

Федеральное государственное бюджетное общеобразовательное
учреждение высшего образования

Сибирский государственный университет телекоммуникаций и
информатики

(СибГУТИ)

Кафедра вычислительных систем

ПРАКТИЧЕСКОЕ ЗАДАНИЕ № 5

«Адресация узлов в сетях. Сетевые адреса IPv6. Протокол NDP. SLAAC и
DHCPv6»

Выполнил:

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1. Определили все link-local адреса, назначенные для узлов из собранной сетевой конфигурации и MAC-адреса.

Host-машина

```
Адаптер Ethernet Ethernet 2:

DNS-суффикс подключения . . . . . :
Описание. . . . . : VirtualBox Host-Only Ethernet Adapter
Физический адрес. . . . . : 0A-00-27-00-00-0A
DHCP включен. . . . . : Да
Автонастройка включена. . . . . : Да
Локальный IPv6-адрес канала . . . : fe80::30c9:d1f7:ddc4:fe06%10(Основной)
IPv4-адрес. . . . . : 192.168.20.5(Основной)
Маска подсети . . . . . : 255.255.255.0
Аренда получена. . . . . : 11 марта 2025 г. 19:20:01
Срок аренды истекает. . . . . : 11 марта 2025 г. 19:30:00
Основной шлюз. . . . . :
DHCP-сервер. . . . . : 192.168.20.2
IAID DHCPv6 . . . . . : 84541479
DUID клиента DHCPv6 . . . . . : 00-01-00-07-2B-AD-63-74-EA-A6-AC-EE-FF-7A
DNS-серверы. . . . . : fec0:0:0:ffff::1%1
                        fec0:0:0:ffff::2%1
                        fec0:0:0:ffff::3%1
NetBios через TCP/IP. . . . . : Включен
```

AstraLinux

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:33:be:0d brd ff:ff:ff:ff:ff:ff
    inet 192.168.20.3/24 brd 192.168.20.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe33:be0d/64 scope link
        valid_lft forever preferred_lft forever
```

MikroTik

```
[admin@MikroTik] > /ipv6 address print
Flags: D - DYNAMIC; L - LINK-LOCAL
Columns: ADDRESS, INTERFACE, ADVERTISE
# ADDRESS INTERFACE ADVERTISE
0 D ::1/128 lo no
1 DL fe80::a00:27ff:fe33:be0d/64 ether1 no
```

```
[admin@MikroTik] > interface ethernet print
Flags: R - RUNNING
Columns: NAME, MTU, MAC-ADDRESS, ARP
# NAME MTU MAC-ADDRESS ARP
0 R ether1 1500 08:00:27:CF:10:21 enabled
```

БазальтОС

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:cd:69:03 brd ff:ff:ff:ff:ff:ff
    inet 169.254.6.209/16 brd 169.254.255.255 scope link enp0s3:avahi
        valid_lft forever preferred_lft forever
    inet 192.168.20.4/24 brd 192.168.20.255 scope global dynamic noprefixroute enp0s3
        valid_lft 589sec preferred_lft 514sec
    inet6 fe80::a00:27ff:fe33:be0d/64 scope link
        valid_lft forever preferred_lft forever
```

2. Запустили ping от AstraLinux до host-машины.

