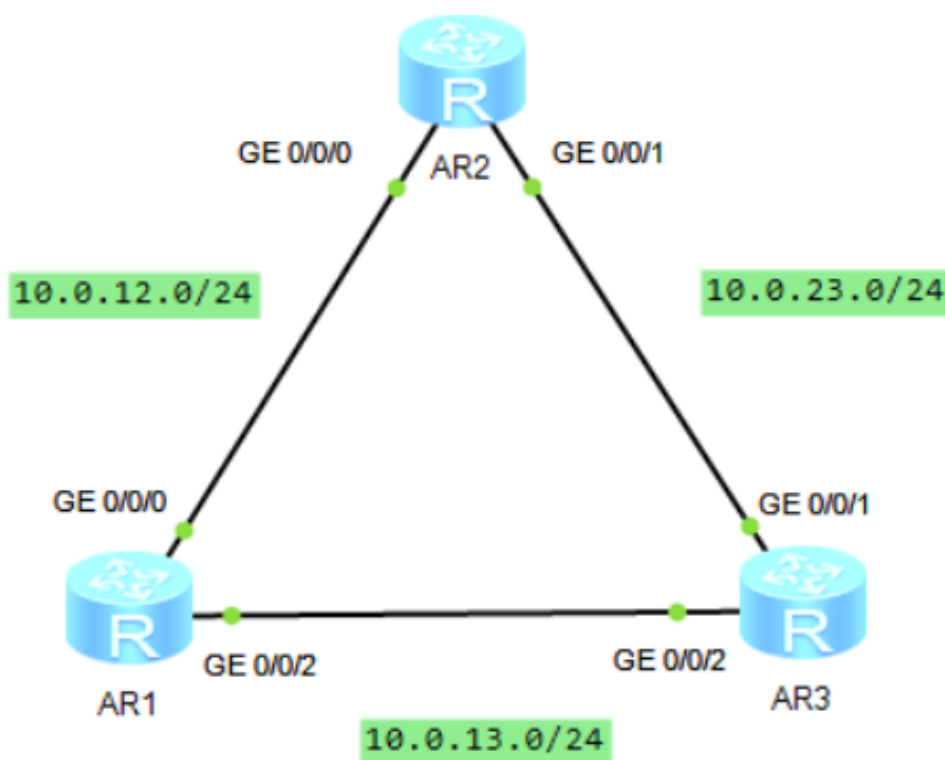
Конфигурация

Шаг 1. Настроим основные параметры устройств.

Задаем имена устройствам.

```
<Huawei>system-view
[Huawei]sysname R1
<Huawei>system-view
[Huawei]sysname R2
<Huawei>system-view
[Huawei]sysname R3
```

Шаг 2. Выводим IP-адрес текущего интерфейса и таблицу маршрутизации маршрутизатора

Выведем на экран статус интерфейса на маршрутизаторе (R1)

```
[R1]display ip interface brief
*down: administratively down
^down: standby
(l): loopback
(s): spoofing
The number of interface that is UP in Physical is 3
The number of interface that is DOWN in Physical is 1
The number of interface that is UP in Protocol is 1
The number of interface that is DOWN in Protocol is 3

Interface              IP Address/Mask     Physical   Protocol
GigabitEthernet0/0/0       unassigned         up         down
GigabitEthernet0/0/1       unassigned         down       down
GigabitEthernet0/0/2       unassigned         up         down
NULL0                      unassigned         up         up(s)
```

Выведем на экран таблицу маршрутизации на маршрутизаторе

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
         Destinations : 4       Routes : 4
    Destination/Mask    Proto   Pre  Cost  Flags NextHop        Interface
         127.0.0.0/8      Direct  0    0       D   127.0.0.1      InLoopBack0
         127.0.0.1/32     Direct  0    0       D   127.0.0.1      InLoopBack0
 127.255.255.255/32      Direct  0    0       D   127.0.0.1      InLoopBack0
 255.255.255.255/32      Direct  0    0       D   127.0.0.1      InLoopBack0
```

Шаг 3. Настроим IP-адреса для физических интерфейсов

Настроим IP-адреса для физических интерфейсов на основе таблицы

Маршрутизатор	Интерфейс	IP-адрес/маска
R1	GigabitEthernet0/0/0	10.0.12.1/24
	GigabitEthernet0/0/2	10.0.13.1/24
R2	GigabitEthernet0/0/0	10.0.12.2/24
	GigabitEthernet0/0/1	10.0.23.2/24
R3	GigabitEthernet0/0/1	10.0.23.3/24
	GigabitEthernet0/0/2	10.0.13.3/24

