



**RIPE NCC**

RIPE NETWORK COORDINATION CENTRE

# Network Visibility with RIPE Atlas

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# RIPE Atlas



- RIPE Atlas is a global active measurements platform, funded by the RIPE NCC and sponsors
- Goal: view Internet reachability
- Probes hosted by volunteers, using a credits system
- Data is publicly available
- More information at: [atlas.ripe.net](https://atlas.ripe.net)

# RIPE Atlas



- Runs six type of measurements:
  - Ping, Traceroute, DNS, NTP, **SSL/TLS** and **HTTP**(anchors only)
- Accessible via **GUI**, **API** and **CLI Tool**

# What happens when...



Your customer claims  
**HIGH Latency**  
towards your network

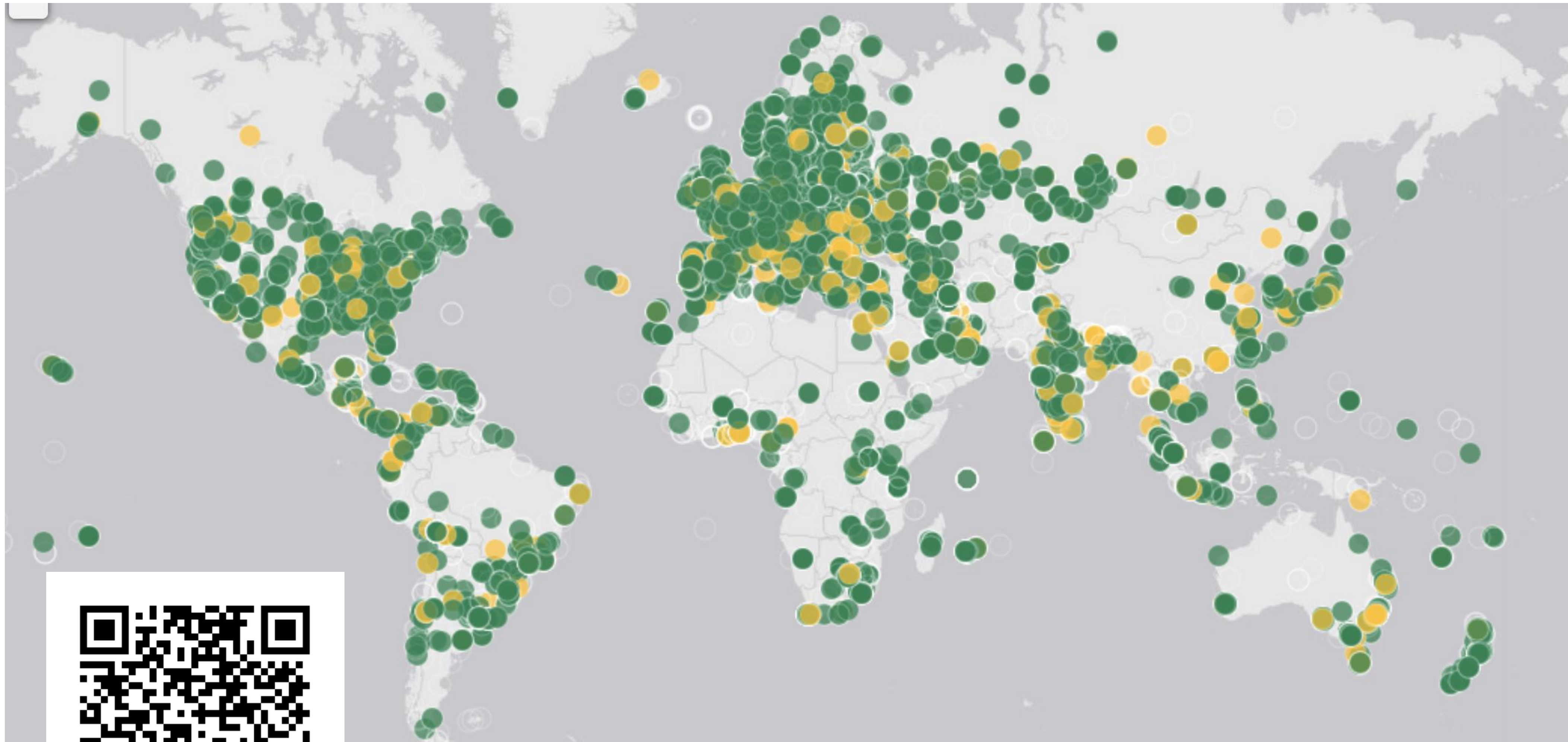
# Replicate the problem!



Test from **multiple ASNs**  
for a fair assessment

**Third party** data and  
toolset for **non bias** answer

# Run RIPE Atlas tests from some of the 12K probes



<https://atlas.ripe.net/results/maps/network-coverage/>

# Run RIPE Atlas tests



## Create a New Measurement

### Step 1 Definitions

Please select the type of measurement you want to create

+ Ping + Traceroute + DNS + SSL + HTTP + NTP

### Step 2 Probe Selection

Worldwide 10 x

+ New Set - wizard + New Set - manual + IDs List + Reuse a set from a measurement

### Step 3 Timing

This is a One-off:

Start time (UTC):

As soon as possible

Stop time (UTC):

Never

> Measurement API Compatible Specification

Create My Measurement(s)

### Costs summary

Please define a measurement

Users who will supply credits for this measurement:

lhestina@ripe.net

Read more:



<https://atlas.ripe.net/measurements/form/>



# Step 1

- Run **traceroute** measurement **towards your network** from 15 probes in your country
- Traceroute measurement to show paths
- To see latency from various networks

# Step 2

Spot any issues?

