Root Servers Instances in the Caribbean – What You Need to Know, What You Need to Do

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4th Technical Community Meeting, ARIN in the Caribbean
20 May 2021

What is a Root-Server?

and were they are located

About the Root Server System

- **RSSAC 026**
  - Entry point to the *root server system*.
  - Authoritative name server that answer queries for the contents of the *root zone.*
- **RFC 7720** *(DNS Root Name Service Protocol and Deployment Requirements)*
  - Protocol Requirements:
    - Core DNS functions (*RFC 1035*) and clarifications (*RFC 2181*)
    - IPv4 (*RFC 791*) and IPv6 (*RFC 2460*)
    - UDP (*RFC 768*) and TCP (*RFC 793*)
    - DNSSEC (*RFC 4035*)
    - DNS EDNS0 (*RFC 6891*)
  - Deployment Requirements:
    - Valid IP Address (*RFC 1122*)
    - Unique Root Zone (*RFC 2826*)

A bit of history of the Root Server System

- A timeline of the Root Servers and the DNS
  - Pre-1983: The HOST file and ARPANET
  - 1983-1986: Jon Postel & Paul Mockapetris work in IETF
    - RFC 881, 882, 883
    - 1984: First Root Servers: SRI-NIC (SRI International), ISIB + ISIC (USC) and BRL-AOS (US Army)
  - 1986-1990: Expansion for MILNET and NSFNET
    - 1987: 7 root-servers (SRI, USC, University Maryland, US Air Force, NASA, US Army and RPI)
    - 1988: IANA is born (RFC 1083)
  - 1991: Added the first non-US server: KTH / NORDUnet

A bit of history of the Root Server System (cont.)

- 1991-1995: Several changes of orgs. ISC takes over BIND development and adds a new root server.
- 1995: Renaming to root-servers.net.
  - 9 orgs renamed to {A..I}.ROOT-SERVERS.NET.
- 1997-1998: Added 4 letters with 3 new* operators: RIPE-NCC WIDE and USC ISI*
  - Formalization of ICANN, RSSAC and the Root Server Operators (RootOps) recognize IANA role as only source of root data.
- 1999: USC transfer some responsibilities to ICANN (including L.ROOT-SERVERS.NET.)

A bit of history of the Root Server System (cont.)

- 2014-2018: IANA and NTIA transition
  - Proposed Governance Model for the DNS Root Server System
    - Creation of documents RSSAC037 and RSSAC038
    - Core principles for the Root Server System
- So, this leave us here (2021)
  - 12 operators for 13 root servers.
    - And ICANN is only 1 of those root server operators.
  - Further info: https://root-servers.org
- If you're interested in history about the Root Server System read: *RSSAC023v2 (updated June 2020)*

root-servers.org website

As of 05/17/2021 11:31 p.m., the root server system consists of 1380 instances operated by the 12 independent root server operators.

root-servers.org website (cont.)

