DNSSEC for the Root Zone

DNSSEC Session at ICANN38, Brussels, Belgium, June 2010

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This design is the result of a cooperation between ICANN & VeriSign with support from the U.S. DoC NTIA
The DURZ

• The 13 root servers were incrementally converted to a signed, but unverifiable, zone beginning in January and finishing in May

• Root server operators collaborated with DNS-OARC to collect DNS queries 24 hours before and after each switchover
DURZ Data Analysis

• Looking at the data for indications of problems
• Query rates
• TCP traffic
• Message sizes
• Priming queries
This drop is due to upgraded resolvers within an ISP’s /23.
A single Cisco CNR instance with max-cache-ttl=0
Generating a Root Key

Done.
DNSSEC Root Zone KSK Ceremony 1

Where: 16 June 2010 in Culpeper, Virginia (outside the nuclear blast zone of Washington, DC)

When: Started at 17:25 UTC, ended at 00:25 UTC (1:25-8:25 PM)

Who: 30 people in a small room for 7 hours (without laptops!):
   – 16 Trusted Community Representatives (TCRs) acting as Crypto Officers, Recovery Key Share Holders and backups
   – 11 ICANN staff and contractors
   – 1 external auditor
   – 1 VeriSign representative to verify the KSR/ZSK (Matt!!)
   – 1 external camera man

What: 19036 (DNSSEC Key Tag for KSK)
DNSSEC Root Zone KSK Ceremony I TCRs

• Sacrificed time and money to improve the confidence in and acceptance of DNSSEC in the root
• 14 Crypto Officers (CO) – 7 for US East and 7 for US West key management facilities
• 7 Recovery Key Share Holders (RKSH)
• Not from an organization affiliated with the root zone management process (ICANN, VeriSign, or the U.S. Department of Commerce)
TCRs

• Crypto Officers (COs)
  – Have physical keys to safe deposit boxes holding smartcards that activate the HSM
  – ICANN cannot generate new key or sign ZSK without 3-of-7 COs
  – Able to travel up to 4 times a year to US. Don’t lose key.
TCRs

• Recovery Key Share Holders (RKSHs)
  – Have smartcards holding pieces (M-of-N) of the key used to encrypt the KSK inside the HSM
  – If both key management facilities fall into the ocean, 5-of-7 RKSH smartcards and an encrypted KSK smartcard can reconstitute KSK in a new HSM

• Backup KSK encrypted on smartcard held by ICANN
  – Able to travel on relatively short notice to US. Hopefully never. Annual inventory.
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<tr>
<th>CO</th>
<th>CO Backup</th>
<th>RKSH</th>
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<td>Alain Aina, BJ</td>
<td>Christopher Griffiths, US</td>
<td>Bevil Wooding, TT</td>
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<td>Anne-Marie Eklund Löwinder, SE</td>
<td>Fabian Arbogast, TZ</td>
<td>Dan Kaminsky, US</td>
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<td>Frederico Neves, BR</td>
<td>John Curran, US</td>
<td>Jiankang Yao, CN</td>
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<td>Gaurab Upadhaya, NP</td>
<td>Nicolas Antoniello, UY</td>
<td>Moussa Guebre, BF</td>
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<td>Olaf Kolkman, NL</td>
<td>Rudolph Daniel, UK</td>
<td>Norm Ritchie, CA</td>
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<td>Robert Seastrom, US</td>
<td>Sarmad Hussain, PK</td>
<td>Ondřej Surý, CZ</td>
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<td>Vinton Cerf, US</td>
<td>Ólafur Guðmundsson, IS</td>
<td>Paul Kane, UK</td>
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<td>Andy Linton, NZ</td>
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<td>Carlos Martinez, UY</td>
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<td>Dmitry Burkov, RU</td>
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<td>Edward Lewis, US</td>
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<td>João Luis Silva Damas, PT</td>
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<td>Masato Minda, JP</td>
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<td>Subramanian Moonesamy, MU</td>
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<td>David Lawrence, US</td>
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<td>Dileepa Lathsara, LK</td>
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<td>Jorge Etges, BR</td>
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<td>Kristian Ørmen, DK</td>
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<td>Ralf Weber, DE</td>
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<td>Warren Kumari, US</td>
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Quick Recap

• 2048-bit RSA KSK, 1024-bit RSA ZSK
• Signatures with RSA/SHA-256
• Split ZSK/KSK operations
• KSK and ZSK policies and other documents published on http://www.root-dnssec.org
DS Change Requests

• Accepting DS records NOW

• DS records handling document at http://www.root-dnssec.org/documentation/
Next....

• Key Ceremony on 12 July 2010 in Los Angeles, California, completes the process
• Key material then replicated and stored in the West coast facility
• At L.A. ceremony, KSR for Q4 will also be signed
• See http://dns.icann.org/ksk
Finally…the DVRZ

- A fully validatable production root zone is currently planned to be published
- Another data collection (five days)
- Root zone trust anchor to be published by ICANN (the IANA Functions Operator)
Key Ceremony
Participants and Attendees
Acknowledgements

Design Team:
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Too many people to mention, from all over the company and the world