

CSEE4119 Project 2 Stage B Report

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Task - Advertise prefix to other ASes

Explain what `next-hop-self` does and why you have to use it using an example in your own network. Also, explain on which BGP sessions `next-hop-self` is required, why, and why it is not required on other sessions.

The `next-hop-self` is used to configure the router itself as the next hop for a BGP neighbour or peer group. Also, it enables BGP to send its own address in route as the next hop for advertised routes [1]. This command will solve the problem happened in the switch between eBGP and iBGP, since the P2P link between edge router and external router may not be advertised in iBGP, which causes the iBGP peers cannot use the BGP advertisement and discard it. In the project configuration, all BGP routes that connect to neighbouring ASes need to call `next-hop-self` command, since routers need to advertise the next hop for the eBGP route to iBGP routes as themselves (loopback addresses). Other BGP routes that do not need to be used in iBGP route, should not use this command, like the BGP route between IXP and NEWY router.

show ip bgp for the router MIAM

```
[14:26:46] 24 MIAM_router# show ip bgp
[14:26:46] 25 BGP table version is 4967, local router ID is 49.158.0.1, vrf id 0
[14:26:46] 26 Default local pref 100, local AS 49
[14:26:46] 27 Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
[14:26:46] 28 i internal, r RIB-failure, S Stale, R Removed
[14:26:46] 29 Nexthop codes: NNNN nexthop's vrf id, < announce-nh-self
[14:26:46] 30 Origin codes: i - IGP, e - EGP, ? - incomplete
[14:26:46] 31
[14:26:46] 32 Network Next Hop Metric LocPrf Weight Path
[14:26:46] 33 * 1.0.0.0/8 49.51.0.2 0 51 58 59 57 1 i
[14:26:46] 34 * i 49.151.0.1 100 0 47 45 43 1 i
[14:26:46] 35 * i 49.156.0.1 100 0 47 45 43 1 i
[14:26:46] 36 **i 49.155.0.1 100 0 58 59 57 1 i
[14:26:46] 37 * i 49.152.0.1 100 0 48 46 43 1 i
[14:26:46] 38 * 2.0.0.0/8 49.51.0.2 0 51 58 59 57 2 i
[14:26:46] 39 * i 49.151.0.1 100 0 47 45 43 2 i
[14:26:46] 40 * i 49.156.0.1 100 0 47 45 43 2 i
[14:26:46] 41 **i 49.155.0.1 100 0 58 59 57 2 i
[14:26:46] 42 * i 49.152.0.1 100 0 48 46 43 2 i
[14:26:46] 43 * 13.0.0.0/8 49.153.0.1 100 0 50 29 31 30 1 3 i
[14:26:46] 44 * i 49.152.0.1 100 0 48 29 31 30 1 3 i
[14:26:46] 45 * 49.51.0.2 0 51 58 59 31 30 1 3 i
[14:26:46] 46 **i 49.157.0.1 100 0 52 29 31 30 1 3 i
[14:26:46] 47 * 13.101.0.0/24 49.153.0.1 100 0 50 29 31 30 1 3 i
[14:26:46] 48 * i 49.152.0.1 100 0 48 29 31 30 1 3 i
[14:26:46] 49 * 49.51.0.2 0 51 58 59 31 30 1 3 i
[14:26:46] 50 **i 49.157.0.1 100 0 52 29 31 30 1 3 i
[14:26:46] 51 * 14.0.0.0/8 49.153.0.1 100 0 50 29 31 30 2 4 i
[14:26:46] 52 * i 49.152.0.1 100 0 48 29 31 30 2 4 i
[14:26:46] 53 * 49.51.0.2 0 51 58 59 31 30 2 4 i
[14:26:46] 54 **i 49.157.0.1 100 0 52 29 31 30 2 4 i
[14:26:46] 55 * 15.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 5 i
[14:26:46] 56 * 49.51.0.2 0 51 58 59 32 15 18 1 3 5 5 i
[14:26:46] 57 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 5 i
[14:26:46] 58 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 5 i
[14:26:46] 59 * 17.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 7 i
[14:26:46] 60 * 49.51.0.2 0 51 58 59 32 15 18 1 3 5 7 i
[14:26:46] 61 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 7 i
[14:26:46] 62 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 7 i
[14:26:46] 63 * 18.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 i
[14:26:46] 64 * 49.51.0.2 0 51 58 59 32 15 18 1 3 5 8 i
[14:26:46] 65 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 8 i
[14:26:46] 66 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 8 i
[14:26:46] 67 * 19.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 9 i

[14:26:46] 68 * 49.51.0.2 0 51 58 29 32 15 18 1 3 5 8 9 i
[14:26:46] 69 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 8 9 i