```
[R1]interface GigabitEthernet0/0/0
[R1-GigabitEthernet0/0/0]ip address 10.0.12.1 24
Nov  5 2024 05:44:39-08:00 R1 %%01IFNET/4/LINK_STATE(I)[2]:The line protocol IP
on the interface GigabitEthernet0/0/0 has entered the UP state.
[R1-GigabitEthernet0/0/0]quit
```

```
[R1]interface GigabitEthernet0/0/2
[R1-GigabitEthernet0/0/2]ip address 10.0.13.1 24
Nov  5 2024 05:45:05-08:00 R1 %%01IFNET/4/LINK_STATE(I)[3]:The line protocol IP
on the interface GigabitEthernet0/0/2 has entered the UP state.
[R1-GigabitEthernet0/0/2]quit
```

```
[R2]interface GigabitEthernet0/0/0
[R2-GigabitEthernet0/0/0]ip address 10.0.12.2 24
Nov  5 2024 05:45:45-08:00 R2 %%01IFNET/4/LINK_STATE(I)[2]:The line protocol IP
on the interface GigabitEthernet0/0/0 has entered the UP state.
[R2-GigabitEthernet0/0/0]quit
```

```
[R2]interface GigabitEthernet0/0/1
[R2-GigabitEthernet0/0/1]ip address 10.0.23.2 24
Nov  5 2024 05:46:05-08:00 R2 %%01IFNET/4/LINK_STATE(I)[3]:The line protocol IP
on the interface GigabitEthernet0/0/1 has entered the UP state.
[R2-GigabitEthernet0/0/1]quit
```

```
[R3]interface GigabitEthernet0/0/1
[R3-GigabitEthernet0/0/1]ip address 10.0.23.3 24
Nov  5 2024 05:46:59-08:00 R3 %%01IFNET/4/LINK_STATE(I)[2]:The line protocol IP
on the interface GigabitEthernet0/0/1 has entered the UP state.
[R3-GigabitEthernet0/0/1]quit
```

```
[R3]interface GigabitEthernet0/0/2
[R3-GigabitEthernet0/0/2]ip address 10.0.13.3 24
Nov  5 2024 05:47:18-08:00 R3 %%01IFNET/4/LINK_STATE(I)[3]:The line protocol IP
on the interface GigabitEthernet0/0/2 has entered the UP state.
[R3-GigabitEthernet0/0/2]quit
```

Проверим наличие связи с помощью ping.

```
[R1]ping -c 5 10.0.12.2
  PING 10.0.12.2: 56  data bytes, press CTRL_C to break
    Reply from 10.0.12.2: bytes=56 Sequence=1 ttl=255 time=90 ms
    Reply from 10.0.12.2: bytes=56 Sequence=2 ttl=255 time=30 ms
    Reply from 10.0.12.2: bytes=56 Sequence=3 ttl=255 time=20 ms
    Reply from 10.0.12.2: bytes=56 Sequence=4 ttl=255 time=20 ms
    Reply from 10.0.12.2: bytes=56 Sequence=5 ttl=255 time=30 ms

  --- 10.0.12.2 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 20/38/90 ms
```

```
[R1]ping -c 5 10.0.13.3
  PING 10.0.13.3: 56  data bytes, press CTRL_C to break
    Reply from 10.0.13.3: bytes=56 Sequence=1 ttl=255 time=70 ms
    Reply from 10.0.13.3: bytes=56 Sequence=2 ttl=255 time=40 ms
    Reply from 10.0.13.3: bytes=56 Sequence=3 ttl=255 time=40 ms
    Reply from 10.0.13.3: bytes=56 Sequence=4 ttl=255 time=20 ms
    Reply from 10.0.13.3: bytes=56 Sequence=5 ttl=255 time=20 ms

