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«Создание взаимосвязанной IP-сети»

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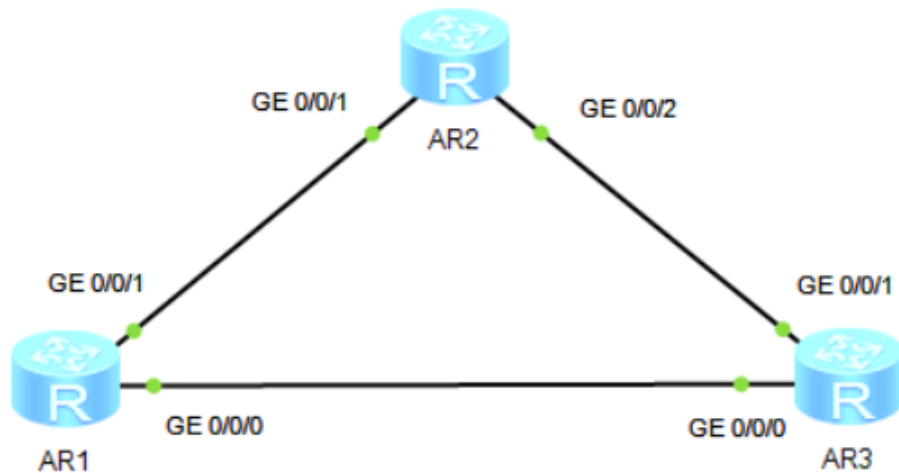
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Часть 1

Топология



Шаг 1. Настройте основные параметры устройств.

Задайте имена устройствам.

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

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

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

Шаг 2. Выведите IP-адрес текущего интерфейса и таблицу маршрутизации.

Выведите статус интерфейса.

```
[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	up	down

GigabitEthernet0/0/2	unassigned	down	down
NULL0	unassigned	up	up (s)

Выведите таблицу маршрутизации.

```
[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. Настройте IP-адреса для физических интерфейсов.

Настройте IP-адреса для физических интерфейсов на основе таблицы.

```
[R1]interface GigabitEthernet0/0/0
[R1-GigabitEthernet0/0/0]ip address 10.0.13.1 24
[R1-GigabitEthernet0/0/0]quit
[R1]interface GigabitEthernet0/0/1
[R1-GigabitEthernet0/0/1]ip address 10.0.12.1 24
[R1-GigabitEthernet0/0/1]quit
```

```
[R2]interface GigabitEthernet0/0/1
[R2-GigabitEthernet0/0/1]ip address 10.0.12.2 24
[R2-GigabitEthernet0/0/1]quit
[R2]interface GigabitEthernet0/0/2
[R2-GigabitEthernet0/0/2]ip address 10.0.23.2 24
[R2-GigabitEthernet0/0/2]quit
```

```
[R3]interface GigabitEthernet0/0/0
[R3-GigabitEthernet0/0/0]ip address 10.0.13.3 24
[R3-GigabitEthernet0/0/0]quit
[R3]interface GigabitEthernet0/0/1
[R3-GigabitEthernet0/0/1]ip address 10.0.23.3 24
[R3-GigabitEthernet0/0/1]quit
```

Проверьте наличие связи с помощью ping.

```
[R1]ping 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=130 ms
    Reply from 10.0.12.2: bytes=56 Sequence=2 ttl=255 time=20 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 = 20/44/130 ms
```

```
[R1]ping 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=100 ms
  Reply from 10.0.13.3: bytes=56 Sequence=2 ttl=255 time=30 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=30 ms
```

```
--- 10.0.13.3 ping statistics ---
 5 packet(s) transmitted
 5 packet(s) received
 0.00% packet loss
 round-trip min/avg/max = 20/44/100 ms
```

Выведите 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	
GigabitEthernet						
0/0/1						
10.0.12.1/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/1						
10.0.12.255/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/1						
10.0.13.0/24	Direct	0	0	D	10.0.13.1	
GigabitEthernet						
0/0/0						
10.0.13.1/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/0						
10.0.13.255/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/0						
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. Создайте loopback-интерфейс.

