Root Server System Advisory Committee

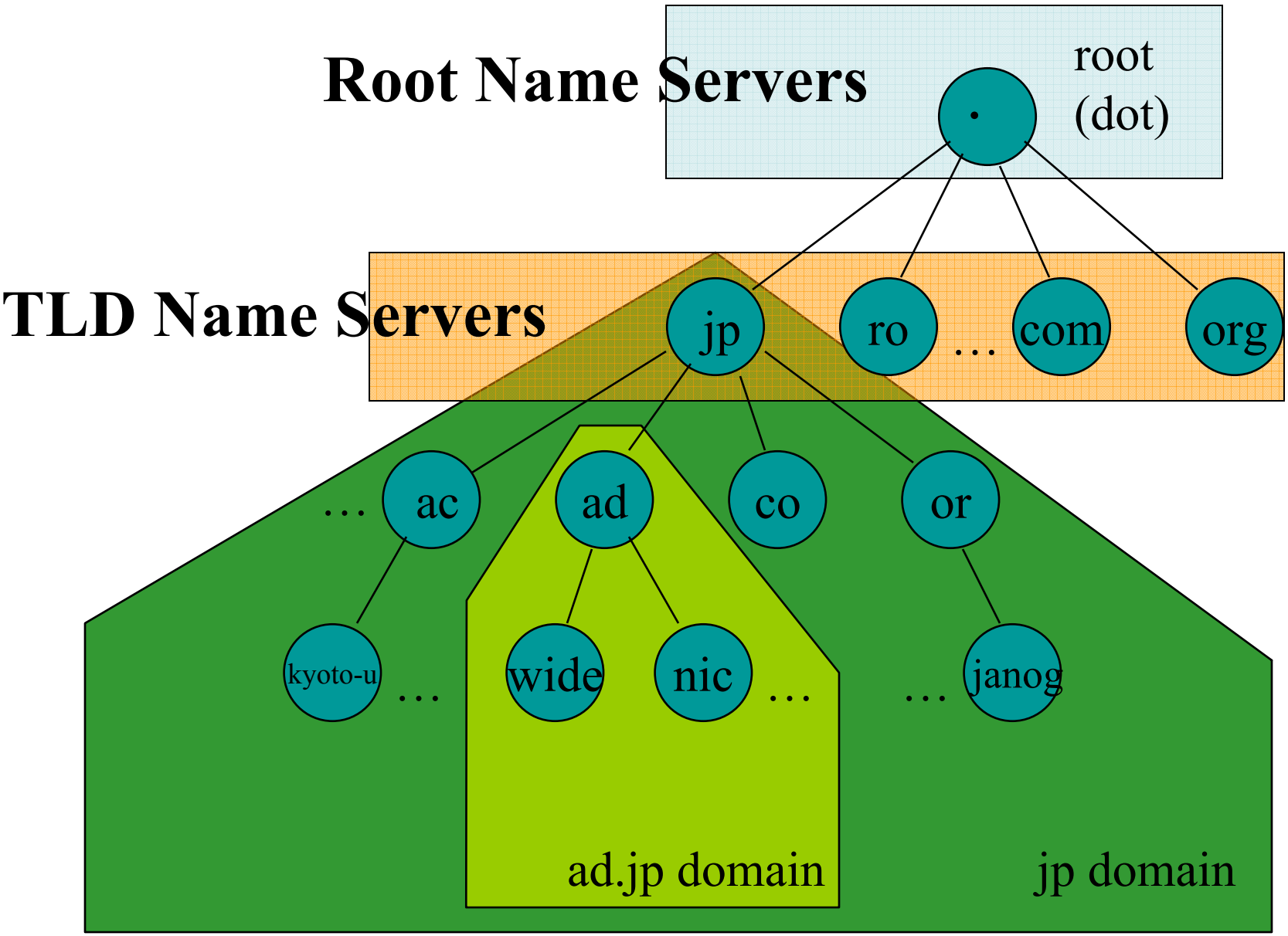
Jun Murai, Chair of RSSAC

ICANN Public meeting

June 28, 2002

Bucharest, RO

DNS Tree


Root Name Servers
root
(dot)
.
TLD Name Servers
jp
ro
…
com
org
…
ac
ad
co
or
kyoto-u
…
wide
nic
…
…
janog
ad.jp domain
jp domain

Semantics of TLDs
Which TLD should be added/deleted?
Who owns/operates that specific TLD?