5 14.5024..	fe80::a00:27ff:fe33:be0d	ff02::1:ffca:f...	ICMPv6	86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 0a:00:27:00:00:0a
6 14.5027..	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) is at 0a:00:27:00:00:0a
7 14.5033..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=1, hop limit=64 (no response found!)
8 15.5247..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=2, hop limit=64 (no response found!)
9 16.5486..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=3, hop limit=64 (no response found!)
10 17.5730..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=4, hop limit=64 (no response found!)
11 18.5962..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=5, hop limit=64 (no response found!)
12 19.2239..	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d from 0a:00:27:00:00:0a
13 19.2247..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe33:be0d (sol)
14 19.6203..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=6, hop limit=64 (no response found!)
15 20.6442..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=7, hop limit=64 (no response found!)
16 21.6685..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=8, hop limit=64 (no response found!)
17 22.6925..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=9, hop limit=64 (no response found!)
18 23.7166..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=10, hop limit=64 (no response found!)
19 24.7408..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=11, hop limit=64 (no response found!)
20 25.7641..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=12, hop limit=64 (no response found!)
21 26.7885..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=13, hop limit=64 (no response found!)
22 27.8124..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=14, hop limit=64 (no response found!)
23 28.8367..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=15, hop limit=64 (no response found!)
24 29.8603..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=16, hop limit=64 (no response found!)
29 30.8848..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=17, hop limit=64 (no response found!)
30 31.9082..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=18, hop limit=64 (no response found!)
31 32.9325..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=19, hop limit=64 (no response found!)
32 33.9563..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=20, hop limit=64 (no response found!)
33 34.9801..	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=21, hop limit=64 (no response found!)

В 5 и 6, а также 12 и 13 строчке мы видим сообщения о поиске соседа. Все остальные пакеты — echo-запросы и echo-ответы.

3. Информация о соседях на узле AstraLinux

```
user@astra:~$ ip -6 neigh show
fe80::4f7b:3343:628:a1f3 dev eth0 FAILED
fe80::30c9:d1f7:ddc4:fe06 dev eth0 lladdr 0a:00:27:00:00:0a REACHABLE
```

4. Запустили ping с MikroTik до AstraLinux и с MikroTik до host-машины

```
[admin@MikroTik] > /ping fe80::a00:27ff:fe33:be0d%ether1
SEQ HOST                                SIZE TTL TIME                        STATUS
0 fe80::a00:27ff:fe33:be0d             56  64 2ms160us    echo reply
1 fe80::a00:27ff:fe33:be0d             56  64 1ms520us    echo reply
2 fe80::a00:27ff:fe33:be0d             56  64 2ms256us    echo reply
3 fe80::a00:27ff:fe33:be0d             56  64 1ms221us    echo reply
4 fe80::a00:27ff:fe33:be0d             56  64 1ms345us    echo reply
5 fe80::a00:27ff:fe33:be0d             56  64 1ms726us    echo reply
6 fe80::a00:27ff:fe33:be0d             56  64 1ms468us    echo reply
7 fe80::a00:27ff:fe33:be0d             56  64 1ms245us    echo reply
8 fe80::a00:27ff:fe33:be0d             56  64 1ms525us    echo reply
9 fe80::a00:27ff:fe33:be0d             56  64 2ms136us    echo reply
10 fe80::a00:27ff:fe33:be0d            56  64 1ms837us    echo reply
11 fe80::a00:27ff:fe33:be0d            56  64 1ms388us    echo reply
12 fe80::a00:27ff:fe33:be0d            56  64 1ms380us    echo reply
sent=13 received=13 packet-loss=0% min-rtt=1ms221us avg-rtt=1ms631us
max-rtt=2ms256us
```

```
[admin@MikroTik] > /ping fe80::30c9:d1f7:ddc4:fe06%ether1
SEQ HOST                                SIZE TTL TIME                        STATUS
0 fe80::30c9:d1f7:ddc4:fe06            56 128 1ms3us     echo reply
1 fe80::30c9:d1f7:ddc4:fe06            56 128 1ms23us    echo reply
2 fe80::30c9:d1f7:ddc4:fe06            56 128 824us     echo reply
3 fe80::30c9:d1f7:ddc4:fe06            56 128 738us     echo reply
4 fe80::30c9:d1f7:ddc4:fe06            56 128 765us     echo reply
5 fe80::30c9:d1f7:ddc4:fe06            56 128 978us     echo reply
6 fe80::30c9:d1f7:ddc4:fe06            56 128 811us     echo reply
sent=7 received=7 packet-loss=0% min-rtt=738us avg-rtt=877us
max-rtt=1ms23us
```

Информация об известных соседях

```
[admin@MikroTik] > ipv6 neighbor print
Flags: R - router
0   address=fe80::30c9:d1f7:ddc4:fe06 interface=ether1
    mac-address=0A:00:27:00:00:0A status="stale"
[admin@MikroTik] > _
```