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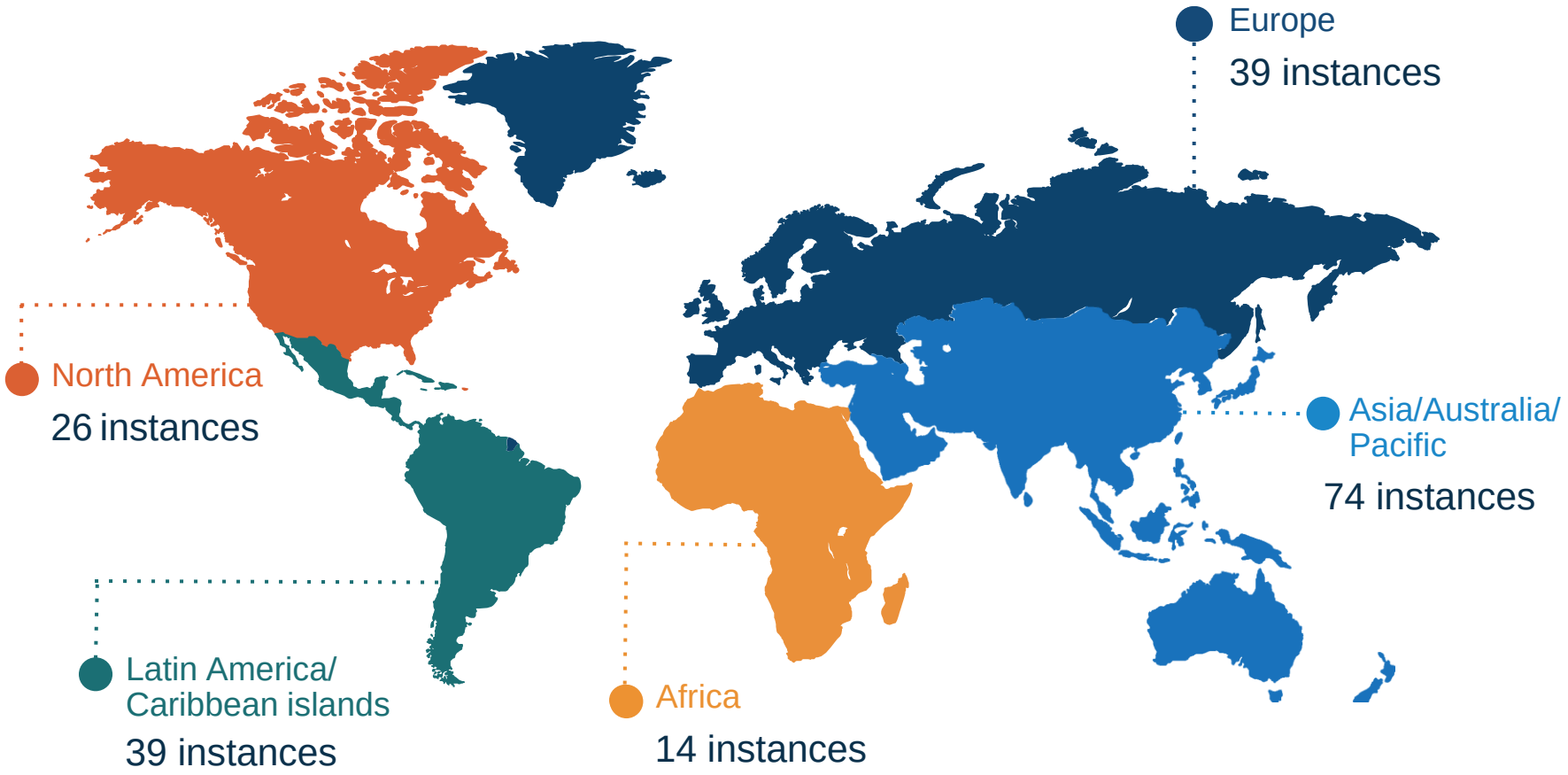
IMRS: ICANN Managed Root Server

- ICANN Operates one of the 13 Root Servers through its ***ICANN DNS Engineering Team*** (part of SaNE)
- ASN **20144**
  - IPv4: **199.7.83.42** (**/23** & **/24**)
  - IPv6: **2001:500:9f::42** (**/47** & **/48**)
  - DNS label: **L.ROOT-SERVERS.NET.**
- Anycasted since 2007
- Renumbered IPv4 address in 2007 (old was 198.32.64.12)
- Renumbered IPv6 address in 2016 (old was 2001:500:3::42)

IMRS Locations and Global Presence (May 2021)



For more details check: https://dns.icann.org/imrs/locations/

IMRS LAC Presence (May 2021)

Latin America and Caribbean islands

39 instances:

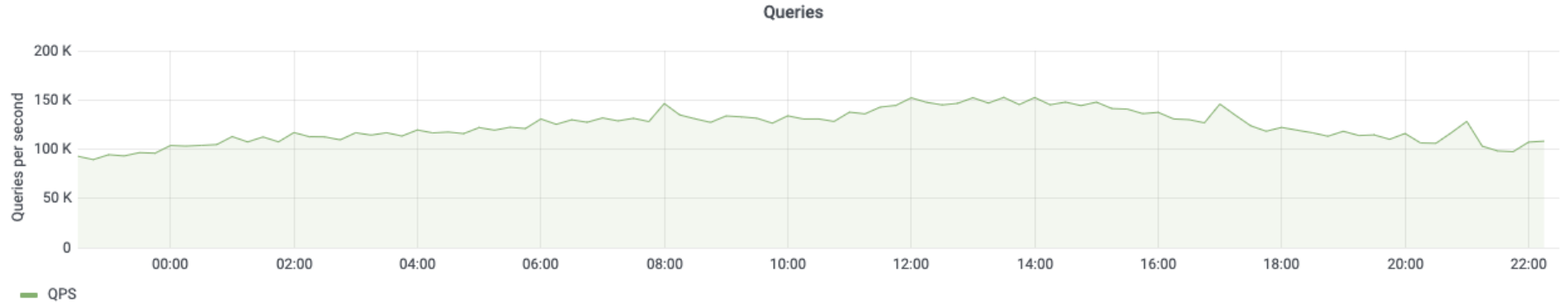
- Argentina (2)
- Bolivia (1)
- Brazil (19)
- Chile (4)
- Colombia (1)
- Costa Rica (1)
- Dominican Republic (1)
- Ecuador (1)
- El Salvador (1)
- Mexico (3)
- Paraguay (1)
- Peru (2)
- Puerto Rico (1)
- Uruguay (1)

