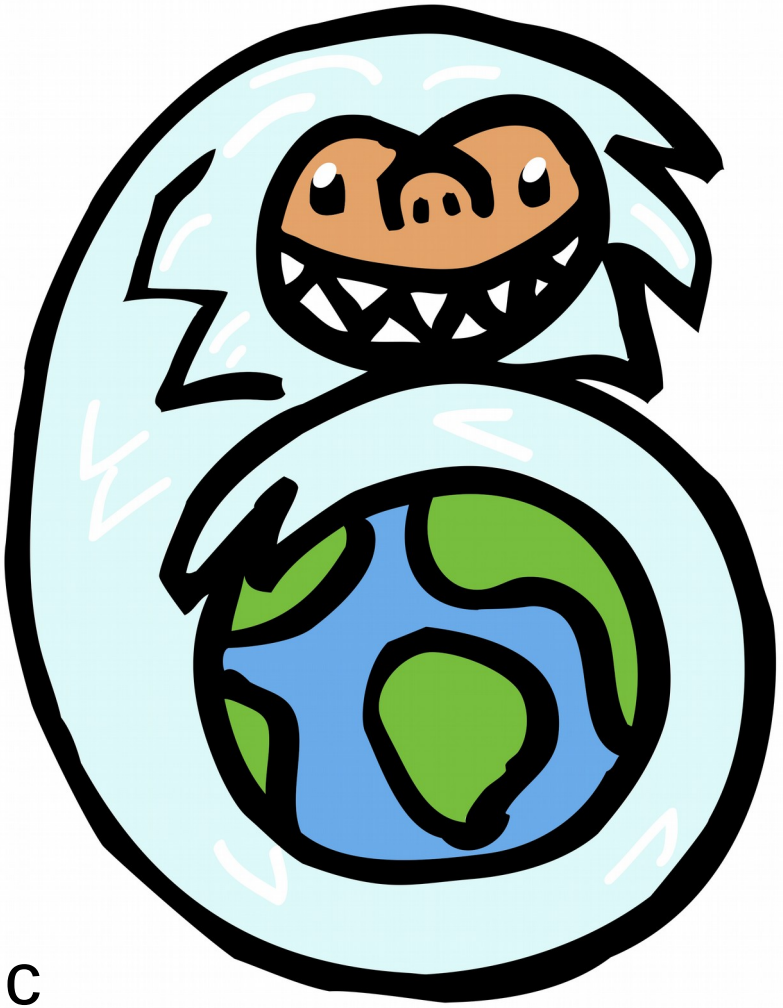
Yeti DNS

IEPG July 2015



Shane Kerr / BII Lab

2015-07-19 / Prague, Czech Republic

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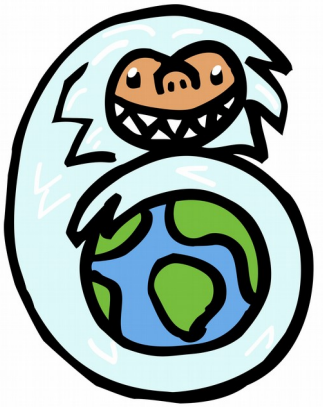
Goals



1. We want more Yeti participants!
2. We want people who can not or will not participate to know about the project.

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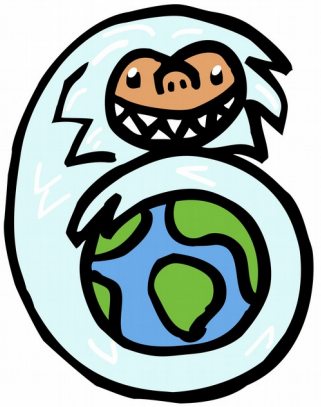
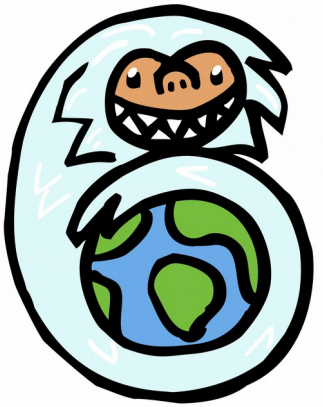
Origin Story



Once upon a time at WIDE Camp,
Davey Song and Paul Vixie were wondering if there was a way to research the DNS root server system without process or political issues.