- If yes, start **debugging**, **talk to your peers**
- No? Show the result to your customer



# Latency



| Probe | ASN (IPv4) | ASN (IPv6) |      | Time (UTC)       | RTT     | Hops | Success |   |
|-------|------------|------------|------|------------------|---------|------|---------|---|
| 4429  | 55430      |            | 🇮🇩 📶 | 2020-05-13 19:02 | 270.039 | 17   | ✗       | 📘 |
| 14042 | 55430      |            | 🇮🇩 📶 | 2020-05-13 19:02 | 267.779 | 17   | ✗       | 📘 |
| 22798 | 55430      | 55430      | 🇮🇩 📶 | 2020-05-13 19:02 | 268.372 | 17   | ✗       | 📘 |
| 24422 | 55430      |            | 🇮🇩 📶 | 2020-05-13 19:02 | 268.974 | 17   | ✗       | 📘 |
| 25828 | 4788       |            | 🇺🇸 📶 | 2020-05-13 19:02 | 364.127 | 15   | ✗       | 📘 |
| 28850 | 4844       |            | 🇮🇩 📶 | 2020-05-13 19:02 | 265.993 | 17   | ✗       | 📘 |
| 54623 | 4773       | 4773       | 🇮🇩 📶 | 2020-05-13 19:02 | 268.964 | 16   | ✗       | 📘 |
| 55415 | 55430      | 55430      | 🇮🇩 📶 | 2020-05-13 19:02 | 367.158 | 13   | ✗       | 📘 |

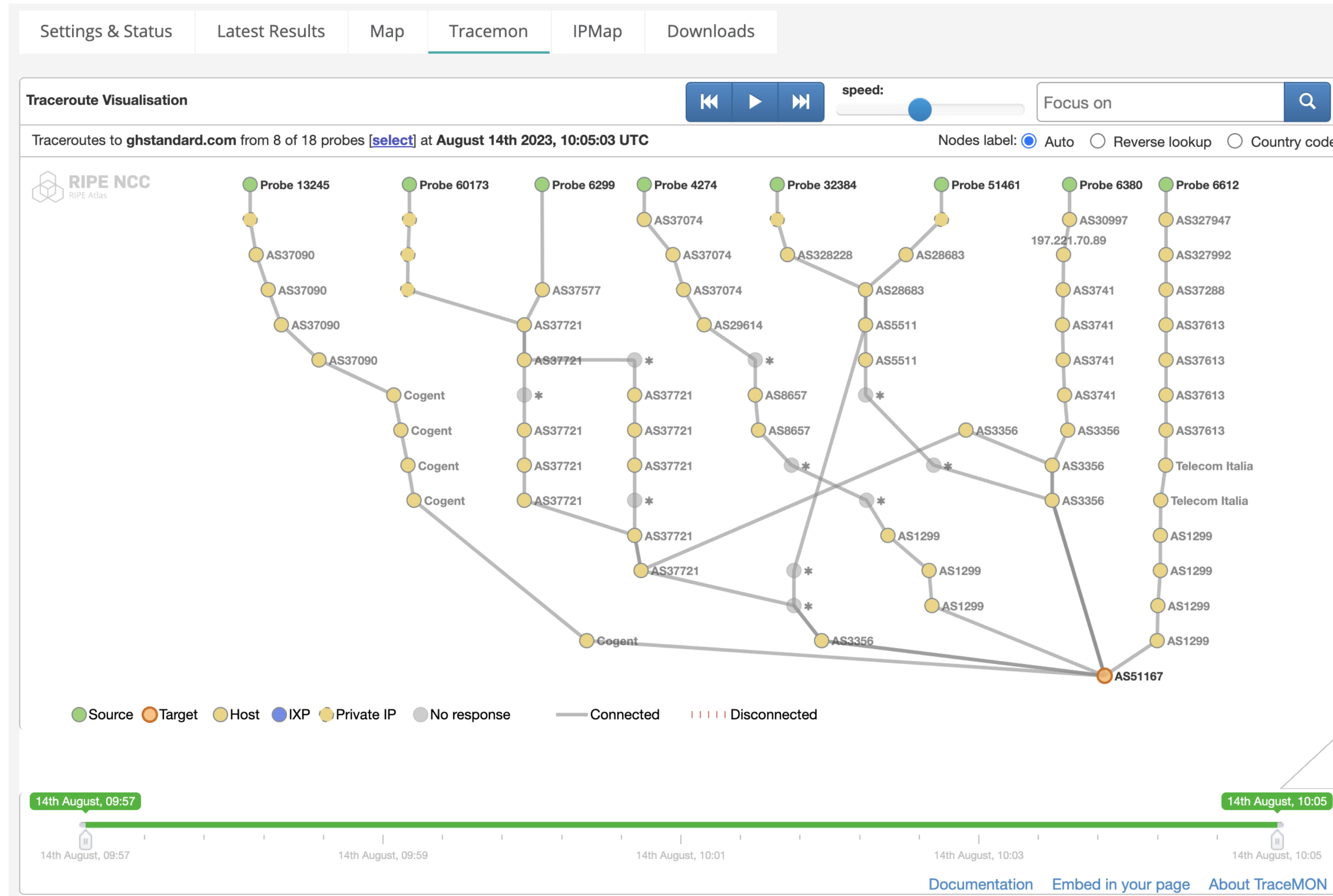
  

| Probe | ASN (IPv4) | ASN (IPv6) |      | Time (UTC)       | RTT   | Hops | Success |   |
|-------|------------|------------|------|------------------|-------|------|---------|---|
| 4429  | 55430      |            | 🇮🇩 📶 | 2020-05-13 20:17 | 4.394 | 14   | ✓       | 📘 |
| 14042 | 55430      |            | 🇮🇩 📶 | 2020-05-13 20:17 | 3.042 | 14   | ✓       | 📘 |
| 22798 | 55430      | 55430      | 🇮🇩 📶 | 2020-05-13 20:17 | 3.336 | 14   | ✓       | 📘 |
| 24422 | 55430      |            | 🇮🇩 📶 | 2020-05-13 20:17 | 3.993 | 15   | ✓       | 📘 |
| 25828 | 4788       |            | 🇺🇸 📶 | 2020-05-13 20:17 | 3.158 | 14   | ✓       | 📘 |
| 28850 | 4844       |            | 🇮🇩 📶 | 2020-05-13 20:17 | 3.127 | 14   | ✓       | 📘 |
| 31918 | 55430      |            | 🇮🇩 📶 | 2020-05-13 20:17 | 5.194 | 15   | ✓       | 📘 |
| 54623 | 4773       | 4773       | 🇮🇩 📶 | 2020-05-13 20:17 | 4.505 | 14   | ✓       | 📘 |
| 55415 | 55430      | 55430      | 🇮🇩 📶 | 2020-05-13 20:17 | 3.508 | 14   | ✓       | 📘 |

