

# **M-Root Update and more**

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# Update of M-Root deployment in AP region

|                               | City/Country • Economy: connected IX etc                                                                                                                          | # of locations          |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 2020                          | Brisbane/ <b>AU</b> : MegalX, QLD-IX                                                                                                                              | <b>1</b>                |
| 2021                          | Hanoi/ <b>VN</b> : VNNIC                                                                                                                                          | <b>1</b>                |
| 2022                          | <b>GU</b> : MARIIX, Kuala Lumpur/ <b>MY</b> : MyIX, Bangkok/ <b>TH</b> : BKNIX, <b>SG</b> : Equinix, SingAREN-SOE                                                 | <b>4</b>                |
| 2023                          | Kaohsiung/ <b>TW</b> : TWIX, Jakarta/ <b>ID</b> : IIX, OpenIXP, Ulaanbaatar/ <b>MN</b> : MISPA-IXP, <b>HK</b> : HKIX, Phnom Penh/ <b>KH</b> : CNX                 | <b>5</b>                |
| 2024                          | Dhaka/ <b>BD</b> : BDIX, Kathmandu/ <b>NP</b> : NPIX, Lahore/ <b>PK</b> : PKIX, Mumbai/ <b>IN</b> : NIXI, Kolkata/ <b>IN</b> : Kolkata IX, Malé/ <b>MV</b> : MVIX | <b>6</b>                |
| 2025<br>(Equipment delivered) | Jinan/ <b>CN</b> : CNNIC, Vientiane/ <b>LA</b> : NIX, Colombo/ <b>LK</b> : Dialog, Hamilton/ <b>NZ</b> : ALK-IX, WLG-IX, CHC-IX, MegalX Auckland                  | <b>4+4</b><br>(planned) |

(※) 30 countries/economies in Asia, 26 in Oceania of APNIC service region

| # of sites |        | A  | B | C  | D   | E   | F   | G |
|------------|--------|----|---|----|-----|-----|-----|---|
| Total      |        | 59 | 6 | 12 | 220 | 328 | 353 | 6 |
| By type    | Global | 35 | 6 | 12 | 23  | 130 | 129 | 6 |
|            | Local  | 24 | 0 | 0  | 197 | 198 | 224 | 0 |
| By region  | NA     | 31 | 3 | 4  | 56  | 92  | 77  | 3 |
|            | LA     | 0  | 1 | 2  | 20  | 33  | 61  | 0 |
|            | EU     | 21 | 1 | 4  | 67  | 97  | 104 | 2 |
|            | AP     | 7  | 1 | 2  | 36  | 50  | 83  | 1 |
|            | AF     | 0  | 0 | 0  | 41  | 56  | 28  | 0 |

| # of sites |        | H  | I  | J   | K   | L   | M  |
|------------|--------|----|----|-----|-----|-----|----|
| Total      |        | 12 | 85 | 150 | 127 | 142 | 21 |
| By type    | Global | 12 | 85 | 63  | 116 | 142 | 8  |
|            | Local  | 0  | 0  | 87  | 11  | 0   | 13 |
| By region  | NA     | 4  | 12 | 44  | 12  | 19  | 1  |
|            | LA     | 1  | 14 | 11  | 12  | 30  | 1  |
|            | EU     | 3  | 36 | 59  | 76  | 35  | 1  |
|            | AP     | 3  | 20 | 28  | 24  | 42  | 18 |
|            | AF     | 1  | 3  | 8   | 3   | 16  | 0  |