[14:26:46] 70 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 8 9 i
[14:26:46] 71 * 110.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 10 i
[14:26:46] 72 * 49.51.0.2 0 51 58 29 32 15 18 1 3 5 8 10 i
[14:26:46] 73 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 8 10 i
[14:26:46] 74 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 8 10 i
[14:26:46] 75 * 111.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 10 i
[14:26:46] 76 * 49.51.0.2 0 51 58 29 32 15 18 1 3 5 8 10 i
[14:26:46] 77 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 8 10 i
[14:26:46] 78 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 8 10 i
[14:26:46] 79 * 113.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 10 i
[14:26:46] 80 * i 49.151.0.1 100 0 47 45 44 16 18 13 i
[14:26:46] 81 * i 49.156.0.1 100 0 47 45 44 16 18 13 i
[14:26:46] 82 **i 49.155.0.1 100 0 50 59 57 16 18 13 i
[14:26:46] 83 * 49.51.0.2 0 51 58 59 57 16 18 13 i
[14:26:46] 84 * i 49.157.0.1 100 0 52 29 32 15 18 13 i
[14:26:46] 85 * i 49.152.0.1 100 0 48 29 32 15 18 13 i
[14:26:46] 86 * 114.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 1 3 5 8 10 11 14 i
[14:26:46] 87 **i 49.157.0.1 100 0 52 29 32 15 18 1 3 5 8 10 11 14 i
[14:26:46] 88 * 49.51.0.2 0 51 58 29 32 15 18 1 3 5 8 10 11 14 i
[14:26:46] 89 * i 49.152.0.1 100 0 48 29 32 15 18 1 3 5 8 10 11 14 i
[14:26:46] 90 * 115.0.0.0/8 49.153.0.1 100 0 50 29 32 15 i
[14:26:46] 91 **i 49.155.0.1 100 0 58 59 57 15 i
[14:26:46] 92 * 49.51.0.2 0 51 58 59 57 15 i
[14:26:46] 93 * i 49.157.0.1 100 0 52 29 32 15 i
[14:26:46] 94 * i 49.152.0.1 100 0 48 29 32 15 i
[14:26:46] 95 * 16.0.0.0/8 49.51.0.2 0 51 58 59 57 16 i
[14:26:46] 96 * i 49.151.0.1 100 0 47 45 43 16 i
[14:26:46] 97 * i 49.156.0.1 100 0 47 45 43 16 i
[14:26:46] 98 **i 49.155.0.1 100 0 58 59 57 16 i
[14:26:46] 99 * i 49.152.0.1 100 0 48 46 43 16 i
[14:26:46] 100 * 117.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 i
[14:26:46] 101 * 49.51.0.2 0 51 58 29 32 15 17 i
[14:26:46] 102 **i 49.157.0.1 100 0 52 29 32 15 17 i
[14:26:46] 103 * i 49.152.0.1 100 0 48 29 32 15 17 i
[14:26:46] 104 * 118.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 i
[14:26:46] 105 * i 49.151.0.1 100 0 47 45 44 16 18 i
[14:26:46] 106 * i 49.156.0.1 100 0 47 45 44 16 18 i
[14:26:46] 107 **i 49.155.0.1 100 0 58 59 57 16 18 i
[14:26:46] 108 * 49.51.0.2 0 51 58 59 57 16 18 i
[14:26:46] 109 * i 49.157.0.1 100 0 52 29 32 15 18 i
[14:26:46] 110 * i 49.152.0.1 100 0 48 29 32 15 18 i
[14:26:46] 111 * 119.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 i
[14:26:46] 112 **i 49.157.0.1 100 0 52 29 32 15 17 19 i

[14:26:46] 113 * 49.51.0.2 0 51 58 29 32 15 17 19 i
[14:26:46] 114 * i 49.152.0.1 100 0 48 29 32 15 17 19 i
[14:26:46] 115 * 120.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 20 i
[14:26:46] 116 * i 49.152.0.1 100 0 48 29 32 15 18 20 i
[14:26:46] 117 * 49.51.0.2 0 51 58 29 32 15 18 20 i
[14:26:46] 118 **i 49.157.0.1 100 0 52 29 32 15 18 20 i
[14:26:46] 119 * 121.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 21 i
[14:26:46] 120 * i 49.152.0.1 100 0 48 29 32 15 17 19 21 i
[14:26:46] 121 **i 49.157.0.1 100 0 52 29 32 15 17 19 21 i
[14:26:46] 122 * 49.51.0.2 0 51 58 29 32 15 17 19 21 i
[14:26:46] 123 * 122.0.0.0/8 49.153.0.1 100 0 50 29 32 15 18 22 i
[14:26:46] 124 * 49.51.0.2 0 51 58 29 32 15 18 22 i
[14:26:46] 125 **i 49.157.0.1 100 0 52 29 32 15 18 22 i
[14:26:46] 126 * i 49.152.0.1 100 0 48 29 32 15 18 22 i
[14:26:46] 127 * i 49.156.0.1 100 0 47 45 44 15 18 22 i
[14:26:46] 128 * i 49.151.0.1 100 0 47 45 44 15 18 22 i
[14:26:46] 129 * 123.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 22 23 i
[14:26:46] 130 * 49.51.0.2 0 51 58 29 32 15 17 19 22 23 i
[14:26:46] 131 **i 49.157.0.1 100 0 52 29 32 15 17 19 22 23 i
[14:26:46] 132 * i 49.151.0.1 100 0 47 45 44 15 17 19 22 23 i
[14:26:46] 133 * i 49.152.0.1 100 0 48 29 32 15 17 19 22 23 i
[14:26:46] 134 * i 49.156.0.1 100 0 47 45 44 15 17 19 22 23 i