High latency  
Identified

Lower latency  
after debugging

# Paths taken to reach target

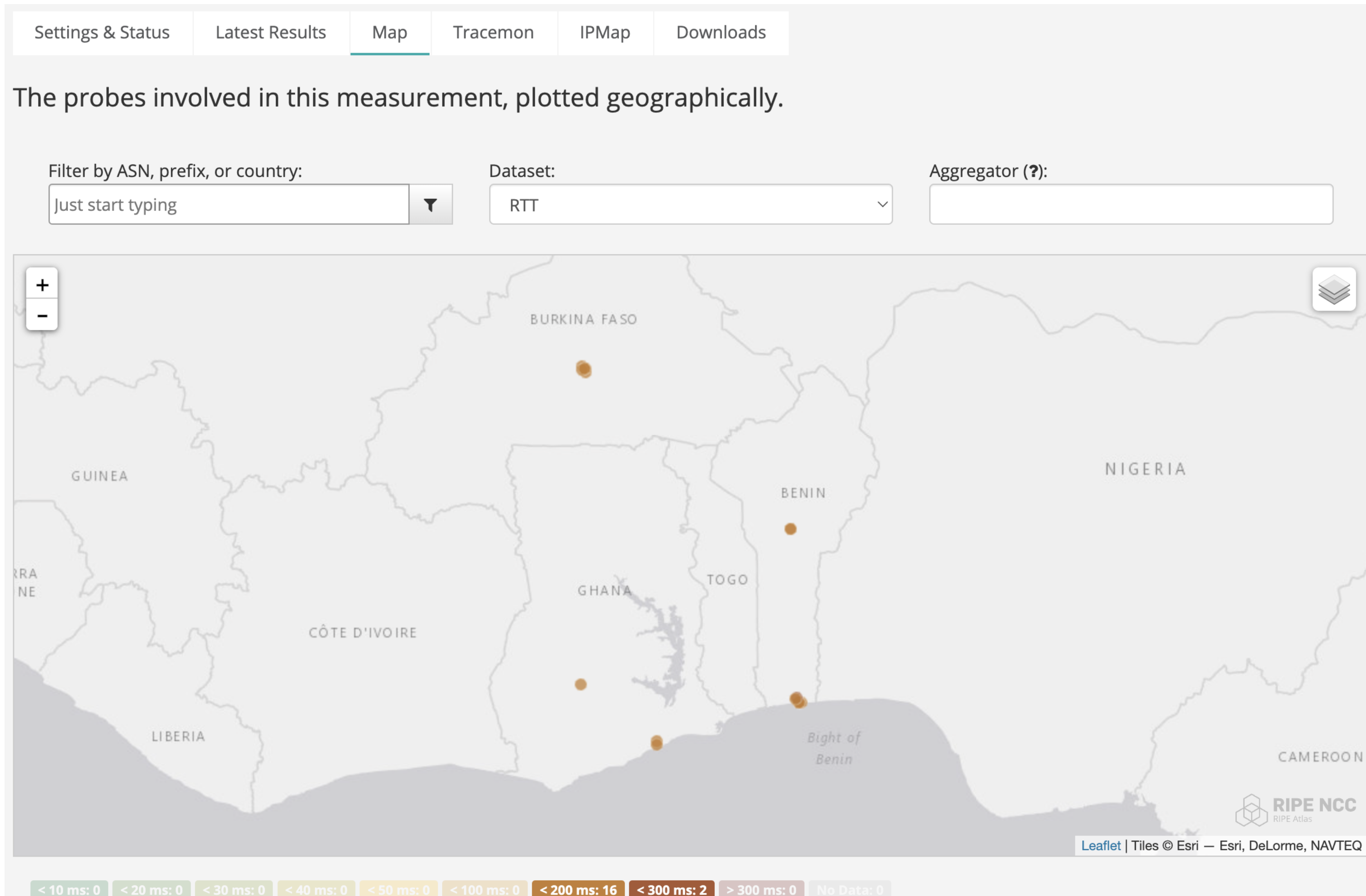


Read more:



<https://atlas.ripe.net/measurements/58613046/#tracemon>

# Latency Map



Read more:



<https://atlas.ripe.net/measurements/58613046/#map>

# Hooray Moments!



## 1. Improve performance

Shorter path is selected, better latency, reliability & security

## 2. Control and flexibility

Repeat the tests as much as you need!

## 3. Service desks ❤️ RIPE Atlas GUI to validate findings



A view into your network  
as seen from RIPE Atlas **Prototypes**



# Prototype 1: MinRTT

- **Latency** of one specific ASN, as seen from all probes and IXP at a specific time
- Colour coded latency map
- Compare results between large ASNs per country

Fullscreen + -

Origin (ASN or ix-ID)

7131

Date

06/17/2024

Address Family

IPv4

Protocol

Any

Aggregate function

Median

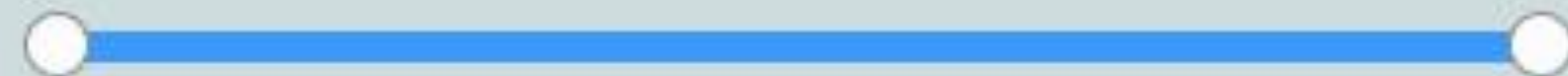
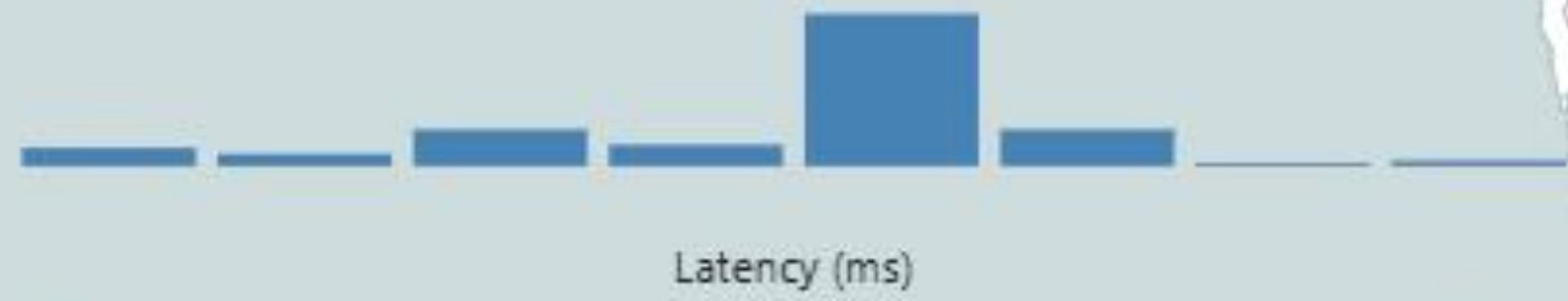
# MinRTT



