

Университет ИТМО

Администрирование вычислительных систем

Лабораторная работа №5

“Реализация сетей и решений IPv6”

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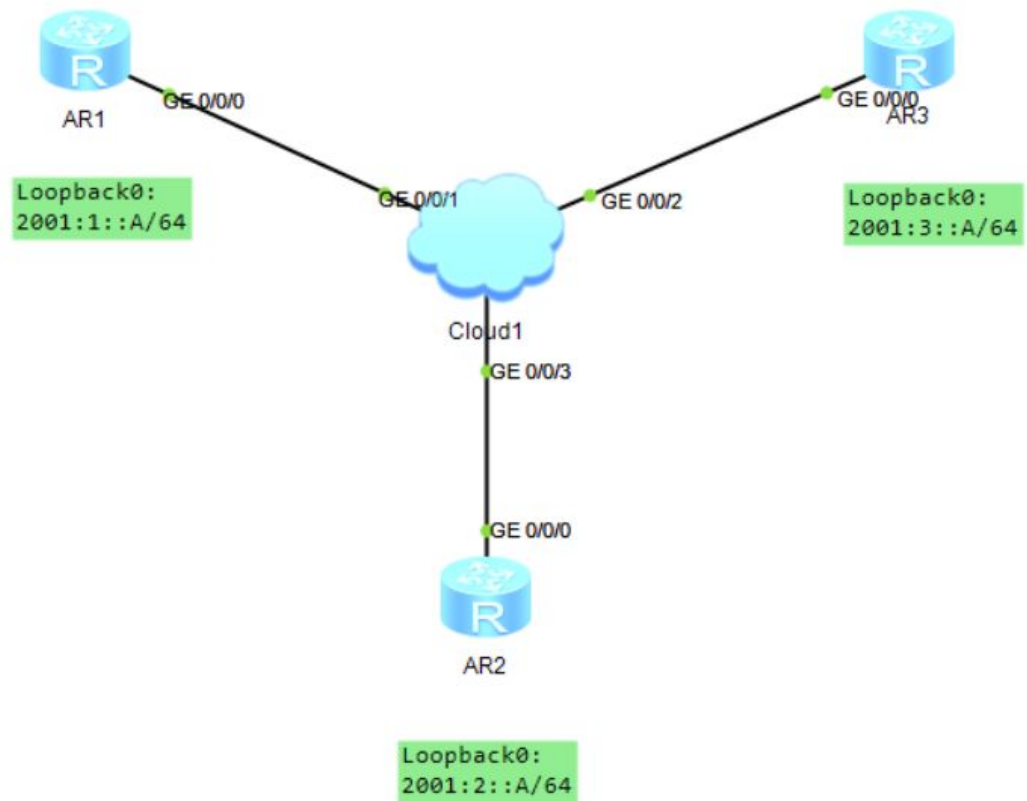
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Топология



1 Подготовка среды

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

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

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

2 Конфигурирование адресации IPv6

Настроим глобальную адресацию одноадресной передачи IPv6 на интерфейсах loopback и вручную настроим локальную адресацию канала на интерфейсе Gigabit Ethernet 0/0/0 всех маршрутизаторов.

```
[R1]ipv6
[R1]interface loopback 0
```

```
[R1-LoopBack0]ipv6 enable
[R1-LoopBack0]ipv6 address 2001:1::A 64
[R1]interface GigabitEthernet 0/0/0
[R1-GigabitEthernet0/0/0]ipv6 enable
[R1-GigabitEthernet0/0/0]ipv6 address fe80::1 link-local
```

```
[R2]ipv6
[R2]interface loopback 0
[R2-LoopBack0]ipv6 enable
[R2-LoopBack0]ipv6 address 2001:2::B 64
[R2]interface GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ipv6 enable
[R2-GigabitEthernet0/0/0]ipv6 address fe80::2 link-local
```

```
[R3]ipv6
[R3]interface loopback 0
[R3-LoopBack0]ipv6 enable
[R3-LoopBack0]ipv6 address 2001:3::C 64
[R3]interface GigabitEthernet 0/0/0
[R3-GigabitEthernet0/0/0]ipv6 enable
[R3-GigabitEthernet0/0/0]ipv6 address fe80::3 link-local
```

```
<R1>display ipv6 interface GigabitEthernet 0/0/0
GigabitEthernet0/0/0 current state : UP
IPv6 protocol current state : UP
IPv6 is enabled, link-local address is FE80::1
No global unicast address configured
Joined group address(es):
    FF02::1:FF00:1
    FF02::2
    FF02::1
MTU is 1500 bytes
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
ND retransmit interval is 1000 milliseconds
Hosts use stateless autoconfig for addresses
```