ICANN/IANA

Who and Where are the (new) root servers?

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

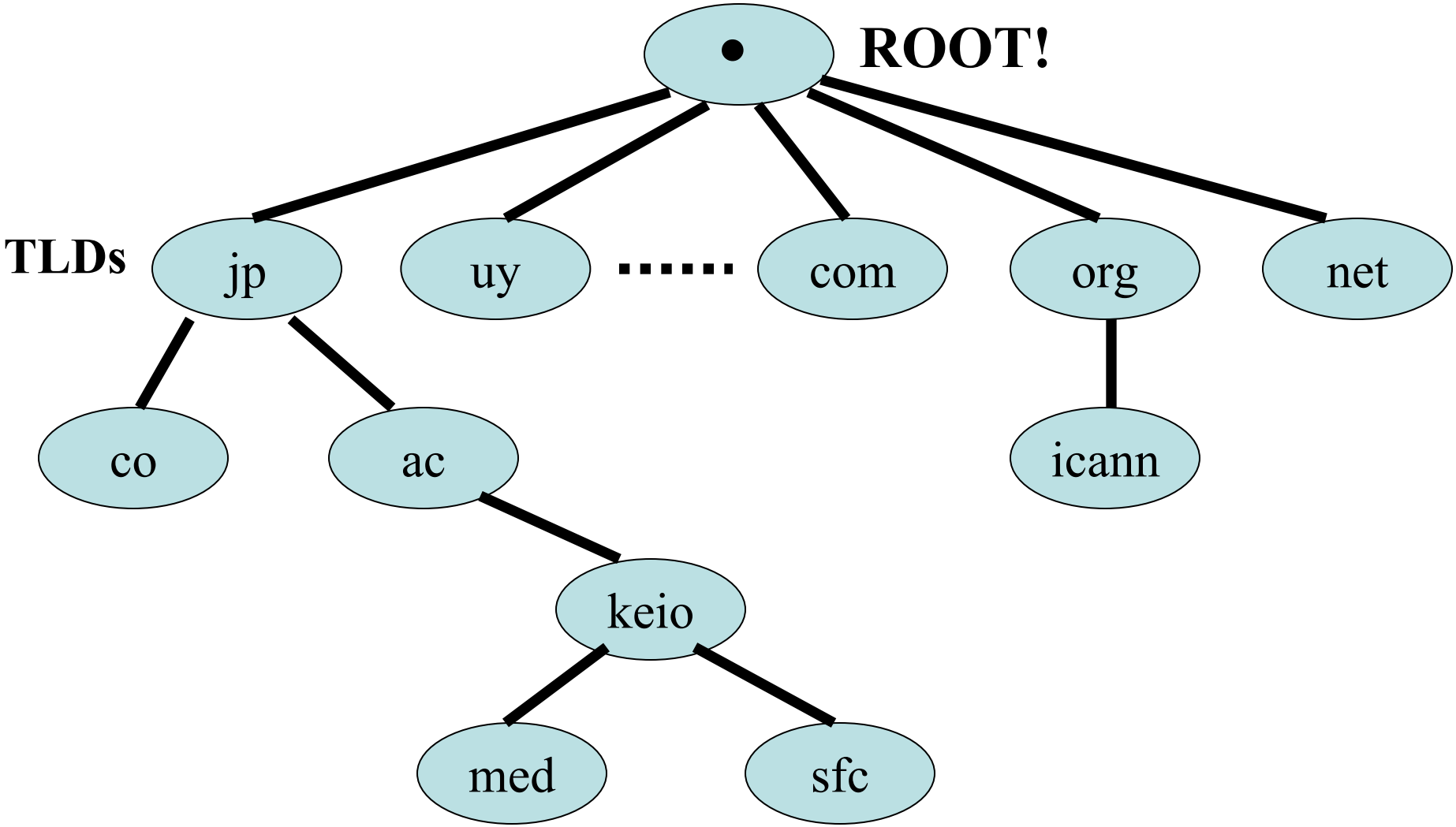
IANA/Root Server Operators

Server	Operator	Status
A	Network Solutions, Inc	confirmed
B	USC/ISI	confirmed
C	PSInet	confirmed
D	UMD	confirmed
E	NASA	confirmed
F	ISC	working
G	DISA	confirmed
H	ARL	working
I	NORDUnet	confirmed
J	(TBD)	confirmed
K	RIPE	confirmed
L	ICANN/IANA	confirmed
M	WIDE	confirmed