**Latency AS7131  
Guam**

<https://observablehq.com/@ripenc/atlas-latency-worldmap>

↑ Frequency



Fullscreen + -

Origin (ASN or ix-ID)  
140627

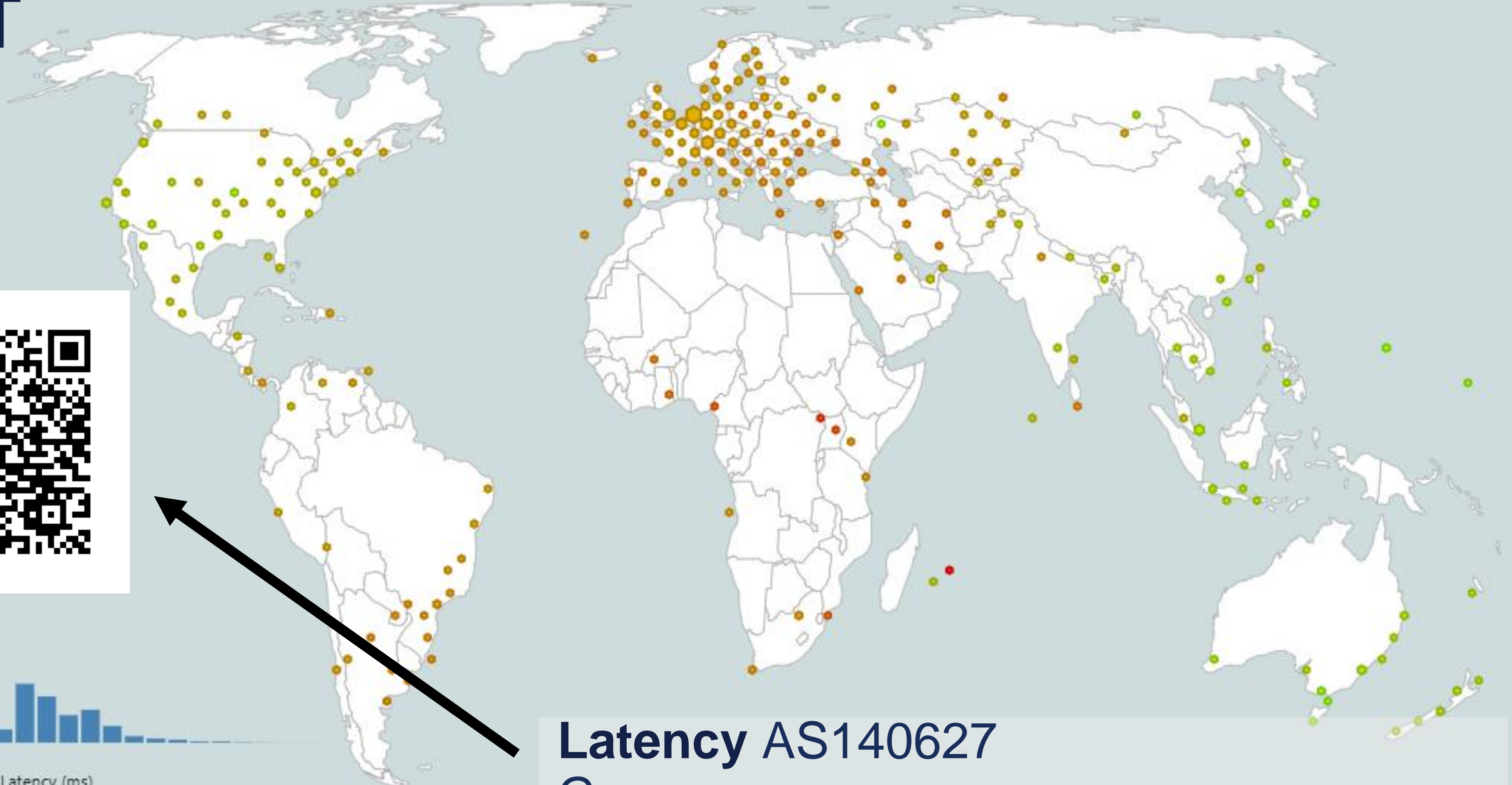
Date  
06/17/2024

Address Family  
IPv4

Protocol  
Any

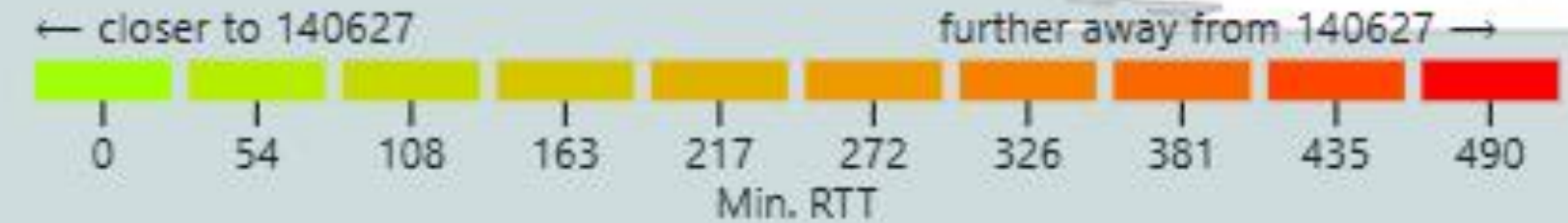
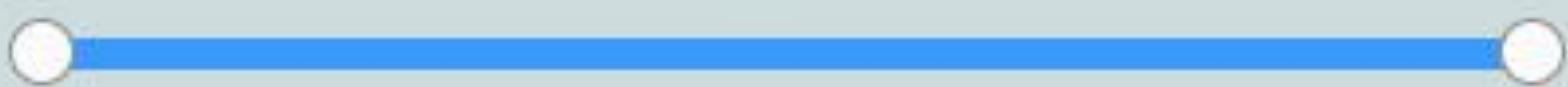
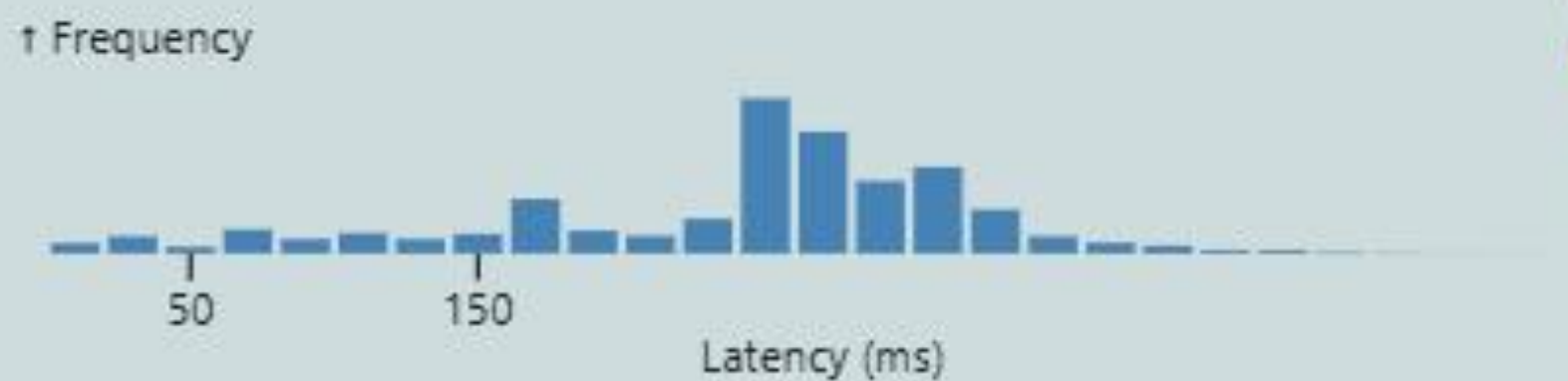
Aggregate function  
Median

# MinRTT



**Latency AS140627**  
**Guam**

<https://observablehq.com/@ripenc/atlas-latency-worldmap>







# Prototype 2:

## MinRTT - ASNs in your neighbourhood seen by your probe

- A view from one specific probe
