

# k.root-servers.net by RIPE NCC

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Daniel Karrenberg  
Chief Scientist, RIPE NCC



# Who is talking: Daniel Karrenberg

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- **1980s:** helped build Internet in Europe
  - GUUG, EUUG, EUnet, Ebone, IXes, RIPE, ...
- **1990s:** helped build RIPE NCC
  - 1st CEO: 1992-2000
- **2000s:** Chief Scientist & Public Service
  - Trustee of the Internet Society, IETF, ...
- **2010s:** Chief Scientist
  - Interests: Internet measurements, stability, trust & identity in the Internet, ...

# What DNS Root Name Servers Do

**Tell where are**



**once every**





# What DNS Root Name Servers Do





# DNS Root Name Server Locations





# DNS Root Name Server Locations





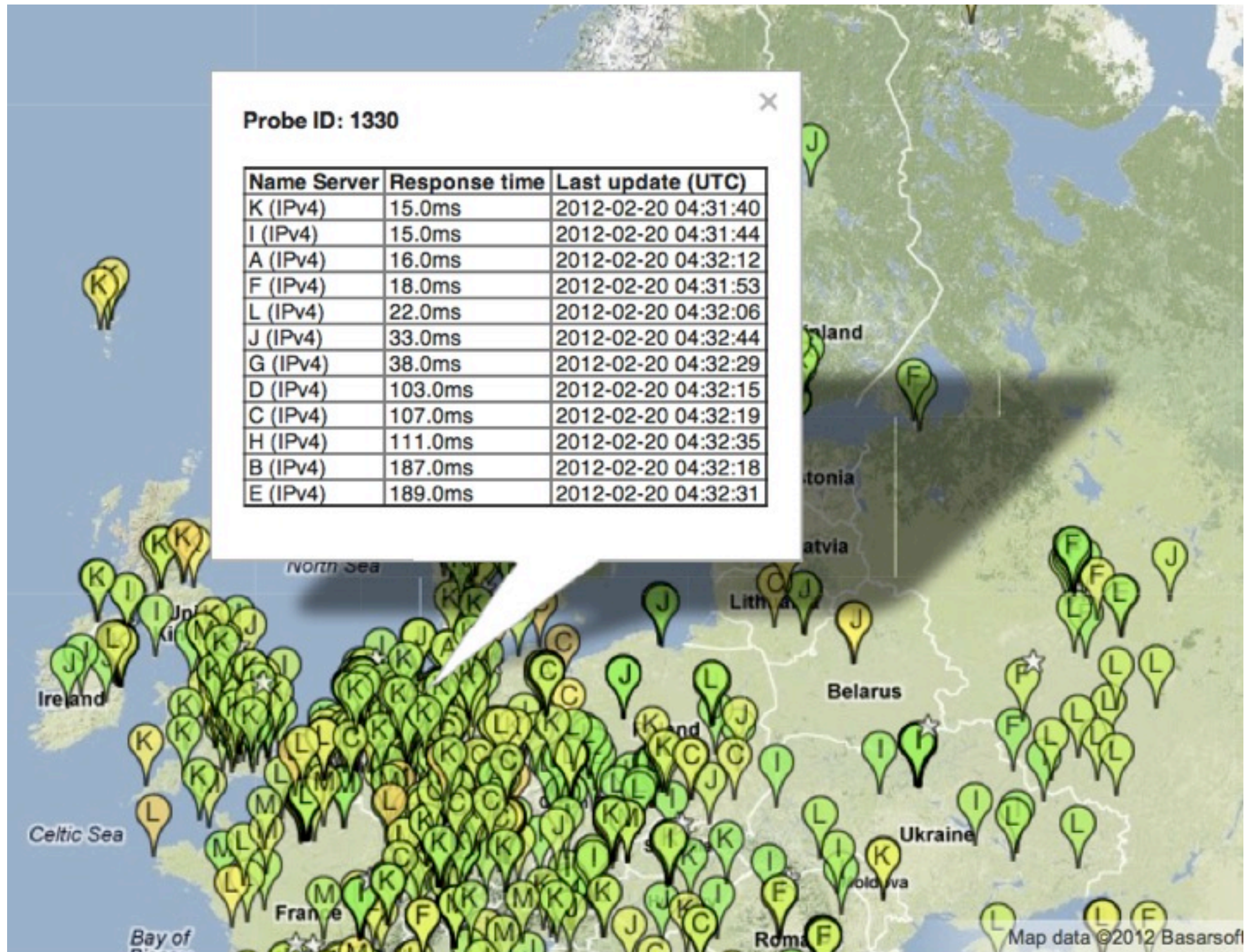
# Closest Root Server as seen by RIPE Atlas



2012-02-20 05:02:01 UTC.