[14:26:46] 135 * 124.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 22 24 i
[14:26:46] 136 * 49.51.0.2 0 51 58 29 32 15 17 19 22 24 i
[14:26:46] 137 **i 49.157.0.1 100 0 52 29 32 15 17 19 22 24 i
[14:26:46] 138 * i 49.151.0.1 100 0 47 45 44 15 17 19 22 24 i
[14:26:46] 139 * i 49.152.0.1 100 0 48 29 32 15 17 19 22 24 i
[14:26:46] 140 * i 49.156.0.1 100 0 47 45 44 15 17 19 22 24 i
[14:26:46] 141 * 125.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 22 25 i
[14:26:46] 142 * 49.51.0.2 0 51 58 29 32 15 17 19 22 25 i
[14:26:46] 143 **i 49.157.0.1 100 0 52 29 32 15 17 19 22 25 i
[14:26:46] 144 * i 49.151.0.1 100 0 47 45 44 15 17 19 22 25 i
[14:26:46] 145 * i 49.152.0.1 100 0 48 29 32 15 17 19 22 25 i
[14:26:46] 146 * i 49.156.0.1 100 0 47 45 44 15 17 19 22 25 i
[14:26:46] 147 * 126.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 22 26 i
[14:26:46] 148 * 49.51.0.2 0 51 58 29 32 15 17 19 22 26 i
[14:26:46] 149 **i 49.157.0.1 100 0 52 29 32 15 17 19 22 26 i
[14:26:46] 150 * i 49.151.0.1 100 0 47 45 44 15 17 19 22 26 i
[14:26:46] 151 * i 49.152.0.1 100 0 48 29 32 15 17 19 22 26 i
[14:26:46] 152 * i 49.156.0.1 100 0 47 45 44 15 17 19 22 26 i
[14:26:46] 153 * 127.0.0.0/8 49.153.0.1 100 0 50 29 32 15 17 19 22 26 i
[14:26:46] 154 * 49.51.0.2 0 51 58 29 32 15 17 19 22 26 i
[14:26:46] 155 **i 49.157.0.1 100 0 52 29 32 15 17 19 22 26 i
[14:26:46] 156 * i 49.152.0.1 100 0 48 29 32 15 17 19 22 26 i
[14:26:46] 157 * 28.0.0.0/8 49.51.0.2 0 51 58 59 57 13 28 i
```



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14:26:46] 293  **i 49.155.0.1          100  0 58 59 57 71 i
14:26:46] 294  * i 49.152.0.1          100  0 48 46 43 71 i
14:26:46] 295  * 72.0.0.0/8 49.155.0.2          100  0 51 58 59 72 i
14:26:46] 296  **i 49.155.0.1          100  0 58 59 72 i
14:26:46] 297  * 73.0.0.0/8 49.151.0.2          100  0 51 58 59 72 73 i
14:26:46] 298  **i 49.155.0.1          100  0 58 59 72 73 i
14:26:46] 299  * 74.0.0.0/8 49.151.0.2          100  0 51 58 59 74 i
14:26:46] 300  **i 49.155.0.1          100  0 58 59 74 i
14:26:46] 301  * 75.0.0.0/8 49.151.0.2          100  0 51 58 59 74 75 i
14:26:46] 302  **i 49.155.0.1          100  0 58 59 74 75 i
14:26:46] 303  * 76.0.0.0/8 49.151.0.2          100  0 51 58 59 76 i
14:26:46] 304  **i 49.155.0.1          100  0 58 59 76 i
14:26:46] 305  * 77.0.0.0/8 49.151.0.2          100  0 51 58 59 76 77 i
14:26:46] 306  **i 49.155.0.1          100  0 58 59 76 77 i
14:26:46] 307  * 78.0.0.0/8 49.151.0.2          100  0 51 58 59 78 i
14:26:46] 308  **i 49.155.0.1          100  0 58 59 78 i
14:26:46] 309  * 79.0.0.0/8 49.151.0.2          100  0 51 58 59 78 79 i
14:26:46] 310  **i 49.155.0.1          100  0 58 59 78 79 i
14:26:46] 311  * 80.0.0.0/8 49.151.0.2          100  0 51 58 59 80 i
14:26:46] 312  **i 49.155.0.1          100  0 58 59 80 i
14:26:46] 313  * 81.0.0.0/8 49.151.0.2          100  0 51 58 59 80 81 i
14:26:46] 314  **i 49.155.0.1          100  0 58 59 80 81 i
14:26:46] 315  * 82.0.0.0/8 49.151.0.2          100  0 51 58 59 82 i
14:26:46] 316  **i 49.155.0.1          100  0 58 59 82 i
14:26:46] 317  * 83.0.0.0/8 49.151.0.2          100  0 51 58 59 82 83 i
14:26:46] 318  **i 49.155.0.1          100  0 58 59 82 83 i
14:26:46] 319  * 84.0.0.0/8 49.151.0.2          100  0 51 58 59 84 i
14:26:46] 320  **i 49.155.0.1          100  0 58 59 84 i
14:26:46] 321  * 100.0.0.0/8 49.151.0.2          100  0 51 100 i
14:26:46] 322  **i 49.155.0.1          100  0 51 100 i
14:26:46] 323  * 1180.0.40.0/24 49.155.0.1          100  0 50 29 31 33 35 37 48 i
14:26:46] 324  * 49.151.0.2          100  0 51 29 31 33 35 37 48 i
14:26:46] 325  **i 49.157.0.1          100  0 52 29 31 33 35 37 48 i
14:26:46] 326  * 1 49.152.0.1          100  0 48 29 31 33 35 37 48 i
14:26:46] 327
14:26:46] 328  Displayed 86 routes and 294 total paths
[14:26:46] 329  MIAM_Router>

```

