# AS112 Intro

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# What is AS 112?

- Not just another AS number!
- An anycasted DNS instance that deals with reverse map queries for RFC 1918 IP addresses
- Very similar in operation to other anycasted DNS instance, eg. F.root-servers.net
- A volunteer effort

# Details

- IANA has delegated reverse maps for the following subnets:
  - 10.0.0.0/8
  - 172.16.0.0/12
  - 192.168.0.0/16
  - 169.254.0.0/16
- The project uses the 192.175.48.0/24 subnet to house the DNS server and uses AS112 as the origin in BGP.

# Anycast

- Simply put, a solution to create multiple ‘clones’ of the same destination address located in geographically different places on a network
  - Typically uses a routing protocol (BGP for Internet, OSPF/IS-IS/etc otherwise)
  - Largely limited to UDP
- Some examples are f.root-servers.net and 6to4 relays (RFC3068).

# Typical Node Software

- Sites use a server with usually the following software:
  - BGP provided through Zebra/Quagga
  - BIND
  - Perl/bash (for automated scripting)
  - Debian GNU/Linux/FreeBSD/etc
- For query monitoring software, there are various solutions:
  - Bindgraph (CPU intensive)
  - DSC (distributed architecture)

# How many are there?

- http://www.as112.net/ lists servers that have been either discovered through route-views.oregon-ix.net or via notification by volunteer operators.
  - At least 54 known nodes
- The next presentation may give us some more insight.

# Operations Adventures

- Maintaining Drupal-based website for the project has been interesting (strictly Drupal-related)
- Two instances of ISPs making AS112 SOA for a domain
- Weird routing leaks
  - Commercial ISPs hear AS112 nodes from research nets and query/respond via commodity links

