Day In The Life of the Internet
2008 Data Collection Event

http://www.caida.org/projects/ditl

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Short Story

- 2008 "Day In the Life of the Internet" data collection event this March.
  - We got some good data in 2006 and 2007
- You have interesting data. Your data can help researchers answer interesting questions. We would love for you to participate.
- We don't necessarily want you to send your data to us.
  - Although we can store it for you if you prefer.
- After you collect data, we'd like you to annotate/describe it and tell others how they might be able to get it.

Motivation

- In 2001 a National Academy of Science report challenged the research community to 'capture a day in the life of the Internet' with as much scientifically grounded methodology as possible, and with resulting data as widely accessible as possible.
- In 2006 CAIDA and OARC coordinated 48-hour data captures from as many DNS root nameservers as possible.
- In 2007 we expanded participation, and developed supporting infrastructure, documentation, and analyses.
- Results, e.g., "The DNS Root Name Servers: a 2007 Snapshot"
- Inspired to further expand scope in 2008

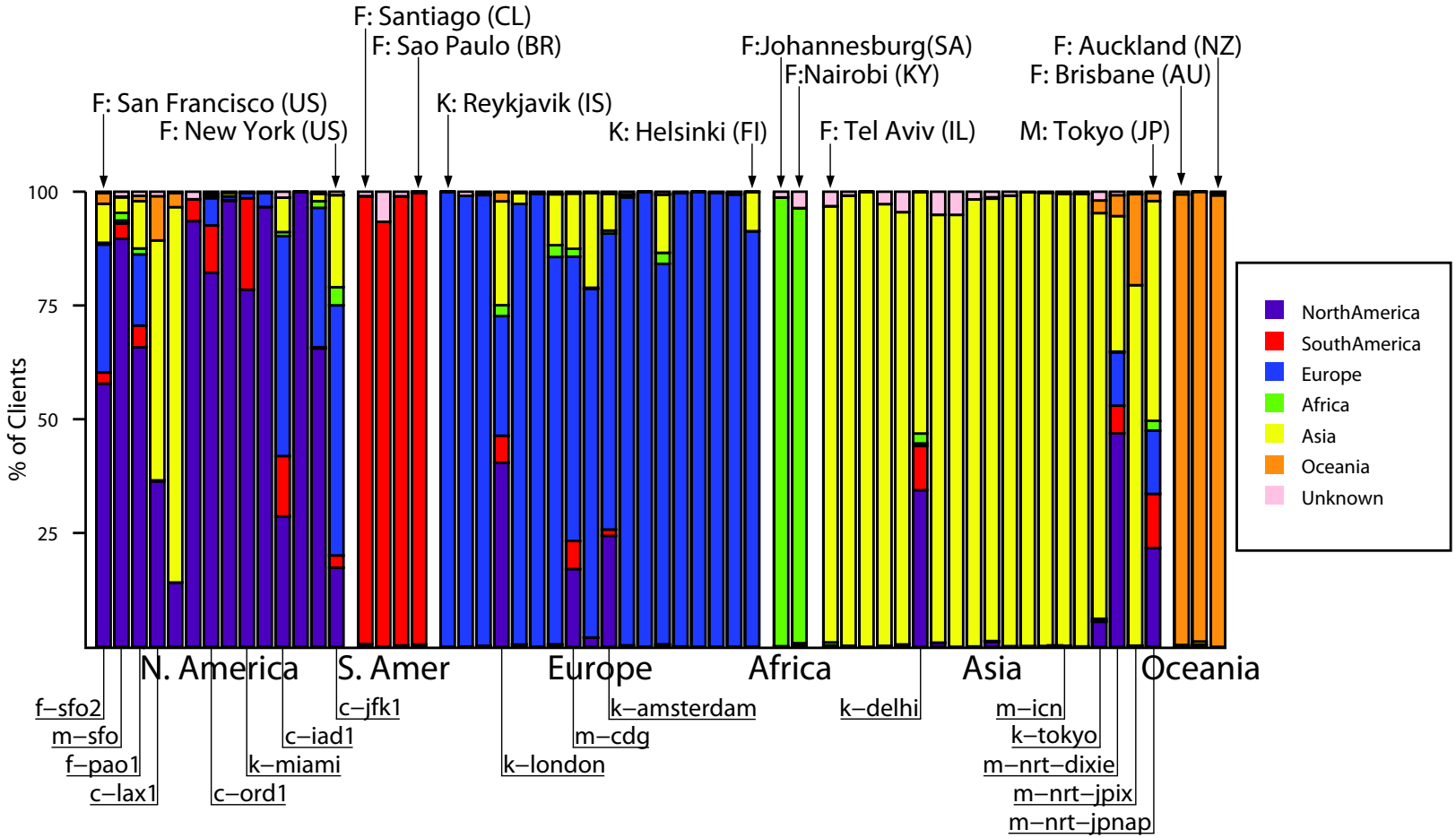
2007 Participants & The Data

1. OARC DNS Root Nameservers: C, E, F, K, M dns packet traces with payload.
