A53271697

Bosi Cheng

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

12 hops away: 72.14.220.244

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","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)