K-root Update

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Outline

- Root Server System
  - Overview
  - Milestones and developments
- k.root-servers.net server
  - Major milestones
  - K-Anycast deployment
  - Current status

Root Server System

- Provides nameservice for the **root zone**
  - The root DNS node with pointers to the authoritative servers for all top-level domains (gTLDs, ccTLDs).
- Thirteen nameservers, thirteen letters
  - 13 is a practical limit
  - [a ÷ m].root-servers.net - equal publishers
  - All 13 are authoritative servers for the root zone
- An average client comes here < 8 times/week
  - Crucial for the functioning of the global DNS

Root servers and operators

- All letter are equal
- Thirteen root nameservers, twelve operators
  - a.root-servers.net Verisign
  - b.root-servers.net USC-ISI
  - c.root-servers.net Cogent Communications
  - d.root-servers.net University of Maryland
  - e.root-servers.net NASA
  - f.root-servers.net ISC
  - g.root-servers.net US DoD (DISA)
  - h.root-servers.net US DoD (ARL)
  - i.root-servers.net Autonomica
  - j.root-servers.net Verisign
  - k.root-servers.net RIPE NCC
  - l.root-servers.net ICANN
  - m.root-servers.net WIDE Project
- Look at www.root-servers.org

Global context

- ICANN/IANA
  - Reviews the changes in the zone file
- US DoC
  - Approves the changes
- Verisign
  - Edits the zone (technical)
- RSSAC
  - Advises ICANN regarding the Root Server System
- 12 Root Server Operators
  - Publish the zone
  - Coordinate operations/share information
- Others
  - IETF/IAB, OARC
  - BIND Forum, NLnetLabs, etc.

Root Server System developments

- Ongoing development
  - Anycast network
- Future developments
  - IDN support
  - IPv6 support
  - Signing of the root zone

Anycast network

- Benefits
  - Distribution, Resilience, Performance, Redundancy, Simplicity
- Anycasting
  - 133 servers globally
  - C(4), F(40), I(30), J(30), K(17), L(2), M(4)
- K-root strategy
  - Local nodes (12): improving access and DDoS isolation
  - Global nodes: London, Amsterdam, Tokyo, Miami, Delhi
  - Stable efficient operation, including security and lifecycle management
  - No immediate plans for expanding the network