List of the Root Servers

name	org	city	type	url
a	Verisign	Herndon,VA, US	com	http:/ / www.internic.org
b	USC/ ISI	Marina del Rey,CA, U	edu	http:/ / www.isi.edu/
c	PSInet	Herndon,VA, US	com	http:/ / www.psi.net/
d	UMD	College Park,MD, US	edu	http:/ / www.umd.edu/
e	NASA	Mt View, CA, US	usg	http:/ / www.nasa.gov/
f	ISC	Palo Alto, CA, US	com	http:/ / www.isc.org/
g	DISA	Vienna, VA, US	usg	http:/ / nic.mil/
h	ARI	Aberdeen, MD, US	usg	http:/ / www.arl.mil/
i	NORDUnet	Stockholm, SE	int	http:/ / www.nordu.net/
j	(TBD)	(colo w/ A)	()	http:/ / www.iana.org/
k	RIPE	London, UK	int	http:/ / www.ripe.net/
l	ICANN	Marina del Rey,CA, U	org	http:/ / www.icann.org/
m	WIDE	Tokyo, JP	int	http:/ / www.wide.ad.jp/

The DNS Tree



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 cheking
  - 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 servrers
  - Need to be informed about six month BEFORE ‘real’ operation
  - Informed on any dceision 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

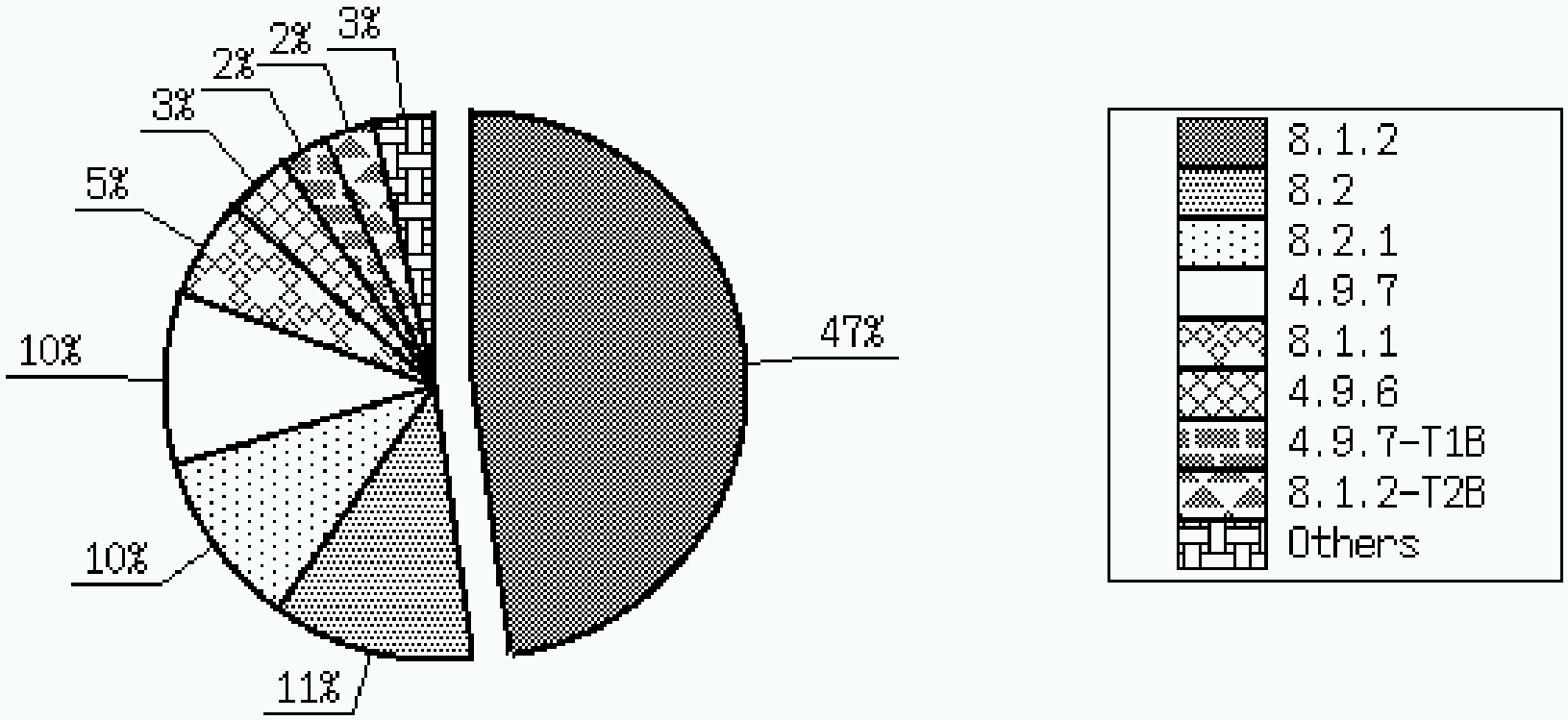
Root Operator ‘contract’