Result of the Looking Glass for one router located in a neighbouring AS

http://34.171.188.127:2500/50_NEWRouter.txt

```

1 | 2022-12-02T19:45:48
2 | BGP table version is 3784, local router ID is 50.155.0.1, vrf id 0
3 | Default local pref 100, local AS 50
4 | Status codes: s suppressed, d damped, h history, * valid, > best, =
   multipath,
      i internal, r RIB-failure, S Stale, R Removed
6 | Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
7 | Origin codes: i - IGP, e - EGP, ? - incomplete
8 |
9 |      Network          Next Hop            Metric LocPrf Weight Path
10 | * i1.0.0.0/8        50.152.0.1         100    0 47 45 43 1
11 |   i
11 | *->i              50.151.0.1         100    0 48 46 43 1
11 |   i
12 | *=>i              50.156.0.1         100    0 48 46 43 1
12 |   i
13 | * i2.0.0.0/8        50.152.0.1         100    0 47 45 43 2
13 |   i
14 | *->i              50.151.0.1         100    0 48 46 43 2
14 |   i
15 | *=>i              50.156.0.1         100    0 48 46 43 2
15 |   i
16 | *-> 3.0.0.0/8      180.88.0.29        0 29 31 30 1
16 |   3 i
17 | *-> 3.101.0.0/24   180.88.0.29        0 29 31 30 1
17 |   3 i
18 | *-> 4.0.0.0/8      180.88.0.29        0 29 31 30 2
18 |   4 i
19 | *-> 5.0.0.0/8      180.88.0.29        0 29 32 15 18
19 |   1 3 5 i
20 | *-> 7.0.0.0/8      180.88.0.29        0 29 32 15 18
20 |   1 3 5 7 i
21 | *-> 8.0.0.0/8      180.88.0.29        0 29 32 15 18
21 |   1 3 5 8 i
22 | *-> 9.0.0.0/8      180.88.0.29        0 29 32 15 18
22 |   1 3 5 8 9 i
23 | *-> 10.0.0.0/8     180.88.0.29       0 29 32 15 18
23 |   1 3 5 8 10 i
24 | *-> 11.0.0.0/8     180.88.0.29       0 29 32 15 18
24 |   1 3 5 8 10 11 i
25 | *-> 13.0.0.0/8     180.88.0.29       0 29 32 15 18
25 |   13 i
26 | *-> 14.0.0.0/8     180.88.0.29       0 29 32 15 18
26 |   1 3 5 8 10 11 14 i
27 | *-> 15.0.0.0/8     180.88.0.29       0 29 32 15 i
28 | * i16.0.0.0/8       50.152.0.1         100    0 47 45 43 16
28 |   i
29 | *->i              50.151.0.1         100    0 48 46 43 16
29 |   i

```

30	<code>*=i</code>	50.156.0.1	100	0 48 46 43 16
	<code>i</code>			
31	<code>*> 17.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>i</code>			
32	<code>*> 18.0.0.0/8</code>	180.88.0.29		0 29 32 15 18
	<code>i</code>			
33	<code>*> 19.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 i</code>			
34	<code>*> 20.0.0.0/8</code>	180.88.0.29		0 29 32 15 18
	<code>20 i</code>			
35	<code>*> 21.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 21 i</code>			
36	<code>*> 22.0.0.0/8</code>	180.88.0.29		0 29 32 15 18
	<code>20 22 i</code>			
37	<code>*> 23.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 22 23 i</code>			
38	<code>*> 24.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 22 24 i</code>			
39	<code>*> 25.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 22 23 25 i</code>			
40	<code>*> 26.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>19 22 24 26 i</code>			
41	<code>*> 27.0.0.0/8</code>	180.88.0.29		0 29 32 27 i
42	<code>* i28.0.0.0/8</code>	50.152.0.1	100	0 47 45 43 1
	<code>3 28 i</code>			
43	<code>*>i</code>	50.151.0.1	100	0 48 46 44 1
	<code>3 28 i</code>			
44	<code>*=i</code>	50.156.0.1	100	0 48 46 44 1
	<code>3 28 i</code>			
45	<code>*> 29.0.0.0/8</code>	180.88.0.29	0	0 29 i
46	<code>*> 30.0.0.0/8</code>	180.88.0.29		0 29 32 30 i
47	<code>*> 31.0.0.0/8</code>	180.88.0.29		0 29 31 i
48	<code>*> 32.0.0.0/8</code>	180.88.0.29		0 29 32 i
49	<code>*> 33.0.0.0/8</code>	180.88.0.29		0 29 32 33 i
50	<code>*> 34.0.0.0/8</code>	180.88.0.29		0 29 32 34 i
51	<code>*> 35.0.0.0/8</code>	180.88.0.29		0 29 32 34 35
	<code>i</code>			
52	<code>*> 36.0.0.0/8</code>	180.88.0.29		0 29 32 34 36
	<code>i</code>			
53	<code>*> 37.0.0.0/8</code>	180.88.0.29		0 29 32 34 36
	<code>37 i</code>			
54	<code>*> 37.153.0.0/24</code>	180.88.0.29		0 29 32 34 36
	<code>37 i</code>			
55	<code>*> 38.0.0.0/8</code>	180.88.0.29		0 29 31 33 35
	<code>38 i</code>			
