

A53271697

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End to end routing behavior in the Internet

1.No. Asymmetric routing in general is a normal, but unwanted situation in an IP network. Asymmetric routing is a situation where for one reason or another packets flowing in i.e. TCP connections flow through different routes to different directions. As a rough example: Host A and B located in different continents are communicating through a TCP connection. Segments sent from host A to host B reach the destination through Sprint link but segments sent from B to A reach the destination through MCI link. Asymmetric routing as described above is not a problem for current TCP/IP implementations, since TCP connection does not care which route a certain IP packet takes as long as it reaches its destination in a reasonable time.

2. In 10 of the traces (0.16%) and 155 of the traces (0.44%) the author observed routing connectivity reported earlier in the traceroute later lost or altered, indicating they were catching a routing failure as it happened. The distribution of recovery times from routing problems is at least bimodal—some recoveries occur quite quickly, on the time scale of congestion delays (100's of microseconds to seconds), while others take on the order of 1 minute to resolve. They suspect the different modes depend on whether the change is due to a new route becoming available, in which case the outage spans only the amount of time required to process the new routing information and update the forwarding table; versus an existing route being lost, and the outage reflecting having to wait for the change to propagate through the network and an alternative route to be found. The latter type of recovery presents significant difficulties for time-sensitive applications that assume outages are short-lived.

There are two types of stability: “prevalence,” meaning the overall likelihood that a particular route is encountered; and “persistence,” the likelihood that a route remains unchanged over a long period of time. We find that Internet paths are heavily dominated by a single prevalent route, but that the time periods over which routes persist show wide variation, ranging from seconds up to days. About two thirds of the Internet paths had routes persisting for either days or weeks.

First time:11/15/2018 2:30pm

Oregon:

www.ucsd.edu

1 hops away: 50.112.0.98

www.cs.ucsd.edu

1 hops away: 50.112.0.88

2 hops away: 100.66.8.204

3 hops away: 100.66.11.130

4 hops away: 100.66.7.131

5 hops away: 100.66.4.13

6 hops away: 100.65.8.1

7 hops away: 52.93.240.52

8 hops away: 52.93.13.60

9 hops away: 52.93.13.39

10 hops away: 100.91.25.66

11 hops away: 54.239.46.105

12 hops away: 54.239.42.216

13 hops away: 100.91.139.23

14 hops away: 52.95.52.232

15 hops away: 52.95.52.225

16 hops away: 207.231.248.132

17 hops away: 137.164.11.31

18 hops away: 137.164.11.0

19 hops away: 137.164.11.36

20 hops away: 137.164.11.25

21 hops away: 137.164.11.11

22 hops away: 137.164.23.177

23 hops away: 132.239.254.163

24 hops away: 132.239.254.44

www.utexas.edu

1 hops away: 50.112.0.66

2 hops away: 100.66.8.4

3 hops away: 100.66.11.74

4 hops away: 100.66.6.143

5 hops away: 100.66.4.75

6 hops away: 100.65.9.225

7 hops away: 52.93.240.60
8 hops away: 52.93.12.130
9 hops away: 52.93.12.235
10 hops away: 100.91.25.230
11 hops away: 54.239.43.119
12 hops away: 54.239.42.218
13 hops away: 52.95.52.28
14 hops away: 52.95.52.192
15 hops away: 206.81.81.10
16 hops away: 206.81.81.10
Done! 104.20.84.19

www.vit.ac.in

1 hops away: 50.112.0.100
2 hops away: 100.66.16.136
3 hops away: 100.66.19.6
4 hops away: 100.66.7.7
5 hops away: 100.66.4.137
6 hops away: 100.65.10.33
7 hops away: 52.93.240.58
8 hops away: 52.93.12.238
9 hops away: 52.93.12.223
10 hops away: 100.91.25.114
11 hops away: 54.239.42.195
12 hops away: 54.239.42.234
13 hops away: 100.91.139.97
14 hops away: 52.95.52.124
15 hops away: 52.95.52.119
16 hops away: 65.122.121.9
17 hops away: 67.14.4.210
Done! 207.109.73.136

www.ntu.edu.sg

1 hops away: 50.112.0.66
2 hops away: 100.66.8.48
3 hops away: 100.66.10.10
4 hops away: 100.66.6.11
5 hops away: 100.66.4.113
6 hops away: 100.65.9.193
7 hops away: 52.93.240.70
8 hops away: 52.93.15.18