3 Конфигурирование OSPFv3

Включим процесс OSPFv3 и укажем его идентификатор маршрутизатора на R1, R2 и R3. Затем OSPFv3 должен быть включен на интерфейсе.

```
[R1]ospfv3 1
[R1-ospfv3-1]router-id 1.1.1.1
[R1-ospfv3-1]quit
[R1]interface GigabitEthernet 0/0/0
[R1-GigabitEthernet0/0/0]ospfv3 1 area 0
[R1-GigabitEthernet0/0/0]quit
[R1]interface loopback 0
[R1-LoopBack0]ospfv3 1 area 0
```

```
[R2]ospfv3 1
[R2-ospfv3-1]router-id 2.2.2.2
```

```
[R2-ospfv3-1]quit
[R2]interface GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ospfv3 1 area 0
[R2-GigabitEthernet0/0/0]quit
[R2]interface loopback 0
[R2-LoopBack0]ospfv3 1 area 0
```

```
[R3]ospfv3 1
[R3-ospfv3-1]router-id 3.3.3.3
[R3-ospfv3-1]quit
[R3]interface GigabitEthernet 0/0/0
[R3-GigabitEthernet0/0/0]ospfv3 1 area 0
[R3-GigabitEthernet0/0/0]quit
[R3]interface loopback 0
[R3-LoopBack0]ospfv3 1 area 0
```

Выполним команду **display ospfv3 peer** на R1 и R3, чтобы убедиться, что установлено одноранговое соединение OSPFv3.

```
<R1>display ospfv3 peer
OSPFv3 Process (1)
OSPFv3 Area (0.0.0.0)
Neighbor ID      Pri  State                Dead Time Interface          Instance ID
2.2.2.2          1   Full/Backup          00:00:31 GE0/0/0                0
3.3.3.3          1   Full/DROther          00:00:32 GE0/0/0                0
```

```
<R3>display ospfv3 peer
OSPFv3 Process (1)
OSPFv3 Area (0.0.0.0)
Neighbor ID      Pri  State                Dead Time Interface          Instance ID
1.1.1.1          1   Full/DR               00:00:34 GE0/0/0                0
2.2.2.2          1   Full/Backup           00:00:36 GE0/0/0                0
```

Проверим подключение к локальному адресу однорангового канала и глобальному адресу одноадресной передачи интерфейса LoopBack 0.

```
<R1>ping ipv6 fe80::3 -i GigabitEthernet 0/0/0
PING fe80::3 : 56 data bytes, press CTRL_C to break
  Reply from FE80::3:
    bytes=56 Sequence=1 hop limit=64  time = 50 ms
  Reply from FE80::3:
    bytes=56 Sequence=2 hop limit=64  time = 10 ms
  Reply from FE80::3:
    bytes=56 Sequence=3 hop limit=64  time = 20 ms
  Reply from FE80::3:
    bytes=56 Sequence=4 hop limit=64  time = 20 ms
  Reply from FE80::3:
    bytes=56 Sequence=5 hop limit=64  time = 30 ms

--- fe80::3 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
```

```
round-trip min/avg/max = 10/26/50 ms
```

```
<R1>ping ipv6 2001:3::C
PING 2001:3::C : 56 data bytes, press CTRL_C to break
Reply from 2001:3::C
bytes=56 Sequence=1 hop limit=64 time = 40 ms
Reply from 2001:3::C
bytes=56 Sequence=2 hop limit=64 time = 10 ms
Reply from 2001:3::C
bytes=56 Sequence=3 hop limit=64 time = 30 ms
Reply from 2001:3::C
bytes=56 Sequence=4 hop limit=64 time = 1 ms
Reply from 2001:3::C
bytes=56 Sequence=5 hop limit=64 time = 20 ms

--- 2001:3::C ping statistics ---
 5 packet(s) transmitted
 5 packet(s) received
 0.00% packet loss
round-trip min/avg/max = 1/20/40 ms
```

4 Настройка DHCPv6 для распределения IPv6 адресов

Включим функцию DHCPv6 Server на R2, чтобы устройствам можно было назначать адреса IPv6 с помощью DHCPv6.

```
[R2]dhcp enable
[R2] dhcpv6 duid 11
Warning: The DHCP unique identifier should be globally-unique and
stable. Are you sure to change it? [Y/N]y
[R2]dhcpv6 pool pool1
[R2-dhcpv6-pool-pool1]address prefix 2001:FACE::/64
[R2-dhcpv6-pool-pool1]dns-server 2001:444e:5300::1
[R2-dhcpv6-pool-pool1]excluded-address 2001:FACE::1
[R2-dhcpv6-pool-pool1]quit

[R2]interface GigabitEthernet 0/0/0
[R2-GigabitEthernet0/0/0]ipv6 address 2001:FACE::1 64
[R2-GigabitEthernet0/0/0]dhcpv6 server pool1
```