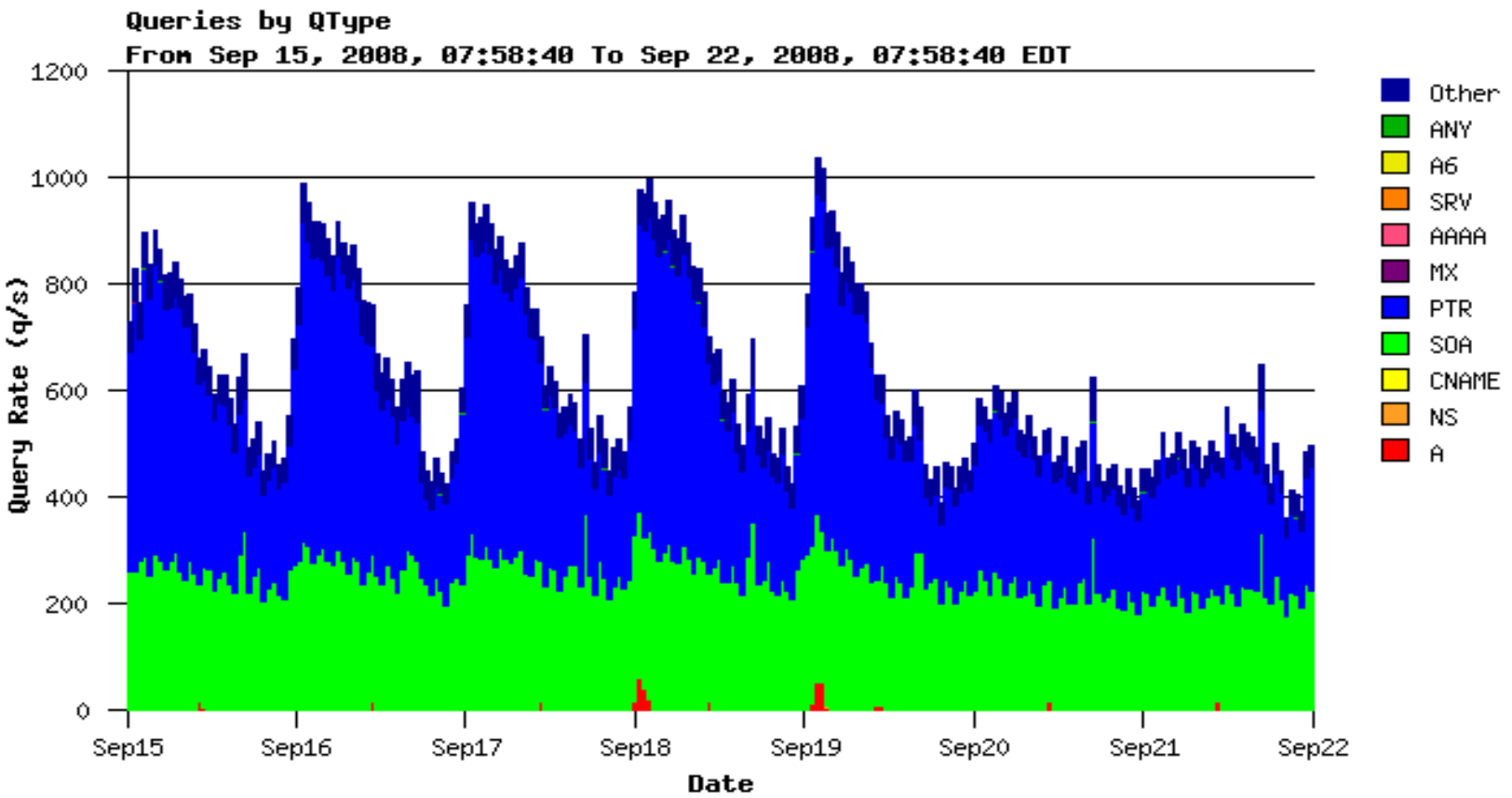
# Numbers

- Ottawa Internet Exchange here in Ottawa runs an atypical AS112 node:
  - Announced to research networks primarily
  - Announced to OttIX peers
  - No Internet access
  - Gives a possible indication of RFC1918 network DNS misuse in a regional context.
- This node typically sees 1000 queries/s peak, dropping to 600 queries peak on weekends

