

The Bootstrap Problem

WEIRDS WG, IETF 84

You can't get there from here

- RESTful servers can redirect to each other
- BUT ...
- A client has to select an initial server

Numbers bootstrap

- Five major servers, the RIRs
- IPv4: each /8 has a “home” server
- IPv6: only 37 IANA allocations, none since 2006
- ASNs: over 2200 16-bit allocations, 5 32-bit

Names bootstrap

- Currently 314 TLDs
 - In principle, each has its own WHOIS
- About 300 different managers
 - Although many subcontracted
- Likely to be > 1000 more

Names issues

- Query rates vary a lot
 - > 200 query/second in .COM and .NET
 - < 200 query/week in .MUSEUM
- Policies vary a lot
 - Both what the registry knows and what they can publish

Bootstrap approaches

- Master server
- Static table
- Random
- DNS

The ideal that won't happen

- One master well known redirect server
- All queries start there
- Who's going to run a 200 q/s redirect server?

Static bootstrap

- Build the list into the client, or a static file
- Could work for IP addresses
 - IPv4 fully allocated, IPv6 almost never changes
- Maybe for ASNs
 - List is long but changes rarely
- Won't work for names
 - Changes too often

Random bootstrap

- Contact the closest server
 - It'll redirect if the info is somewhere else
- What RIR servers do now
 - Works because only five of them

DNS Bootstraps

- The simple idea: look up part of the object in the DNS to find a server
 - First /8 of IPv4, TLD of name, ...
- DNS can handle query volumes
- DNS management is already distributed

The options so far

	SRV	NAPTR	CNAME or A
In TLD	?	?	?
In ARPA	?	?	?

DNS Locations

- In TLD:
 - `_nicname._tcp.TLD`
 - `whois-server-location.TLD`
- In ARPA:
 - `TLD.weirds.arpa`

In the TLD

- TLD operator updates directly as needed
- Name has to be reserved
- Some TLDs have admin issues with 2LDs
- TLD can get SSL certs itself
- In gTLDs, may constitute a “registry service”
 - Requires ICANN process to approve

In ARPA

- Doesn't pollute TLD namespace
- Requires IANA help to manage entries
 - All from entities IANA already deals with
- Requires IANA help for SSL certs

Record types: SRV

- SRV: points to arbitrary server

```
_weirds._tcp.TLD SRV 0 5 80
```

```
weirds.server.net.
```

```
_weirds._tcp.TLD SRV 0 5 443
```

```
weirds.server.net.
```

Record type: NAPTR

- NAPTR: points to a URL

```
TLD NAPTR 100 10 "U" "weirds:http"
```

```
"!*!http://weirds.server.net!" .
```

```
TLD NAPTR 100 10 "U" "weirds:https"
```

```
"!*!https://weirds.server.net!" .
```


Record type: CNAME or A

- CNAME or A: is the server
TLD.weirds.arpa. CNAME
weirds.server.net

Record types (cont.)

- Exactly what SRV and NAPTR are intended for
 - NAPTR can say SSL or not, SRV can hint
- Many clients still can't look up SRV or NAPTR
 - Particularly web browsers
- Workarounds possible
 - Performance and security issues

Record types (cont.)

- CNAME or A gives each TLD's server a different name
 - Each needs its own SSL cert
 - Admin hassle for multi-TLD registries