2. NaMeX Internet Exchange: AS112 data.
3. Open Root Server Network (ORSN): dns packet traces with payload.
4. Japan: WIDE, GigE campus/transit packet traces.
5. Korea: universities (3), R&E backbone access link (1) and commercial GigE link packet traces.
6. AMPATH: Miami IXP, anonymized OC12 trace (.edu link).
7. CAIDA: topology, ucsd telescope, IRcache squid logs.
8. Other available data: Internet2 netflows and Routeviews.

What did we learn from DITL 2007 data?

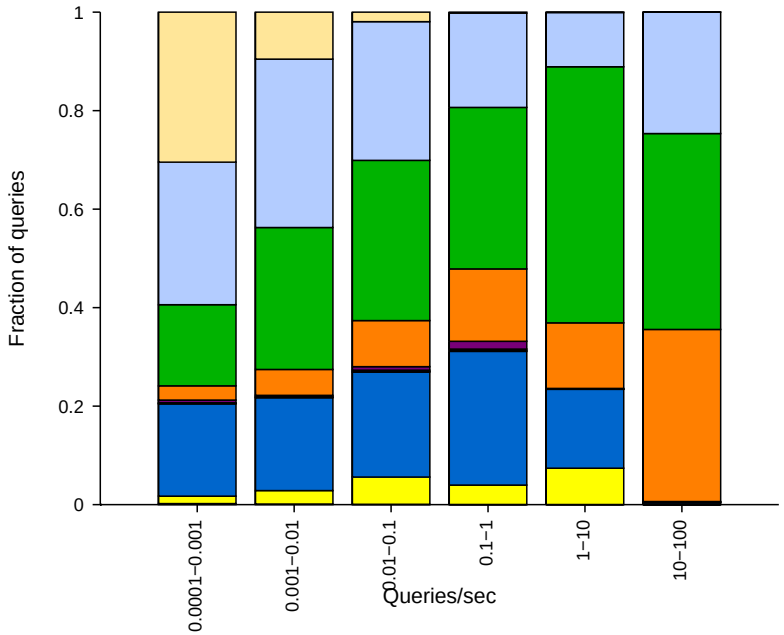
- 5% of clients contribute 95% of the query load (5 roots)
  - diverse query rate distribution
- 1–2% of queries to roots are legitimate
  - repeated, identical, referral-not-cached queries are 69% of total
  - the higher the query rate, the lower fraction of legitimate queries
  - for low rate queriers, similar distribution of query types
  - quite a few A6 (deprecated) queries
- Query rates at observed servers approximately doubled from 2006 DITL.
- Anycast at roots is effective at localizing resource consumption
  - and limiting impact of DOS attacks
  - stable: 98–99% of clients use only one instance of an anycast cloud

Where do root queries come from? (DITL 2007)

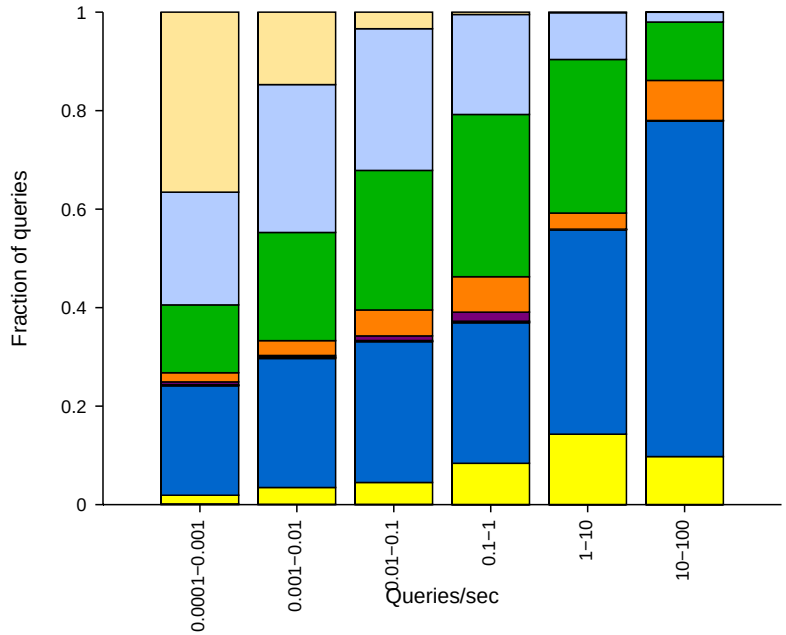


Server locations (longitude) on X-axis, Client geography by color.