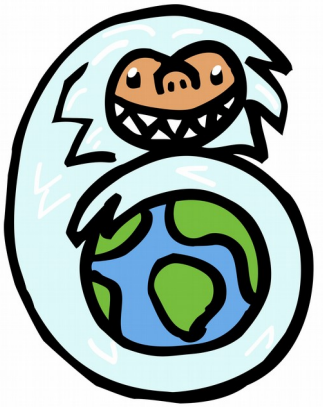
”If only there was a way to look at technical questions in a scientific way... a way to strictly research... if only...”

DNS Root Server System



- There are 13 root servers
  - 12 operators, more than 450 sites
  - *Possibly* the very best possible configuration
  - Let's test it!
- Stability needs make it hard to test new ideas
  - Lab experiments cannot match the real-world, diverse user environments

What is the Yeti DNS Project?



- Large-scale testbed
- Parallel root server system
- Yeti Participants:
  - Operators of Yeti components, or experimenters
  - DNS experts, with varied backgrounds and interests

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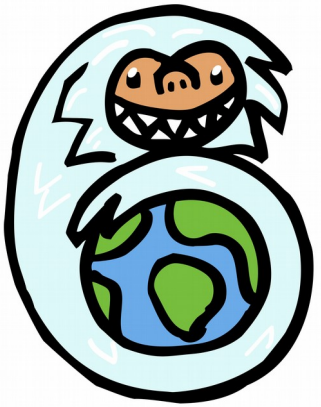
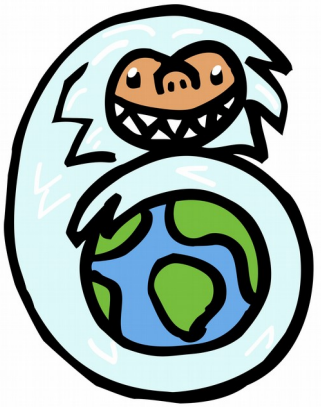
Yeti Components (1 of 2)



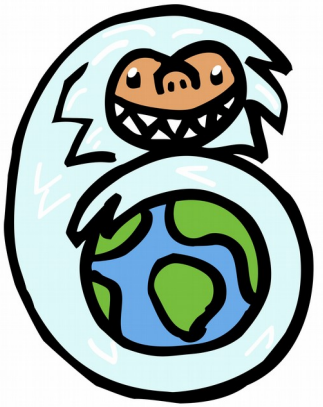
- Yeti Distribution Masters (DM)
  - Start with IANA root (via AXFR)
  - Change IANA root servers to Yeti root servers
  - Sign using Yeti KSK
- Yeti root servers
  - AXFR Yeti root from Yeti DM
  - Serve as DNS root servers
  - Capture traffic information

Yeti Components (2 of 2)



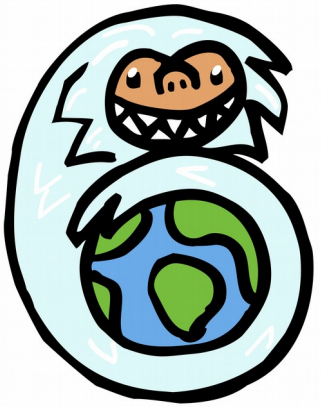
- Yeti resolvers
  - Use Yeti root servers
  - May capture traffic information
- IPv6-only FTW ;)

Things That Yeti is Not...



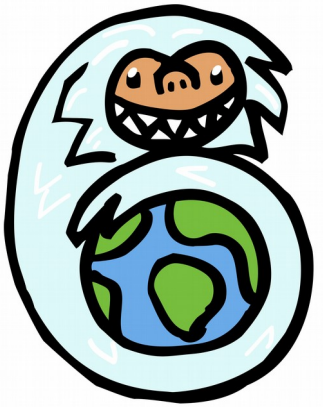
- ***NOT*** research into alternatives to the IANA root
- ***NOT*** interested in policy or political work
  - Although such work may eventually result from Yeti findings

Planned Experiments & Other Investigations



- Impacts of IPv6-only DNS
  - Bigger minimum packet size, no IP-fragmentation
- Changes in DNSSEC
  - KSK rollover, KSK/ZSK rollover frequency, algorithm, signature size
- Changes to root servers
  - Lots/few of root servers, churn in root server set

