Thoughts on F-Root Futures

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What’s the Point?

• What is a root server?
• Root server traditions
• Current root server realities
• Post mortem of root attacks
• New root server purpose
• Server management?
• More and smaller F-root servers
What is a Root Server?

• A root server is little known outside places like this

• Wikipedia states, “A root name server is a name server for the root zone of the Domain Name System (DNS) of the Internet.“

• But really a root server is just an IP address

• Some agent with that IP address agrees to maintain current data and to answer queries from it

• External forces guide your query to that agent
Root Server traditions

• In the beginning there were exactly 13 devices in the world that could answer root queries

• Each was 7.7% of the world's root service capacity

• Most root servers were in the USA; failure of one node outside the USA could damage root service for half the world

• Root servers were built and operated as if a matter of life and death
Current Root Server Realities

• root-servers.net listed 572 root server devices last month

• If one fails or is attacked, global capacity falls by 0.17%

• No longer necessary for every root server node to be built to space shuttle specifications

• Individual root servers have acquired a new role: sacrificial protection of the overall root system. (Think sacrificial anodes.)

• Yes, root servers must serve the root, but they also serve as attack targets, closer to the attacker
Post mortem of root attacks

- Historically, published post mortem analyses of root server attacks have counted failed servers.
- Given current numbers, better to count those that didn't fail. How many were left standing? More than 13?
- Individual servers don't have to be bomb-proof.
- Like a swarm of small animals, what matters is how many survive and not how many are eaten by lions.
New root server purpose?

- Yes, a purpose of a root server is to serve the root
- A purpose of having hundreds of root servers is to give faster response times
- A new purpose of root servers is to be sacrificial: to absorb attacks that might reach other root servers
- Root servers nearer the edge will intercept attack traffic sooner
Server management?

- When classic root server systems fail, 25 pagers around the world ring.

- Is there an F-Root small enough that if it fails you say "oh well" and plan to go fix it next month?

- Do small servers even have to be managed? What if you have so many that you can take roll weekly?
Current state of F-root

- 58 instances in 50 countries
- Most of them fill a rack
- Managed by exception when pager wails
- Requires notable ongoing support by experts
Smaller F-Root servers

• What would a smaller server look like? Where would it be deployed?

  • Single-box 1U rackmount: Dell based F single

  • Small form-factor standalone server devices: Beagle, Minnow, Pine

  • Software load in an existing device container: docker

  • Configuration addition to an existing device: RFC 7706
Questions?