  --- 10.0.13.3 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 20/38/70 ms
```

#Выведем на экран таблицу маршрутизации R1

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 10      Routes : 10

    Destination/Mask Proto Pre Cost  Flags NextHop        Interface
          10.0.12.0/24  Direct  0    0      D    10.0.12.1     GigabitEthernet0/0/0
          10.0.12.1/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/0
        10.0.12.255/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/0
          10.0.13.0/24  Direct  0    0      D    10.0.13.1     GigabitEthernet0/0/2
          10.0.13.1/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/2
        10.0.13.255/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/2
           127.0.0.0/8  Direct  0    0      D    127.0.0.1     InLoopBack0
          127.0.0.1/32  Direct  0    0      D    127.0.0.1     InLoopBack0
    127.255.255.255/32  Direct  0    0      D    127.0.0.1     InLoopBack0
    255.255.255.255/32  Direct  0    0      D    127.0.0.1     InLoopBack0
```

Шаг 4. Создадим loopback-интерфейс

#Настроим loopback-интерфейс в соответствии с таблицей

Маршрутизатор	Интерфейс	IP-адрес/маска
R1	LoopBack0	10.0.1.1/32
R2	LoopBack0	10.0.1.2/32
R3	LoopBack0	10.0.1.3/32

```
[R1]interface LoopBack0
[R1-LoopBack0]ip address 10.0.1.1 32
[R1-LoopBack0]quit
```

```
[R2]interface LoopBack0
[R2-LoopBack0]ip address 10.0.1.2 32
[R2-LoopBack0]quit
```

```
[R3]interface LoopBack0
[R3-LoopBack0]ip address 10.0.1.3 32
[R3-LoopBack0]quit
```

#Выведем таблицу маршрутизации R1

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 11      Routes : 11

  Destination/Mask  Proto   Pre  Cost  Flags NextHop       Interface
        10.0.1.1/32  Direct  0    0      D    127.0.0.1     LoopBack0
       10.0.12.0/24  Direct  0    0      D    10.0.12.1     GigabitEthernet0/0/0
       10.0.12.1/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/0
     10.0.12.255/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/0
       10.0.13.0/24  Direct  0    0      D    10.0.13.1     GigabitEthernet0/0/2
       10.0.13.1/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/2
     10.0.13.255/32  Direct  0    0      D    127.0.0.1     GigabitEthernet0/0/2
       127.0.0.0/8   Direct  0    0      D    127.0.0.1     InLoopBack0
       127.0.0.1/32  Direct  0    0      D    127.0.0.1     InLoopBack0
 127.255.255.255/32  Direct  0    0      D    127.0.0.1     InLoopBack0
 255.255.255.255/32  Direct  0    0      D    127.0.0.1     InLoopBack0
```

Проверим наличие связи между loopback - интерфейсами

```
[R1]ping -a 10.0.1.1 10.0.1.2
 PING 10.0.1.2: 56  data bytes, press CTRL_C to break
   Request time out
   Request time out
   Request time out
   Request time out
   Request time out

 --- 10.0.1.2 ping statistics ---
   5 packet(s) transmitted
   0 packet(s) received
   100.00% packet loss
```

Шаг 5. Настроим статические маршруты

На маршрутизаторе R1 настроим маршрут к интерфейсам LoopBack0 маршрутизаторов R2 и R3