Включим функцию клиента DHCPv6 на R1 и R3, чтобы устройствам можно было назначать адреса IPv6 с помощью DHCPv6.

```
[R1]dhcp enable
[R1] dhcpv6 duid 11
Warning: The DHCP unique identifier should be globally-unique and
stable. Are you sure to change it? [Y/N]y
[R1]interface GigabitEthernet 0/0/0
[R1-GigabitEthernet0/0/0]ipv6 address auto dhcp

[R3]dhcp enable
[R3] dhcpv6 duid 11
```

```
Warning: The DHCP unique identifier should be globally-unique and
stable. Are you sure to change it? [Y/N]y
[R3]interface GigabitEthernet 0/0/0
[R3-GigabitEthernet0/0/0]ipv6 address auto dhcp
```

Выполним команду `display dhcpv6 pool` на R2 для проверки информации о пуле адресов DHCPv6.

```
<R2>display dhcpv6 pool
DHCPv6 pool: pool1
  Address prefix: 2001:FACE::/64
    Lifetime valid 172800 seconds, preferred 86400 seconds
    2 in use, 0 conflicts
  Excluded-address 2001:FACE::1
    1 excluded addresses
  Information refresh time: 86400
  DNS server address: 2001:444E:5300::1
  Conflict-address expire-time: 172800
  Active normal clients: 2
```

Выполним команду `display ipv6 interface brief` на R1 и R3 для проверки информации об адресе IPv6.

```
[R1]display ipv6 interface brief
*down: administratively down
(l): loopback
(s): spoofing
Interface                                Physical          Protocol
GigabitEthernet0/0/0                    up                up
[IPv6 Address] 2001:FACE::2
LoopBack0                                up                up(s)
[IPv6 Address] 2001:1::A
```

```
[R3]display ipv6 interface brief
*down: administratively down
(l): loopback
(s): spoofing
Interface                                Physical          Protocol
GigabitEthernet0/0/0                    up                up
[IPv6 Address] 2001:FACE::3
LoopBack0                                up                up(s)
[IPv6 Address] 2001:3::C
```

5 Окончательная конфигурация

```
<R1>display current-configuration
[V200R003C00]
```

```
#
 sysname R1
#
ipv6
#
dhcp enable
#
ospfv3 1
 router-id 1.1.1.1
#
interface GigabitEthernet0/0/0
 ipv6 enable
 ipv6 address FE80::1 link-local
 ospfv3 1 area 0.0.0.0
 ipv6 address auto dhcp
#
interface LoopBack0
 ipv6 enable
 ipv6 address 2001:1::A/64
 ospfv3 1 area 0.0.0.0
#
return
```

```
<R2>display current-configuration
[V200R003C00]
#
 sysname R2
#
ipv6
#
dhcp enable
#
dhcpv6 pool pool1
 address prefix 2001:FACE::/64
 excluded-address 2001:FACE::1
 dns-server 2001:444E:5300::1
#
ospfv3 1
 router-id 2.2.2.2
#
interface GigabitEthernet0/0/0
 ipv6 enable
 ipv6 address 2001:FACE::1/64
 ipv6 address FE80::2 link-local
 ospfv3 1 area 0.0.0.0
 dhcpv6 server pool1
#
interface LoopBack0
 ipv6 enable
 ipv6 address 2001:2::B/64
 ospfv3 1 area 0.0.0.0
#
return
```



```
<R3>display current-configuration
[V200R003C00]
#
 sysname R3
#
ipv6
#
dhcp enable
#
ospfv3 1
 router-id 3.3.3.3
#
interface GigabitEthernet0/0/0
 ipv6 enable
 ipv6 address FE80::3 link-local
 ospfv3 1 area 0.0.0.0
 ipv6 address auto dhcp
#
interface LoopBack0
 ipv6 enable
 ipv6 address 2001:3::C/64
 ospfv3 1 area 0.0.0.0
#
return
```

Вывод

В ходе выполнения лабораторной работы была выполнена настройка базовой адресации IPv6, настройка протокола маршрутизации OSPFv3 и проведена настройка функций сервера DHCPv6.