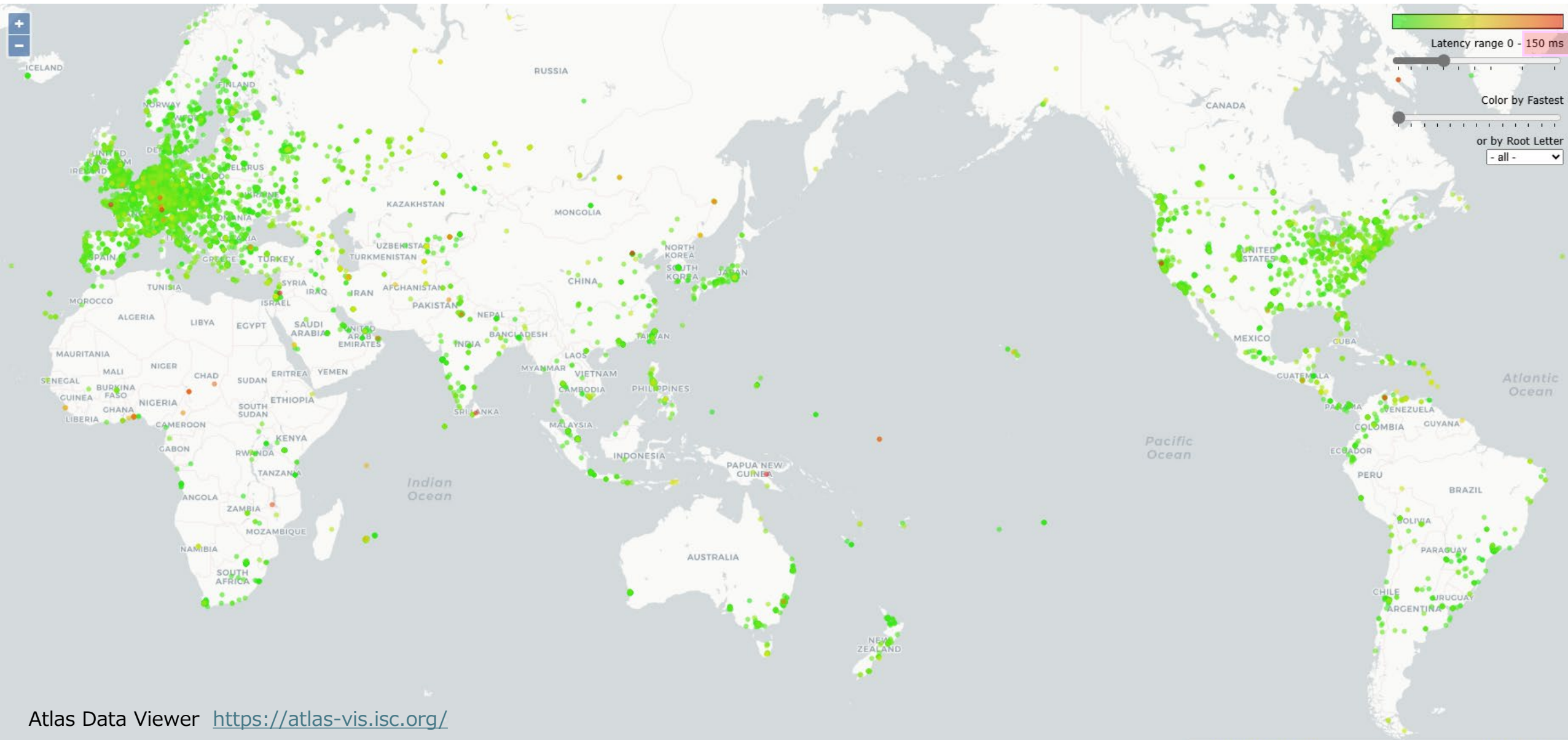
- Region is based on which RIR country belongs to

- Data as of 1<sup>st</sup> December (Total : 1,521)