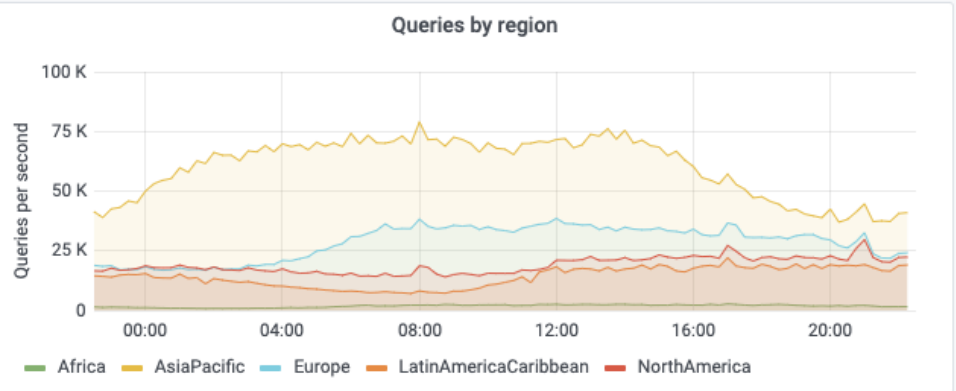
DNS-STATS

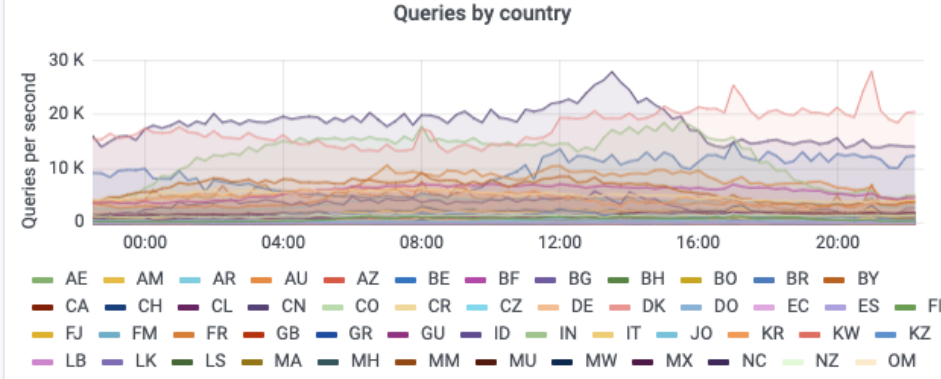
ICANN Managed Root Server