56	<code>*> 39.0.0.0/8</code>	180.88.0.29		0 29 31 33 35
	<code>37 39 i</code>			
57	<code>*> 40.0.0.0/8</code>	180.88.0.29		0 29 31 33 35
	<code>37 40 i</code>			
58	<code>*> 41.0.0.0/8</code>	180.88.0.41	0	0 41 i
59	<code>*> 42.0.0.0/8</code>	180.88.0.29		0 29 32 15 17
	<code>42 i</code>			
60	<code>* i43.0.0.0/8</code>	50.152.0.1	100	0 47 45 43 i
61	<code>*>i</code>	50.151.0.1	100	0 48 46 43 i

62	<code>*=i</code>	50.156.0.1	100	0 48 46 43 i
63	<code>* i44.0.0.0/8</code>	50.152.0.1	100	0 47 45 44 i
64	<code>*></code>	180.88.0.29		0 29 31 44 i
65	<code>* i</code>	50.151.0.1	100	0 48 46 44 i
66	<code>* i</code>	50.156.0.1	100	0 48 46 44 i
67	<code>* i45.0.0.0/8</code>	50.152.0.1	100	0 47 45 i
68	<code>*</code>	180.88.0.29		0 29 31 44 45
	<code>i</code>			
69	<code>*=i</code>	50.156.0.1	100	0 48 45 i
70	<code>*>i</code>	50.151.0.1	100	0 48 45 i
71	<code>* i46.0.0.0/8</code>	50.152.0.1	100	0 47 46 i
72	<code>*</code>	180.88.0.29		0 29 31 44 46
	<code>i</code>			
73	<code>*>i</code>	50.151.0.1	100	0 48 46 i
74	<code>*=i</code>	50.156.0.1	100	0 48 46 i
75	<code>*>i47.0.0.0/8</code>	50.152.0.1	100	0 47 i
76	<code>*</code>	180.88.0.29		0 29 31 44 46
	<code>47 i</code>			
77	<code>* 48.0.0.0/8</code>	180.88.0.29		0 29 31 44 46
	<code>48 i</code>			
78	<code>*=i</code>	50.156.0.1	0	100 0 48 i
79	<code>*>i</code>	50.151.0.1	0	100 0 48 i
80	<code>* 49.0.0.0/8</code>	180.88.0.29		0 29 31 44 46
	<code>47 49 i</code>			
81	<code>*>i</code>	50.153.0.1	0	100 0 49 i
82	<code>*>i50.0.0.0/8</code>	50.153.0.1	0	100 0 i
83	<code>* 51.0.0.0/8</code>	180.88.0.29		0 29 31 44 46
	<code>47 49 51 i</code>			
84	<code>*>i</code>	50.157.0.1	0	100 0 51 i
85	<code>* 52.0.0.0/8</code>	180.88.0.29		0 29 31 44 46
	<code>47 49 52 i</code>			
86	<code>* i</code>	50.154.0.1	100	0 52 i
87	<code>*>i</code>	50.158.0.1	100	0 52 i
88	<code>* i53.0.0.0/8</code>	50.154.0.1	100	0 52 53 i
89	<code>* i</code>	50.158.0.1	100	0 52 53 i
90	<code>*</code>	180.88.0.29		0 29 31 44 45
	<code>47 49 51 53 i</code>			
91	<code>*>i</code>	50.157.0.1	100	0 51 53 i
92	<code>* 54.0.0.0/8</code>	180.88.0.29		0 29 31 44 46
	<code>47 49 52 54 i</code>			
93	<code>*>i</code>	50.158.0.1	100	0 52 54 i
94	<code>* i</code>	50.154.0.1	100	0 52 54 i
95	<code>*>i55.0.0.0/8</code>	50.157.0.1	100	0 51 53 55 i
96	<code>* i</code>	50.154.0.1	100	0 52 54 55 i
97	<code>* i</code>	50.158.0.1	100	0 52 53 55 i
98	<code>*> 56.0.0.0/8</code>	180.88.0.29		0 29 31 56 i
99	<code>* i</code>	50.158.0.1	100	0 52 54 56 i
100	<code>* i</code>	50.154.0.1	100	0 52 54 56 i
101	<code>* i57.0.0.0/8</code>	50.157.0.1	100	0 51 58 59 57
	<code>i</code>			
102	<code>* i</code>	50.152.0.1	100	0 47 58 59 57
	<code>i</code>			
103	<code>* i</code>	50.153.0.1	100	0 49 58 59 57
	<code>i</code>			

104	*>i i	50.151.0.1	100	0 48 46 43 57
105	*=i i	50.156.0.1	100	0 48 46 43 57
106	*>i58.0.0.0/8	50.157.0.1	100	0 51 58 i
107	* i	50.152.0.1	100	0 47 58 i
108	* i	50.153.0.1	100	0 49 58 i
109	*>i59.0.0.0/8	50.157.0.1	100	0 51 58 59 i
110	* i	50.152.0.1	100	0 47 58 59 i
111	* i	50.153.0.1	100	0 49 58 59 i
112	*>i60.0.0.0/8	50.157.0.1	100	0 51 58 60 i
113	* i	50.152.0.1	100	0 47 58 60 i
114	* i	50.153.0.1	100	0 49 58 60 i
115	*>i61.0.0.0/8	50.157.0.1	100	0 51 58 59 61
	i			
116	* i	50.152.0.1	100	0 47 58 59 61
	i			
117	* i	50.153.0.1	100	0 49 58 59 61
	i			
118	*>i62.0.0.0/8	50.157.0.1	100	0 51 58 59 62
	i			
119	* i	50.152.0.1	100	0 47 58 59 62
	i			
120	* i	50.153.0.1	100	0 49 58 59 62
	i			
121	*	180.88.0.29		0 29 32 30 57
	59 62 i			
122	*>i63.0.0.0/8	50.157.0.1	100	0 51 58 59 61
	63 i			
123	* i	50.152.0.1	100	0 47 58 59 61
	63 i			
124	* i	50.153.0.1	100	0 49 58 59 61
	63 i			
125	*	180.88.0.29		0 29 32 30 57
	59 61 63 i			
126	*>i64.0.0.0/8	50.157.0.1	100	0 51 58 59 61
	64 i			
127	* i	50.152.0.1	100	0 47 58 59 61
	64 i			
128	* i	50.153.0.1	100	0 49 58 59 61
	64 i			
129	*>i65.0.0.0/8	50.157.0.1	100	0 51 58 59 61
	63 65 i			
130	* i	50.152.0.1	100	0 47 58 59 61