9 hops away: 52.93.15.13
10 hops away: 100.91.27.148
11 hops away: 54.239.44.110
12 hops away: 52.93.128.25
13 hops away: 100.91.153.87
14 hops away: 54.240.243.120
15 hops away: 54.240.243.109
16 hops away: 198.32.176.50
17 hops away: 203.208.158.125
18 hops away: 203.208.158.190
19 hops away: 203.208.190.250
20 hops away: 165.21.12.7
21 hops away: 119.75.53.178

www.ethz.ch

1 hops away: 50.112.0.86
2 hops away: 100.66.8.170
3 hops away: 100.66.11.100
4 hops away: 100.66.7.101
5 hops away: 100.66.4.43
6 hops away: 100.65.8.161
7 hops away: 52.93.240.60
8 hops away: 52.93.12.100
9 hops away: 52.93.12.81
10 hops away: 100.91.25.100
11 hops away: 54.239.45.118
12 hops away: 100.91.139.53
13 hops away: 52.95.52.94
14 hops away: 52.95.53.228
15 hops away: 62.115.162.168
16 hops away: 62.115.117.49
17 hops away: 80.91.246.163
18 hops away: 213.155.135.4
19 hops away: 62.115.135.123
20 hops away: 213.248.79.190
21 hops away: 192.33.92.1
22 hops away: 192.33.92.169

www.google.com

1 hops away: 50.112.0.88
2 hops away: 100.66.8.206

3 hops away: 100.66.11.200
4 hops away: 100.66.7.201
5 hops away: 100.66.4.207
6 hops away: 100.65.11.97
7 hops away: 52.93.240.74
8 hops away: 52.93.12.130
9 hops away: 52.93.12.113
10 hops away: 100.91.25.64
11 hops away: 54.239.46.105
12 hops away: 54.239.42.216
13 hops away: 100.91.139.21
14 hops away: 52.95.52.94
15 hops away: 52.95.52.81
16 hops away: 52.95.216.101
17 hops away: 108.170.245.97
18 hops away: 209.85.240.255
Done! 216.58.216.132

www.bing.com

1 hops away: 50.112.0.80
2 hops away: 100.66.8.254
3 hops away: 100.66.10.110
4 hops away: 100.66.7.203
5 hops away: 100.66.4.147
6 hops away: 100.65.8.33
7 hops away: 52.93.240.58
8 hops away: 52.93.12.238
9 hops away: 52.93.13.15
10 hops away: 100.91.25.128
11 hops away: 54.239.43.119
12 hops away: 54.239.42.224
13 hops away: 52.95.52.228
14 hops away: 52.95.52.94
15 hops away: 52.95.216.139
16 hops away: 52.95.216.139

www.facebook.com

1 hops away: 50.112.0.66
2 hops away: 100.66.8.52
3 hops away: 100.66.10.134
4 hops away: 100.66.6.135

5 hops away: 100.66.4.245
6 hops away: 100.65.11.129
7 hops away: 52.93.240.54
8 hops away: 52.93.14.166
9 hops away: 52.93.14.157
10 hops away: 100.91.27.176
11 hops away: 54.239.44.25
12 hops away: 100.91.4.124
Done! 31.13.70.36

Seoul;

www.ucsd.edu

1 hops away: 52.79.0.22
2 hops away: 100.64.1.76
3 hops away: 100.64.0.69
4 hops away: 100.64.16.97
5 hops away: 54.239.122.39
6 hops away: 54.239.122.244
7 hops away: 54.239.123.27
8 hops away: 54.239.45.185
9 hops away: 100.91.146.96
10 hops away: 100.91.146.53
11 hops away: 54.239.46.231
12 hops away: 54.239.44.109
13 hops away: 100.91.27.135
14 hops away: 52.93.14.198
15 hops away: 52.93.14.71
16 hops away: 52.93.14.108
17 hops away: 52.93.14.67
18 hops away: 52.93.240.33
19 hops away: 100.65.11.160
20 hops away: 100.66.4.150
21 hops away: 100.66.6.102
22 hops away: 100.66.11.167
23 hops away: 100.66.20.39