DNS-STATS

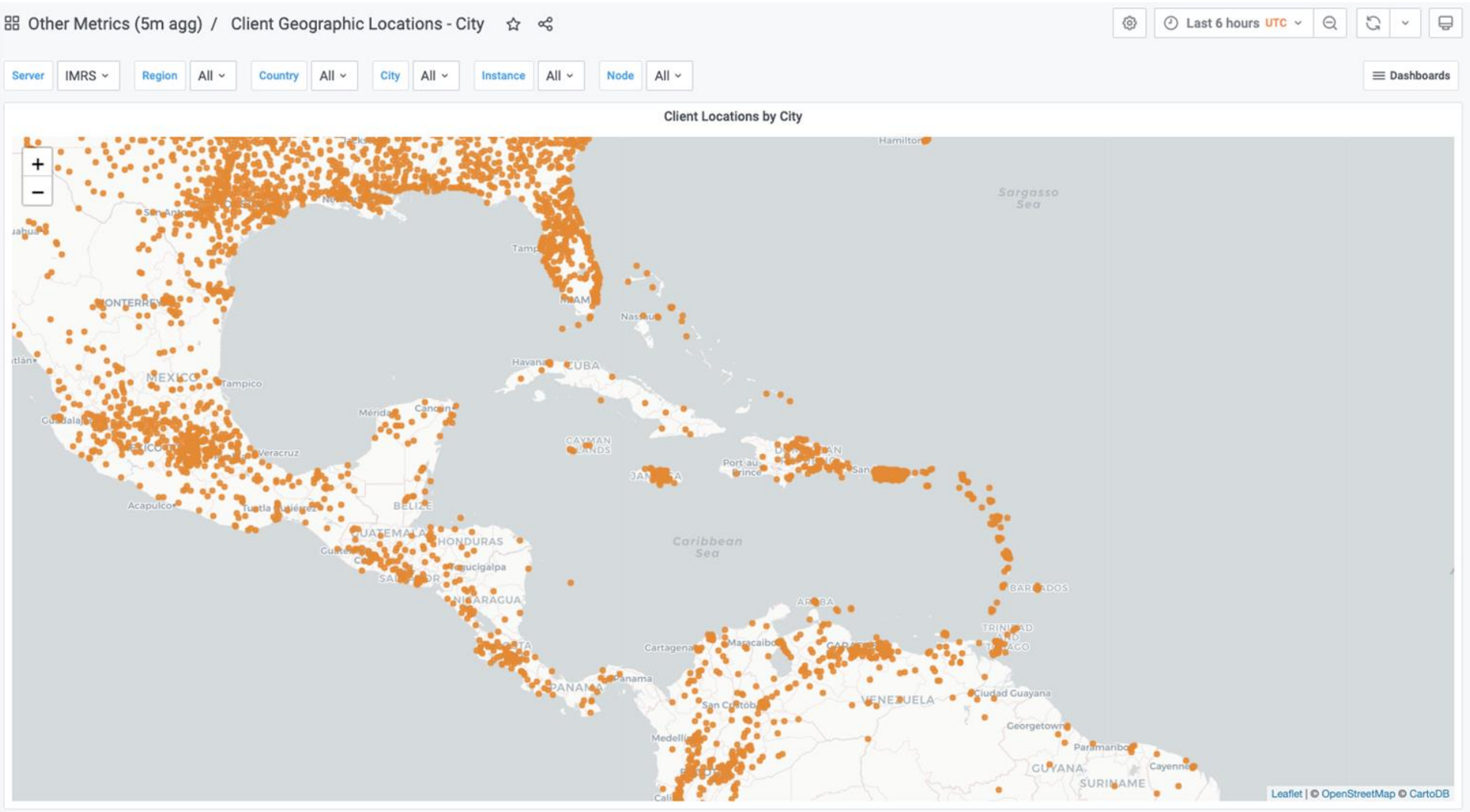
https://stats.dns.icann.org



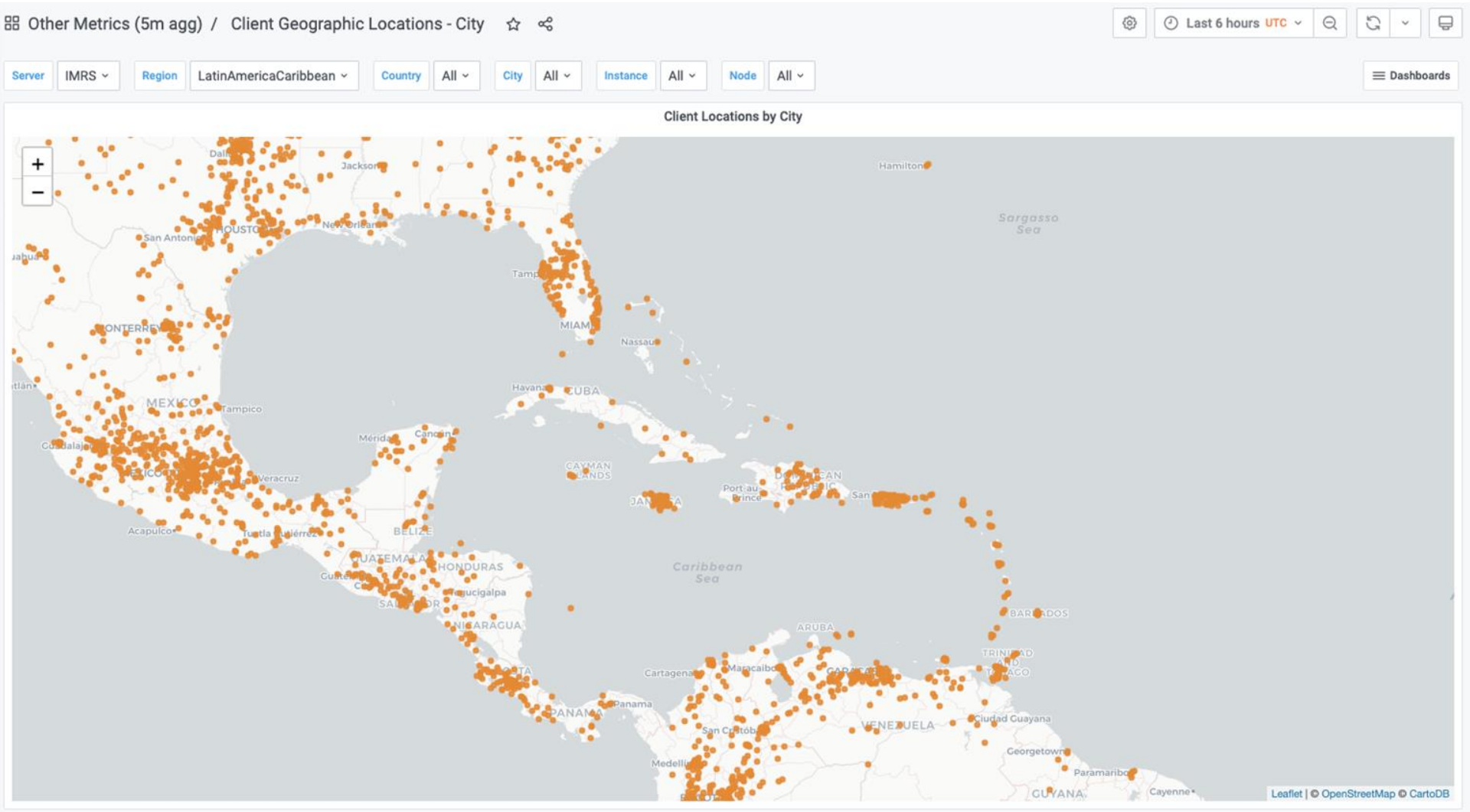




