Root Server System Advisory Committee

Jun Murai, Chair of RSSAC

ICANN Public meeting
June 28, 2002
Bucharest, RO
DNS Tree

Root Name Servers

TLD Name Servers

ad.jp domain

jp domain

jp

ro ...
com
org

root (dot)

ac
ad
co
or

... kyoto-u

... wide
... nic
...

... janog

jp domain

ad.jp domain

...
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, U</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, U</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

TLDs

ROOT!
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>Count</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-minutre 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