	63 65 i			
131	* i	50.153.0.1	100	0 49 58 59 61
	63 65 i			
132	*>i66.0.0.0/8	50.157.0.1	100	0 51 58 59 61
	63 66 i			
133	* i	50.152.0.1	100	0 47 58 59 61
	63 66 i			
134	* i	50.153.0.1	100	0 49 58 59 61
	63 66 i			

135	*>i67.0.0.0/8 63 65 67 i	50.157.0.1	100	0 51 58 59 61
136	* i 63 65 67 i	50.152.0.1	100	0 47 58 59 61
137	* i 63 65 67 i	50.153.0.1	100	0 49 58 59 61
138	*>i68.0.0.0/8	50.157.0.1	100	0 51 68 i
139	* i	50.152.0.1	100	0 47 68 i
140	*	180.88.0.29 68 i		0 29 31 44 45
141	* i	50.153.0.1	100	0 49 68 i
142	*>i69.0.0.0/8	50.157.0.1	100	0 51 68 69 i
143	* i	50.152.0.1	100	0 47 68 69 i
144	*	180.88.0.29 68 69 i		0 29 31 44 45
145	* i	50.153.0.1	100	0 49 68 69 i
146	*>i70.0.0.0/8	50.157.0.1	100	0 51 70 i
147	* i	50.152.0.1	100	0 47 70 i
148	* i	50.153.0.1	100	0 49 70 i
149	*	180.88.0.29 70 i		0 29 31 44 45
150	* i71.0.0.0/8 i	50.152.0.1	100	0 47 45 43 71
151	*>i i	50.151.0.1	100	0 48 46 43 71
152	*=i i	50.156.0.1	100	0 48 46 43 71
153	* i72.0.0.0/8 i	50.157.0.1	100	0 51 58 59 72
154	* i i	50.152.0.1	100	0 47 58 59 72
155	* i i	50.153.0.1	100	0 49 58 59 72
156	*>i i	50.151.0.1	100	0 48 46 43 72
157	*=i i	50.156.0.1	100	0 48 46 43 72
158	* i73.0.0.0/8 73 i	50.157.0.1	100	0 51 58 59 72
159	* i 73 i	50.152.0.1	100	0 47 58 59 72
160	* i 73 i	50.153.0.1	100	0 49 58 59 72
161	*>i 73 i	50.151.0.1	100	0 48 46 43 71
162	*=i 73 i	50.156.0.1	100	0 48 46 43 71
163	*>i74.0.0.0/8 i	50.157.0.1	100	0 51 58 59 74
164	* i i	50.152.0.1	100	0 47 58 59 74
165	* i i	50.153.0.1	100	0 49 58 59 74

166	*>i75.0.0.0/8 75 i	50.157.0.1	100	0 51 58 59 74
167	* i 75 i	50.152.0.1	100	0 47 58 59 74
168	* i 75 i	50.153.0.1	100	0 49 58 59 74
169	*>i76.0.0.0/8 i	50.157.0.1	100	0 51 58 59 76
170	* i i	50.152.0.1	100	0 47 58 59 76
171	* i i	50.153.0.1	100	0 49 58 59 76
172	*>i77.0.0.0/8 77 i	50.157.0.1	100	0 51 58 59 76
173	* i 77 i	50.152.0.1	100	0 47 58 59 76
174	* i 77 i	50.153.0.1	100	0 49 58 59 76
175	*>i78.0.0.0/8 i	50.157.0.1	100	0 51 58 59 78
176	* i i	50.152.0.1	100	0 47 58 59 78
177	* i i	50.153.0.1	100	0 49 58 59 78
178	*>i79.0.0.0/8 79 i	50.157.0.1	100	0 51 58 59 78
179	* i 79 i	50.152.0.1	100	0 47 58 59 78
180	* i 79 i	50.153.0.1	100	0 49 58 59 78
181	*>i80.0.0.0/8 i	50.157.0.1	100	0 51 58 59 80
182	* i i	50.152.0.1	100	0 47 58 59 80
183	* i i	50.153.0.1	100	0 49 58 59 80
184	*>i81.0.0.0/8 81 i	50.157.0.1	100	0 51 58 59 80
185	* i 81 i	50.152.0.1	100	0 47 58 59 80
186	* i 81 i	50.153.0.1	100	0 49 58 59 80
187	*>i82.0.0.0/8 i	50.157.0.1	100	0 51 58 59 82
188	* i i	50.152.0.1	100	0 47 58 59 82
189	* i i	50.153.0.1	100	0 49 58 59 82
190	*>i83.0.0.0/8 83 i	50.157.0.1	100	0 51 58 59 82
191	* i 83 i	50.152.0.1	100	0 47 58 59 82
192	* i 83 i	50.153.0.1	100	0 49 58 59 82

```
193  *>i84.0.0.0/8      50.157.0.1          100      0 51 58 59 84
     i
194  * i                  50.152.0.1          100      0 47 58 59 84
     i
195  * i                  50.153.0.1          100      0 49 58 59 84
     i
196  * 100.0.0.0/8       180.88.0.29        0 29 32 100 i
197  *>i                  50.153.0.1          0 100 i
198  *> 180.0.40.0/24    180.88.0.29        0 29 31 33 35
     37 40 i
199
200  Displayed 86 routes and 189 total paths
```

PARI-host to the PARI-host of one of the neighbouring AS

PARI_host(ASN49) -> PARI_host(ASN51)

```

 1.PARI_host x
[14:46:46] 375 root@PARI_host:# traceroute 51.103.0.2
traceroute to 51.103.0.2 (51.103.0.2), 30 hops max, 60 byte packets
[14:46:46] 376 1 PARI-host.group49 (49.0.6.2) 0.276 ms 0.069 ms 0.021 ms
[14:46:46] 377 2 MIAM-PARI.AS49 (49.0.6.2) 0.228 ms GENE-PARI.AS49 (49.0.3.2) 0.187 ms MIAM-PARI.AS49 (49.0.6.2) 0.322 ms
[14:46:46] 378 3 49.51.0.2 (49.51.0.2) 2.721 ms 49.51.1.2 (49.51.1.2) 2.865 ms 2.406 ms
[14:46:46] 379 4 PARI-host.group51 (51.103.0.2) 2.646 ms 2.594 ms NEWY-BOST.AS51 (51.0.10.1) 2.521 ms
[14:46:49] 380 root@PARI_host:# ping 51.103.0.2
[14:46:49] 381 PING 51.103.0.2 (51.103.0.2) 56(84) bytes of data.