Повторили тоже самое для БазальтОС:

```
9 39.6520... fe80::a00:27ff:fe00:6903 ff02::1:ff02:f... ICMPv6 86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 08:00:27:00:00:03
10 39.6523... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) is a
11 39.6534... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=1, hop limit=64 (reply in 12)
12 39.6535... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=1, hop limit=128 (request in 1)
13 40.6535... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=2, hop limit=64 (reply in 14)
14 40.6537... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=2, hop limit=128 (request in 1)
15 41.6546... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=3, hop limit=64 (reply in 16)
16 41.6547... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=3, hop limit=128 (request in 1)
17 42.6557... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=4, hop limit=64 (reply in 18)
18 42.6558... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=4, hop limit=128 (request in 1)
19 43.6577... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=5, hop limit=64 (reply in 20)
20 43.6579... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=5, hop limit=128 (request in 1)
21 44.3901... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Solicitation for fe80::a00:27ff:fe00:6903 from 0a:00:27:00:00:03
22 44.3910... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 78 Neighbor Advertisement fe80::a00:27ff:fe00:6903 (sol)
23 44.6586... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=6, hop limit=64 (reply in 24)
24 44.6587... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=6, hop limit=128 (request in 2)
25 45.6596... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=7, hop limit=64 (reply in 26)
26 45.6598... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 118 Echo (ping) reply id=0x0001, seq=7, hop limit=128 (request in 2)
27 46.6608... fe80::a00:27ff:fe00:6903 fe80::30c9:d1f... ICMPv6 118 Echo (ping) request id=0x0001, seq=8, hop limit=64 (no response)
```

В 9 и 10, а также 21 и 22 строчке мы видим сообщения о поиске соседа. Все остальные пакеты — echo-запросы и echo-ответы.

```
[admin@MikroTik] > /ping fe80::a00:27ff:fe00:6903%ether1
SEQ HOST                               SIZE TTL TIME                               STATUS
0 fe80::a00:27ff:fe00:6903           56 64 2ms870us                               echo reply
1 fe80::a00:27ff:fe00:6903           56 64 2ms960us                               echo reply
2 fe80::a00:27ff:fe00:6903           56 64 1ms585us                               echo reply
3 fe80::a00:27ff:fe00:6903           56 64 1ms478us                               echo reply
4 fe80::a00:27ff:fe00:6903           56 64 1ms156us                               echo reply
5 fe80::a00:27ff:fe00:6903           56 64 2ms11us                                echo reply
6 fe80::a00:27ff:fe00:6903           56 64 1ms727us                               echo reply
7 fe80::a00:27ff:fe00:6903           56 64 2ms280us                               echo reply
sent=8 received=8 packet-loss=0% min-rtt=1ms156us avg-rtt=2ms8us
max-rtt=2ms960us
```

```
[admin@MikroTik] >
```

```
[admin@MikroTik] > /ping fe80::30c9:d1f7:ddc4:fe06%ether1
SEQ HOST                               SIZE TTL TIME                               STATUS
0 fe80::30c9:d1f7:ddc4:fe06           56 128 906us                                echo reply
1 fe80::30c9:d1f7:ddc4:fe06           56 128 1ms231us                             echo reply
2 fe80::30c9:d1f7:ddc4:fe06           56 128 924us                                echo reply
3 fe80::30c9:d1f7:ddc4:fe06           56 128 1ms45us                               echo reply
4 fe80::30c9:d1f7:ddc4:fe06           56 128 972us                                echo reply
5 fe80::30c9:d1f7:ddc4:fe06           56 128 974us                                echo reply
6 fe80::30c9:d1f7:ddc4:fe06           56 128 919us                                echo reply
sent=7 received=7 packet-loss=0% min-rtt=906us avg-rtt=995us
max-rtt=1ms231us
```

```
[admin@MikroTik] > ipv6 neighbor print
Flags: R - router
0   address=fe80::30c9:d1f7:ddc4:fe06 interface=ether1
    mac-address=0A:00:27:00:00:0A status="reachable"

1   address=fe80::a00:27ff:fe00:6903 interface=ether1
    mac-address=08:00:27:CD:69:03 status="stale"
```