www.cs.ucsd.edu

1 hops away: 52.79.0.20
2 hops away: 100.64.2.200

3 hops away: 100.64.2.199
4 hops away: 100.64.17.133
5 hops away: 54.239.122.37
6 hops away: 54.239.122.112
7 hops away: 54.239.122.105
8 hops away: 54.239.44.250
9 hops away: 52.93.248.68
10 hops away: 52.93.248.13
11 hops away: 121.78.68.237
12 hops away: 203.234.255.245
13 hops away: 112.174.85.21
14 hops away: 112.174.83.118
15 hops away: 112.174.87.254
16 hops away: 198.32.251.49
17 hops away: 137.164.11.31
18 hops away: 137.164.11.0
19 hops away: 137.164.11.34
20 hops away: 137.164.11.23
21 hops away: 137.164.11.11
22 hops away: 137.164.23.177
23 hops away: 132.239.254.163
24 hops away: 132.239.254.44

www.utexas.edu

1 hops away: 52.79.0.24
2 hops away: 100.64.3.202
3 hops away: 100.64.2.7
4 hops away: 100.64.17.165
5 hops away: 54.239.122.45
6 hops away: 54.239.122.200
7 hops away: 54.239.123.131
8 hops away: 54.239.41.236
9 hops away: 52.93.248.88
10 hops away: 52.93.248.37
11 hops away: 192.145.251.68
Done! 104.20.84.19

www.vit.ac.in

1 hops away: 52.79.0.20
2 hops away: 100.64.1.8
3 hops away: 100.64.1.69

4 hops away: 100.64.16.71
5 hops away: 54.239.122.39
6 hops away: 54.239.122.156
7 hops away: 54.239.122.235
8 hops away: 54.239.44.250
9 hops away: 52.93.248.70
10 hops away: 52.93.248.63
11 hops away: 192.145.251.65
Done! 72.246.103.24

www.ntu.edu.sg

1 hops away: 52.79.0.22
2 hops away: 100.64.2.202
3 hops away: 100.64.2.197
4 hops away: 100.64.17.103
5 hops away: 54.239.122.45
6 hops away: 54.239.123.120
7 hops away: 54.239.123.113
8 hops away: 54.239.45.185
9 hops away: 100.91.146.96
10 hops away: 100.91.146.119
11 hops away: 52.93.128.16
12 hops away: 54.239.41.151
13 hops away: 52.93.9.18
14 hops away: 52.93.9.11
15 hops away: 52.95.216.115
16 hops away: 203.30.38.5

www.ethz.ch

1 hops away: 52.79.0.24
2 hops away: 100.64.2.140
3 hops away: 100.64.2.133
4 hops away: 100.64.17.67
5 hops away: 54.239.122.45
6 hops away: 54.239.123.98
7 hops away: 54.239.123.89
8 hops away: 54.239.45.4
9 hops away: 52.93.248.86
10 hops away: 52.93.248.45
11 hops away: 121.78.68.237

www.google.com

1 hops away: 52.79.0.24
2 hops away: 100.64.3.76
3 hops away: 100.64.3.71
4 hops away: 100.64.17.133
5 hops away: 54.239.122.39
6 hops away: 54.239.122.244
7 hops away: 54.239.122.239
8 hops away: 54.239.45.187
9 hops away: 100.91.147.33
10 hops away: 52.95.30.15
11 hops away: 54.239.53.231
12 hops away: 72.14.220.244
13 hops away: 108.170.242.193
14 hops away: 108.170.233.79
Done! 172.217.25.68

www.bing.com

1 hops away: 52.79.0.26
2 hops away: 100.64.0.74
3 hops away: 100.64.2.135
4 hops away: 100.64.16.165
5 hops away: 54.239.122.43
6 hops away: 54.239.123.54
7 hops away: 54.239.122.129
8 hops away: 54.239.42.42
9 hops away: 52.93.248.90
10 hops away: 52.93.248.61
11 hops away: 52.46.167.53

www.facebook.com

1 hops away: 52.79.0.24
2 hops away: 100.64.2.140
3 hops away: 100.64.2.135
4 hops away: 100.64.17.133
5 hops away: 54.239.122.39
6 hops away: 54.239.123.54
7 hops away: 54.239.123.35
8 hops away: 112.175.138.13
9 hops away: 183.111.65.134
10 hops away: 204.15.21.106

