ICANN

Rolling the Root Zone DNSSEC Key Signing Key

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Motivation for this talk

- ICANN is about to change an important configuration parameter in DNSSEC

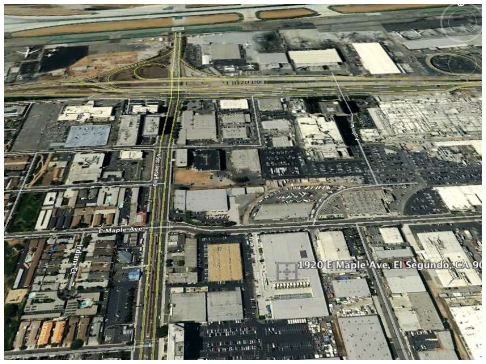
- For a network operator, this may create a need for action

- This discussion is meant to inform: Why this is happening, what is happening, and when
  - Highlighting: the availability of project plan documents

Do Class Exercise Here

Current Root KSK

- The current root KSK was created in 2010
  - Stored in Hardware Security Modules in two Key Management Facilities
  - The operations surrounding the key is an entirely different talk (21 trusted community representatives, multi-person controls, key ceremonies, 3rd party audit.)



NOTICE
NOTICE
UNAUTHORIZED PERSONS NOT PERMITTED BEYOND THIS POINT
NOTICE
NO FOOD OR DRINK BEYOND THIS POINT
NOTICE
ICANN
SEASTROM
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ICANN
One World. One Internet. Everyone Connected.
19036

Why change the current Root KSK?

- Good cryptographic hygiene
  - Secrets don't remain secret forever
- Good operational hygiene
  - Have a plan, complete enough to execute
  - Exercise the plan under normal circumstances
- Promised to do so in a policy statement* in 2010
  - “Each RZ KSK will be scheduled to be rolled over through a key ceremony as required, or after 5 years of operation.”

* https://www.iana.org/dnssec/icann-dps.txt Section 6.5

Bottom Line

- Changing the root KSK will impact just about all DNSSEC validations (15% worldwide)
  - If the trust anchor is "misconfigured" (i.e., the wrong key) DNSSEC will reject legitimate responses
  - To anyone or any process relying on DNS, it will appear that the desired data is unavailable, website is unreachable, "the Internet is down"