- Showing **Latency** of ASNs in the probe's neighbourhood
- Showing low and high latency of ASNs





# Prototype 3: Country IXP Jedi

- Mesh between ASNs
- Showing if paths remain local or go out of the country
- Showing if an IXP is seen between the path

# 3. Finding anomalies in Country IXP JEDI - AS9299



- Local IXP found: YES, out-of-country IPs: NO
- Local IXP found: YES, out-of-country IPs: YES

- Local IXP found: NO, out-of-country IPs: NO
- Local IXP found: NO, out-of-country IPs: YES

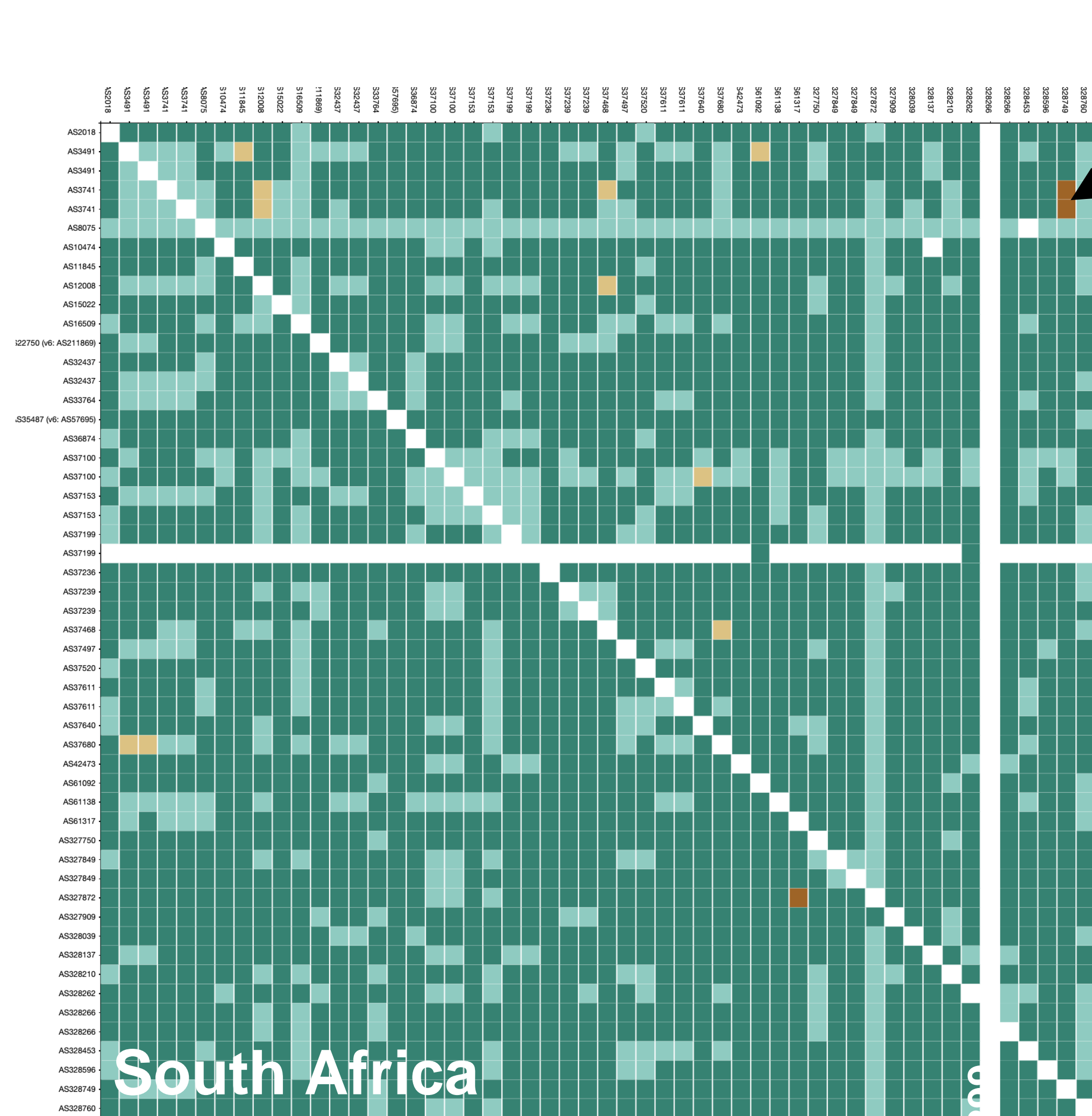


Read more:



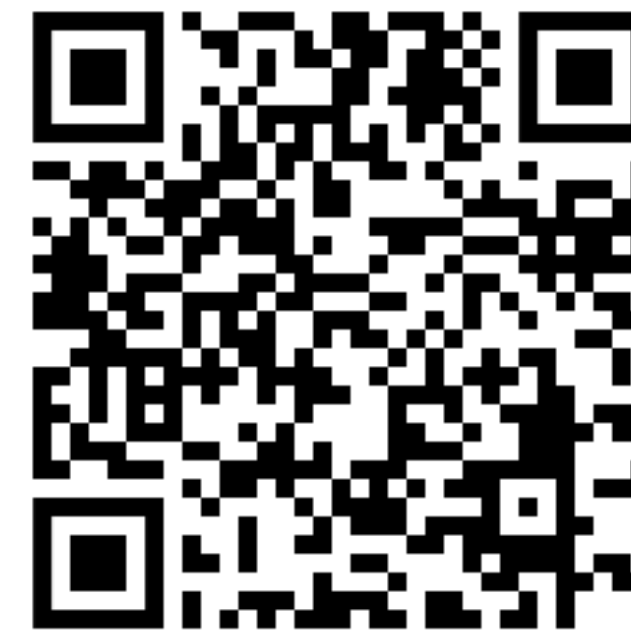
<https://jedi.ripe.net/latest/GU/ixpcountry/index.html?ASNS=all&ipv=v4>

# 3. Finding anomalies in Country IXP JEDI - AS9299



- Local IXP found: YES, out-of-country IPs: YES
- Local IXP found: NO, out-of-country IPs: YES

Read more:



<https://jedi.ripe.net/latest/ZA/ixpcountry/index.html?ASNS=all&ipv=v4>



# Where to Improve RIPE Atlas Coverage?



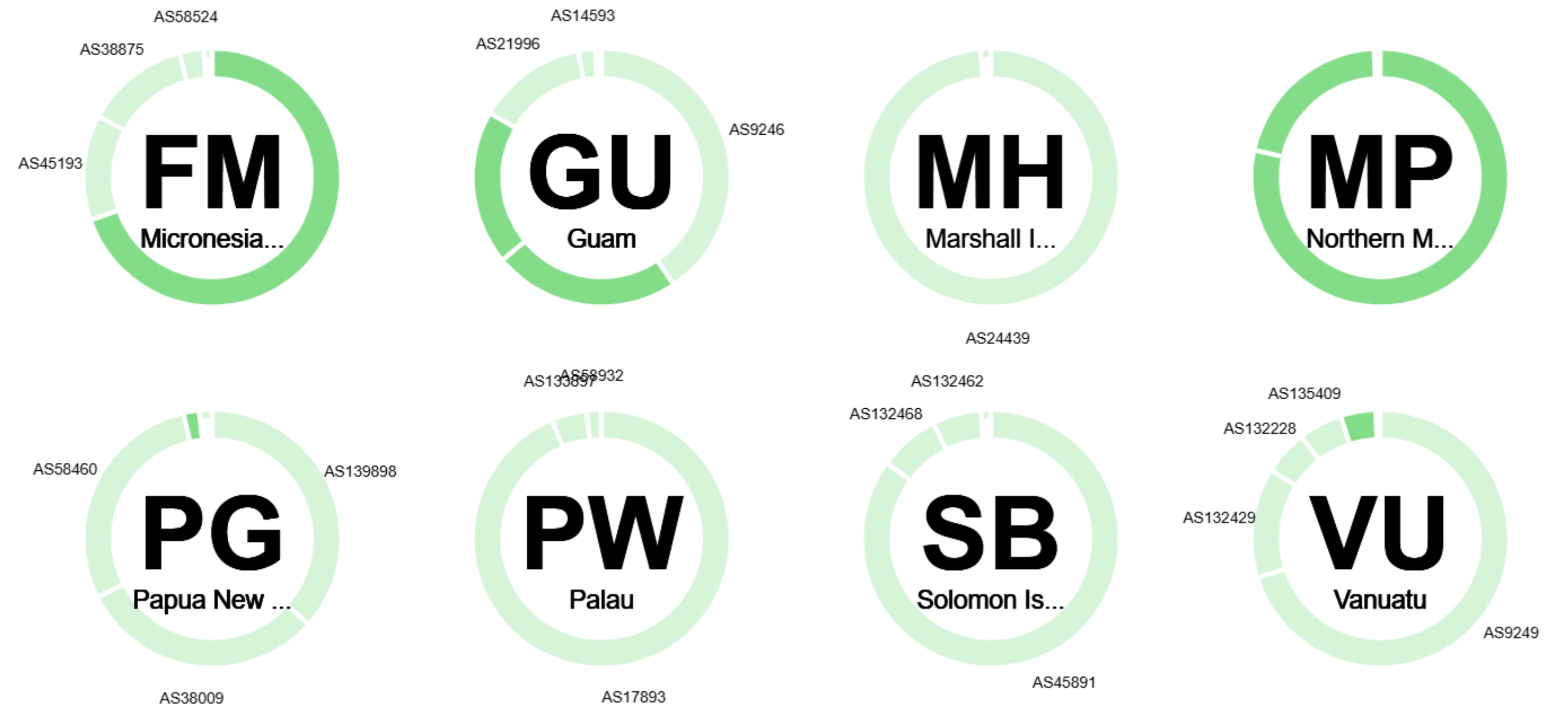
# We'd like to install probes in these ASNs!



## RIPE Atlas probe coverage

Showing ASNs covering at least 1% of the country's population (2024-06-21)

- ASN has at least 1 probe
- ASN is not covered



<https://observablehq.com/@ripenc/ripe-atlas-network-coverage?country=FM,GU,MH,MO,PG,PW,SB,VU&labels=notCovered&columns=4&spacing=4&radius=90>

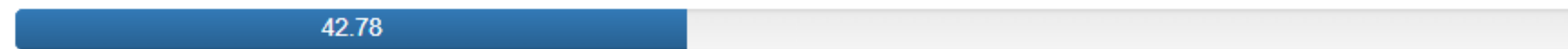
# Country specific table



Select Date: 21/06/2024

Showing data for 21/06/2024

- Details for : **Guam ( GU )** | [View Guam on RIPEstat](#)



Total Internet Users: **124717**

Internet Users in networks with RIPE Atlas probes: **53350**

Internet users coverage is estimated using percentage of IPv4 Public probes.