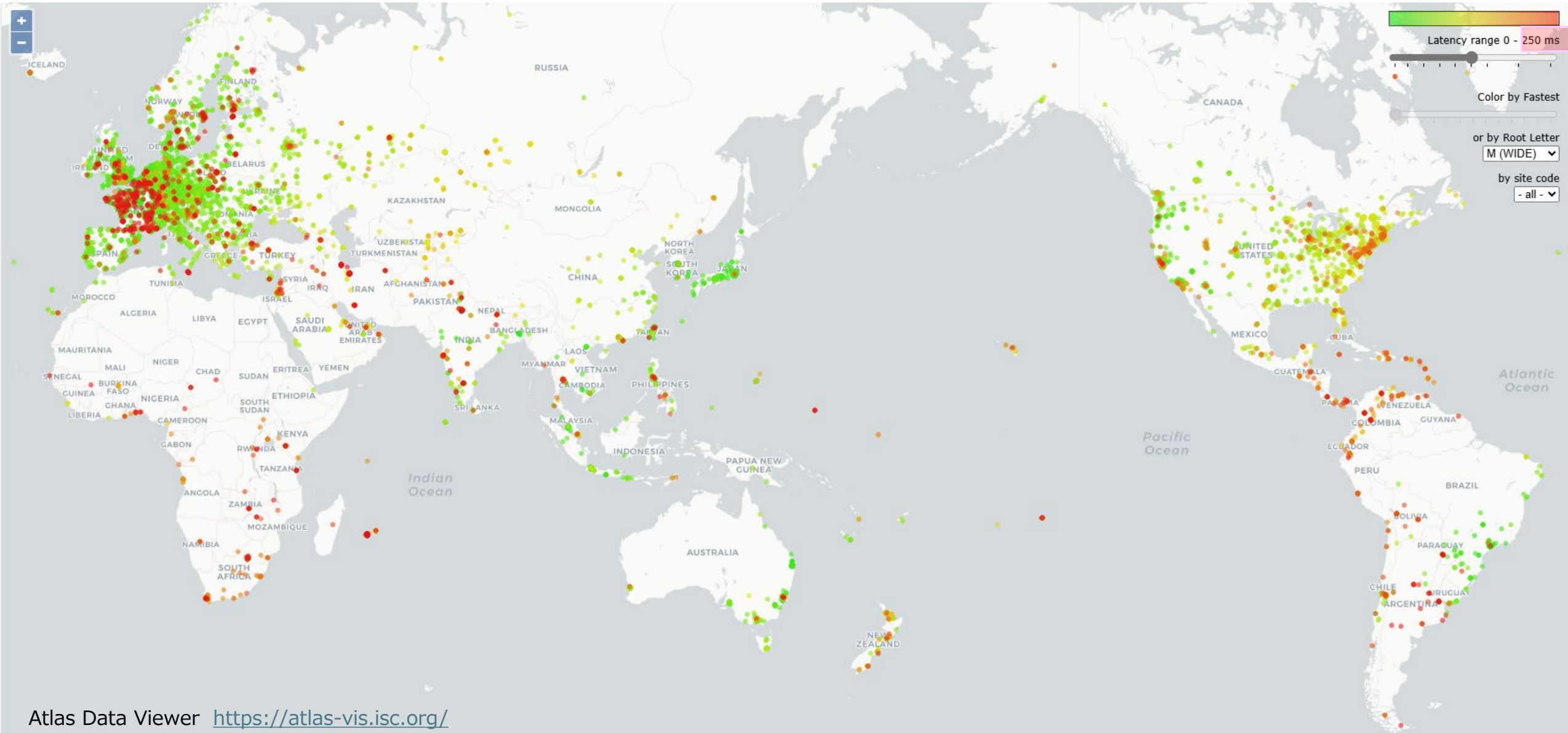
# Why more anycast instances are needed?

- Strengthen resilience from DDOS attacks on Root Server by limiting the affected areas, and then avoid global-level instability of the root DNS service
- For local communities hosting root servers,
  - Improve accessibility to root server even when they lose the connectivity to outside the country, which enables the name resolution
  - Faster access to root server (but less than 1sec level)
- Discussion ongoing about Root Server governance by RSS GWG in ICANN
  - Metric and measurement on RSS/RSI performance is proposed by RSSAC document as RSSAC047v2
  - Metric includes “Response Latency” of RSS and RSI
    - Recommendation for RSS : 150 msec(UDP)/300msec(TCP) as medium of measurements
    - Recommendation for RSI : 250 msec(UDP)/500msec(TCP) as medium of measurements