[14:46:49] 382 64 bytes from 51.103.0.2: icmp_seq=1 ttl=61 time=3.62 ms
[14:46:49] 383 64 bytes from 51.103.0.2: icmp_seq=2 ttl=61 time=3.67 ms
[14:46:49] 384 64 bytes from 51.103.0.2: icmp_seq=3 ttl=61 time=3.74 ms
[14:46:51] 385 64 bytes from 51.103.0.2: icmp_seq=4 ttl=61 time=3.58 ms
[14:46:52] 386 64 bytes from 51.103.0.2: icmp_seq=5 ttl=61 time=3.59 ms
[14:46:53] 387 64 bytes from 51.103.0.2: icmp_seq=6 ttl=61 time=3.83 ms
[14:46:54] 388 64 bytes from 51.103.0.2: icmp_seq=7 ttl=61 time=3.66 ms
[14:46:55] 389 64 bytes from 51.103.0.2: icmp_seq=8 ttl=61 time=3.94 ms
[14:46:56] 390 64 bytes from 51.103.0.2: icmp_seq=9 ttl=61 time=3.43 ms
[14:46:57] 391 64 bytes from 51.103.0.2: icmp_seq=10 ttl=61 time=3.68 ms
[14:46:59] 392 64 bytes from 51.103.0.2: icmp_seq=11 ttl=61 time=3.87 ms
[14:47:00] 393 64 bytes from 51.103.0.2: icmp_seq=12 ttl=61 time=3.57 ms
[14:47:00] 394 ^C
[14:47:00] 395 --- 51.103.0.2 ping statistics ---
[14:47:00] 396 12 packets transmitted, 12 received, 0% packet loss, time 11015ms
[14:47:00] 397 rtt min/avg/max/mdev = 3.439/3.685/3.942/0.152 ms
[14:47:02] 398 root@PARI_host:# traceroute 51.103.0.1
[14:47:02] 399 root@PARI_host:# traceroute 51.103.0.1
[14:47:02] 400 traceroute to 51.103.0.1 (51.103.0.1), 30 hops max, 60 byte packets
[14:47:02] 401 1 PARI-host.group49 (49.0.6.2) 0.166 ms 0.029 ms 0.023 ms
[14:47:02] 402 2 MIAM-PARI.AS49 (49.0.6.2) 0.448 ms 0.413 ms 0.218 ms
[14:47:02] 403 3 49.51.1.2 (49.51.1.2) 2.375 ms 49.51.0.2 (49.51.0.2) 2.515 ms 2.648 ms
[14:47:02] 404 4 NEWY-BOST.AS51 (51.0.10.1) 3.257 ms 3.177 ms PARI-LOND.AS51 (51.0.4.1) 2.862 ms
[14:47:02] 405 5 host.PARI.group51 (51.103.0.1) 2.941 ms 3.045 ms PARI-LOND.AS51 (51.0.4.1) 4.245 ms
[14:47:05] 406 root@PARI_host:# ping 51.103.0.1
[14:47:05] 407 PING 51.103.0.1 (51.103.0.1) 56(84) bytes of data.
[14:47:06] 408 64 bytes from 51.103.0.1: icmp_seq=1 ttl=60 time=2.62 ms
[14:47:06] 409 64 bytes from 51.103.0.1: icmp_seq=2 ttl=60 time=2.78 ms
[14:47:07] 410 64 bytes from 51.103.0.1: icmp_seq=3 ttl=60 time=2.71 ms
[14:47:08] 411 64 bytes from 51.103.0.1: icmp_seq=4 ttl=60 time=2.63 ms
[14:47:09] 412 64 bytes from 51.103.0.1: icmp_seq=5 ttl=60 time=2.58 ms
[14:47:10] 413 64 bytes from 51.103.0.1: icmp_seq=6 ttl=60 time=3.15 ms
[14:47:11] 414 64 bytes from 51.103.0.1: icmp_seq=7 ttl=60 time=2.76 ms
[14:47:12] 415 64 bytes from 51.103.0.1: icmp_seq=8 ttl=60 time=2.64 ms
[14:47:13] 416 64 bytes from 51.103.0.1: icmp_seq=9 ttl=60 time=2.42 ms
[14:47:14] 417 64 bytes from 51.103.0.1: icmp_seq=10 ttl=60 time=2.53 ms
[14:47:15] 418 64 bytes from 51.103.0.1: icmp_seq=11 ttl=60 time=2.73 ms
[14:47:16] 419 64 bytes from 51.103.0.1: icmp_seq=12 ttl=60 time=2.62 ms
[14:47:17] 420 64 bytes from 51.103.0.1: icmp_seq=13 ttl=60 time=2.53 ms
[14:47:17] 421 ^C
[14:47:17] 422 --- 51.103.0.1 ping statistics ---
[14:47:17] 423 13 packets transmitted, 13 received, 0% packet loss, time 12018ms
[14:47:17] 424 rtt min/avg/max/mdev = 2.427/2.676/3.159/0.169 ms
[14:47:17] 425 root@PARI_host:# 

```

PARI_host(ASN49) -> PARI_host(ASN20)

```

 1.PARI_host x
[14:42:39] 223 L ssh -c 4119-project2:2049
[14:42:43] 224 root@PARI_host:# traceroute 28.103.0.2
traceroute to 28.103.0.2 (28.103.0.2), 38 hops max, 60 byte packets
[14:42:43] 225 1 PARI-host.group49 (49.103.0.2) 0.081 ms 0.019 ms 0.015 ms
[14:42:43] 226 2 58.49.0.1 (58.49.0.1) 2.398 ms 2.614 ms 2.587 ms
[14:42:43] 227 3 NEWY-PARI.AS50 (58.0.5.2) 4.928 ms 4.898 ms 4.371 ms
[14:42:43] 228 4 179.0.19.1 (179.0.19.1) 12.322 ms 12.293 ms 12.249 ms
[14:42:43] 229 5 ZURI-PARI.AS32 (32.0.1.1) 14.618 ms 14.561 ms 14.518 ms