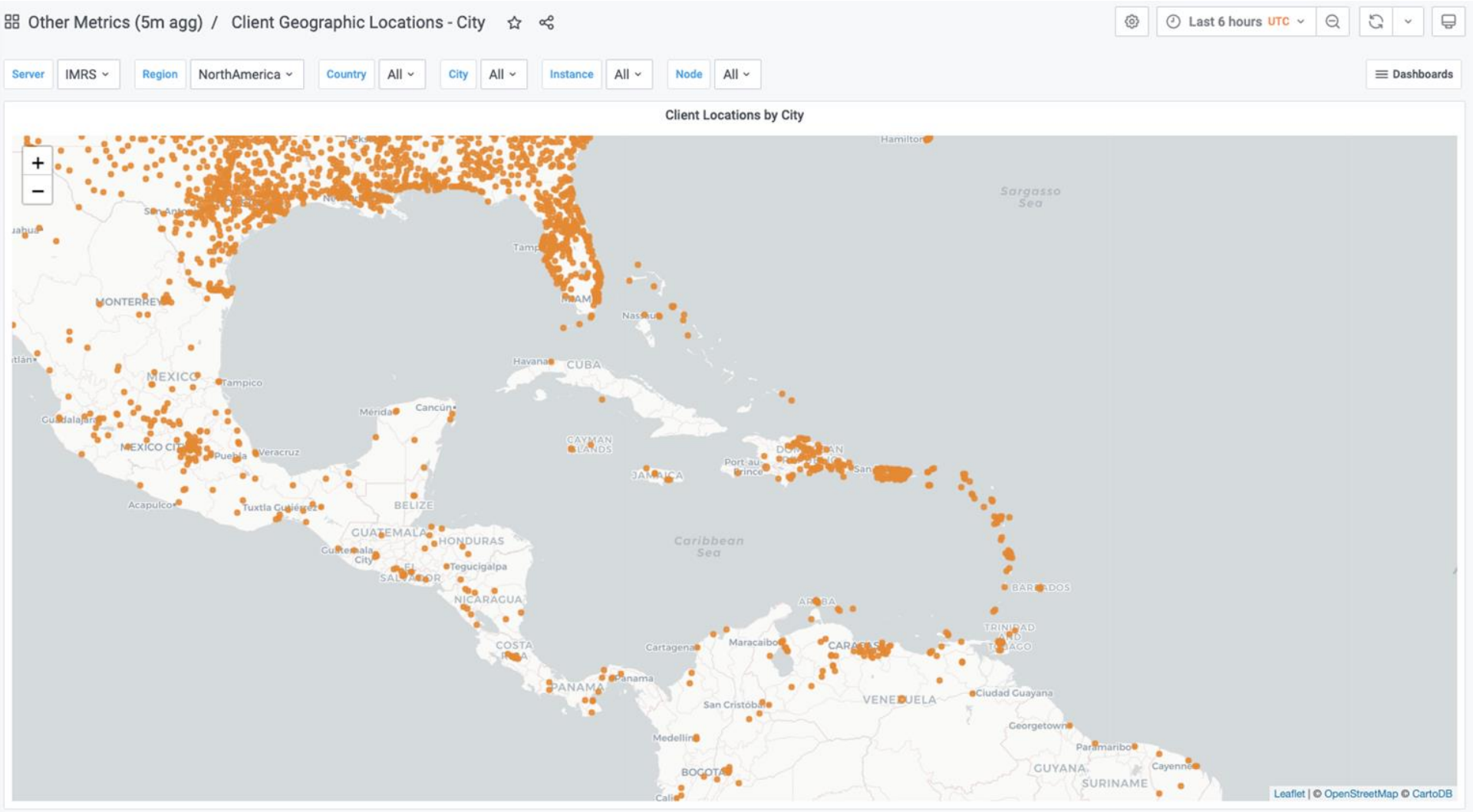
DNS-Stats: Client Geographic Location (by City)