11 hops away: 173.252.65.90

Done! 31.13.68.35

Second time:11/15/2018 5:20pm

Oregon:

www.ucsd.edu

1 hops away: 50.112.0.66

www.cs.ucsd.edu

1 hops away: 50.112.0.88

2 hops away: 100.66.8.204

3 hops away: 100.66.11.130

4 hops away: 100.66.7.131

5 hops away: 100.66.4.13

6 hops away: 100.65.8.1

7 hops away: 52.93.240.52

8 hops away: 52.93.13.60

9 hops away: 52.93.13.39

10 hops away: 100.91.25.66

11 hops away: 54.239.43.127

12 hops away: 100.91.139.81

13 hops away: 52.95.52.90

14 hops away: 52.95.52.89

15 hops away: 207.231.248.132

16 hops away: 137.164.11.31

17 hops away: 137.164.11.0

18 hops away: 137.164.11.36

19 hops away: 137.164.11.25

20 hops away: 137.164.11.11

21 hops away: 137.164.23.177

22 hops away: 132.239.254.163

23 hops away: 132.239.254.44

www.utexas.edu

1 hops away: 50.112.0.64

2 hops away: 100.66.8.58

3 hops away: 100.66.10.142

4 hops away: 100.66.7.75

5 hops away: 100.66.4.117

6 hops away: 100.65.9.33
7 hops away: 52.93.240.74
8 hops away: 52.93.12.244
9 hops away: 52.93.12.127
10 hops away: 100.91.25.246
11 hops away: 54.239.46.103
12 hops away: 54.239.42.220
13 hops away: 100.91.139.55
14 hops away: 52.95.52.198
15 hops away: 52.95.52.189
16 hops away: 206.81.81.10
Done! 104.20.83.19

www.vit.ac.in

1 hops away: 50.112.0.86
2 hops away: 100.66.8.46
3 hops away: 100.66.10.96
4 hops away: 100.66.7.239
5 hops away: 100.66.4.147
6 hops away: 100.65.11.33
7 hops away: 52.93.240.76
8 hops away: 52.93.14.58
9 hops away: 52.93.12.235
10 hops away: 100.91.27.146
11 hops away: 54.239.43.123
12 hops away: 100.91.141.119
13 hops away: 52.95.52.22
14 hops away: 52.95.54.83
15 hops away: 65.153.72.121
Done! 207.109.73.58

www.ntu.edu.sg

1 hops away: 50.112.0.66
2 hops away: 100.66.8.48
3 hops away: 100.66.10.10
4 hops away: 100.66.6.11
5 hops away: 100.66.4.113
6 hops away: 100.65.9.193
7 hops away: 52.93.240.70
8 hops away: 52.93.15.18
9 hops away: 52.93.15.13

10 hops away: 100.91.27.164
11 hops away: 54.239.44.116
12 hops away: 52.93.128.29
13 hops away: 100.91.153.117
14 hops away: 54.240.243.98
15 hops away: 54.240.243.89
16 hops away: 198.32.176.50
17 hops away: 203.208.158.125
18 hops away: 203.208.158.190
19 hops away: 203.208.190.250
20 hops away: 165.21.12.7
21 hops away: 119.75.53.178

www.ethz.ch

1 hops away: 50.112.0.86
2 hops away: 100.66.8.170
3 hops away: 100.66.11.100
4 hops away: 100.66.7.101
5 hops away: 100.66.4.43
6 hops away: 100.65.8.161
7 hops away: 52.93.240.60
8 hops away: 52.93.12.100
9 hops away: 52.93.12.81
10 hops away: 100.91.25.100
11 hops away: 54.239.45.118
12 hops away: 100.91.139.51
13 hops away: 52.95.52.58
14 hops away: 52.95.53.242
15 hops away: 62.115.162.170
16 hops away: 62.115.117.49
17 hops away: 80.91.246.163
18 hops away: 213.155.135.4
19 hops away: 62.115.135.123
20 hops away: 213.248.79.190
21 hops away: 192.33.92.1
22 hops away: 192.33.92.169

www.google.com

1 hops away: 50.112.0.68
2 hops away: 100.66.16.210
3 hops away: 100.66.18.110

4 hops away: 100.66.6.111
5 hops away: 100.66.4.19
6 hops away: 100.65.8.65
7 hops away: 52.93.240.68
8 hops away: 52.93.12.172
9 hops away: 52.93.12.163
10 hops away: 100.91.25.214
11 hops away: 54.239.43.135
12 hops away: 54.239.42.218
13 hops away: 100.91.139.35
14 hops away: 52.95.52.58
15 hops away: 52.95.52.47
16 hops away: 52.95.216.101
17 hops away: 74.125.243.193
18 hops away: 209.85.254.237
Done! 172.217.14.196