[14:42:43] 230 6 192.168.0.1 (192.168.0.1) 24.588 ms 23.553 ms 23.484 ms
[14:42:43] 231 7 NEWY-ATLA.AS32 (32.0.11.1) 14.544 ms 14.833 ms 14.749 ms
[14:42:43] 232 8 179.0.13.1 (179.0.13.1) 18.199 ms 18.233 ms 18.129 ms
[14:42:43] 233 9 ZURI-LOND.AS18 (18.0.2.1) 18.152 ms 18.352 ms 18.275 ms
[14:42:43] 234 10 PARI-LOND.AS18 (18.0.4.1) 17.864 ms 17.728 ms 17.677 ms
[14:42:43] 235 11 MIAM-NEWY.AS18 (18.0.12.2) 18.168 ms MIAM-PARI.AS18 (18.0.6.2) 17.538 ms MIAM-NEWY.AS18 (18.0.12.2) 17.461 ms
[14:42:43] 236 12 18.220.0.2 (18.220.0.2) 19.556 ms 19.276 ms 20.285 ms
[14:42:43] 237 13 LOND-BOST.AS20 (20.0.10.1) 20.188 ms LOND-BOST.AS20 (20.0.7.1) 39.968 ms 39.462 ms
[14:42:43] 238 14 PARI-host.group20 (20.103.0.2) 22.835 ms 40.040 ms 21.638 ms
[14:42:43] 239 root@PARI_host:# traceroute 28.103.0.1
traceroute to 28.103.0.1 (28.103.0.1), 38 hops max, 60 byte packets
[14:42:43] 240 1 PARI-host.group49 (49.103.0.2) 0.534 ms 0.224 ms 0.049 ms
[14:42:43] 241 2 58.49.0.1 (58.49.0.1) 2.738 ms 2.269 ms 2.082 ms
[14:42:43] 242 3 NEWY-PARI.AS50 (58.0.5.2) 4.249 ms 4.338 ms 4.298 ms
[14:42:43] 243 4 179.0.29.1 (179.0.29.1) 22.294 ms 179.0.19.1 (179.0.19.1) 12.137 ms 179.0.28.1 (179.0.28.1) 22.209 ms
[14:42:43] 244 5 ZURI-PARI.AS32 (32.0.1.1) 13.678 ms 13.635 ms 13.595 ms
[14:42:43] 245 6 LOND-PARI.AS32 (32.0.4.2) 14.012 ms 192.168.0.1 (192.168.0.1) 23.876 ms 23.777 ms
[14:42:43] 246 7 NEWY-ATLA.AS32 (32.0.11.1) 15.561 ms 15.142 ms 15.089 ms
[14:42:43] 247 8 179.0.13.1 (179.0.13.1) 19.732 ms 18.798 ms 18.734 ms
[14:42:43] 248 9 ZURI-LOND.AS18 (18.0.2.1) 18.648 ms 19.351 ms 18.877 ms
[14:42:43] 249 10 PARI-LOND.AS18 (18.0.4.1) 17.796 ms 17.768 ms 18.066 ms
[14:42:43] 250 11 MIAM-PARI.AS18 (18.0.6.2) 18.142 ms 17.656 ms 17.666 ms
[14:42:43] 251 12 18.220.0.2 (18.220.0.2) 21.000 ms 20.922 ms 21.174 ms
[14:42:43] 252 13 LOND-BOST.AS20 (20.0.7.1) 40.982 ms 40.948 ms NEWY-BOST.AS20 (20.0.10.1) 21.030 ms
[14:42:43] 253 14 PARI-LOND.AS20 (20.0.4.1) 40.879 ms PARI-LOND.AS20 (20.0.5.1) 23.290 ms PARI-LOND.AS20 (20.0.4.1) 40.881 ms
[14:42:43] 254 15 host.PARI.group20 (20.103.0.1) 24.045 ms 31.155 ms 23.944 ms
[14:42:43] 255 root@PARI_host:# ping 28.103.0.1
[14:42:43] 256 PING 28.103.0.1 (28.103.0.1) 56(84) bytes of data.
[14:42:43] 257 64 bytes from 28.103.0.1: icmp_seq=1 ttl=46 time=23.6 ms
[14:42:43] 258 64 bytes from 28.103.0.1: icmp_seq=2 ttl=46 time=22.3 ms
[14:42:43] 259 64 bytes from 28.103.0.1: icmp_seq=3 ttl=46 time=21.7 ms
[14:42:43] 260 64 bytes from 28.103.0.1: icmp_seq=4 ttl=46 time=23.1 ms
[14:42:43] 261 64 bytes from 28.103.0.1: icmp_seq=5 ttl=46 time=22.5 ms
[14:42:43] 262 64 bytes from 28.103.0.1: icmp_seq=6 ttl=46 time=22.5 ms
[14:42:43] 263 64 bytes from 28.103.0.1: icmp_seq=7 ttl=46 time=21.9 ms
[14:42:43] 264 64 bytes from 28.103.0.1: icmp_seq=8 ttl=46 time=22.3 ms
[14:42:43] 265 64 bytes from 28.103.0.1: icmp_seq=9 ttl=46 time=22.0 ms
[14:42:43] 266 64 bytes from 28.103.0.1: icmp_seq=10 ttl=46 time=23.0 ms
[14:42:43] 267 64 bytes from 28.103.0.1: icmp_seq=11 ttl=46 time=22.0 ms
[14:42:43] 268 64 bytes from 28.103.0.1: icmp_seq=12 ttl=46 time=23.0 ms
[14:42:43] 269 ^C
[14:42:43] 270 --- 28.103.0.1 ping statistics ---
[14:42:43] 271 10 packets transmitted, 10 received, 0% packet loss, time 9013ms
[14:42:43] 272 rtt min/avg/max/mdev = 21.754/22.539/23.685/0.601 ms
[14:42:43] 273 root@PARI_host:# 

```

References

- [1] *Neighbor next-hop-self*. (n.d.). Retrieved 2 December 2022, from https://www.arubanetworks.com/techdocs/AOS-CX/10.07/HTML/5200-7858/Content/Chp_BGP/BGP_cmds/nei-nex-hop-sel-10.htm