Настройте loopback-интерфейс в соответствии с таблицей.

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

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

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

Выведите таблицу маршрутизации.

```
[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	
GigabitEthernet						
0/0/1						
10.0.12.1/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/1						
10.0.12.255/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/1						
10.0.13.0/24	Direct	0	0	D	10.0.13.1	
GigabitEthernet						
0/0/0						
10.0.13.1/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/0						
10.0.13.255/32	Direct	0	0	D	127.0.0.1	
GigabitEthernet						
0/0/0						
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

Проверьте 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. Настройте статические маршруты.

На маршрутизаторе R1 настройте 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
```

Выведите 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        GigabitEthernet
0/0/1
      10.0.1.3/32    Static   60     0            RD    10.0.13.3        GigabitEthernet
0/0/0
      10.0.12.0/24   Direct   0     0             D    10.0.12.1        GigabitEthernet
0/0/1
      10.0.12.1/32   Direct   0     0             D    127.0.0.1        GigabitEthernet
0/0/1
      10.0.12.255/32 Direct   0     0             D    127.0.0.1        GigabitEthernet
0/0/1
      10.0.13.0/24   Direct   0     0             D    10.0.13.1        GigabitEthernet
0/0/0
      10.0.13.1/32   Direct   0     0             D    127.0.0.1        GigabitEthernet
0/0/0
      10.0.13.255/32 Direct   0     0             D    127.0.0.1        GigabitEthernet
0/0/0
      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
```

Проверьте 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 добавьте маршрут к интерфейсу LoopBack0 маршрутизатора R1.

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

Проверьте 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=20 ms
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=30 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=30 ms
```

```
--- 10.0.1.2 ping statistics ---
 5 packet(s) transmitted
 5 packet(s) received
 0.00% packet loss
round-trip min/avg/max = 10/22/30 ms
```

```
[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=50 ms
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=30 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 = 20/28/50 ms
```

Настройте другие необходимые маршруты.

```
[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
```

Проверьте возможность установления связи между интерфейсами LoopBack маршрутизаторов, следуя приведённой 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=40 ms
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=10 ms
```



```
Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=255 time=30 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 = 10/26/40 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=40 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=40 ms
Reply from 10.0.1.3: bytes=56 Sequence=4 ttl=255 time=30 ms
Reply from 10.0.1.3: bytes=56 Sequence=5 ttl=255 time=10 ms
```

```
--- 10.0.1.3 ping statistics ---
 5 packet(s) transmitted
 5 packet(s) received
 0.00% packet loss
round-trip min/avg/max = 10/30/40 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=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=20 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=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 = 20/24/30 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=30 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=30 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=20 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=40 ms
Reply from 10.0.1.1: bytes=56 Sequence=4 ttl=255 time=30 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 = 20/26/40 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=40 ms
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=255 time=10 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=30 ms
```

```
--- 10.0.1.2 ping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 10/24/40 ms
```

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

Настройте статические маршруты на R1 и R2.

```
[R1]ip route-static 10.0.1.2 32 10.0.13.3 preference 100
```

```
[R2]ip route-static 10.0.1.1 32 10.0.23.3 preference 100
```

Выведите таблицы 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	GigabitEthernet