# Closest Root Server as seen by RIPE Atlas





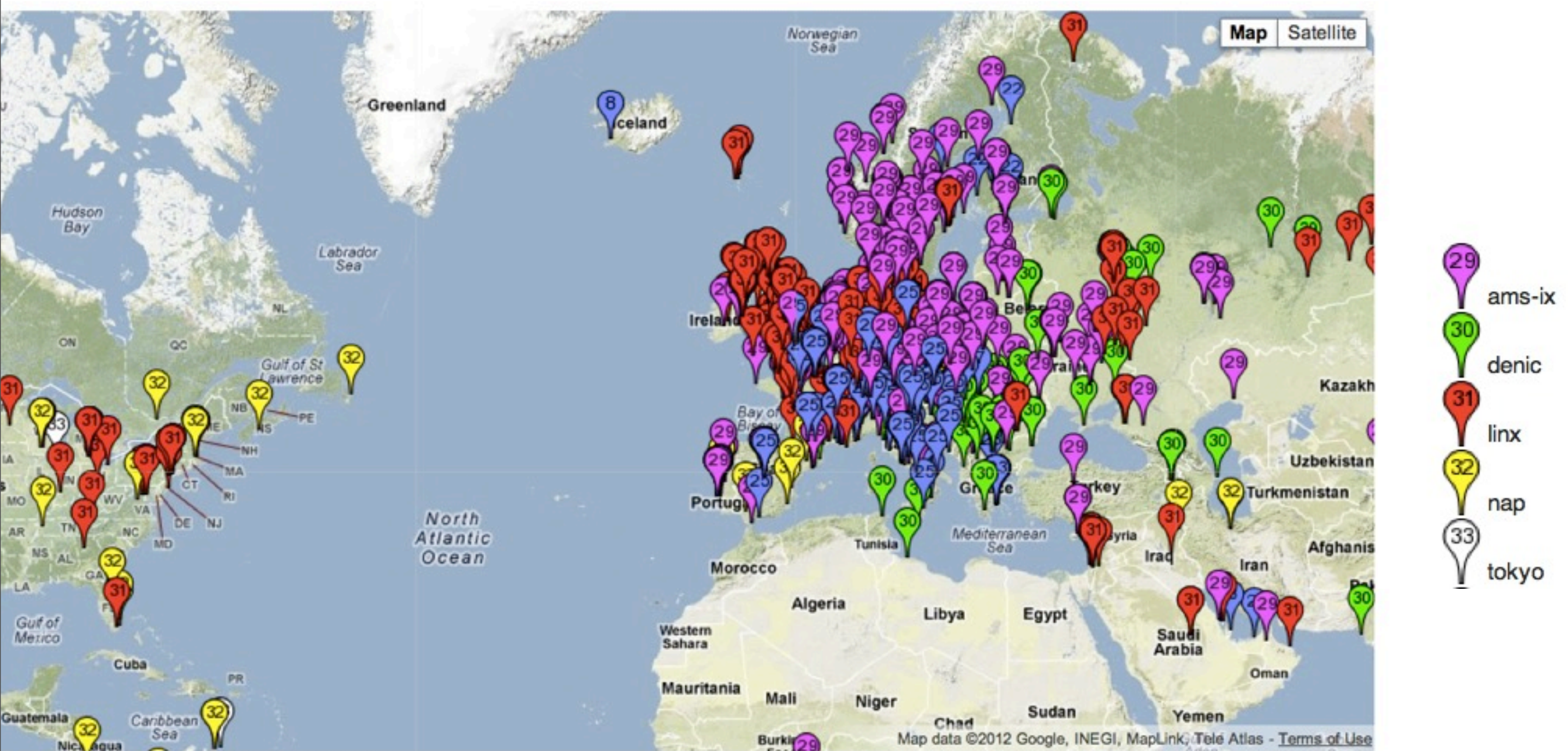
# k.root-servers.net: Locations



Local Nodes: Budapest, HU • Milan, IT • Helsinki, FI • Reykjavik, IS • Poznan, PL • Geneva, CH • Delhi, IN • Athens, GR • Doha, QA • Novosibirsk, RU • Abu Dhabi, AE • Brisbane, AU • Dar es Salaam, TZ