www.bing.com

1 hops away: 50.112.0.90
2 hops away: 100.66.8.82
3 hops away: 100.66.11.202
4 hops away: 100.66.6.111
5 hops away: 100.66.4.15
6 hops away: 100.65.10.33
7 hops away: 52.93.240.58
8 hops away: 52.93.13.18
9 hops away: 52.93.12.229
10 hops away: 100.91.25.230
11 hops away: 54.239.45.116
12 hops away: 54.239.42.218
13 hops away: 52.95.52.124
14 hops away: 52.95.53.4
15 hops away: 52.95.216.139
16 hops away: 52.95.217.159

www.facebook.com

1 hops away: 50.112.0.100
2 hops away: 100.66.16.158
3 hops away: 100.66.19.228
4 hops away: 100.66.7.229
5 hops away: 100.66.4.111

6 hops away: 100.65.9.225
7 hops away: 52.93.240.74
8 hops away: 52.93.12.238
9 hops away: 52.93.12.221
10 hops away: 100.91.25.80
11 hops away: 54.239.45.126
12 hops away: 54.239.43.41
13 hops away: 100.91.155.65
14 hops away: 54.240.242.74
15 hops away: 54.240.242.73
16 hops away: 52.95.216.171
17 hops away: 157.240.32.34
18 hops away: 157.240.47.221
19 hops away: 173.252.67.185
Done! 157.240.22.35

Seoul:

www.ucsd.edu

1 hops away: 52.79.0.22
2 hops away: 100.64.1.10
3 hops away: 100.64.1.71
4 hops away: 100.64.17.39
5 hops away: 54.239.122.39
6 hops away: 54.239.122.244
7 hops away: 54.239.122.237
8 hops away: 54.239.45.187
9 hops away: 100.91.146.0
10 hops away: 100.91.146.49
11 hops away: 54.239.46.233
12 hops away: 54.239.44.111
13 hops away: 100.91.27.211
14 hops away: 52.93.15.50
15 hops away: 52.93.14.33
16 hops away: 52.93.14.70
17 hops away: 52.93.15.19
18 hops away: 52.93.240.113
19 hops away: 100.65.10.32
20 hops away: 100.66.4.44
21 hops away: 100.66.7.172

22 hops away: 100.66.11.205
23 hops away: 100.66.8.45

www.cs.ucsd.edu

1 hops away: 52.79.0.20
2 hops away: 100.64.2.200
3 hops away: 100.64.2.199
4 hops away: 100.64.17.133
5 hops away: 54.239.122.37
6 hops away: 54.239.122.112
7 hops away: 54.239.122.105
8 hops away: 54.239.44.250
9 hops away: 52.93.248.68
10 hops away: 52.93.248.13
11 hops away: 121.78.68.237
12 hops away: 203.234.255.245
13 hops away: 112.174.85.21
14 hops away: 112.174.83.118
15 hops away: 112.174.87.254
16 hops away: 198.32.251.49
17 hops away: 137.164.11.31
18 hops away: 137.164.11.0
19 hops away: 137.164.11.34
20 hops away: 137.164.11.23
21 hops away: 137.164.11.11
22 hops away: 137.164.23.177
23 hops away: 132.239.254.163
24 hops away: 132.239.254.44

www.utexas.edu

1 hops away: 52.79.0.24
2 hops away: 100.64.3.202
3 hops away: 100.64.2.7
4 hops away: 100.64.17.165
5 hops away: 54.239.122.45
6 hops away: 54.239.122.200
7 hops away: 54.239.123.131
8 hops away: 54.239.41.236
9 hops away: 52.93.248.88
10 hops away: 52.93.248.37

11 hops away: 192.145.251.68
Done! 104.20.84.19

www.vit.ac.in

1 hops away: 52.79.0.20
2 hops away: 100.64.1.8
3 hops away: 100.64.1.69
4 hops away: 100.64.16.71
5 hops away: 54.239.122.39
6 hops away: 54.239.122.156
7 hops away: 54.239.122.235
8 hops away: 54.239.44.250
9 hops away: 52.93.248.70
10 hops away: 52.93.248.63
11 hops away: 192.145.251.65
Done! 72.246.103.24