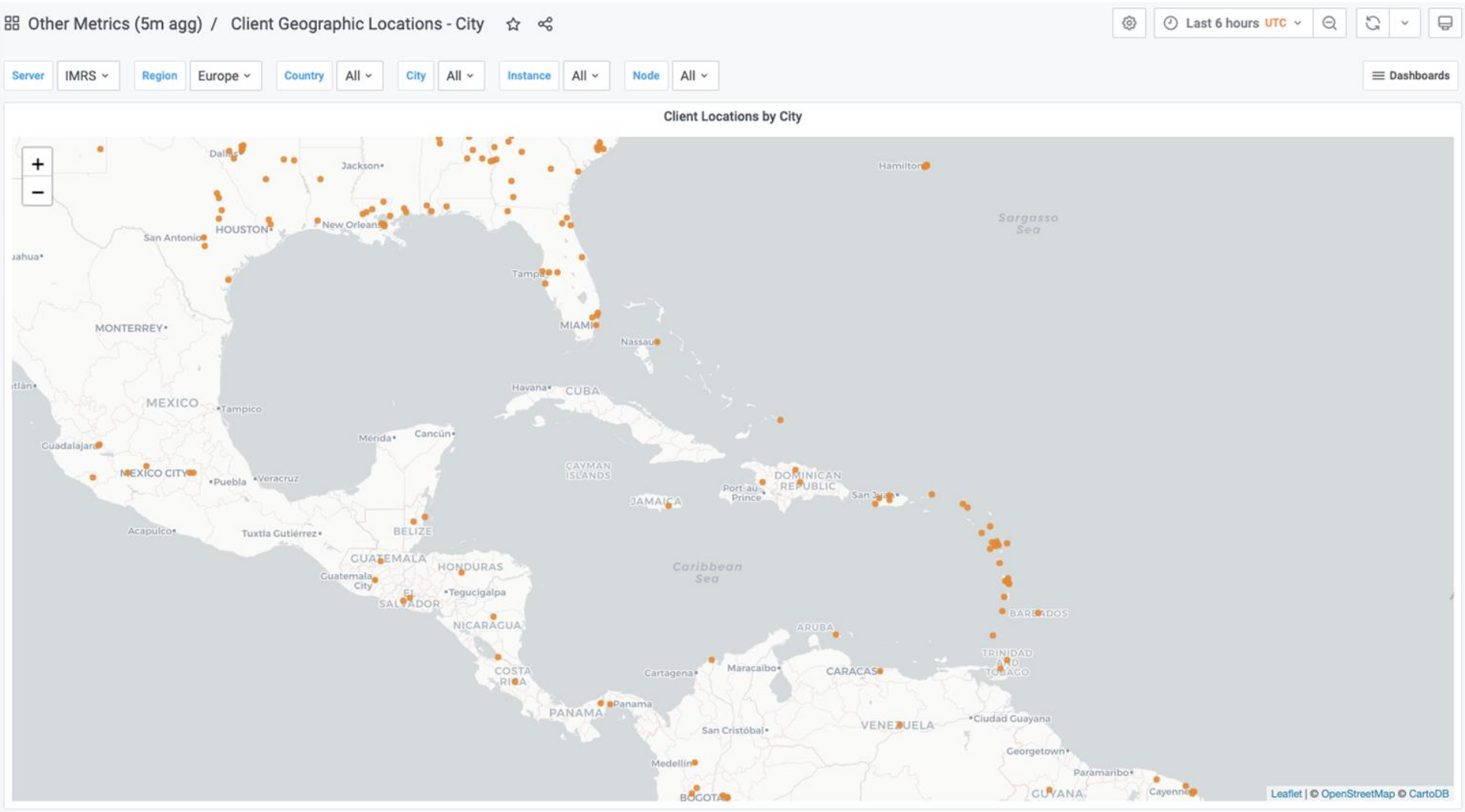
DNS-Stats: Client Geographic Location (by City) as seen by IMRS instances in Latin America and the Caribbean