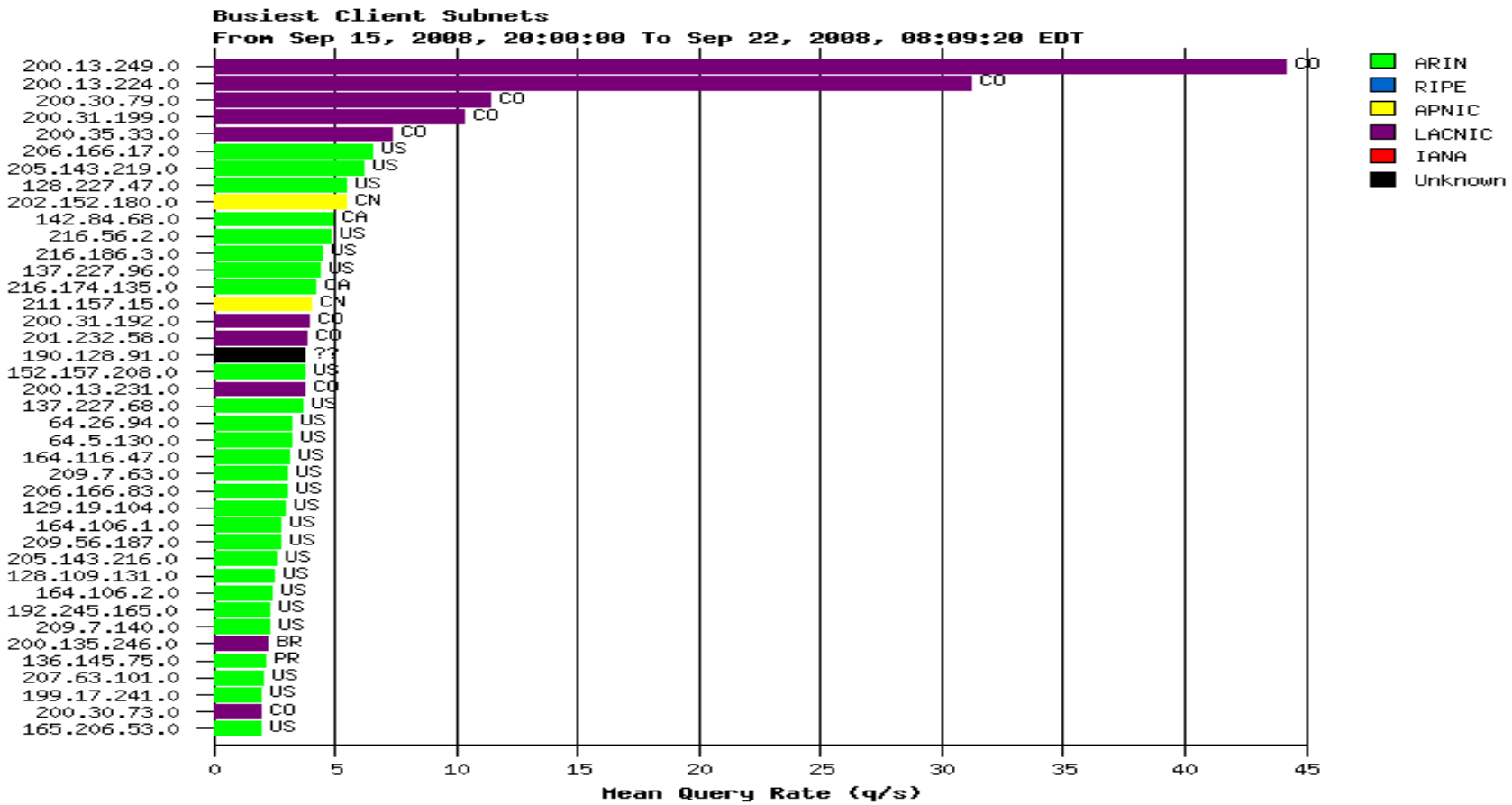
# Queries

- For the Ottawa node queries seem to be divided into three types:
  - SOA
  - PTR
  - Dynamic DNS updates
- Of these SOA and PTR queries dominate
- An incredibly interesting anomaly:  A very periodic bunch of A queries from just one K12 org in the US (red) within an extremely short (minutes) period of time
- Top clients:  By volume, from Columbia; by subnets, USA.

# Query by type



# Queries by subnet



# IETF Efforts

- Two drafts submitted to IETF DNSOP working group
  - *Draft-ietf-dnsop-as112-ops* documents AS112 operations for the first time in a standards body context
  - *Draft-ietf-dnsop-as112-under-attack-help-help* tries to educate users or ‘network admins’ who encounter issues with AS112 operations
- Comments on these drafts are appreciated

# Future

- Some mechanisms need to be created to deal with new delegations of reverse maps
  - RFC3330 and RFC3330bis
  - IPv6 special use
  - Perhaps a new draft is required
- DNSOP's *draft-ietf-dnsop-default-local-zones* and vender adoption and DNS operator deployment will go a long way to alleviate such traffic and concerns.
  - Will get IANA to setup a registry that perhaps AS112 can take advantage of
- Convince more AS112 operators to make stats available

# Future Imperfect

- There has been some discussion about the load on root DNS servers regarding junk TLDs (eg .local)
  - See http://blog.icann.org/?p=240 for more info
  - Duane Wessel's 2002/2003 data in http://www.nanog.org/mtg-0310/pdf/wessels.pdf slide "Punchline from Last Year's Talk": Unknown TLD queries at 12.5% of total
  - This isn't likely to get traction as it enters the ICANN/IANA political spheres
  - But if DNS operators are seeing the hit, maybe then they'll act?