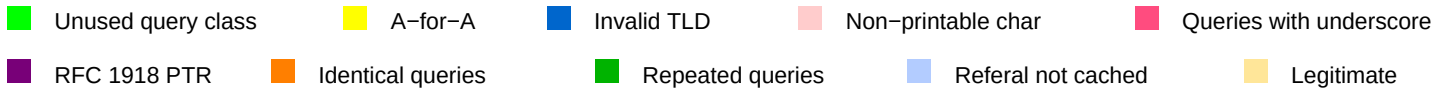
What is all the pollution at the roots? (DITL 2007)



C-root



F-root



What did we learn from DITL 2007 collection process?

- You need more disk than you think.
- Some remote collection sites don't have enough bandwidth to upload data.
- Collecting data is easy; Indexing and annotating data is hard.
- Some clocks will be skewed, despite best efforts.
- Why use *tcpdump* when you can use *dnscap*?

We're addressing all of these issues for the 2008 collection:

`http://www.caida.org/research/dns/roottraffic/dnsroot_measurement_recommendations.xml`

Questions to pursue with DITL data: DNS

- Who/what is the source of root server garbage traffic?
- What does root server data suggest about trends in IPv6, DNSSEC, DNS packet sizes, prevalence of TCP-based DNS queries, and use of unallocated or unassigned IP address space?
- Can we characterize workload and performance of IDN deployments?
- Why are millions of clients querying old IP addresses of roots?
- How prevalent are misconfigurations, e.g., lame delegations?
- Is there correlation of DNS query target to geographic origin?

Questions to pursue with DITL data: traffic/performance

- What observable behavior is attributable to botnets?
- How can we identify applications (web, VoIP, video, p2p) and estimate their share of traffic and responsiveness to congestion?
- Do IPv6 traffic characteristics differ from IPv4?
- Is latency and jitter on the Internet increasing or decreasing?
- How are flow and packet size distributions changing, including bandwidth symmetry?
- How are TCP characteristics changing: flags, retransmits, buffer sizes, new versions?
- How is R&E traffic different from commercial traffic?
- How much web data is unnecessarily uncacheable?

Questions to pursue with DITL data: routing/topology

- What are the convergence properties of current and proposed routing protocols?
- Which ASes control how much of the Internet address space?
- What percent of Internet links block ICMP or other probing traffic?
- Estimate the distribution of hosts behind NATs.
- What percentage of users on open wireless networks use VPNs?
- How much allocated but "unused" IPv4 space remains?

Types of data needed for the above questions

- DNS query packet traces and/or logs from various places (roots, TLDs, IN-ADDR.ARPAs, ISP resolvers).
- Other dns-related measurements (passive and active).
- IPv4/IPv6 topology probing data.
- BGP feeds/updates, ideally with adjacent topology probes.
- Web cache logs.
- Anonymized report generator, e.g, coralreef, netflow-based.
- Router-level topology (anonymized), with event log per link.
- Consistent macroscopic ping data over years.
- Packet traces, appropriately anonymized.

Accommodating legal/privacy concerns: 2008 participation modes

- Make data selectively available under terms of your choosing.
- Index your data into CAIDA's DatCat.
  - Announce existence of your data.
  - Submit only meta-data or statistics about the data.
- Contribute more "cooked" data, e.g., logfile summaries, RRD graphs, reports based on data collected internally by networks during the DITL dates.
- Contribute questions, feedback, analysis.

So, please participate!

Related Links

- A Day In The Life of the Internet
  `http://www.caida.org/projects/ditl/`
- A Summary of the January 9-10, 2007 Collection Event
  `http://www.caida.org/projects/ditl/summary-2007-01/`
- Internet Measurement Data Catalog (DatCat)
  `http://imdc.datcat.org/`
- Day in the Life of the Internet, January 9-10, 2007 (DITL-2007-01-09)
  `http://imdc.datcat.org/collection/1-031B-Q`

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The End