```

0/0/1
    10.0.1.3/32 Static 60 0 RD 10.0.13.3 GigabitEthernet
0/0/0
    10.0.12.0/24 Direct 0 0 D 10.0.12.1 GigabitEthernet
0/0/1
    10.0.12.1/32 Direct 0 0 D 127.0.0.1 GigabitEthernet
0/0/1
    10.0.12.255/32 Direct 0 0 D 127.0.0.1 GigabitEthernet
0/0/1
    10.0.13.0/24 Direct 0 0 D 10.0.13.1 GigabitEthernet
0/0/0
    10.0.13.1/32 Direct 0 0 D 127.0.0.1 GigabitEthernet
0/0/0
    10.0.13.255/32 Direct 0 0 D 127.0.0.1 GigabitEthernet
0/0/0
    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	GigabitEthernet
0/0/1						
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	GigabitEthernet
0/0/2						
10.0.12.0/24	Direct	0	0	D	10.0.12.2	GigabitEthernet
0/0/1						
10.0.12.2/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.12.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.23.0/24	Direct	0	0	D	10.0.23.2	GigabitEthernet
0/0/2						
10.0.23.2/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/2						
10.0.23.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/2						
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

Отключите интерфейс GigabitEthernet0/0/3 на маршрутизаторах R1 и R2, чтобы сделать недействительным маршрут с наивысшим приоритетом.

[R1]interface GigabitEthernet0/0/1

[R1-GigabitEthernet0/0/1]shutdown

Sep 13 2021 00:19:26-08:00 R1 %%01IFPDT/4/IF_STATE(1)[4]:Interface GigabitEthern

et0/0/1 has turned into DOWN state.

quit

Выведите на экран таблицы маршрутизации на R1 и R2. Из командного вывода видно, что маршруты с более низким приоритетом активизируется, когда маршруты с более высоким приоритетом становятся недействительными.

[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	GigabitEthernet
0/0/0						
10.0.1.3/32	Static	60	0	RD	10.0.13.3	GigabitEthernet
0/0/0						
10.0.13.0/24	Direct	0	0	D	10.0.13.1	GigabitEthernet
0/0/0						
10.0.13.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
10.0.13.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
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	GigabitEthernet
0/0/2						
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	GigabitEthernet
0/0/2						
10.0.23.0/24	Direct	0	0	D	10.0.23.2	GigabitEthernet
0/0/2						
10.0.23.2/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/2						
10.0.23.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/2						
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

Проверьте 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=20 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=30 ms
  Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=254 time=30 ms

--- 10.0.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 20/30/40 ms
```

Выполните трассировку маршрута, по которому передаются пакеты данных.

```
[R1]tracert -a 10.0.1.1 10.0.1.2

tracert 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 20 ms 10 ms 10 ms

 2 10.0.23.2 30 ms 20 ms 20 ms
```

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

Включите интерфейса и удалите настроенные маршруты.

```
[R1]interface GigabitEthernet0/0/1
[R1-GigabitEthernet0/0/1]undo shutdown
Sep 13 2021 00:23:11-08:00 R1 %01IFPDT/4/IF_STATE(1)[6]:Interface
GigabitEthernet0/0/1 has turned into UP state.
[R1]
Sep 13 2021 00:23:11-08:00 R1 %01IFNET/4/LINK_STATE(1)[7]:The line
protocol IP
on the interface GigabitEthernet0/0/1 has entered the UP state.
[R1-GigabitEthernet0/0/1]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
```

Выведите 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	GigabitEthernet
0/0/0						
10.0.12.0/24	Direct	0	0	D	10.0.12.1	GigabitEthernet
0/0/1						
10.0.12.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.12.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.13.0/24	Direct	0	0	D	10.0.13.1	GigabitEthernet
0/0/0						
10.0.13.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
10.0.13.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
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

Настройте маршрут по умолчанию на R1.

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

Выведите 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	GigabitEthernet
0/0/1						
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	GigabitEthernet
0/0/0						
10.0.12.0/24	Direct	0	0	D	10.0.12.1	GigabitEthernet
0/0/1						
10.0.12.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.12.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/1						
10.0.13.0/24	Direct	0	0	D	10.0.13.1	GigabitEthernet
0/0/0						
10.0.13.1/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
10.0.13.255/32	Direct	0	0	D	127.0.0.1	GigabitEthernet
0/0/0						
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

Проверьте наличие связи между LorrBack0 маршрутизатора R1 и LorrBack0 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=30 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=30 ms
```

```
--- 10.0.1.2 ping statistics ---
```

```
5 packet(s) transmitted
```