# k-root: Instance seen by RIPE Atlas

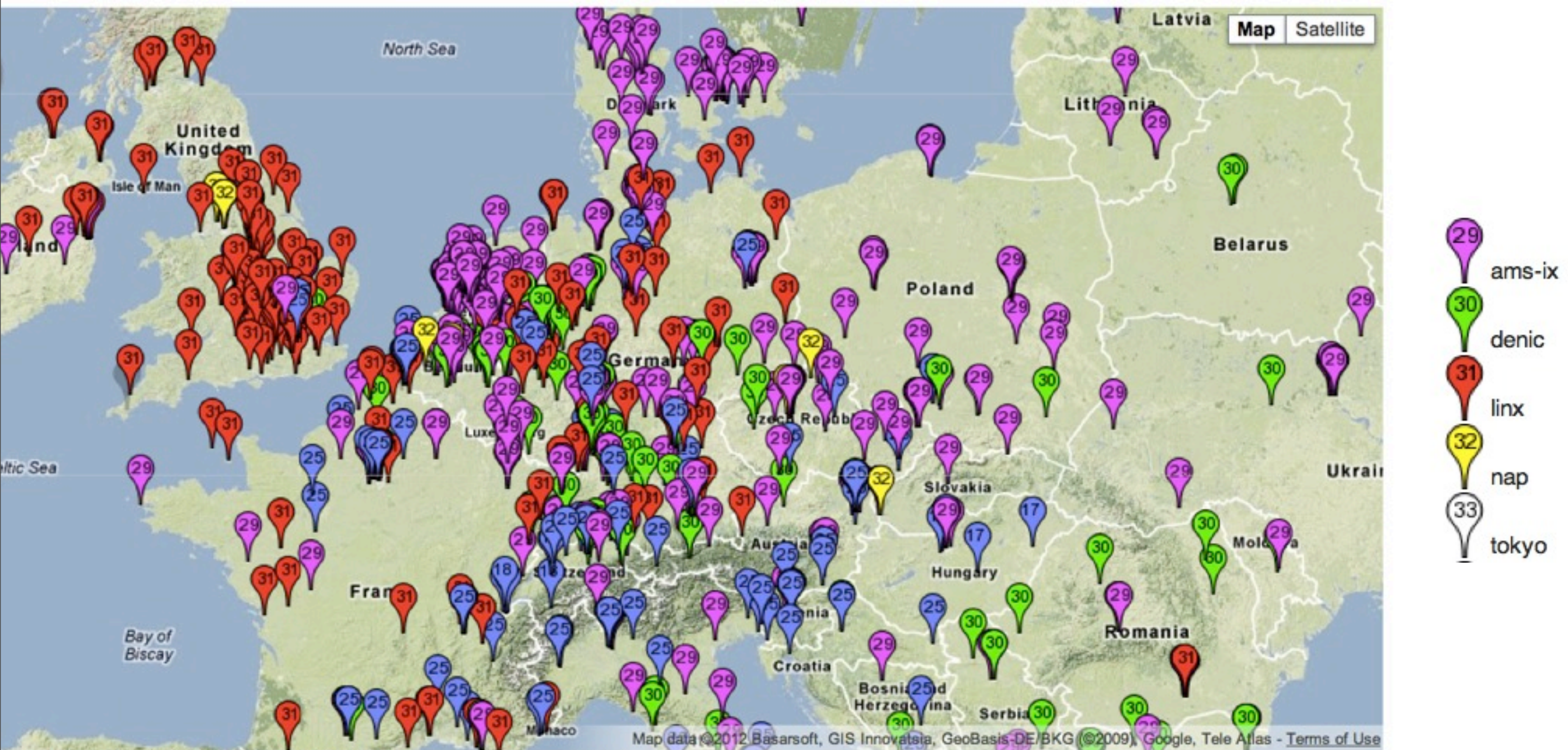


Map produced at: 2012-02-20 04:50:16 UTC.  
between 2012-02-19 05:20 UTC and 2012-02-20 04:50 UTC.