# Measurement results of fastest RTT by RIPE Atlas probes



# Measurement results of M-Root



# Current # of RIPE Atlas probe locations in AP region

| Country or Economy/cc | #of probe (connect ed) | # of probe (discon nected) | Country/cc                        | #of probe (connect ed) | # of probe (disconn ected) | Country or Economy/cc | #of probe (connect ed) | # of probe (disconn ected) | Country/cc                     | #of probe (connect ed) | # of probe (discon nected) |
|-----------------------|------------------------|----------------------------|-----------------------------------|------------------------|----------------------------|-----------------------|------------------------|----------------------------|--------------------------------|------------------------|----------------------------|
| Japan/JP★             | 254                    | 114                        | Pakistan/PK★                      | 3                      | 8                          | Cocos Islands/CC      | 0                      | 0                          | Palau/PW                       | 1                      | 0                          |
| China/CN★             | 79                     | 247                        | Bhutan/BT                         | 1                      | 1                          | Christmas Island/CX   | 0                      | 0                          | Northern Mariana Islands/MP    | 1                      | 0                          |
| Hong Kong/HK★         | 55                     | 39                         | British Indian Ocean Territory/IO | 0                      | 0                          | Australia/AU★         | 253                    | 93                         | Pitcairn Islands/PN            | 0                      | 0                          |
| Taiwan/TW★            | 48                     | 26                         | Singapore/SG★                     | 137                    | 60                         | New Zealand/NZ★       | 101                    | 24                         | Samoa/WS                       | 0                      | 0                          |
| South Korea/KR★       | 28                     | 24                         | Indonesia/ID★                     | 97                     | 63                         | Guam/GU★              | 8                      | 4                          | French Southern Territories/TF | 0                      | 0                          |
| Mongolia/MN★          | 7                      | 8                          | Philippines/PH                    | 65                     | 49                         | New Caledonia/NC      | 6                      | 0                          | Marshall Islands/MH            | 0                      | 0                          |
| Macau/MO              | 0                      | 1                          | Thailand/TH★                      | 41                     | 14                         | French Polynesia/PF   | 5                      | 1                          | American Samoa/AS              | 0                      | 0                          |
| North Korea/KP        | 0                      | 0                          | Malaysia/MY★                      | 30                     | 15                         | Papua New Guinea/PG   | 3                      | 0                          | Niue/NU                        | 0                      | 0                          |
| India/IN★             | 151                    | 153                        | Vietnam/VN★                       | 16                     | 3                          | Micronesia/FM         | 3                      | 0                          | Nauru/NR                       | 0                      | 0                          |
| Nepal/NP★             | 12                     | 5                          | Timor-Leste/TL                    | 3                      | 0                          | Fiji/FJ               | 2                      | 2                          | Tuvalu/TV                      | 0                      | 0                          |
| Maldives/MV★          | 7                      | 3                          | Cambodia/KH★                      | 2                      | 3                          | Vanuatu/VU            | 2                      | 1                          | Norfolk Island/NF              | 0                      | 0                          |
| Afghanistan/AF        | 7                      | 0                          | Myanmar/MM                        | 1                      | 1                          | Kiribati/KI           | 2                      | 0                          | Wallis and Futuna/WF           | 0                      | 0                          |
| Bangladesh/BD★        | 5                      | 8                          | Brunei/BN                         | 1                      | 1                          | Cook Islands/CK       | 1                      | 1                          | Solomon Islands/SB             | 0                      | 0                          |
| Sri Lanka/LK★         | 4                      | 3                          | Laos/LA★                          | 0                      | 2                          | Tonga/TO              | 1                      | 1                          | Tokelau/TK                     | 0                      | 0                          |

# More RIPE Atlas probes in AP region!

- For local communities, health checking and visualizing the local community network to the Internet infrastructure is important to evaluate the network performance
  - Six types measurements of ping, traceroute, DNS, SSL/TLS, NTP and HTTP towards targets defined by users as well as build-in measurement for root servers
- For Root Server Operator, the probes help to
  - check the status of root service when the connectivity for admin has been lost
  - investigate routing issue which causes not to query the nearest root server instance
  - find good locations to host root servers to improve its connectivity and performance
- Please contact [\*\*training@apnic.net\*\*](mailto:training@apnic.net), if you have interest on placing Atlas probe in your network