```
[R1]ip route-static 10.0.1.2 32 10.0.12.2
[R1]ip route-static 10.0.1.3 32 10.0.13.3
```

Выведем на экран таблицу маршрутизации R1

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 13      Routes : 13
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
10.0.1.1/32	Direct	0	0	D	127.0.0.1	LoopBack0
10.0.1.2/32	Static	60	0	RD	10.0.12.2	GigabitEthernet0/0/0
10.0.1.3/32	Static	60	0	RD	10.0.13.3	GigabitEthernet0/0/2
10.0.12.0/24	Direct	0	0	D	10.0.12.1	GigabitEthernet0/0/0
10.0.12.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/0
10.0.12.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/0
10.0.13.0/24	Direct	0	0	D	10.0.13.1	GigabitEthernet0/0/2
10.0.13.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/2
10.0.13.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/2
127.0.0.0/8	Direct	0	0	D	127.0.0.1	InLoopBack0
127.0.0.1/32	Direct	0	0	D	127.0.0.1	InLoopBack0
127.255.255.255/32	Direct	0	0	D	127.0.0.1	InLoopBack0
255.255.255.255/32	Direct	0	0	D	127.0.0.1	InLoopBack0

#Проверим возможность установления связи

```
[R1]ping -a 10.0.1.1 10.0.1.2
 PING 10.0.1.2: 56  data bytes, press CTRL_C to break
   Request time out
   Request time out
   Request time out
   Request time out
   Request time out

 --- 10.0.1.2 ping statistics ---
   5 packet(s) transmitted
   0 packet(s) received
   100.00% packet loss
```

На R2 добавим маршрут к интерфейсу LoopBack0 маршрутизатора R1

```
[R2]ip route-static 10.0.1.1 32 10.0.12.1
```

#Проверим возможность установления связи.

```
[R1]ping -a 10.0.1.1 10.0.1.2
 PING 10.0.1.2: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=255 time=40 ms
   Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=20 ms
   Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=255 time=20 ms
   Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=255 time=30 ms
   Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=255 time=20 ms

 --- 10.0.1.2 ping statistics ---
   5 packet(s) transmitted
   5 packet(s) received
   0.00% packet loss
   round-trip min/avg/max = 20/26/40 ms
```

Настроим другие необходимые пути

```
[R2]ip route-static 10.0.1.3 32 10.0.23.3
[R3]ip route-static 10.0.1.1 32 10.0.13.1
[R3]ip route-static 10.0.1.2 32 10.0.23.2
```

#Проверим возможность установления связи между интерфейсами LoopBack0 маршрутизаторов, следуя приведенной процедуре.

```
[R1]ping -a 10.0.1.1 10.0.1.2
 PING 10.0.1.2: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=255 time=30 ms
   Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=20 ms
   Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=255 time=10 ms
   Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=255 time=20 ms
```

```
   Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=255 time=10 ms


 --- 10.0.1.2 ping statistics ---
   5 packet(s) transmitted
   5 packet(s) received
   0.00% packet loss
   round-trip min/avg/max = 10/18/30 ms
```

```
[R1]ping -a 10.0.1.1 10.0.1.3
 PING 10.0.1.3: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.3: bytes=56 Sequence=1 ttl=255 time=20 ms
   Reply from 10.0.1.3: bytes=56 Sequence=2 ttl=255 time=30 ms
   Reply from 10.0.1.3: bytes=56 Sequence=3 ttl=255 time=30 ms
   Reply from 10.0.1.3: bytes=56 Sequence=4 ttl=255 time=20 ms
   Reply from 10.0.1.3: bytes=56 Sequence=5 ttl=255 time=20 ms

 --- 10.0.1.3 ping statistics ---
   5 packet(s) transmitted
   5 packet(s) received
   0.00% packet loss
   round-trip min/avg/max = 20/24/30 ms
```

```
[R2]ping -a 10.0.1.2 10.0.1.1
 PING 10.0.1.1: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=255 time=10 ms
   Reply from 10.0.1.1: bytes=56 Sequence=2 ttl=255 time=20 ms
   Reply from 10.0.1.1: bytes=56 Sequence=3 ttl=255 time=30 ms
   Reply from 10.0.1.1: bytes=56 Sequence=4 ttl=255 time=10 ms
   Reply from 10.0.1.1: bytes=56 Sequence=5 ttl=255 time=20 ms

 --- 10.0.1.1 ping statistics ---
   5 packet(s) transmitted
   5 packet(s) received
   0.00% packet loss
   round-trip min/avg/max = 10/18/30 ms
```