Current Status



- System functioning
- Infrastructure up
  - Web site, http://yeti-dns.org
  - Mailing lists, DSC, RT ticketing, ...
- Docs & scripts in GitHub (IPv4 only!)
  - https://github.com/BII-Lab/Yeti-Project
- Currently gathering Yeti root operators
  - 9 up, more pending

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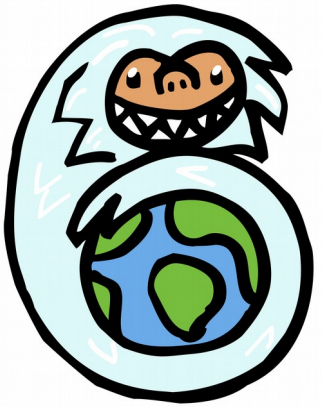
Some Findings So Far…
Glue



- Priming queries made from resolvers

  `$ dig +norecurse -t ns . @some-root`

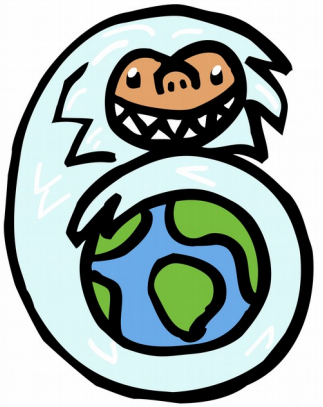
- Current root servers answer for the **`root-servers.net`** zone
- Without this setup, BIND 9 does not include glue in answers to priming queries
- NSD works as desired; patch for BIND 9 developed

Some Findings So Far… dnscap

- dnscap saves packet captures (like tcpdump)
- DNS sends *messages*, not *packets*
  - IPv4 fragmentation, TCP
- Currently able to run dnscap since it captures a super-set of desired packets
  - Not ideal, possibly switch to dnstap later

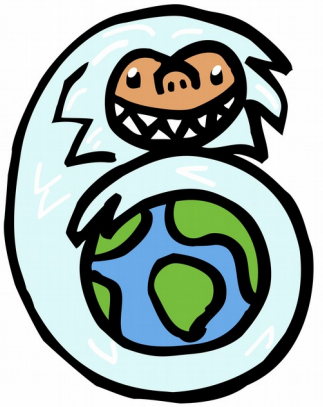
- Currently investigating dnscap packet loss

Probl^H^H^H^H^HChallenges



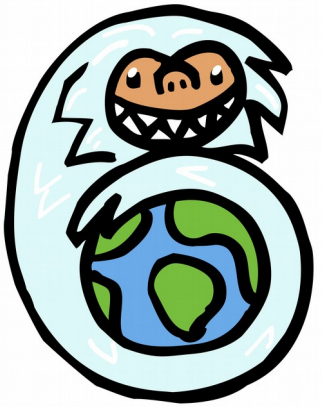
- KSK roll
  - Not really planned or organized
  - RFC 5011 issue
    - BIND 9 worked, Unbound not
    - Difference in hold-down timer?
  - Will Do It Right
- Generating different root with same serial
  - Need to only generate on serial increase

Probl^H^H^H^H^HChallenges



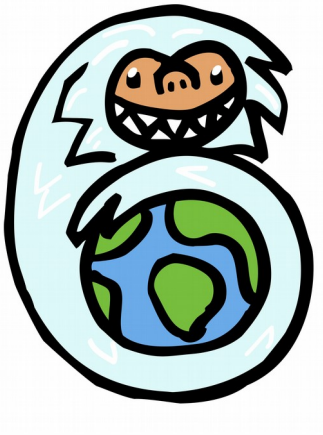
- Authoritative for ARPA
  - DM currently generates root zone with broken ARPA non-delegation (oops)
- Reliability issues with packet captures
  - Improving setup, adding redundancy
- Monitoring
  - Minimal, working to make systematic

Next Steps



- Get ”enough” Yeti root servers
- Fill gaps, fix issues in process & infrastructure
  - Document results in informational RFC?
- Get more resolvers
- Run some experiments!

Yeti Coordinators



BII Group — the parent company of BII (Beijing Internet Institute), a public interest company serving as BII's Engineering Research Center.

WIDE — Widely Integrated Distributed Environment.

TISF — a collaborative engineering and security project by Paul Vixie.