Location of the Root Servers

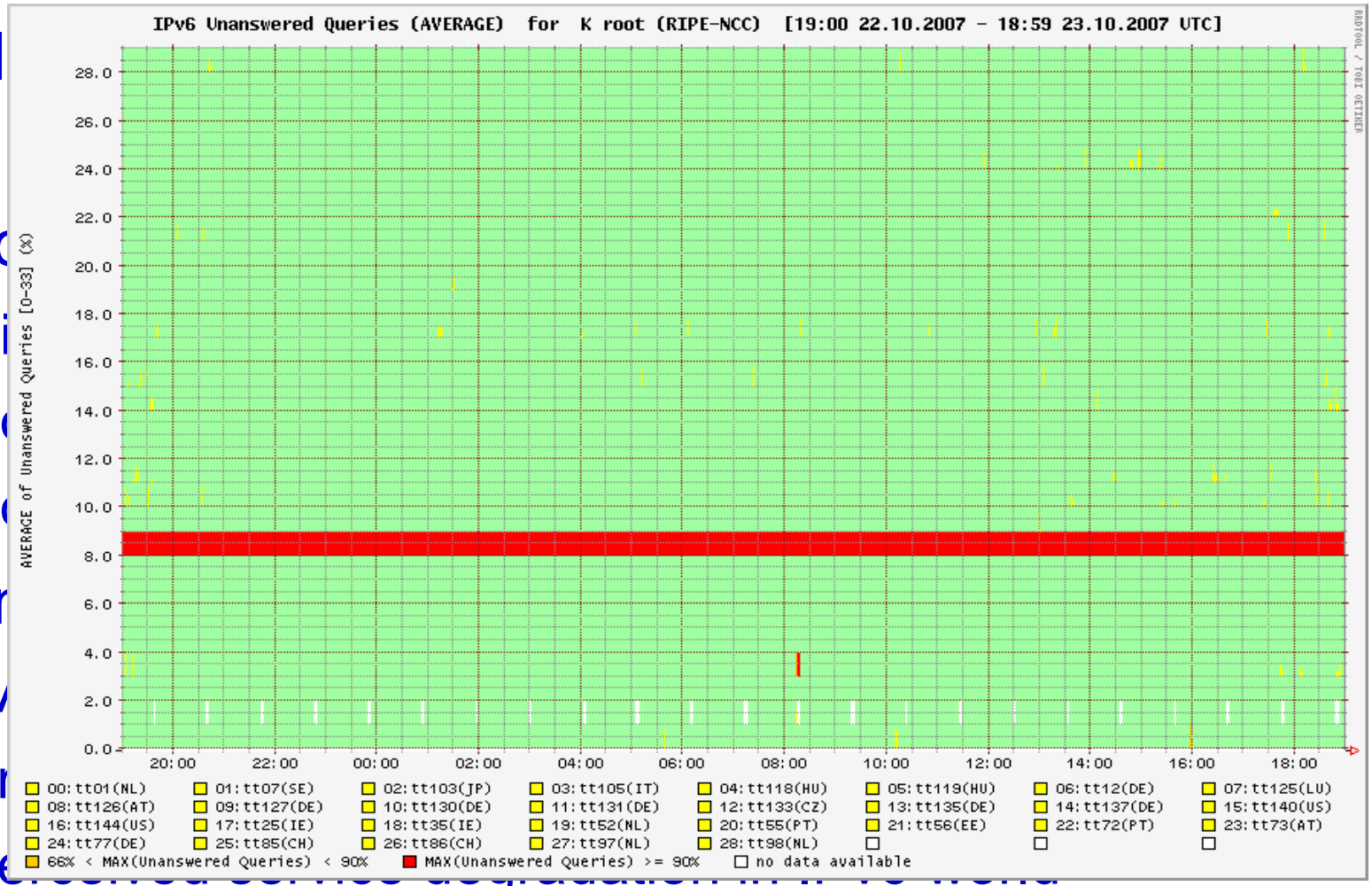
IDN support in the root zone

- Example.test in 11 languages since 15 October 2007

Script	Language	SLD.TLD U-labels	SLD A-label	TLD A-label
Arabic	Arabic	مثال.إختبار	xn--mgbh0fb	xn--kgbechtv
Arabic	Persian	مثال.آزمایشی	xn--mgbh0fb	xn--hgbk6aj7f53bba
Chinese, simplified	Chinese	例子.测试	xn--fsqu00a	xn--0zwm56d
Chinese, traditional	Chinese	例子.測試	xn--fsqu00a	xn--g6w251d
Cyrillic	Russian	пример.испытание	xn--e1afmkfd	xn--80akhbyknj4f
Devanagari	Hindi	उदाहरण.परीक्षा	xn--p1b6ci4b4b3a	xn--11b5bs3a9aj6g
Greek	Greek	παράδειγμα.δοκιμή	xn--hxajbheg2az3al	xn--jxalpdlp
Hangul	Korean	실례.테스트	xn--9n2bp8q	xn--9t4b11yi5a
Hebrew	Yiddish	בײשפּיל.טעסט	xn--fdbk5d8ap9b8a8d	xn--deba0ad
Kanji Hirigana, and Katakana	Japanese	例え.テスト	xn--r8jz45g	xn--zckzah
Tamil	Tamil	உதாரணம்.பரிட்சை	xn--zkc6cc5bi7f6e	xn--hlcj6aya9esc7a

IPv6 support

- Abil
  - 4
- Intro
  - Hi
  - R
  - R
- Sign
  - A
  - P
  - P
- SSAC/RSAC recommendation SAC018