```
[R2]ping -a 10.0.1.2 10.0.1.3
 PING 10.0.1.3: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.3: bytes=56 Sequence=1 ttl=255 time=60 ms
   Reply from 10.0.1.3: bytes=56 Sequence=2 ttl=255 time=40 ms
   Reply from 10.0.1.3: bytes=56 Sequence=3 ttl=255 time=20 ms
   Reply from 10.0.1.3: bytes=56 Sequence=4 ttl=255 time=20 ms
   Reply from 10.0.1.3: bytes=56 Sequence=5 ttl=255 time=20 ms

 --- 10.0.1.3 ping statistics ---
```

```
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 20/32/60 ms
```

```
[R3]ping -a 10.0.1.3 10.0.1.1
  PING 10.0.1.1: 56  data bytes, press CTRL_C to break
    Reply from 10.0.1.1: bytes=56 Sequence=1 ttl=255 time=30 ms
    Reply from 10.0.1.1: bytes=56 Sequence=2 ttl=255 time=30 ms
    Reply from 10.0.1.1: bytes=56 Sequence=3 ttl=255 time=30 ms
    Reply from 10.0.1.1: bytes=56 Sequence=4 ttl=255 time=20 ms
    Reply from 10.0.1.1: bytes=56 Sequence=5 ttl=255 time=10 ms

  --- 10.0.1.1 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 10/24/30 ms
```

```
[R3]ping -a 10.0.1.3 10.0.1.2
  PING 10.0.1.2: 56  data bytes, press CTRL_C to break
    Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=255 time=30 ms
    Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=20 ms
    Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=255 time=20 ms
    Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=255 time=10 ms
    Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=255 time=20 ms

  --- 10.0.1.2 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 10/20/30 ms
```

Шаг 6. Настроит маршрут от R1 к R2 через R3 в качестве резервного маршрута от LoopBack0 R1 к LoopBack0 R2.

Настроим статические маршруты на R1 и R2

```
[R1]ip ro 10.0.1.2 32 10.0.13.3 preference 100
[R2]ip ro 10.0.1.1 32 10.0.23.3 preference 100
```

Выведем на экран таблицу маршрутизации R1 и R2

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 13      Routes : 13
```

```
 Destination/Mask Proto  Pre  Cost   Flags NextHop        Interface
        10.0.1.1/32 Direct  0    0       D    127.0.0.1      LoopBack0
        10.0.1.2/32 Static  60   0       RD   10.0.12.2      GigabitEthernet0/0/0
        10.0.1.3/32 Static  60   0       RD   10.0.13.3      GigabitEthernet0/0/2
       10.0.12.0/24 Direct  0    0       D    10.0.12.1      GigabitEthernet0/0/0
       10.0.12.1/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/0
     10.0.12.255/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/0
       10.0.13.0/24 Direct  0    0       D    10.0.13.1      GigabitEthernet0/0/2
       10.0.13.1/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/2
     10.0.13.255/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/2
        127.0.0.0/8 Direct  0    0       D    127.0.0.1      InLoopBack0
        127.0.0.1/32 Direct  0    0       D    127.0.0.1      InLoopBack0
127.255.255.255/32 Direct  0    0       D    127.0.0.1      InLoopBack0
255.255.255.255/32 Direct  0    0       D    127.0.0.1      InLoopBack0
```

```
[R2]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 13     Routes : 13

 Destination/Mask Proto  Pre  Cost   Flags NextHop        Interface
        10.0.1.1/32 Static  60   0       RD   10.0.12.1      GigabitEthernet0/0/0
        10.0.1.2/32 Direct  0    0       D    127.0.0.1      LoopBack0
        10.0.1.3/32 Static  60   0       RD   10.0.23.3      GigabitEthernet0/0/1
       10.0.12.0/24 Direct  0    0       D    10.0.12.2      GigabitEthernet0/0/0
       10.0.12.2/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/0
     10.0.12.255/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/0
       10.0.23.0/24 Direct  0    0       D    10.0.23.2      GigabitEthernet0/0/1
       10.0.23.2/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/1
     10.0.23.255/32 Direct  0    0       D    127.0.0.1      GigabitEthernet0/0/1
        127.0.0.0/8 Direct  0    0       D    127.0.0.1      InLoopBack0
        127.0.0.1/32 Direct  0    0       D    127.0.0.1      InLoopBack0
127.255.255.255/32 Direct  0    0       D    127.0.0.1      InLoopBack0
255.255.255.255/32 Direct  0    0       D    127.0.0.1      InLoopBack0
```