DNS-Stats: Client Geographic Location (by City) as seen by IMRS instances in North America



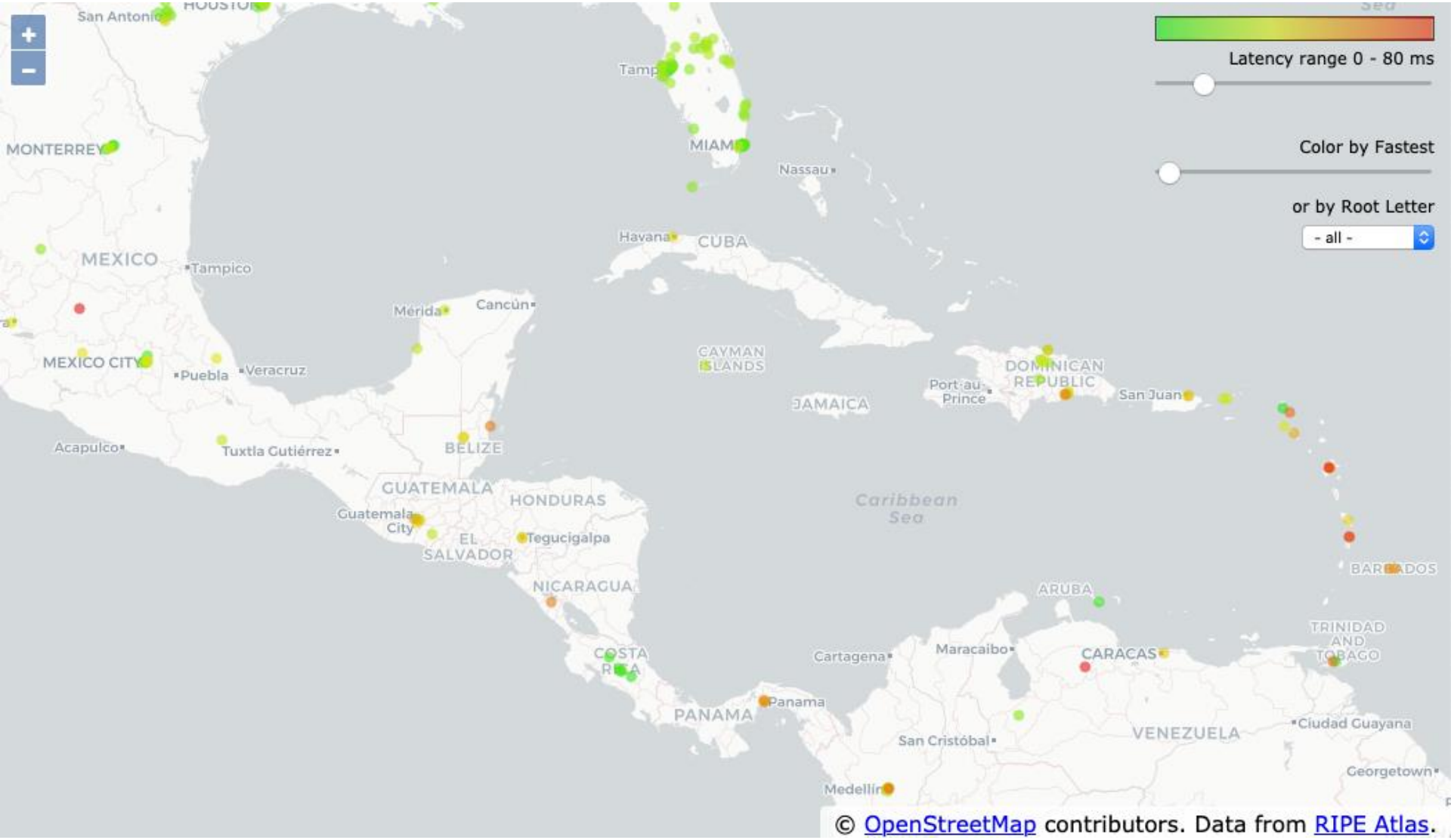
DNS-Stats: Client Geographic Location (by City) as seen by IMRS instances in Europe