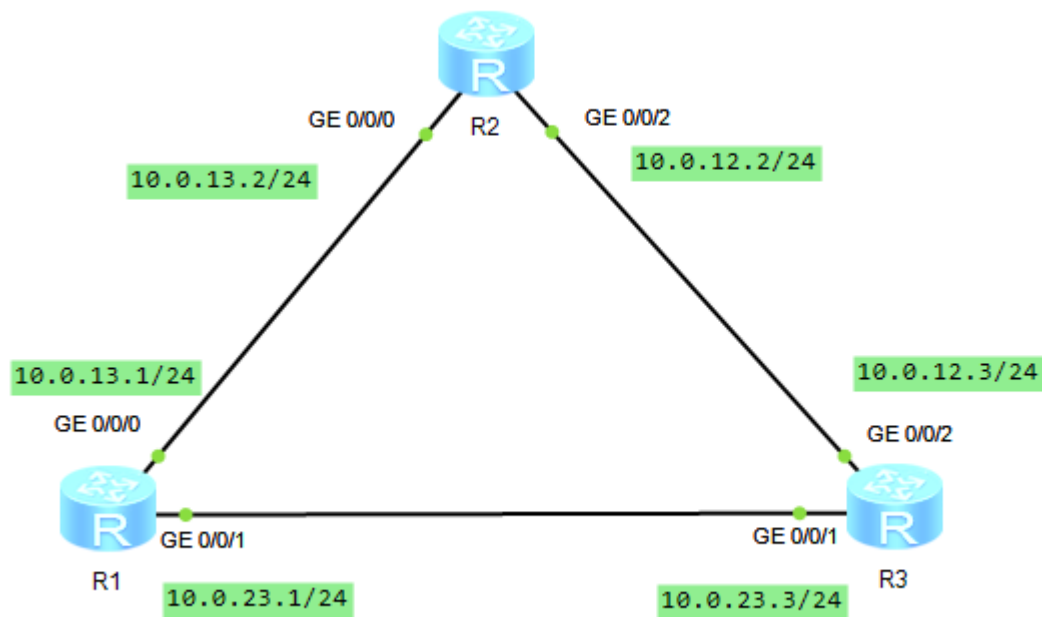
```
5 packet(s) received
```

```
0.00% packet loss
```

```
round-trip min/avg/max = 20/28/40 ms
```

Часть 2

Топология



Шаг 1. Настройка основных параметров устройств

Команды:

```
[Huawei]sys
```

```
[Huawei]sysname R1
```

```
[R1]interface GigabitEthernet 0/0/0
```

```
[R1-GigabitEthernet0/0/0]ip address 10.0.13.1 24
```

```

[R1]interface GigabitEthernet 0/0/1
[R1-GigabitEthernet0/0/1]ip address 10.0.23.1 24

[Huawei]sys
[Huawei]sysname R2

[R2]interface GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ip address 10.0.13.2 24

[R2]interface GigabitEthernet 0/0/2
[R2-GigabitEthernet0/0/2]ip address 10.0.12.2 24

[Huawei]sys
[Huawei]sysname R3

[R3]interface GigabitEthernet 0/0/2
[R3-GigabitEthernet0/0/2]ip address 10.0.12.3 24

[R3]interface GigabitEthernet 0/0/1
[R3-GigabitEthernet0/0/1]ip address 10.0.23.3 24

[R1]interface LoopBack 0
[R1-LoopBack0]ip address 10.0.1.1 32

[R2]interface LoopBack 0
[R2-LoopBack0]ip address 10.0.1.2 32

[R3]interface LoopBack 0
[R3-LoopBack0]ip address 10.0.1.3 32