Отключим интерфейс GigabitEtherneto0/0/3 на маршрутизаторах R1 и R2, чтобы сделать недействительным маршрут с наивысшим приоритетом.

```
[R1]interface GigabitEthernet0/0/0
[R1-GigabitEthernet0/0/0]shutdown
Nov  5 2024 06:01:32-08:00 R1 %%01IFPDT/4/IF_STATE(l)[4]:Interface GigabitEthern
et0/0/0 has turned into DOWN state.
[R1-GigabitEthernet0/0/0]quit
```

#Выведем на экран таблицу маршрутизации на R1 и R2.

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 10     Routes : 10

   Destination/Mask Proto  Pre  Cost  Flags NextHop       Interface
         10.0.1.1/32  Direct  0    0       D    127.0.0.1    LoopBack0
         10.0.1.2/32  Static  100  0       RD   10.0.13.3    GigabitEthernet0/0/2
         10.0.1.3/32  Static  60   0       RD   10.0.13.3    GigabitEthernet0/0/2
        10.0.13.0/24  Direct  0    0       D    10.0.13.1    GigabitEthernet0/0/2
        10.0.13.1/32  Direct  0    0       D    127.0.0.1    GigabitEthernet0/0/2
      10.0.13.255/32  Direct  0    0       D    127.0.0.1    GigabitEthernet0/0/2
        127.0.0.0/8   Direct  0    0       D    127.0.0.1    InLoopBack0
        127.0.0.1/32  Direct  0    0       D    127.0.0.1    InLoopBack0
127.255.255.255/32  Direct  0    0       D    127.0.0.1    InLoopBack0
255.255.255.255/32  Direct  0    0       D    127.0.0.1    InLoopBack0
```

```
[R2]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 10     Routes : 10

   Destination/Mask Proto  Pre  Cost  Flags NextHop       Interface
         10.0.1.1/32  Static  100  0       RD   10.0.23.3    GigabitEthernet0/0/1
         10.0.1.2/32  Direct  0    0       D    127.0.0.1    LoopBack0
         10.0.1.3/32  Static  60   0       RD   10.0.23.3    GigabitEthernet0/0/1
        10.0.23.0/24  Direct  0    0       D    10.0.23.2    GigabitEthernet0/0/1
        10.0.23.2/32  Direct  0    0       D    127.0.0.1    GigabitEthernet0/0/1
      10.0.23.255/32  Direct  0    0       D    127.0.0.1    GigabitEthernet0/0/1
        127.0.0.0/8   Direct  0    0       D    127.0.0.1    InLoopBack0
        127.0.0.1/32  Direct  0    0       D    127.0.0.1    InLoopBack0
127.255.255.255/32  Direct  0    0       D    127.0.0.1    InLoopBack0
255.255.255.255/32  Direct  0    0       D    127.0.0.1    InLoopBack0
```

Проверим возможность установления связи

```
[R1]ping -a 10.0.1.1 10.0.1.2
 PING 10.0.1.2: 56  data bytes, press CTRL_C to break
   Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=254 time=40 ms
   Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=254 time=30 ms
   Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=254 time=30 ms
   Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=254 time=40 ms
   Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=254 time=20 ms
```

```
--- 10.0.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 20/32/40 ms
```

\# Выполним трассировку маршрута, по которому передаются пакеты данных.