5. Выделенный префикс IPv6 — fd00:2004:12:24::/64

Присвоили адрес из выданного диапазона

```
[admin@MikroTik] > /ipv6 address print
Flags: D - DYNAMIC; G - GLOBAL, L - LINK-LOCAL
Columns: ADDRESS, INTERFACE, ADVERTISE
# ADDRESS INTERFACE ADVERTISE
0 D ::1/128 lo no
1 DL fe80::a00:27ff:fecf:1021/64 ether1 no
2 G fd00:2004:12:24::/64 ether1 yes
[admin@MikroTik] > _
```

Информация о распространяемом префиксе

```
280 544.786... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
282 544.787... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
295 544.817... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
302 588.255... :: ff02::16 ICMPv6 110 Multicast Listener Report Message v2
307 589.025... :: ff02::16 ICMPv6 110 Multicast Listener Report Message v2
308 589.104... :: ff02::1:ffcf:1... ICMPv6 86 Neighbor Solicitation for fe80::a00:27ff:fecf:1021
309 590.148... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 130 Multicast Listener Report Message v2
310 590.149... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
311 590.175... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
312 590.384... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
313 590.405... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 130 Multicast Listener Report Message v2
314 593.904... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
315 601.585... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
320 616.305... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
324 637.317... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Solicitation for fe80::a00:27ff:fecf:1021 from 0a:00
325 637.317... fe80::a00:27ff:fecf:1021 fe80::30c9:d1f... ICMPv6 78 Neighbor Advertisement fe80::a00:27ff:fecf:1021 (rtr, sol)
326 642.385... fe80::a00:27ff:fecf:1021 fe80::30c9:d1f... ICMPv6 86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 08:0
327 642.385... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) i
332 647.025... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
341 699.817... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Solicitation for fe80::a00:27ff:fecf:1021 from 0a:00
342 699.818... fe80::a00:27ff:fecf:1021 fe80::30c9:d1f... ICMPv6 78 Neighbor Advertisement fe80::a00:27ff:fecf:1021 (rtr, sol)
343 701.425... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 150 Multicast Listener Report Message v2
344 701.464... fe80::a00:27ff:fecf:1021 ff02::16 ICMPv6 150 Multicast Listener Report Message v2
345 701.595... fe80::a00:27ff:fecf:1021 ff02::1 ICMPv6 110 Router Advertisement from 08:00:27:cf:10:21
347 701.597... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
350 701.605... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
360 701.618... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
362 701.618... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
375 701.817... fe80::30c9:d1f7:ddc4:fe06 ff02::16 ICMPv6 90 Multicast Listener Report Message v2
376 701.935... :: ff02::1:ff00:1 ICMPv6 86 Neighbor Solicitation for fd00:2004:12:24::1
377 702.100... fe80::a00:27ff:fecf:1021 ff02::1 ICMPv6 110 Router Advertisement from 08:00:27:cf:10:21
378 702.601... fe80::a00:27ff:fecf:1021 ff02::1 ICMPv6 110 Router Advertisement from 08:00:27:cf:10:21
379 704.864... fe80::a00:27ff:fecf:1021 fe80::30c9:d1f... ICMPv6 86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 08:0
380 704.865... fe80::30c9:d1f7:ddc4:fe06 fe80::a00:27ff... ICMPv6 86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) i
385 708.464... fe80::a00:27ff:fecf:1021 ff02::2 ICMPv6 70 Router Solicitation from 08:00:27:cf:10:21
387 726.013... fd00:2004:12:24::1 ff02::1:ffae:c... ICMPv6 86 Neighbor Solicitation for fd00:2004:12:24:1d81:f51:f7ae:cd53
388 726.013... fd00:2004:12:24:1d81:f51... fd00:2004:12:2... ICMPv6 86 Neighbor Advertisement fd00:2004:12:24:1d81:f51:f7ae:cd53 (so
```