8 isnic 12 nskix 13 qtcl 16 apnic 17 bix 18 cern 19 delhi 21 emix 22 ficix 23 grnet 25 mix 27 poznan



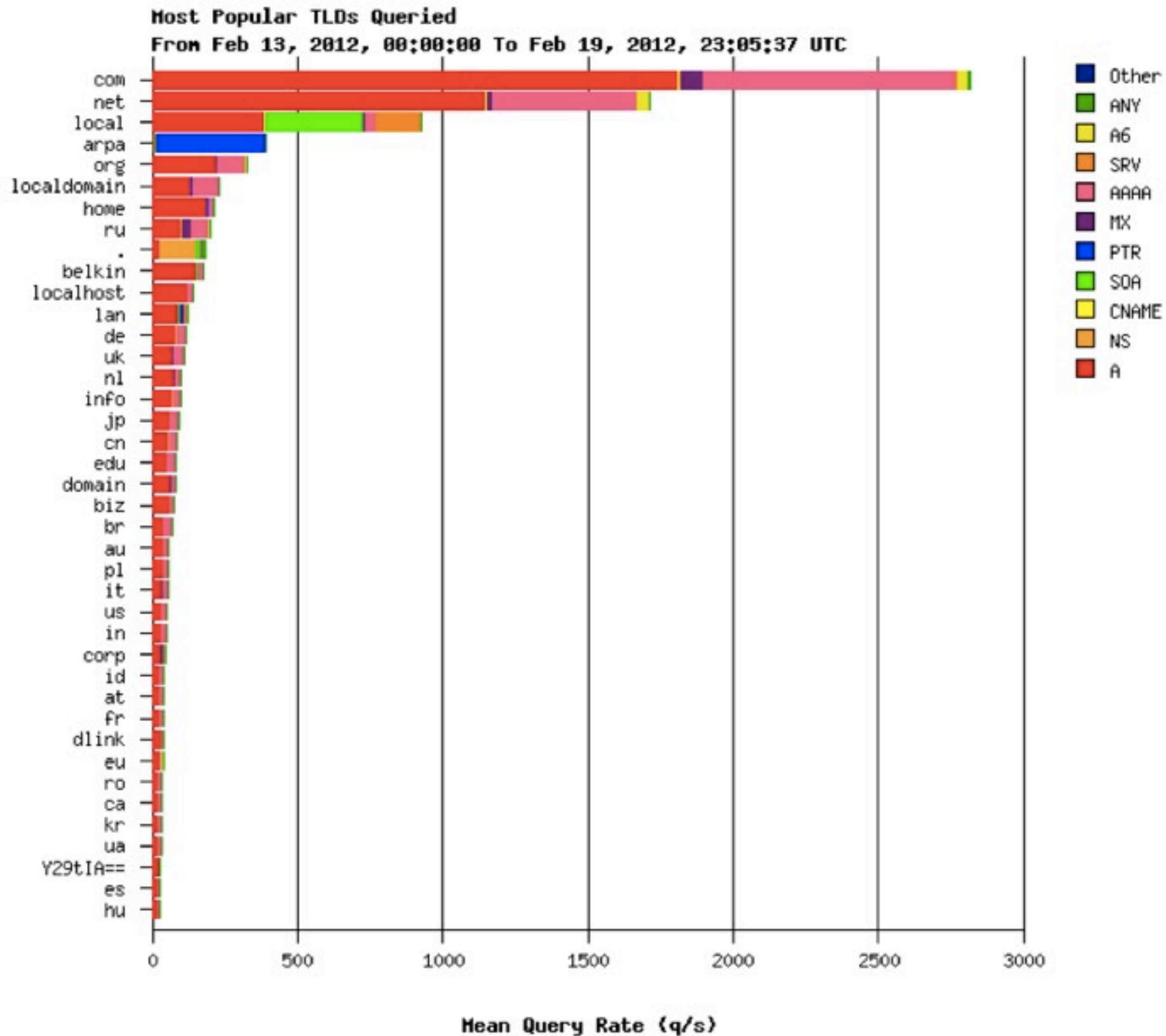
# k-root: Instance seen by RIPE Atlas



8 isnic 12 nskix 13 qtcl 16 apnic 17 bix 18 cern 19 delhi 21 emix 22 ficix 23 grnet 25 mix 27 poznan