```

Таблица маршрутизации на маршрутизаторе R1:

```
[R1]display ip routing-table
```

Route Flags: R - relay, D - download to fib

Routing Tables: Public

Destinations : 11 Routes : 11

Destination/Mask Interface	Proto	Pre	Cost	Flags	NextHop
10.0.1.1/32 LoopBack0	Direct	0	0	D	127.0.0.1
10.0.13.0/24 GigabitEthernet 0/0/0	Direct	0	0	D	10.0.13.1
10.0.13.1/32 GigabitEthernet 0/0/0	Direct	0	0	D	127.0.0.1


```

10.0.13.255/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/0
10.0.23.0/24 Direct 0 0 D 10.0.23.1
GigabitEthernet
0/0/1
10.0.23.1/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/1
10.0.23.255/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/1
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

```

Шаг 2. Настройка основных параметров OSPF

```

[R1]ospf 1
[R1-ospf-1]area 0
[R1-ospf-1-area-0.0.0.0]network 10.0.13.1 0.0.0.255
[R1-ospf-1-area-0.0.0.0]network 10.0.23.1 0.0.0.255
[R1-ospf-1-area-0.0.0.0]network 10.0.1.1 0.0.0.0

```

```

[R2]ospf 1
[R2-ospf-1]area 0
[R2-ospf-1-area-0.0.0.0]network 10.0.13.2 0.0.0.0
[R2-ospf-1-area-0.0.0.0]network 10.0.12.2 0.0.0.0
[R2-ospf-1-area-0.0.0.0]network 10.0.1.2 0.0.0.0

```

```

[R3]ospf 1
[R3-ospf-1]area 0
[R3-ospf-1-area-0.0.0.0]network 10.0.12.3 0.0.0.0
[R3-ospf-1-area-0.0.0.0]network 10.0.23.3 0.0.0.0
[R3-ospf-1-area-0.0.0.0]network 10.0.1.3 0.0.0.0

```

Шаг 3. Рабочий статус OSPF

Вывод информации о соседях OSPF:

```

[R1]display ospf peer

```

```

OSPF Process 1 with Router ID 10.0.13.1

```

Neighbors

```
Area 0.0.0.0 interface 10.0.13.1(GigabitEthernet0/0/0)'s neighbors
Router ID: 10.0.13.2      Address: 10.0.13.2
  State: Full  Mode:Nbr is Master  Priority: 1
  DR: 10.0.13.2  BDR: 10.0.13.1  MTU: 0
  Dead timer due in 38  sec
  Retrans timer interval: 5
  Neighbor is up for 00:00:13
  Authentication Sequence: [ 0 ]
```

Neighbors

```
Area 0.0.0.0 interface 10.0.23.1(GigabitEthernet0/0/1)'s neighbors
Router ID: 10.0.23.3      Address: 10.0.23.3
  State: Full  Mode:Nbr is Master  Priority: 1
  DR: 10.0.23.3  BDR: None  MTU: 0
  Dead timer due in 31  sec
  Retrans timer interval: 5
  Neighbor is up for 00:00:07
  Authentication Sequence: [ 0 ]
```

Маршруты, полученные от OSPF:

```
[R1]display ip routing-table protocol ospf
Route Flags: R - relay, D - download to fib
```

```
-----
Public routing table : OSPF
```

```
  Destinations : 3      Routes : 4
```

```
OSPF routing table status : <Active>
```

```
  Destinations : 3      Routes : 4
```

Destination/Mask Interface	Proto	Pre	Cost	Flags	NextHop
10.0.1.2/32 GigabitEthernet 0/0/0	OSPF	10	1	D	10.0.13.2
10.0.1.3/32 GigabitEthernet 0/0/1	OSPF	10	1	D	10.0.23.3
10.0.12.0/24 GigabitEthernet 0/0/0	OSPF	10	2	D	10.0.13.2
GigabitEthernet 0/0/1	OSPF	10	2	D	10.0.23.3

```
OSPF routing table status : <Inactive>
Destinations : 0          Routes : 0
```