При получении 308 пакета, участники нашей сети генерируют себе адрес из этого диапазона

```
valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether 08:00:27:33:be:0d brd ff:ff:ff:ff:ff:ff
inet 192.168.20.3/24 brd 192.168.20.255 scope global eth0
valid_lft forever preferred_lft forever
inet6 fd00:2004:12:24:a00:27ff:fe33:be0d/64 scope global mngtmpaddr dynamic
valid_lft 6087sec preferred_lft 9sec
inet6 fe80::a00:27ff:fe33:be0d/64 scope link
valid_lft forever preferred_lft forever
```

1114	1968.81...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe
1115	1968.81...	fe80::a00:27ff:fe0f:1021	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe0f:
1116	1969.18...	fe80::a00:27ff:fe0f:1021	fd00:2004:12:2...	ICMPv6	86 Neighbor Solicitation for fd00:2004:12:24:1
1117	1969.18...	fd00:2004:12:24:1d81:f51...	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fd00:2004:12:24:1d81
1118	1973.82...	fe80::a00:27ff:fe0f:1021	fe80::30c9:d1f...	ICMPv6	86 Neighbor Solicitation for fe80::30c9:d1f7:d
1119	1973.82...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fe80::30c9:d1f7:ddc4
1125	2014.03...	fd00:2004:12:24::1	fd00:2004:12:2...	ICMPv6	134 Destination Unreachable (No route to destin
1127	2014.28...	fd00:2004:12:24::1	fd00:2004:12:2...	ICMPv6	134 Destination Unreachable (No route to destin
1128	2018.81...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe
1129	2018.81...	fe80::a00:27ff:fe0f:1021	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe0f:
1130	2019.10...	fe80::a00:27ff:fe0f:1021	fd00:2004:12:2...	ICMPv6	86 Neighbor Solicitation for fd00:2004:12:24:1
1131	2019.10...	fd00:2004:12:24:1d81:f51...	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fd00:2004:12:24:1d81
1132	2023.82...	fe80::a00:27ff:fe0f:1021	fe80::30c9:d1f...	ICMPv6	86 Neighbor Solicitation for fe80::30c9:d1f7:d
1133	2023.82...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fe80::30c9:d1f7:ddc4

6.Сконфигурировали интерфейс AstraLinux так, чтобы он использовал механизм SLAAC для настройки адреса IPv6

```
GNU nano 2.7.4                               Файл: eth0                               Изменён
auto eth0
iface eth0 inet manual
iface eth0 inet6 auto_
```

Перезапустили AstraLinux в режиме захвата пакетов. С 16 строчки происходит автоматическое назначение адреса.

3	4.787554	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe0f:1021 from 0a:00:27:00:00:0a
4	5.786482	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe0f:1021 from 0a:00:27:00:00:0a
5	6.786620	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe0f:1021 from 0a:00:27:00:00:0a
6	32.9776...	::	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
7	33.3492...	::	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
8	33.3496...	::	ff02::1:ff33:b...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d
9	34.3727...	fe80::a00:27ff:fe33:be0d	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
10	34.3733...	fe80::a00:27ff:fe33:be0d	ff02::2	ICMPv6	70 Router Solicitation from 08:00:27:33:be:0d
11	35.0132...	fe80::a00:27ff:fe33:be0d	ff02::16	ICMPv6	90 Multicast Listener Report Message v2
12	38.3088...	fe80::a00:27ff:fe33:be0d	ff02::2	ICMPv6	70 Router Solicitation from 08:00:27:33:be:0d
13	46.5009...	fe80::a00:27ff:fe33:be0d	ff02::2	ICMPv6	70 Router Solicitation from 08:00:27:33:be:0d
14	62.6289...	fe80::a00:27ff:fe33:be0d	ff02::2	ICMPv6	70 Router Solicitation from 08:00:27:33:be:0d
15	95.9091...	fe80::a00:27ff:fe33:be0d	ff02::2	ICMPv6	70 Router Solicitation from 08:00:27:33:be:0d
16	130.905...	fe80::a00:27ff:fe33:be0d	ff02::1:ffc4:f...	ICMPv6	86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 08:00:27:33:be:0d
17	130.905...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) is at 0a:00:27:00:00:0a
18	130.906...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=1, hop limit=64 (reply in 19)
19	130.906...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=1, hop limit=128 (request in 18)
20	131.907...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=2, hop limit=64 (reply in 21)
21	131.907...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=2, hop limit=128 (request in 20)
22	132.909...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=3, hop limit=64 (reply in 23)
23	132.909...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=3, hop limit=128 (request in 22)
24	133.910...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=4, hop limit=64 (reply in 25)
25	133.910...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=4, hop limit=128 (request in 24)
26	134.911...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=5, hop limit=64 (reply in 27)
27	134.911...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=5, hop limit=128 (request in 26)
28	135.787...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d from 0a:00:27:00:00:0a
29	135.787...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe33:be0d (sol)
30	135.912...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=6, hop limit=64 (reply in 31)
31	135.912...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=6, hop limit=128 (request in 30)
32	136.914...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=7, hop limit=64 (reply in 33)
33	136.914...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0282, seq=7, hop limit=128 (request in 32)
34	137.916...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0282, seq=8, hop limit=64 (reply in 35)