- 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)

8.1.2	**95863**
8.2	**23988**
8.2.1	**21158**
4.9.7	**20824**
8.1.1	**11968**
4.9.6	**7712**
4.9.7-TB1	**5808**
8.1.2-TB2	**5759**
Others	**7626**

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J	(TBD)	working
K	RIPE	confirmed
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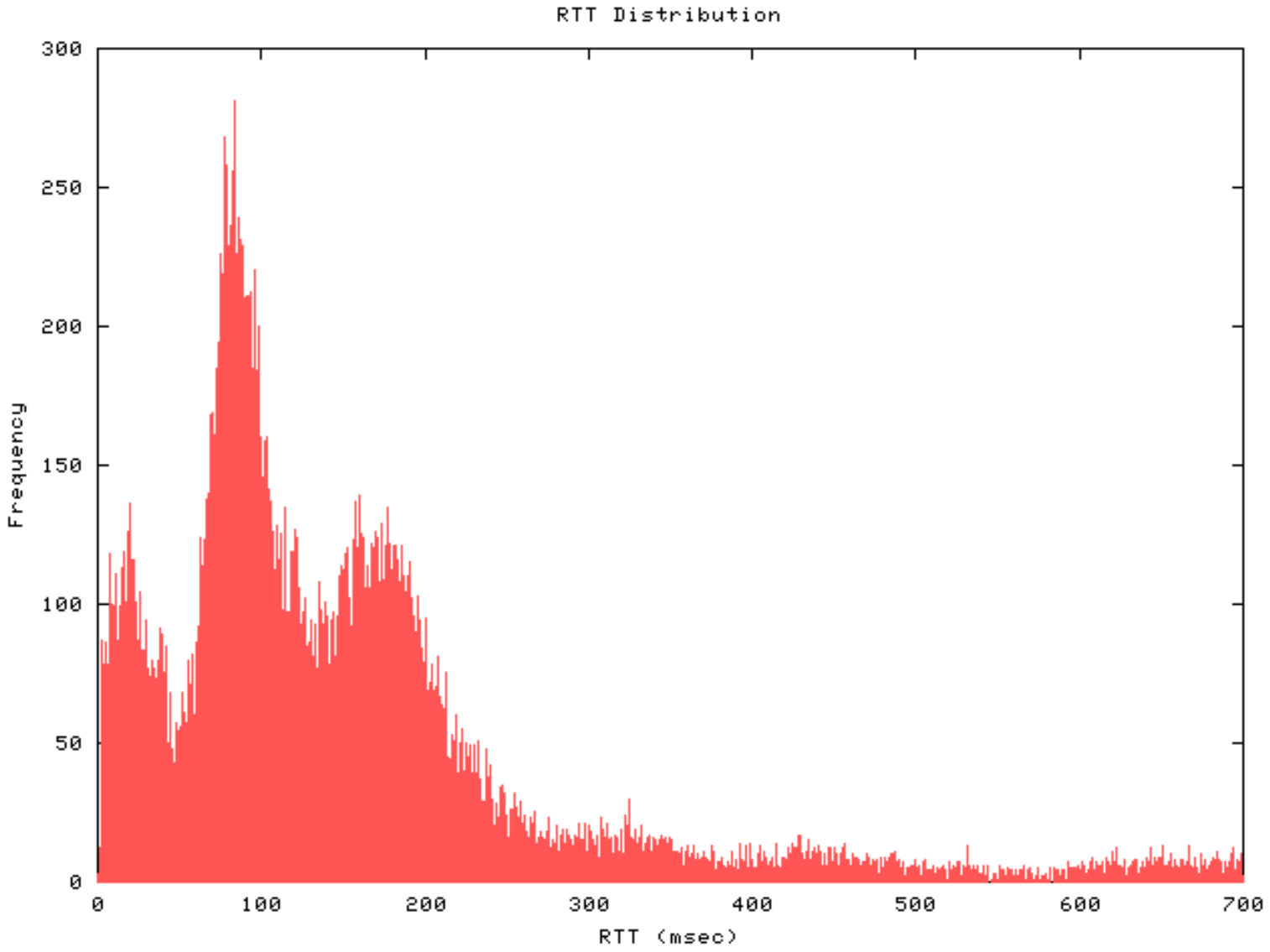
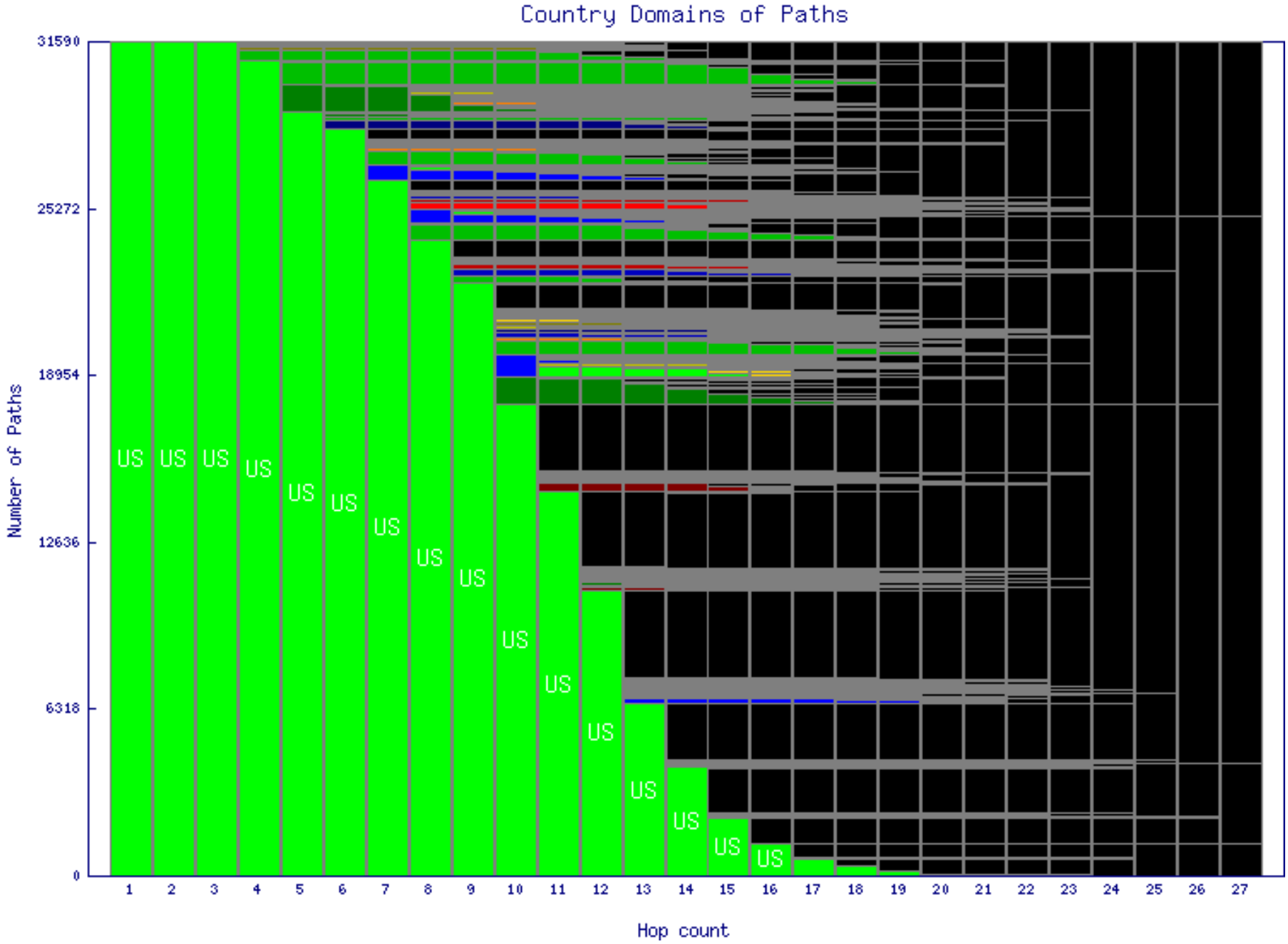
M	WIDE	confirmed