www.ntu.edu.sg

1 hops away: 52.79.0.22
2 hops away: 100.64.2.202
3 hops away: 100.64.2.197
4 hops away: 100.64.17.103
5 hops away: 54.239.122.45
6 hops away: 54.239.123.120
7 hops away: 54.239.123.113
8 hops away: 54.239.45.185
9 hops away: 100.91.146.0
10 hops away: 100.91.146.23
11 hops away: 52.93.128.16
12 hops away: 54.239.41.151
13 hops away: 52.93.9.18
14 hops away: 52.93.9.11
15 hops away: 52.95.216.115
16 hops away: 203.30.38.5

www.ethz.ch

1 hops away: 52.79.0.24
2 hops away: 100.64.2.140
3 hops away: 100.64.2.133
4 hops away: 100.64.17.67
5 hops away: 54.239.122.45

6 hops away: 54.239.123.98
7 hops away: 54.239.123.89
8 hops away: 54.239.45.4
9 hops away: 52.93.248.86
10 hops away: 52.93.248.45
11 hops away: 121.78.68.237

www.google.com

1 hops away: 52.79.0.20
2 hops away: 100.64.1.200
3 hops away: 100.64.1.197
4 hops away: 100.64.17.7
5 hops away: 54.239.122.45
6 hops away: 54.239.123.54
7 hops away: 54.239.123.49
8 hops away: 54.239.45.187
9 hops away: 100.91.147.33
10 hops away: 52.95.30.13
11 hops away: 54.239.53.229
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13 hops away: 108.170.242.97
14 hops away: 108.170.233.17
Done! 172.217.25.196

www.bing.com

1 hops away: 52.79.0.26
2 hops away: 100.64.0.74
3 hops away: 100.64.2.135
4 hops away: 100.64.16.165
5 hops away: 54.239.122.43
6 hops away: 54.239.123.54
7 hops away: 54.239.122.129
8 hops away: 54.239.42.42
9 hops away: 52.93.248.90
10 hops away: 52.93.248.61
11 hops away: 52.46.167.53

www.facebook.com

1 hops away: 52.79.0.24
2 hops away: 100.64.2.140
3 hops away: 100.64.2.135

4 hops away: 100.64.17.133
5 hops away: 54.239.122.39
6 hops away: 54.239.123.54
7 hops away: 54.239.123.35
8 hops away: 112.175.138.13
9 hops away: 183.111.65.134
10 hops away: 204.15.21.106
11 hops away: 173.252.65.90
Done! 31.13.68.35

Oregon Report:

First time:11/15/2018 2:30pm

Second time:11/15/2018 5:20pm

www.ucsd.edu:

first:1

second:1

www.cs.ucsd.edu:

first:24

second:23

www.utexas.edu:

first:16

second:16

www.vit.ac.in:

first:17

second:15

www.ntu.edu.sg:

first:21

second:21

www.ethz.ch:

first:22

second:22

www.google.com:

first:18

second:18

www.bing.com:

first:16

second:16

www.facebook.com:

first:12

second:19

Seoul Report:

First time:11/15/2018 2:30pm

Second time:11/15/2018 5:20pm

www.ucsd.edu:

first:23

second:23

www.cs.ucsd.edu:

first:24

second:24

www.utexas.edu:

first:11

second:11

www.vit.ac.in:

first:11

second:11

www.ntu.edu.sg:

first:16

second:16

www.ethz.ch:

first:11

second:11

www.google.com:

first:14

second:14

www.bing.com:

first:11

second:11

www.facebook.com:

first:11

second:11

```

from scapy.all import *

ip_packet = IP(dst="hackerschool.com", ttl=10)

udp_packet = UDP(dport=40000)

full_packet = IP(dst="hackerschool.com", ttl=10) / UDP(dport=40000)

hostnames =

["www.ucsd.edu", "www.cs.ucsd.edu", "www.utexas.edu", "www.vit.ac.in", "www.ntu.edu.sg", "www.ethz.ch", "w

www.google.com", "www.bing.com", "www.facebook.com"]

for index, hostname in enumerate(hostnames):

    print(hostname)

    for i in range(1, 28):

        pkt = IP(dst=hostname, ttl=i) / UDP(dport=33434)

        # Send the packet and get a reply

        reply = sr1(pkt, verbose=0)

        if reply is None:

            # No reply =(

            break

        elif reply.type == 3:

            # We've reached our destination

            print ("Done!", reply.src)

            break

```

```
else:
```

```
    # We're in the middle somewhere
```

```
    print ("%d hops away: " % i , reply.src)
```