7. На AstraLinux включили режим установления на интерфейс временных IPv6 адресов с приоритетом временного адреса.

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1
0
    link/ether 08:00:27:33:be:0d brd ff:ff:ff:ff:ff:ff
    inet6 fd00:2004:12:24:a00:27ff:fe33:be0d/64 scope global deprecated mngtppaddr dynamic
        valid_lft 4sec preferred_lft 0sec
    inet6 fe80::a00:27ff:fe33:be0d/64 scope link
        valid_lft forever preferred_lft forever
user@astra:~$
```


При ping в качестве адреса источника был использован временный адрес.

Меняем режим приоритета

Теперь при ping в качестве адреса источника был использован основной адрес.

83 12.6562...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=2, hop limit=64 (reply in 84)
84 12.6563...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=2, hop limit=128 (request in 83)
93 13.6804...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=3, hop limit=64 (reply in 94)
94 13.6807...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=3, hop limit=128 (request in 93)
95 14.3859...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d from 0a:00:27:00:00:0a
96 14.3862...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe33:be0d (rtr, sol)
97 14.4631...	fe80::a00:27ff:fe33:be0d	fd00:2004:12:2...	ICMPv6	86 Neighbor Solicitation for fd00:2004:12:24:1d81:f51:f7ae:cd53 from 08:00:27:cf:10:21
98 14.4632...	fd00:2004:12:24:1d81:f51...	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fd00:2004:12:24:1d81:f51:f7ae:cd53 (sol, ovr) is at 0a:00:27:00:00:0a
101 14.6822...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=4, hop limit=64 (reply in 102)
102 14.6823...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=4, hop limit=128 (request in 101)
103 15.6964...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=5, hop limit=64 (reply in 104)
104 15.6966...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=5, hop limit=128 (request in 103)
105 16.3852...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d from 0a:00:27:00:00:0a
106 16.3855...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	78 Neighbor Advertisement fe80::a00:27ff:fe33:be0d (sol)
109 16.7207...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=6, hop limit=64 (reply in 110)
110 16.7209...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=6, hop limit=128 (request in 109)
111 17.7438...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=7, hop limit=64 (reply in 112)
112 17.7439...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=7, hop limit=128 (request in 111)
113 18.7678...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=8, hop limit=64 (reply in 114)
114 18.7679...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=8, hop limit=128 (request in 113)
115 19.4225...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	86 Neighbor Solicitation for fe80::30c9:d1f7:ddc4:fe06 from 08:00:27:cf:10:21
116 19.4226...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	86 Neighbor Advertisement fe80::30c9:d1f7:ddc4:fe06 (sol, ovr) is at 0a:00:27:00:00:0a
117 19.7918...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=9, hop limit=64 (reply in 118)
118 19.7919...	fe80::30c9:d1f7:ddc4:fe06	fe80::a00:27ff...	ICMPv6	118 Echo (ping) reply id=0x0292, seq=9, hop limit=128 (request in 117)
119 20.8163...	fe80::a00:27ff:fe33:be0d	fe80::30c9:d1f...	ICMPv6	118 Echo (ping) request id=0x0292, seq=10, hop limit=64 (reply in 120)

8. Установили на AstraLinux статически адрес из выданного диапазона.

