Root Server System Advisory Committee

Jun Murai, Chair of RSSAC

ICANN Public meeting
June 28, 2002
Bucharest, RO
Semantics of TLDs
Which TLD should be added/deleted?
Who owns/operates that specific TLD?

1. Update the database
2. Share the database among the distributed root servers
3. Make it available to everyone

ICANN/IANA

Who and Where are the (new) root servers?

IANA/Root Server Operators
# List of the Root Servers

<table>
<thead>
<tr>
<th>name</th>
<th>org</th>
<th>city</th>
<th>type</th>
<th>url</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Verisign</td>
<td>Herndon, VA, US</td>
<td>com</td>
<td><a href="http://www.internic.org">http://www.internic.org</a></td>
</tr>
<tr>
<td>b</td>
<td>USC/ ISI</td>
<td>Marina del Rey, CA, US</td>
<td>edu</td>
<td><a href="http://www.isi.edu/">http://www.isi.edu/</a></td>
</tr>
<tr>
<td>c</td>
<td>PSInet</td>
<td>Herndon, VA, US</td>
<td>com</td>
<td><a href="http://www.psi.net/">http://www.psi.net/</a></td>
</tr>
<tr>
<td>d</td>
<td>UMD</td>
<td>College Park, MD, US</td>
<td>edu</td>
<td><a href="http://www.umd.edu/">http://www.umd.edu/</a></td>
</tr>
<tr>
<td>e</td>
<td>NASA</td>
<td>Mt View, CA, US</td>
<td>usg</td>
<td><a href="http://www.nasa.gov/">http://www.nasa.gov/</a></td>
</tr>
<tr>
<td>g</td>
<td>DISA</td>
<td>Vienna, VA, US</td>
<td>usg</td>
<td><a href="http://nic.mil/">http://nic.mil/</a></td>
</tr>
<tr>
<td>h</td>
<td>ARL</td>
<td>Aberdeen, MD, US</td>
<td>usg</td>
<td><a href="http://www.arl.mil/">http://www.arl.mil/</a></td>
</tr>
<tr>
<td>i</td>
<td>NORDUnet</td>
<td>Stockholm, SE</td>
<td>int</td>
<td><a href="http://www.nordu.net/">http://www.nordu.net/</a></td>
</tr>
<tr>
<td>j</td>
<td>(TBD)</td>
<td>(colo w/ A)</td>
<td>()</td>
<td><a href="http://www.iana.org/">http://www.iana.org/</a></td>
</tr>
<tr>
<td>k</td>
<td>RIPE</td>
<td>London, UK</td>
<td>int</td>
<td><a href="http://www.ripe.net/">http://www.ripe.net/</a></td>
</tr>
<tr>
<td>l</td>
<td>ICANN</td>
<td>Marina del Rey, CA, US</td>
<td>org</td>
<td><a href="http://www.icann.org/">http://www.icann.org/</a></td>
</tr>
<tr>
<td>m</td>
<td>WIDE</td>
<td>Tokyo, JP</td>
<td>int</td>
<td><a href="http://www.wide.ad.jp/">http://www.wide.ad.jp/</a></td>
</tr>
</tbody>
</table>
The DNS Tree

ROOT!

TLDs
- jp
- uy
- com
- org
- net
- icann
- co
- ac
- keio
- med
- sfc
The Past 12 Meetings

- March 2, 1999 in Singapore (Apricot)
- March 16, 1999 in Minneapolis (IETF)
- June 21, 1999 in San Jose (INET99)
- July 12, 1999 in OSLO (IETF)
- November 9, 1999 in Washington D.C. (IETF)
- March 27, 2000 in Adelaide (IETF)
- August 1, 2000 in Pittsburgh (IETF)
- December 13, 2000 in Dan Diego (IETF)
- March 12, 2001 in Minneapolis (IETF)
- August 5, 2001 in London (IETF)
- December 9, 2001 in Salt Lake City (IETF)
- March 17, 2002 in Minneapolis (IETF)
Panel: Root Name Servers
November 13, 2001

Paul Vixie (F)
Mark Kosters (A, J)
Lars-Johan Liman (I, Co-chair
IETF/DNSOPS)
Chair: Jun Murai (M, chair of RSSAC)
Root name servers: distributed system

• Diversed variants of the Unix operating system:
  – 7 different hardware platforms
  – 8 different operating systems (UNIX variants)
  – from 5 different vendors.