Latency as seen by the RIPE Atlas project

https://atlas.ripe.net

RIPE Atlas: Latency to the Root Server System



Hosting an instance in your network

Becoming an IMRS host

Want to host an instance on your network?

- Pre-requisites:
  - Your organization is willing to host a server instance managed by ICANN
  - Your organization can provide all the following:
    - Sign an **NDA** and an **ICANN Agreement** (no cost)
    - **Purchase a hardware appliance** (specified by ICANN DNS Engineering)
    - **Provide housing** for the appliance (hosting + power + IPv4 + IPv6 connectivity)
    - Ability to **establish a BGP peering** session to propagate (re-advertise) prefixes in both IPv4 and IPv6 from AS20144.
    - **Follow BCP38**

Benefits of Hosting an IMRS instance

- Anycast allow multiple copies of a server to be on multiple places, allowing us to:
  - Put service closer to the end-user:
    - Lower RTT
    - Improve user experience
  - Increase query capacity
  - Reduces the likelihood that some types of attack traffic would affect the rest of the Internet by keeping it closer to the source
  - Flexibility to add/remove instances

Hosting an IMRS Workflow

- If the organization can satisfy the prerequisites, it will contact the ICANN GSE local representative to start the process
- Internally ICANN GSE will contact the ICANN DNS Engineering (DNSEng) team to deliver the process documents via DocuSign to the candidate organization.
  - The organization will complete the following:
    - Initial information gathering document
    - Then it will need to sign an NDA
    - Then it will need to sign the contract and a Technical Information gathering form (addressing and routing details)
  - Once everything above is completed, the organization then proceed to buy the appliance
  - ICANN DNSEng team installs and commissions the appliance(s).

IMRS Appliance

Why? Which one is right for me?

Why an appliance to host an IMRS ?

- Advantages of installing/upgrading an IMRS appliance
  - The IMRS appliance life span is 5 years.
    - Support for 5 years is included on the price.
    - Hosting IMRS agreement requires the upgrade of hardware every 5 years.
  - Uniformity of hardware allows us to ensure operation stability.
    - Removes complexity and operational costs.
    - Removes driver selection/compatibility issues.
    - Hardware performance tuning possible.
- Hardware is owned by the host, but managed by ICANN DNS Engineering

What kind of appliance is right for an org?

- Appliance is purchased to a third-party provider (there's no payment involved via or with ICANN)
- Two OEM systems. Both with 5-year warranty
  - Code-name **Calypso** (most common)
    - 1U, single power, Gigabit ethernet
    - Best fit for small orgs (Tier 2/3 ISPs and Enterprises)
  - Code-name **Pandora**
    - 1U, redundant power, 10gig fiber ethernet ports
    - Best fitted for larger orgs (Tier 1 ISPs)

Engaging with ICANN DNS Engineering

- Website: http://dns.icann.org/imrs
  - How to host an ICANN Managed Root Server (IMRS) inside your network
  - F.A.Q. about hosting an IMRS-Single in your network
  - World coverage presence and current locations
  - IMRS DNS Metrics and Usage, powered by DNS-STATS
  - IMRS RSSAC measurements
  - Our regular scheduled maintenance windows
- You can find us on the usual meetings (research, standards and protocols, regional ops, etc.)
  - DNS-OARC, *NOG, IETF, CENTR, etc.
- Also, we are on Twitter: @ICANNdnsEng

Engage with ICANN – Thank You and Questions

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