■ IPv4 Public Probes >= 3
 ■ 3 > IPv4 Public Probes > 1

Search:

We'd like to install probes in these ASNs:



| Network (ASN) | Network Name         | Estimated User Population % | IPv4 Public Probes | IPv4 Private Probes | IPv4 Total Probes | IPv6 Public Probes | IPv6 Private Probes | IPv6 Total Probes | More                              |
|---------------|----------------------|-----------------------------|--------------------|---------------------|-------------------|--------------------|---------------------|-------------------|-----------------------------------|
| 9246          | GTA-AP               | 40.56                       | 0                  | 0                   | 0                 | 0                  | 0                   | 0                 | <a href="#">Apply for a probe</a> |
| 3605          | ERX-KUENTOS-AS       | 23.4                        | 2                  | 0                   | 2                 | 0                  | 0                   | 0                 | <a href="#">View</a>              |
| 7131          | PTIPACIFICAINC-AS-AP | 19.38                       | 2                  | 0                   | 2                 | 0                  | 0                   | 0                 | <a href="#">View</a>              |
| 21996         | GUAMCELL             | 13.74                       | 0                  | 0                   | 0                 | 0                  | 0                   | 0                 | <a href="#">Apply for a probe</a> |
| 14593         | SPACEX-STARLINK      | 2.15                        | 0                  | 0                   | 0                 | 0                  | 0                   | 0                 | <a href="#">Apply for a probe</a> |

[https://sg-pub.ripe.net/petros/population\\_coverage/country.html?name=GU](https://sg-pub.ripe.net/petros/population_coverage/country.html?name=GU)



