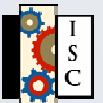


IPv6 and the DNS

Suzanne Woolf, ISC

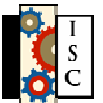
ICANN New Delhi

12/2/08



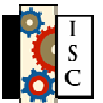
IPv6 Pieces for DNS

- The resource record
 - AAAA maps a name to an IPv6 address
 - Just another resource record
- IPv6 transport
 - Host has to speak IPv6 to something that's listening
 - Some assessment still to be done in areas like address selection and gating/translation
 - Nameserver will answer on the same interface the query came from
 - Authority server has some control over which address records to send, not much else



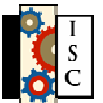
A Case Study: F-Root

- Why it matters
- What we're doing
- Open issues



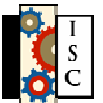
IPv6 and F-Root

- IANA added AAAA records for six root name servers to the root zone just over a week ago. (RIPE, ISC, VeriSign, WIDE, US-ARL)
- This makes it possible for a normally configured DNS client to make queries for AAAA records, over IPv6 transport, and get answers.
- It's now possible for complete DNS referral chains to be formed and used over IPv6 only.
- Hardly anyone will do this at first, but:
 - We'll now be able to see where the gaps are
 - Eventually, native v6 will prevail....



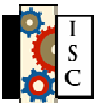
Issues to Consider

- A number of questions reviewed first:
 - New RR type in priming response
 - Size of root referral
 - Jointly studied by SSAC and RSSAC: See SAC018
- Operational concerns
 - Host provisioning
 - Connectivity for production service
 - Connectivity for troubleshooting and administration
 - Security
- No negative impact on IPv4 service is acceptable!



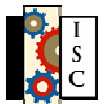
Critical Questions

- Are there routes to us over IPv6 transport?
- Are there routes back from us to the query source over IPv6 transport?
- How good are they?
- What do clients do with As and AAAAs when they have both?
 - This depends on OS and application
 - Additional latency and timeouts come in here!
 - RFC 3901 recommends v4 or dual-stack
 - Experience is still very limited



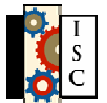
Anycasting DNS service

- In the context of IPv4 root nameserver operations, anycast is:
 - A way to make multiple, widely distant hosts reachable at the same IP address
 - Identical content from each host answering the published address
- Anycast Adds:
 - redundancy
 - DDoS resistance
 - troubleshooting complexity



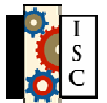
Architecture of IPv4 service

- Tiered
 - Global nodes
 - Local nodes
- Global nodes are at carrier-class facilities with multiple transit providers and many peers
- Local nodes are at exchange points and major colos
 - Optimize for more local service
 - Partnerships with ISPs, registries, industry, governments
 - Node in Chennai is operated in partnership with NIXI



Anycast deployment for IPv6

- Dedicated address block from ARIN
- IPv6 transit to global nodes
 - Multiple providers in each location
 - These are the “catch-alls”
- Local nodes rolling out
 - All our hosts are dual stack (freeBSD)
 - Adding v6 peering as available
 - Tunnels for administrative access in some places



Day 1 and Beyond

- Global sites connected with native IPv6 transit
- 15 out of 38 local sites offer v6 service
- Add new ones as local partners are ready
- Complete query data being logged for research
 - Summary data will be made public at a future date
 - Historic opportunity to watch a major technology transition for the Internet