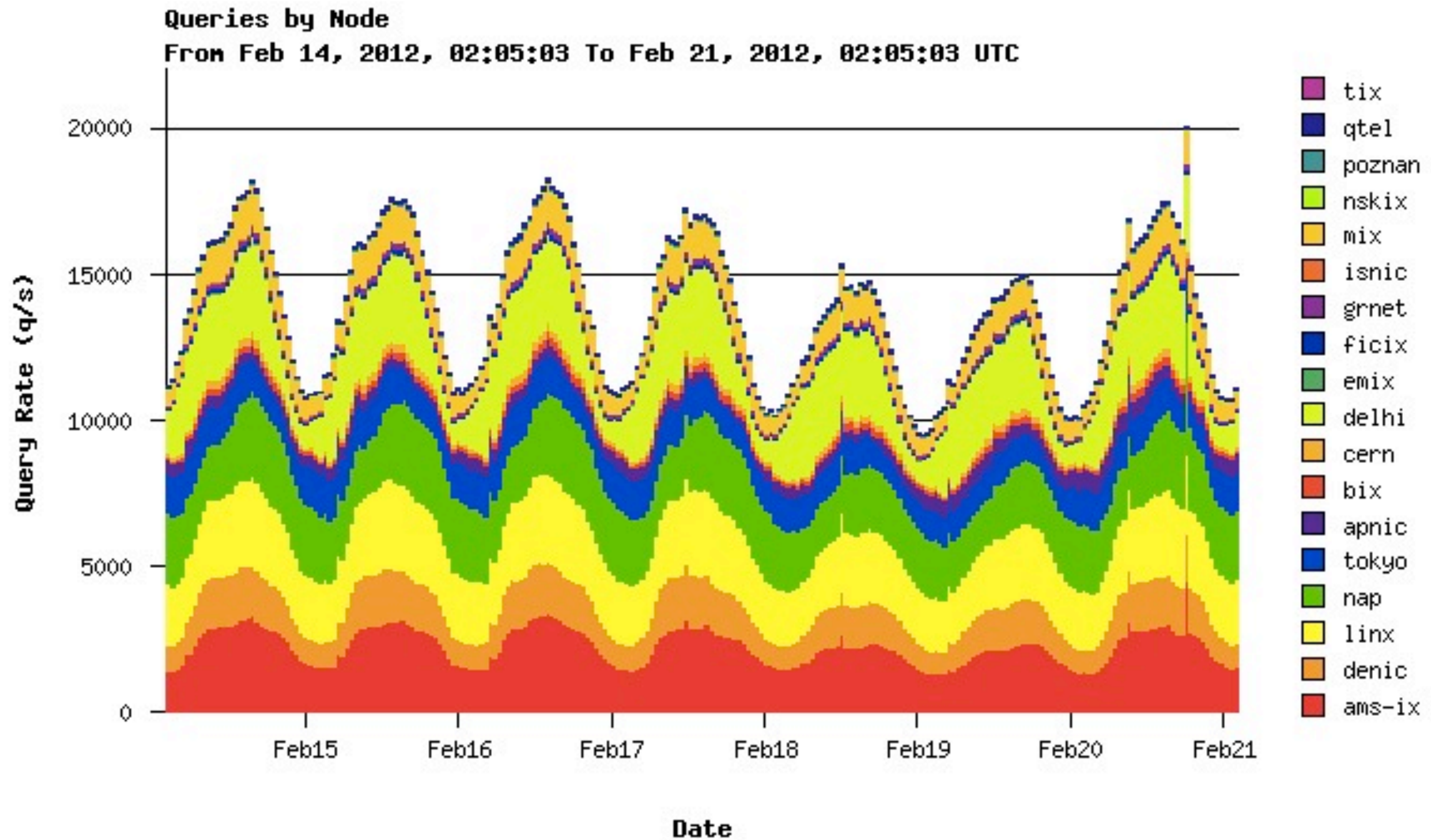


# k.root-servers.net: TLDs Queried



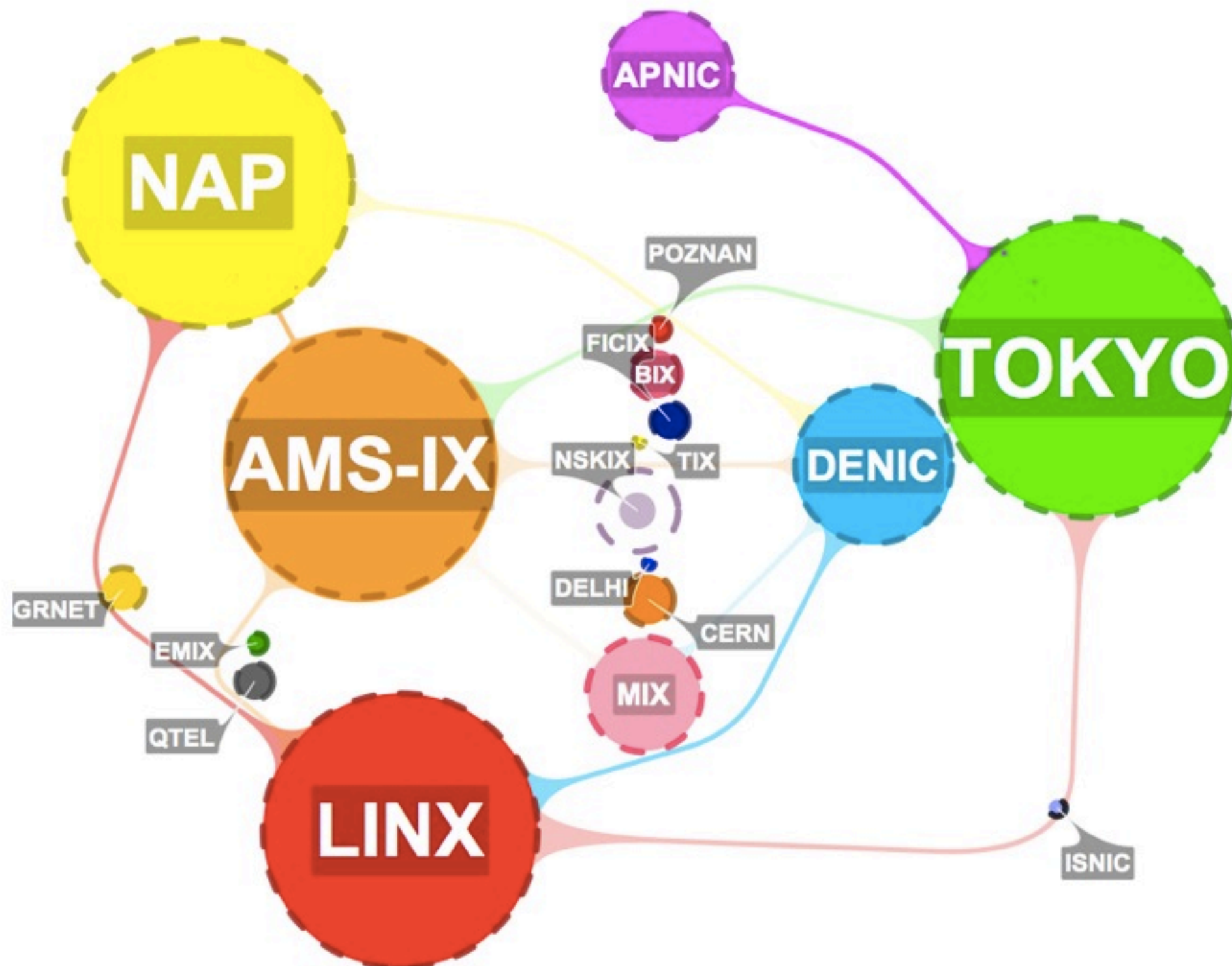


# k.root-servers.net: Query Load





# k.root-servers.net: Load Distribution





# DDoS Mitigation

- Over-provisioning:

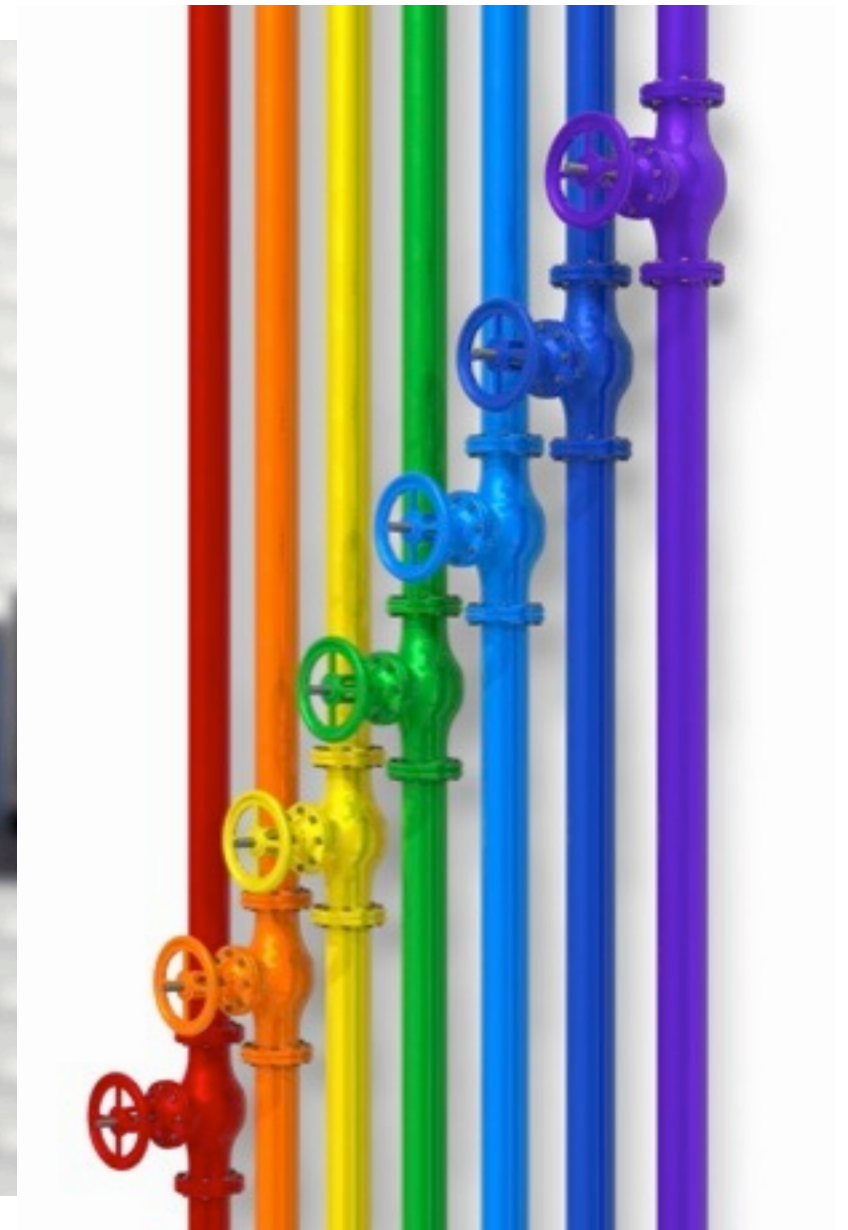


Not to scale !



# DDoS Mitigation

- Cooperation with ISPs





# DDoS Mitigation

- Cooperation with ISPs





# dnsmon



Daniel Karrenberg, 21 February 2012



# References

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- [root-servers.org](http://root-servers.org)
- [k.root-servers.org](http://k.root-servers.org)
- [k.root-servers.org/visualk](http://k.root-servers.org/visualk)
- [atlas.ripe.net](http://atlas.ripe.net)
- [dnsmon.ripe.net](http://dnsmon.ripe.net)
- [www.isoc.org/briefings/019](http://www.isoc.org/briefings/019)
- [www.isoc.org/briefings/020](http://www.isoc.org/briefings/020)
- [labs.ripe.net](http://labs.ripe.net)



# Questions?