RTT Distribution
Frequency
300
250
200
150
100
50
0
0
100
200
300
400
500
600
700
RTT (msec)


Country Domains of Paths
Number of Paths
31590
25272
18954
12636
6318
0
US
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
Hop count

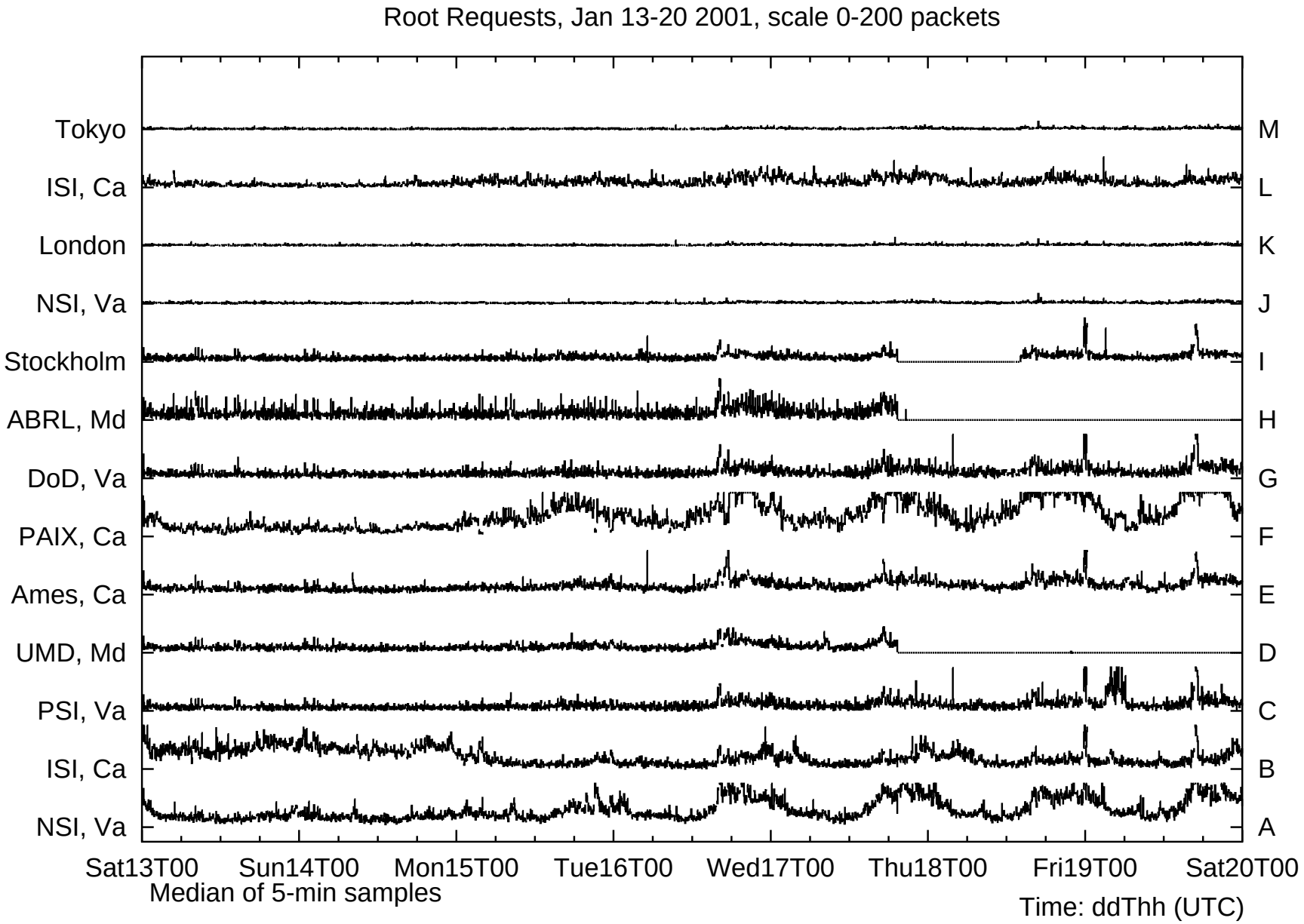
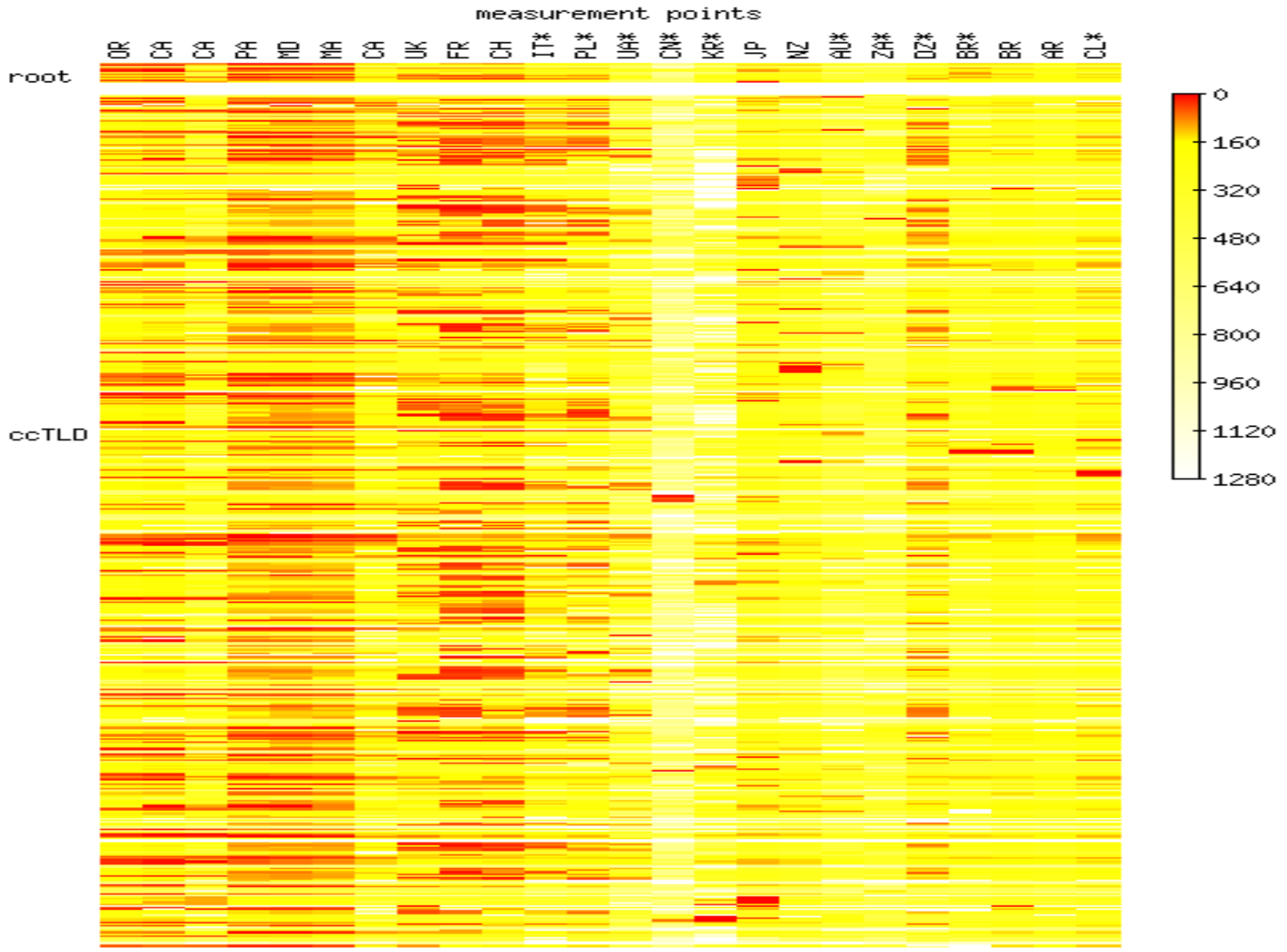


Fig. 1. Root requests per 5-minutre interval, showing diurnal variation and loss of connectivity to D, H and I roots.


measurement points
OR
CA
CA
PA
MD
MA
CA
UK
FR
CH
IT*
PL*
UA*
CN*
KR*
JP
NZ
AU*
ZA*
DZ*
BR*
BR
AR
CL*
root
ccTLD
0
160
320
480
640
800
960
1120
1280

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
  - http://www.ietf.org/html.charters/dnsop-charter.html
- 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