```
[R1]tracert -a 10.0.1.1 10.0.1.2
 traceroute to  10.0.1.2(10.0.1.2), max hops: 30 ,packet length: 40,press CTRL_C
 to break
 1 10.0.13.3 30 ms  20 ms  20 ms
 2 10.0.23.2 20 ms  20 ms  20 ms
```

Шаг 7. Настроим маршруты по умолчанию для установления связи между интерфейсом LoopBack0 маршрутизатора R1 и интерфейсом LoopBack0 маршрутизатора R2.

\# Выключим интерфейсы и удалим настроенные маршруты.

```
[R1]interface GigabitEthernet0/0/0
[R1-GigabitEthernet0/0/0]undo shutdown
[R1-GigabitEthernet0/0/0]quit
[R1]undo ip route-static 10.0.1.2 255.255.255.255 10.0.12.2
[R1]undo ip route-static 10.0.1.2 255.255.255.255 10.0.13.3 preference 100
```

\# Выведем на экран таблицу маршрутизации R1

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 12     Routes : 12
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
10.0.1.1/32	Direct	0	0	D	127.0.0.1	LoopBack0
10.0.1.3/32	Static	60	0	RD	10.0.13.3	GigabitEthernet0/0/2
10.0.12.0/24	Direct	0	0	D	10.0.12.1	GigabitEthernet0/0/0
10.0.12.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/0
10.0.12.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/0
10.0.13.0/24	Direct	0	0	D	10.0.13.1	GigabitEthernet0/0/2
10.0.13.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/2
10.0.13.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet0/0/2
127.0.0.0/8	Direct	0	0	D	127.0.0.1	InLoopBack0
127.0.0.1/32	Direct	0	0	D	127.0.0.1	InLoopBack0
127.255.255.255/32	Direct	0	0	D	127.0.0.1	InLoopBack0
255.255.255.255/32	Direct	0	0	D	127.0.0.1	InLoopBack0

Настроим маршрут по умолчанию на R1

```
[R1]ip route-static 0.0.0.0 0 10.0.12.2
```

Выведем на экран таблицу маршрутизации R1

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
------------------------------------------------------------------------------
Routing Tables: Public
        Destinations : 13      Routes : 13

  Destination/Mask  Proto   Pre  Cost   Flags  NextHop         Interface
         0.0.0.0/0  Static  60   0      RD     10.0.12.2       GigabitEthernet0/0/0
        10.0.1.1/32  Direct  0    0      D      127.0.0.1       LoopBack0
        10.0.1.3/32  Static  60   0      RD     10.0.13.3       GigabitEthernet0/0/2
       10.0.12.0/24  Direct  0    0      D      10.0.12.1       GigabitEthernet0/0/0
       10.0.12.1/32  Direct  0    0      D      127.0.0.1       GigabitEthernet0/0/0
     10.0.12.255/32  Direct  0    0      D      127.0.0.1       GigabitEthernet0/0/0
       10.0.13.0/24  Direct  0    0      D      10.0.13.1       GigabitEthernet0/0/2
       10.0.13.1/32  Direct  0    0      D      127.0.0.1       GigabitEthernet0/0/2
     10.0.13.255/32  Direct  0    0      D      127.0.0.1       GigabitEthernet0/0/2
        127.0.0.0/8  Direct  0    0      D      127.0.0.1       InLoopBack0
       127.0.0.1/32  Direct  0    0      D      127.0.0.1       InLoopBack0
 127.255.255.255/32  Direct  0    0      D      127.0.0.1       InLoopBack0
 255.255.255.255/32  Direct  0    0      D      127.0.0.1       InLoopBack0
```

Проверим наличие связи между LoopBack0 маршрутизатора R1 и LoopBack0 маршрутизатора R2

```
[R1]ping -a 10.0.1.1 10.0.1.2
  PING 10.0.1.2: 56  data bytes, press CTRL_C to break
    Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=255 time=40 ms
    Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=20 ms
    Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=255 time=20 ms
    Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=255 time=20 ms
    Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=255 time=20 ms

  --- 10.0.1.2 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 20/24/40 ms
```

Вывод:

В ходе лабораторной работы мы познакомились со средой eNSP, а также были изучены настройки IPv4-адресов на интерфейсах, использование loopback-интерфейсов, генерация прямых и статических маршрутов.