• geographically distributed

• operate on local time (including GMT),
Zone file transfer (from Nov. Panel)

- Master File Generation
  - Generated by Provisioning Database
  - Replicated to disaster recovery site
    - Database
    - Distribution mechanism
    - Backups stored at off-site locations
  - Humans look at differences
  - Look for key changes
    - Serial number of SOA record
    - Feedback from provisioning if changes made to Delegation
  - Security Elements
    - Hash of zone file
    - Gpg (pgp) signatures per file
    - File that contains md5sum signed
  - Installed on staging machine
    - Logs checked
    - DNS queries

- Zone Files pushed to ftp servers
  - ftp://rs.internic.net/domains
  - ftp://ftp.crsnic.net/domains for those who have accounts for com/net/org
  - Files pushed to distribution master and a.root-servers.net
    - Pushed to Trusted interface
    - Before loading -Security checks performed
      - Authenticity
      - Validity
  - Multiple machines used while changing zones
    - Minimize downtime on a.root-servers.net or j.root-servers.net
  - Message sent out to internal notification list

- Slave side checking
  - Using the DNS protocol
    - Notify message
    - Refresh interval check
  - Out of band
    - Pgp-signed email
    - Cronjob
  - Responsibility of each root operator to check validity
Root Server System Advisory Committee

Jun Murai, Chair of RSSAC

ICANN c c TLD meeting
June 25, 2002
Bucharest, RO
DNSsec

- Several workshops over the years.
  - European – SE, NL, Ripe
  - USA – Cairn & NANOG
  - ASIA – Apricot 2001
- Workshops have all been in isolated environments.
- key management, key creating, validation periods need to be tested
IPv6

- Applications need DNS resolution.
- DNS servers have had forms of IPv6 DNS support for 7 years.
- NO native IPv6 support has been available until very recently.
- Generated: Proposal for IPv6 testbed on Root Servers
- Four servers are in operation of testing with isolated environment
- Community consensus on the process
IDN impact on root servers

• Result of the review
  – Proposed technologies should not be any impact to root servers
• But need to be tested from a point of views of root servers
  – Need to be informed about six month BEFORE ‘real’ operation
  – Informed on any decision would be appreciated.
• Concerns that a lot of the development is actually done outside the IETF.
• Need consistency with architectural definition of the global DNS in the IAB/IESG/IETF community
Operational requirements

- RFC2010
  - “Operational Criteria for Root Name Servers” by Bill Manning and Paul Vixie

- RFC2870
  - “Root Name Server Operational Requirements”
  - by Bush, Karrenberg, Kosters and Plzak

- IETF DNSOP Working group
  - Since March 1999
  - Root Server Operation
  - co-chaired by Lars-Johan Liman and Ray Plzak
Root Operator ‘contract’

- Initial specifications: modified RFC 2870
  - RSSAC review was done and modified on detailed specification
    - Commitment on measurement added
- Defining list of institutional contractual and legal responsibility
  - For finalizing the ‘contract’ process
- Discussions start including the people above
Root server (re)location decision

• Engineering criteria definition
  – Operational requirements: done
    • RFC2870

• Measurement and Analysis for existing root name servers

• Approve of methods

• The methods above will be used for future decision

• Joint research/program with CAIDA and others
The version number of bind which are running in the Internet.
The number of DNS servers categorized by BIND version. (as of November 1999)

<table>
<thead>
<tr>
<th>Version</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1.2</td>
<td>95863</td>
</tr>
<tr>
<td>8.2</td>
<td>23988</td>
</tr>
<tr>
<td>8.2.1</td>
<td>21158</td>
</tr>
<tr>
<td>4.9.7</td>
<td>20824</td>
</tr>
<tr>
<td>8.1.1</td>
<td>11968</td>
</tr>
<tr>
<td>4.9.6</td>
<td>7712</td>
</tr>
<tr>
<td>4.9.7-TB1</td>
<td>5808</td>
</tr>
<tr>
<td>8.1.2-TB2</td>
<td>5759</td>
</tr>
<tr>
<td>Others</td>
<td>7626</td>
</tr>
</tbody>
</table>
Fig. 1. Root requests per 5-minitre interval, showing diurnal variation and loss of connectivity to D, H and I roots.
Summary

• Root DNS
  – Zone administration
    • ICANN/IANA/US-DOC
  – Name server operation
    • Root server operators

• Security and Stability
  – DNSSEC/TSIG
  – ICANN November Presentations
  – ICANN DNSSAC

• CRADA report
  – On editorial action

• Possible relocation(s)
  – Measurement tasks on performance of root servers going on
  – Recommendation on mechanisms
Important URLs

• ICANN RSSAC
  – http://www.icann.org/committees/dns-root/
• Root Name Servers
  – http://www.root-servers.org
• IANA
  – http://www.iana.org
• RSSAC Y2K Statement
  – http://www.icann.org/committees/dns-root/y2k-statement.htm
• IETF DNSOP
• CRADA
  – http://www.icann.org/committees/dns-root/crada.htm
• CAIDA
  – http://www.caida.org/tools/measurement/skitter/RSSAC/
• WIDE
  – http://www.wide.ad.jp
Schedules

• The 13th meeting of RSSAC is Scheduled
  – IETF/Yokohama (Monday, July 14)

• Expected agenda of the 13th meeting
  – Contractual process discussion
  – Documentation for Board and DOC finalizing
  – More on Monitor/Measurement
  – DNSSEC/TSIG deployment update
  – IPv6 experiments update

• Mailing list:
  – rssac@icann.org