```
auto eth0
iface eth0 inet manual
iface eth0 inet6 static
    address fd00:2004:12:24::10
    netmask 64
    gateway fd00:2004:12:24::1
```

Настроили dhcp-server

```
option dhcp6.name-servers fd00:2004:12:24::10;
default-lease-time 3600;
max-lease-time 7200;

subnet6 fd00:2004:12:24::/64 {
    range6 fd00:2004:12:24::100 fd00:2004:12:24::200;
    prefix6 fd00:2004:12:24:: fd00:2004:12:24:: /64;
}
```

Настроили dhcp-client, получили адрес

```
[admin@MikroTik] > /ipv6 dhcp-client print
Columns: INTERFACE, STATUS, REQUEST, PREFIX
# INTERFACE STATUS REQUEST PREFIX
0 ether1 bound prefix fd00:2004:12:24::/64, 59m1s
[admin@MikroTik] >
```

```

[admin@MikroTik] > /ipv6 address print
Flags: D - DYNAMIC; G - GLOBAL, L - LINK-LOCAL
Columns: ADDRESS, INTERFACE, ADVERTISE
# ADDRESS INTERFACE ADVERTISE
0 D ::1/128 lo no
1 DL fe80::a00:27ff:febf:1021/64 ether1 no
2 DG fd00:2004:12:24::200/128 ether1 no
[admin@MikroTik] > _

```

Настроили AstraLinux в режим захвата пакетов, просмотрели полученные пакеты.

11	1.533717	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	112 Solicit	XID: 0x599d09 CID: 00030001080027cf1021
18	2.575454	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	112 Solicit	XID: 0x599d09 CID: 00030001080027cf1021
23	4.617867	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	112 Solicit	XID: 0x599d09 CID: 00030001080027cf1021
26	8.816299	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	155 Request	XID: 0x6b82e4 CID: 00030001080027cf1021
167	661.638...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	128 Solicit	XID: 0xbec157 CID: 00030001080027cf1021
168	662.711...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	199 Request	XID: 0xcd24b8 CID: 00030001080027cf1021 IAA: fd00:2004:12:24::200
564	2462.70...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	199 Renew	XID: 0xb67c1f CID: 00030001080027cf1021 IAA: fd00:2004:12:24::200
648	2840.25...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	181 Rebind	XID: 0xa9d8a9 CID: 00030001080027cf1021 IAA: fd00:2004:12:24::200
652	2850.10...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	181 Rebind	XID: 0xa9d8a9 CID: 00030001080027cf1021 IAA: fd00:2004:12:24::200
653	2850.25...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	128 Solicit	XID: 0x923b8d CID: 00030001080027cf1021
654	2851.20...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	128 Solicit	XID: 0x923b8d CID: 00030001080027cf1021
658	2853.10...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	128 Solicit	XID: 0x923b8d CID: 00030001080027cf1021
665	2856.97...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	128 Solicit	XID: 0x923b8d CID: 00030001080027cf1021
667	2864.43...	fe80::a00:27ff:febf:1021	ff02::1:2	DHCPv6	199 Request	XID: 0xdfec96 CID: 00030001080027cf1021 IAA: fd00:2004:12:24::200

12	1.667708	::	ff02::1:6	ICMPv6	110 Multicast Listener Report Message v2	
13	1.883645	::	ff02::1:6	ICMPv6	110 Multicast Listener Report Message v2	
14	2.003821	::	ff02::1:ff00:10	ICMPv6	86 Neighbor Solicitation for fd00:2004:12:24::10	
15	2.227798	::	ff02::1:ff33:b...	ICMPv6	86 Neighbor Solicitation for fe80::a00:27ff:fe33:be0d	