# Starlink network measurement – RIPE Atlas

## Experience 1 : Link stability measurement

Measurement ID : [48065838](https://atlas.ripe.net/measurements/48065838/) (IPv4) and [48065839](https://atlas.ripe.net/measurements/48065839/) (IPv6)  
From :

* Probe 28, US
  + IPv4 : [216.147.126.61](https://stat.ripe.net/216.147.126.61)
  + IPv6 : [2605:59c8:515c:4014:220:4aff:fec8:2455](https://stat.ripe.net/2605:59c8:515c:4014:220:4aff:fec8:2455/64)
* Probe 50 008, DE
  + IPv4 : [145.224.73.245](https://stat.ripe.net/145.224.73.245)
  + IPv6 : [2a0d:3344:156a:c002:1:76ff:fed8:6526](https://stat.ripe.net/2a0d:3344:156a:c002:1:76ff:fed8:6526/64)
* Probe 60 323 : DE
  + IPv4 : [145.224.72.149](https://stat.ripe.net/145.224.72.149)
  + IPv6 : 2a0d:3344:1525:ce10:da58:d7ff:fe03:268

Subject :

* Probe 19 983, AUS
  + IPv4 : 206.83.114.184
  + IPv6 : 2406:2d40:4024:a600:c24a:ff:fe09:45b4

Settings :

* Two EU probes and one US probe
* Traceroute every 15 minutes (1 packets) during a period of 24 hours

Description : Testing the stability of the traceroute to determine if the path taken is always the same or if some variant can be observed. Two probes are located in Europe and one probe is in the USA. This test is done both in IPv4 and IPv6 to compare the two.

Conclusion :

* The routing seems to be always the same for a given path, however in two cases we could see changes :
  + One of the probe (50 008) has a first hop that changes between two addresses while still remain in the same domain
  + Sometimes a node can have a “\*” as a value, but it seems to be related with packet lost
* There are no differences regarding the number of success hop between IPv4 and IPv6
* Some of the hop in IPv4 contain private addresses, which are public for IPv6.
* The size of the packet increase at a certain point, which could mean that tunnel are used.

## Experience 2 : Path taken in EU

|  |  |
| --- | --- |
| Measurement ID : [48159572](https://atlas.ripe.net/measurements/48159572/) |  |

From :

* Probe 35681, AUS
  + IPv6 : 2a0d:3344:189b:8100:c225:e9ff:febb:10e6
* Probe 50 008, DE
  + IPv6 : 2a0d:3344:156a:c002:1:76ff:fed8:6526
* Probe 60 323, DE
  + IPv6 : 2a0d:3344:1525:ce10:da58:d7ff:fe03:268
* Probe 61 366, UK
  + IPv6 : 2a0d:3344:191:3b10:da58:d7ff:fe03:382
* Probe 1 004 701, IT
  + IPv6 : 2a0d:3344:1b62:7710:ec21:68ff:fe41:a703
* Probe 1 004 978, IT
  + IPv6 : 2a0d:3344:1b62:7710:1ce8:a1ff:fe8c:719c

Subject :

* Probe 1 004 978, IT
  + IPv6 : 2a0d:3344:1b62:7710:1ce8:a1ff:fe8c:719c

Settings :

* Seven EU probes (one has since then changed and is not starlink anymore)
* A single traceroute was performed

Description : This test was done in order to understand the path a EU probe would take when it’s made to stay inside its continent or even inside its own country, with the same gateway.

Conclusion :

* The hop located at 2620:134:b0ff::/42 is not listed in IP range list but appears to be host.stalink.net and is taken by every multi-coutry traceroute. The location of this IP is California
* Each cross-country traceroute has one hop assigned to AS1267 (Wind Tre SPA)
* The UK probe has an additional 2620:134:b0ff::/42 hop compare to the other
* Path within the same country seems to have only one hop (possibly the gateway)

## Experience 3 : Protocol test

Measurement ID : 50022021, 50022022, 50022157, 50022615, 50022616, 50022617

From : All IPv4/v6 address with the the AS14593

To : 145.224.99.23

Settings :

* One time traceroute
* Using both IPv4 and IPv6
* One for every protocol : TCP, UDP, ICMP

Notes :

* No difference between the protocols in IPv6
* TCP is less effective in IPv4 compared to the other protocol
  + Path is probably the same but hop don’t appear
  + RTT isn’t the same as other protocol
* Path are always the same, regardless of the protocol
* RTT is averagely the same, regardless of the protocol

## Experience 4 : Reverse traceroute

Measurement ID : 50106412, 50106413, 50106414, 50106415, 50106436

From : 145.224.99.23

To : 145.224.65.130, 206.83.114.177, 98.97.45.86, 216.147.124.230

Settings :

* One time traceroute
* Using both IPv4 and IPv6
* One for every protocol : TCP, UDP, ICMP

Notes :

* No difference between the protocols in IPv6
* TCP is less effective in IPv4 compared to the other protocol
  + Path is probably
* s

## Experience 2 : Protocol test

Measurement ID :

From :

To :

Settings :

Notes :

# Traceroute using M-Lab

Measurement Lab (M-Lab) is an free and open internet measurement provider that allow anyone to performe and consult the result of various test available. Among these test, we can take a closer look at Traceroute. Here is a link to MLab’s official Traceroute page :

* [measurementlab.net/tests/traceroute/](https://www.measurementlab.net/tests/traceroute/)

Everytime an M-Lab server encounters a TCP connection from an external host, the server will perform a Traceroute to the destination host. Here’s an the link to the different MLab server :

* [measurementlab.net/status/](https://www.measurementlab.net/status/)

Once a Traceroute is performed by the server, every data is collected by traceroute-caller (developed by MLab, using scamper1 as the datatype), upload the files on Google Cloud Storage and parse them in Google BigQuery.

In this experiment, the use of the Google BigQuery database is a good start as it allow us to run query which will be performed using Google’s big computer power, important with such big databases. In order to get access to the database, you just need to be subscribe to M-Lab Discuss group (<https://groups.google.com/a/measurementlab.net/g/discuss?pli=1>) and then are able to perform query.

First of all, we started by checking if some Traceroute were made to a Starlink connected network. We selected a sample of different Starlink connected probe from RIPE atlas in order to have their IP and location. Then we performed the following query, which output the 100 most recent traceroute to these probe :

SELECT id, date, raw

FROM `measurement-lab.ndt\_raw.scamper1`

WHERE raw.Tracelb.dst IN ('98.97.14.69', '216.147.126.100', '145.224.65.24', '145.224.99.30')

ORDER BY date DESC

LIMIT 100

# Remarks, ideas and note

Articles

* Some of these paper are based on the fact that all satellites have the same altitude -> this can alter or modify the view we have on certain algorithms
* Future optimisation that could be made to DisCoRoute (as example) is to take into account the average load of a satellite at a given point above the earth in order to not overload the satellite that need lots of computing power

Routing

* The folling sub network are to be saved, may be verry interesting
  + <https://whois.ipip.net/AS14593/149.19.108.0/23> -> possibly Sattelite
  + <https://whois.ipip.net/AS14593/145.224.112.0/21> -> says spain but also US
  + <https://whois.ipip.net/AS14593/176.116.124.0/23> -> MC-LHR ?
  + <https://whois.ipip.net/AS14593/188.95.144.0/23> -> MC-FRA
  + <https://whois.ipip.net/AS14593/65.181.0.0/22> -> SpaceX AP
  + <https://whois.ipip.net/AS14593/103.235.92.0/22> -> STARLINK-MC-SYD-JP1