Шаг 4. Настройка аутентификации OSPF

Команды аутентификации OSPF на маршрутизаторе R1:

```
[R1]interface GigabitEthernet 0/0/0
[R1-GigabitEthernet0/0/0]ospf authentication-mode md5 1 cipher qwerty

[R1]interface GigabitEthernet 0/0/1
[R1-GigabitEthernet0/0/1]ospf authentication-mode md5 1 cipher qwerty
```

Вывод информации о соседях OSPF маршрутизатора R1:

```
[R1]display ospf peer brief
```

```
OSPF Process 1 with Router ID 10.0.13.1
Peer Statistic Information
```

Area Id	Interface	Neighbor id	State
---------	-----------	-------------	-------

Команды аутентификации OSPF на маршрутизаторе R2:

```
[R2]interface GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ospf authentication-mode md5 1 cipher qwerty

[R2]interface GigabitEthernet 0/0/2
[R2-GigabitEthernet0/0/2]ospf authentication-mode md5 1 cipher qwerty
```

Вывод информации о соседях OSPF маршрутизатора R2:

```
[R2]display ospf peer brief
```

```
OSPF Process 1 with Router ID 10.0.13.2
Peer Statistic Information
```

Area Id	Interface	Neighbor id	State
0.0.0.0	GigabitEthernet0/0/0	10.0.13.1	Full

Команды аутентификации OSPF на маршрутизаторе R3:

```
[R3]interface GigabitEthernet 0/0/2
[R3-GigabitEthernet0/0/2]ospf authentication-mode md5 1 cipher qwerty

[R3]interface GigabitEthernet 0/0/1
[R3-GigabitEthernet0/0/1]ospf authentication-mode md5 1 cipher qwerty

[R3]display ospf peer brief
```

```
OSPF Process 1 with Router ID 10.0.23.3
Peer Statistic Information
```

Вывод информации о соседях OSPF маршрутизатора R3:

Area Id	Interface	Neighbor id	State
0.0.0.0	GigabitEthernet0/0/1	10.0.13.1	Full
0.0.0.0	GigabitEthernet0/0/2	10.0.13.2	Full

Шаг 5. Анонсирование маршрута по умолчанию на R1

Анонсирование:

```
[R1]ospf 1
[R1-ospf-1]default-route-advertise always
```

Таблица маршрутизации на маршрутизаторе R2:

```
[R2]display ip routing-table
Route Flags: R - relay, D - download to fib
```

```
-----
Routing Tables: Public
```

```
Destinations : 15      Routes : 16
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop
Interface					
0.0.0.0/0	O_ASE	150	1	D	10.0.13.1
GigabitEthernet					
0/0/0					
10.0.1.1/32	OSPF	10	1	D	10.0.13.1
GigabitEthernet					
0/0/0					

```

    10.0.1.2/32 Direct 0 0 D 127.0.0.1
LoopBack0
    10.0.1.3/32 OSPF 10 1 D 10.0.12.3
GigabitEthernet
0/0/2
    10.0.12.0/24 Direct 0 0 D 10.0.12.2
GigabitEthernet
0/0/2
    10.0.12.2/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/2
    10.0.12.255/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/2
    10.0.13.0/24 Direct 0 0 D 10.0.13.2
GigabitEthernet
0/0/0
    10.0.13.2/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/0
    10.0.13.255/32 Direct 0 0 D 127.0.0.1
GigabitEthernet
0/0/0
    10.0.23.0/24 OSPF 10 2 D 10.0.13.1
GigabitEthernet
0/0/0
                                OSPF 10 2 D 10.0.12.3
GigabitEthernet
0/0/2
    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

```

Таблица маршрутизации на маршрутизаторе R3:

```
[R3]display ip routing-table
```

```
Route Flags: R - relay, D - download to fib
```

```
-----
```

```
Routing Tables: Public
```

```
Destinations : 15 Routes : 16
```

```

Destination/Mask    Proto    Pre  Cost    Flags NextHop
Interface

```

0.0.0.0/0	O_ASE	150	1	D	10.0.23.1
GigabitEthernet					
0/0/1					
10.0.1.1/32	OSPF	10	1	D	10.0.23.1
GigabitEthernet					
0/0/1					
10.0.1.2/32	OSPF	10	1	D	10.0.12.2
GigabitEthernet					
0/0/2					
10.0.1.3/32	Direct	0	0	D	127.0.0.1
LoopBack0					
10.0.12.0/24	Direct	0	0	D	10.0.12.3
GigabitEthernet					
0/0/2					
10.0.12.3/32	Direct	0	0	D	127.0.0.1
GigabitEthernet					
0/0/2					
10.0.12.255/32	Direct	0	0	D	127.0.0.1
GigabitEthernet					
0/0/2					
10.0.13.0/24	OSPF	10	2	D	10.0.12.2
GigabitEthernet					
0/0/2					
	OSPF	10	2	D	10.0.23.1
GigabitEthernet					
0/0/1					
10.0.23.0/24	Direct	0	0	D	10.0.23.3
GigabitEthernet					
0/0/1					
10.0.23.3/32	Direct	0	0	D	127.0.0.1
GigabitEthernet					
0/0/1					
10.0.23.255/32	Direct	0	0	D	127.0.0.1
GigabitEthernet					
0/0/1					
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					

Шаг 6. Изменение значения стоимости интерфейсов на R1, чтобы LoopBack0 на R1 мог

Команды:

```
[R1]interface GigabitEthernet 0/0/0
[R1-GigabitEthernet0/0/0]ospf cost 10
```

Таблица маршрутизации на маршрутизаторе R1:

```
[R1]display ip routing-table
Route Flags: R - relay, D - download to fib
```

Routing Tables: Public

Destinations : 14 Routes : 14

Destination/Mask Interface	Proto	Pre	Cost	Flags	NextHop
10.0.1.1/32 LoopBack0	Direct	0	0	D	127.0.0.1
10.0.1.2/32 GigabitEthernet 0/0/1	OSPF	10	2	D	10.0.23.3
10.0.1.3/32 GigabitEthernet 0/0/1	OSPF	10	1	D	10.0.23.3
10.0.12.0/24 GigabitEthernet 0/0/1	OSPF	10	2	D	10.0.23.3
10.0.13.0/24 GigabitEthernet 0/0/0	Direct	0	0	D	10.0.13.1
10.0.13.1/32 GigabitEthernet 0/0/0	Direct	0	0	D	127.0.0.1
10.0.13.255/32 GigabitEthernet 0/0/0	Direct	0	0	D	127.0.0.1
10.0.23.0/24 GigabitEthernet 0/0/1	Direct	0	0	D	10.0.23.1
10.0.23.1/32 GigabitEthernet 0/0/1	Direct	0	0	D	127.0.0.1
10.0.23.255/32 GigabitEthernet 0/0/1	Direct	0	0	D	127.0.0.1

```
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
```

Проверка с помощью tracer:

```
[R1]tracert -a 10.0.1.1 10.0.1.2
```

```
tracert to 10.0.1.2(10.0.1.2), max hops: 30 ,packet length:
40,press CTRL_C
to break
```

```
1 10.0.23.3 20 ms  20 ms  20 ms
```

```
2 10.0.12.2 30 ms  20 ms  20 ms
```


Вывод

В процессе выполнения лабораторной работы мы получили базовые навыки работы с имитационным ПО Huawei eNSP и с маршрутизаторам AR2220, создали с их помощью 2 сети, проверили работоспособность сетей утилитами ping и tracert.