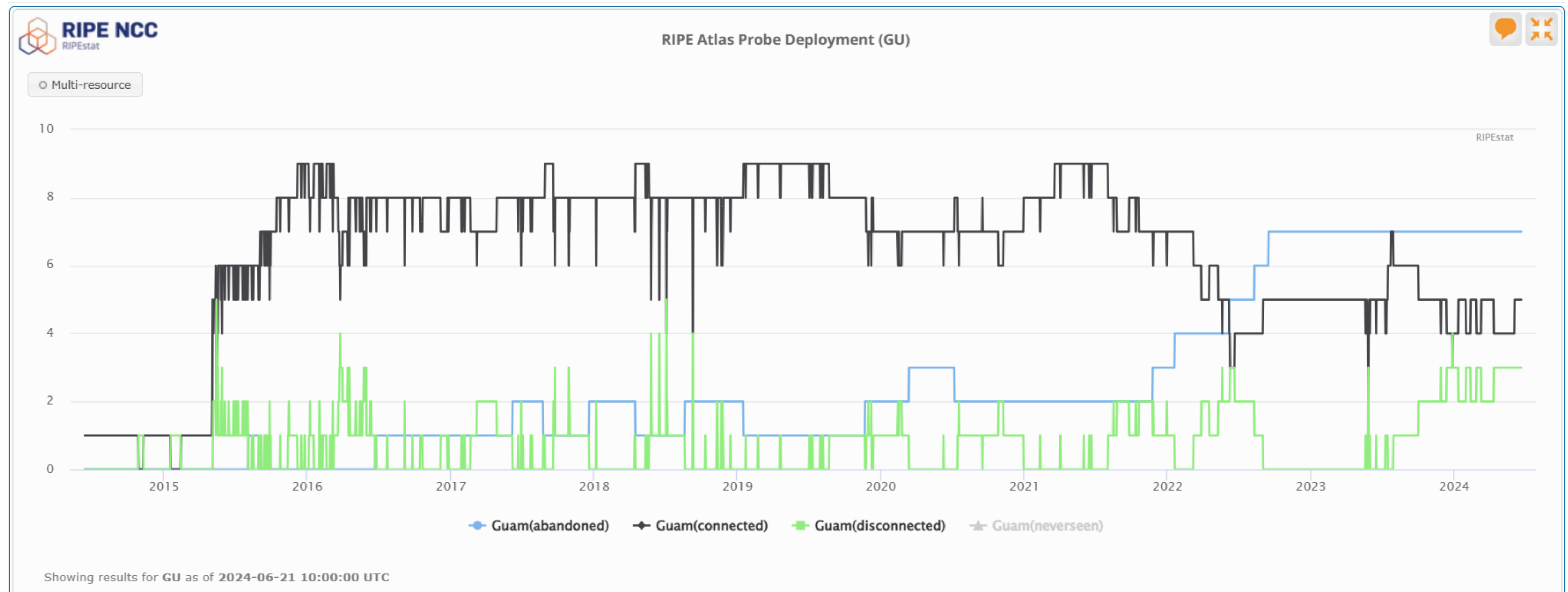
# History of probes in Guam



| ID                      | ASN v4                 | ASN v6               | C...<br>Guam | Description & Tags  | Status<br>All      | Public? |
|-------------------------|------------------------|----------------------|--------------|---|--------------------|---------|
| <a href="#">1002128</a> | <a href="#">140627</a> |                      | GU           | Guam Probe <span>system-ipv4-capable</span> <span>system-software</span>  | 2 years, 10 months | ✓       |
| <a href="#">62456</a>   | <a href="#">17456</a>  |                      | GU           | Guam Community College <span>system-ipv4-capable</span> <span>system-ipv4-rfc1918</span> <span>system-v5</span>   | 10 months, 3 weeks | ✓       |
| <a href="#">62232</a>   |                        |                      | GU           | University of Guam - Yigo Experimental Station <span>system-dns-problem-suspected</span><br><span>system-v5</span>  | Never Connected    | ✓       |
| <a href="#">62018</a>   |                        |                      | GU           | <span>system-dns-problem-suspected</span> <span>system-v5</span>  | Never Connected    | ✓       |
| <a href="#">61368</a>   | <a href="#">17456</a>  |                      | GU           | University of Guam - Fadian Hatchery <span>wireless-isp</span> <span>system-ipv4-capable</span> <span>system-v5</span>  | 6 months, 1 week   | ✓       |
| <a href="#">60689</a>   | <a href="#">7131</a>   |                      | GU           | d-net.tech HQ <span>system-resolves-a-correctly</span> <span>system-resolves-aaaa-correctly</span><br><span>system-ipv4-works</span> <span>system-ipv4-capable</span> <span>system-ipv4-rfc1918</span> <span>system-ipv4-stable-1d</span><br><span>system-v5</span>   | 1 day, 3 hours     | ✓       |
| <a href="#">29899</a>   | <a href="#">395400</a> |                      | GU           | University of Guam <span>fibre</span> <span>datacentre</span> <span>academic</span> <span>no-nat</span> <span>ipv4</span> <span>multihomed</span><br><span>system-v3</span> <span>system-ipv4-capable</span> <span>internet2</span> <span>noc</span> <span>system-dns-problem-suspected</span>  | 2 months, 1 week   | ✓       |
| <a href="#">23039</a>   | <a href="#">17456</a>  |                      | GU           | GUAM Dept of Education <span>system-v3</span> <span>system-resolves-a-correctly</span><br><span>system-resolves-aaaa-correctly</span> <span>system-ipv4-works</span> <span>system-ipv4-capable</span><br><span>system-ipv4-rfc1918</span>   | 4 days             | ✓       |
| <a href="#">22813</a>   | <a href="#">17456</a>  |                      | GU           | <span>system-v3</span> <span>system-ipv4-capable</span> <span>system-ipv4-rfc1918</span><br><span>system-flash-drive-filesystem-corrupted</span>  | 2 years, 1 month   | ✓       |
| <a href="#">22751</a>   | <a href="#">3605</a>   |                      | GU           | TADEO at University of Guam <span>system-v3</span> <span>system-ipv4-capable</span> <span>system-ipv6-capable</span><br><span>system-ipv4-rfc1918</span>  | 2 years, 3 months  | ✓       |
| <a href="#">22745</a>   | <a href="#">395400</a> |                      | GU           | University of Guam Campus Network <span>system-v3</span> <span>system-ipv4-capable</span><br><span>system-ipv4-rfc1918</span>   | 4 years, 7 months  | ✓       |
| <a href="#">22672</a>   | <a href="#">55863</a>  |                      | GU           | iConnect Guam <span>system-v3</span> <span>system-ipv4-capable</span> <span>system-ipv4-rfc1918</span>  | 2 years, 8 months  | ✓       |
| <a href="#">22668</a>   | <a href="#">7131</a>   |                      | GU           | University of Guam Broadband 50.0 via IT&E <span>office</span> <span>datacentre</span> <span>academic</span> <span>nat</span><br><span>ipv4</span> <span>system-v3</span> <span>system-resolves-a-correctly</span> <span>system-resolves-aaaa-correctly</span><br><span>system-ipv4-works</span> <span>system-ipv4-capable</span> <span>noc</span> <span>meeting</span> | 1 week, 2 days     | ✓       |
| <a href="#">22667</a>   | <a href="#">7131</a>   |                      | GU           | IT&E Guam <span>system-v3</span> <span>system-ipv4-capable</span> <span>system-ipv4-rfc1918</span>  | 8 years, 4 months  | ✓       |
| <a href="#">22639</a>   | <a href="#">3605</a>   |                      | GU           | Docomo Pacific at the GuIX <span>system-v3</span> <span>system-resolves-a-correctly</span><br><span>system-resolves-aaaa-correctly</span> <span>system-ipv4-works</span> <span>system-ipv4-capable</span>   | 2 months, 1 week   | ✓       |
| <a href="#">329</a>     | <a href="#">3605</a>   |                      | GU           | <span>no-nat</span> <span>system-v1</span> <span>system-resolves-a-correctly</span> <span>system-resolves-aaaa-correctly</span><br><span>system-ipv4-works</span> <span>system-ipv4-capable</span> <span>system-ipv4-stable-30d</span> <span>system-ipv4-stable-90d</span><br><span>system-ipv4-stable-1d</span>  | 1 hour             | ✓       |
| <a href="#">2</a>       | <a href="#">1136</a>   | <a href="#">1136</a> | GU           | Zuidoost <span>dsl</span> <span>home</span> <span>system-v1</span> <span>system-ipv4-capable</span> <span>system-ipv6-capable</span><br><span>system-ipv4-rfc1918</span> <span>system-no-controller-connection</span>   | 2 years, 6 months  | ✗       |

17 Probes recorded

# Probe Deployment in Guam



<https://stat.ripe.net/ui2013/widget/atlas-probe-deployment#w.resource=GU>

# Reasons to Love RIPE Atlas



12,000 Probes

Global Coverage

Trusted Source

Non-profit Organisation  
Volunteers: End Users

Safe & Secure

Regular third-party security review

Open Data

Measurement results open to all

Community Driven

From the community for the community

# What's Next?



1. Increase Coverage of top ASNs in your country

2. Reconnect your probes!



## MEET RIPE ATLAS AMBASSADORS

- Intro to RIPE Atlas
- Demo: RIPE Atlas measurements



**Terry Sweetser**  
APNIC



**Jose Santiago**  
RIPE Atlas Ambassador

**24-26 JUNE | GUAM**  
**PACNOG 2024**



# Questions



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[atlas@ripe.net](mailto:atlas@ripe.net)

# Use Cases



## **A distributed view of the Internet**

[https://labs.ripe.net/author/alun\\_davies/ripe-atlas-a-distributed-view-of-the-internet/](https://labs.ripe.net/author/alun_davies/ripe-atlas-a-distributed-view-of-the-internet/)

## **The Kazakhstan outage as seen from RIPE Atlas**

<https://labs.ripe.net/author/emileaben/the-kazakhstan-outage-as-seen-from-ripe-atlas/>

## **Detecting DNS root manipulation**

<https://labs.ripe.net/author/qasim-lone/detecting-dns-root-manipulation/>

## **DNS vulnerability, configuration errors that can cause DDoS**

[https://labs.ripe.net/author/giovane\\_moura/dns-vulnerability-configuration-errors-that-can-cause-ddos/](https://labs.ripe.net/author/giovane_moura/dns-vulnerability-configuration-errors-that-can-cause-ddos/)