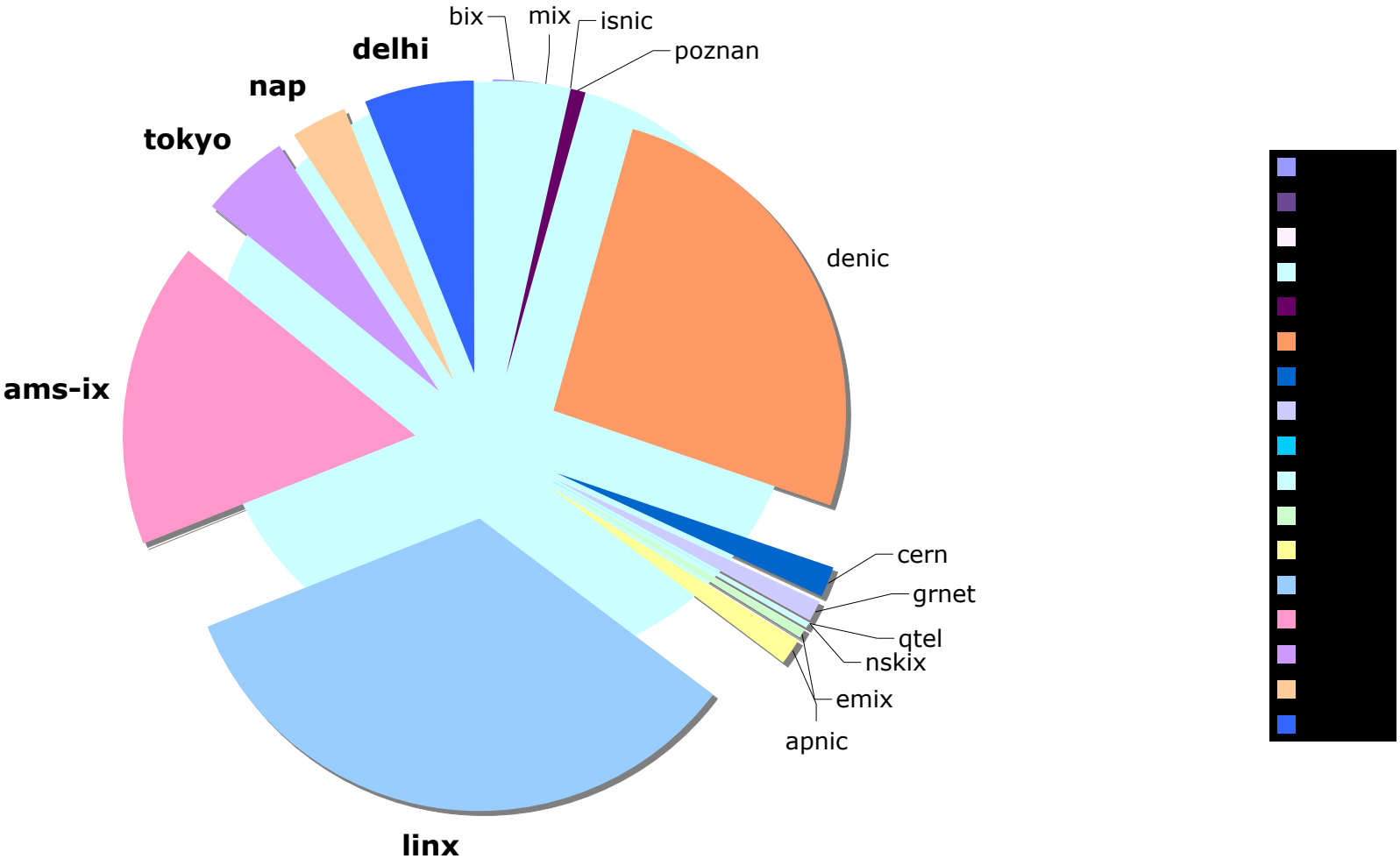
Signing the root zone

- Major barriers for implementing DNSSEC
  - Zone-file enumeration, the impact on resources of fully signing a large zone
  - Support for DNSSEC in application software
  - Single trust anchor
- RIPE 54:
  - *The lack of progress towards the deployment of DNSSEC is undermining the stability and security of the internet. Operators and implementers are compelled to adopt adhoc, short-term solutions which will create long-term problems. The RIPE community urges ICANN to speed up and improve its efforts to get the root zone signed.*
- Nominet position paper
  - http://www.nominet.org.uk/news/latest/?contentId=4549
- IANA is preparing the DNSSEC-ready infrastructure
  - Targeting arpa, in-addr.arpa, uri.arpa, urn.arpa, iris.arpa, ip6.arpa, int
  - https://ns.iana.org/dnssec/status.html

K-root Milestones

- Operated by RIPE NCC since May 1997
  - Hosted by LINX in London
- Running NSD since February 2003
  - Increased software diversity and performance
- Anycast since July 2003
  - Two global instances: London and Amsterdam
- Wider anycast deployment (since 2004)
  - 12 local anycast nodes
  - 5 global nodes

K-root Statistics



More Information

- Root operators & servers
  - http://www.root-servers.org
  - http://[a-m].root-servers.org
    - http://dnsmon.ripe.net
- Root server analysis
  - http://www.caida.org/projects/dns-analysis/
- Anycasting
  - Host Anycasting Service, RFC1546, http://www.ietf.org/rfc/rfc1546.txt
  - Distributing Authoritative Name Servers via Shared Unicast Addresses. RFC3258, http://www.ietf.org/rfc/rfc3258.txt

More Information (cont.)

- K-root
  - http://k.root-servers.org

- K-root anycasting
  - Distributing K-Root Service by Anycast Routing, RIPE- 268, http://www.ripe.net/ripe/docs/ripe-268.html

Questions?