The KSK Rollover Plan Documents

- Available at: *https://www.icann.org/kskroll*

  2017 KSK Rollover Operational Implementation Plan

  2017 KSK Rollover Systems Test Plan

  2017 KSK Rollover Monitoring Plan

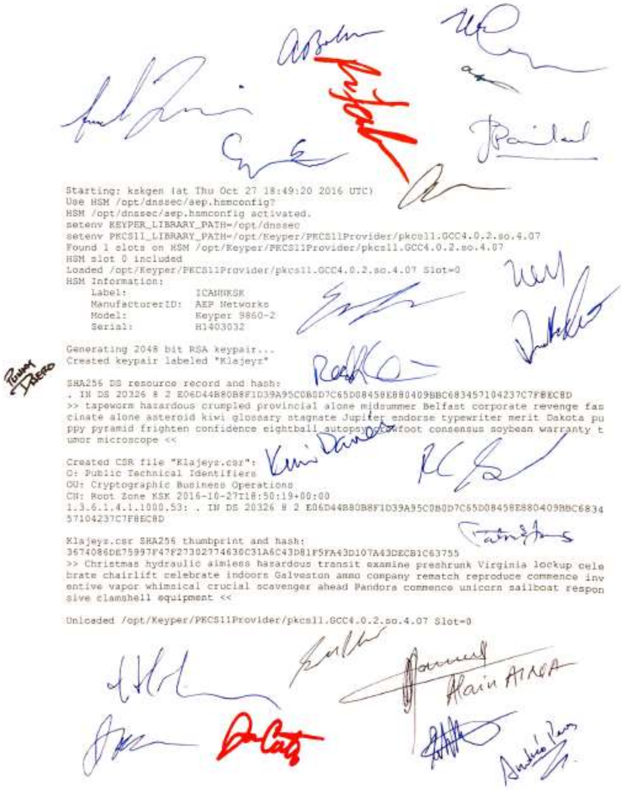
  2017 KSK Rollover External Test Plan

  2017 KSK Rollover Back Out Plan

- We encourage interested folks to given them a read

Overview of Project Plans

- The new KSK was created on October 27, 2016
- Expect new KSK to be install on backup site Feb 2017



```
Starting: kskgen (at Thu Oct 27 18:49:20 2016 UTC)
Use HSM /opt/dnssec/aep.hsmconfig?
HSM /opt/dnssec/aep.hsmconfig activated.
setenv KEYPER_LIBRARY_PATH=/opt/dnssec
setenv PKCS11_LIBRARY_PATH=/opt/Keyper/PKCS11Provider/pkcs11.GCC4.0.2.so.4.07
Found 1 slots on HSM /opt/Keyper/PKCS11Provider/pkcs11.GCC4.0.2.so.4.07
HSM slot 0 included
Loaded /opt/Keyper/PKCS11Provider/pkcs11.GCC4.0.2.so.4.07 Slot=0
HSM Information:
    Label:          ICANNKSK
    ManufactorerID: AEP Networks
    Model:          Keyper 9860-2
    Serial:         H1403032

Generating 2048 bit RSA keypair...
Created keypair labeled "Klajeyz"

SHA256 DS resource record and hash:
. IN DS 20326 8 2 E06D44B80B8F1D39A95C0B0D7C65D08458E880409BBC683457104237C7F8EC8D
>> tapeworm hazardous crumpled provincial alone midsummer Belfast corporate revenge fas
cinate alone asteroid kiwi glossary stagnate Jupiter endorse typewriter merit Dakota pu
ppy pyramid frighten confidence eightball autopsy crowfoot consensus soybean warranty t
umor microscope <<

Created CSR file "Klajeyz.csr":
O: Public Technical Identifiers
OU: Cryptographic Business Operations
CN: Root Zone KSK 2016-10-27T18:50:19+00:00
1.3.6.1.4.1.1000.53: . IN DS 20326 8 2 E06D44B80B8F1D39A95C0B0D7C65D08458E880409BBC6834
57104237C7F8EC8D

Klajeyz.csr SHA256 thumbprint and hash:
3674086DE75997F47F27302774630C31A6C43D81F5FA43D107A43DECB1C63755
>> Christmas hydraulic aimless hazardous transit examine preshrunk Virginia lockup cele
brate chairlift celebrate indoors Galveston ammo company rematch reproduce commence inv
entive vapor whimsical crucial scavenger ahead Pandora commence unicorn sailboat respon
sive clamshell equipment <<

Unloaded /opt/Keyper/PKCS11Provider/pkcs11.GCC4.0.2.so.4.07 Slot=0
```

Kim Davies

Alain AINA

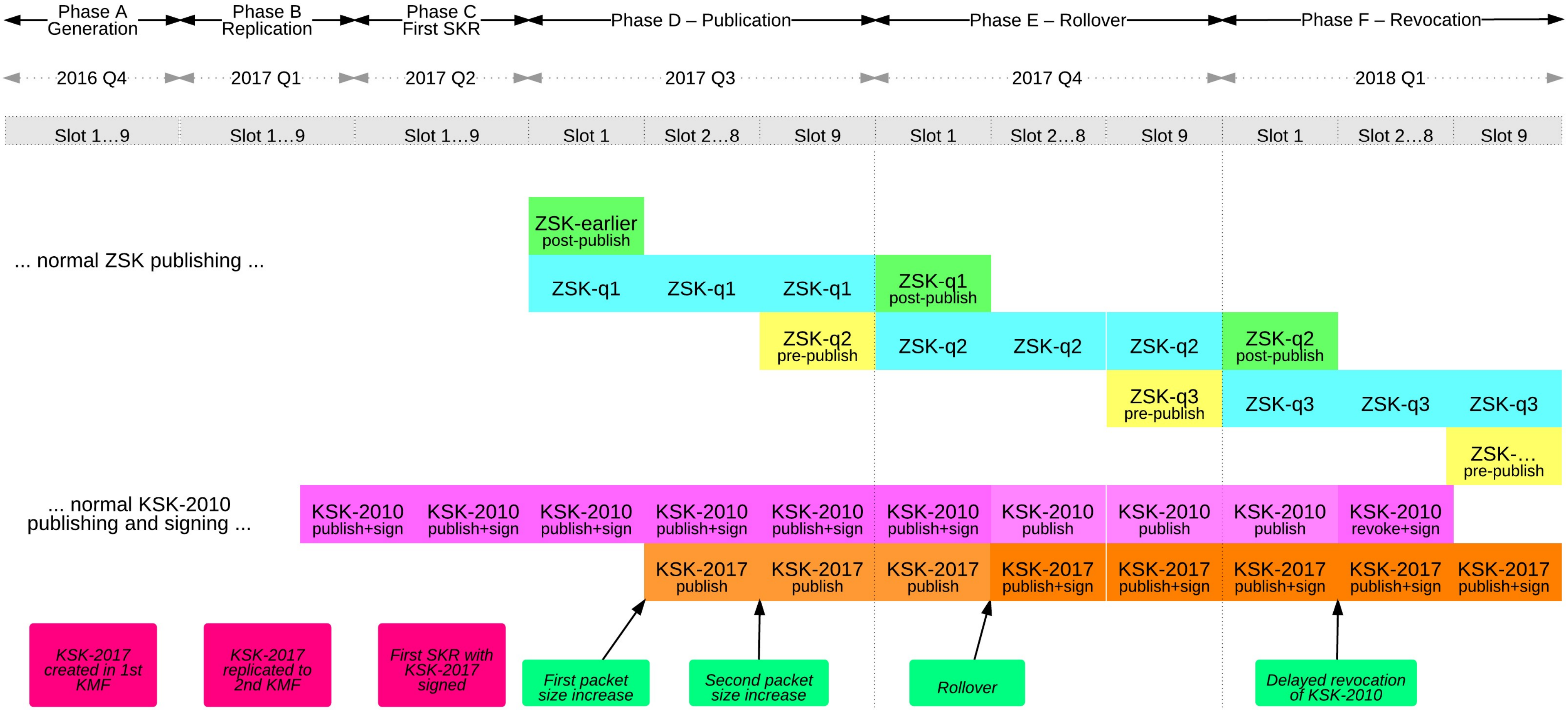
Upcoming Dates to Watch

- September 19, 2017
  - The root zone DNSKEY set will increase to 1414 bytes for 20 days, prior to that date 1139 bytes has been the high water mark

- **October 11, 2017**
  - On this date the root zone DNSKEY set will be signed only by the new KSK

- January 11, 2018
  - The root zone DNSKEY set will increase to 1425 bytes for 20 days

Operational Implementation Plan Timeline



Phase A Generation
Phase B Replication
Phase C First SKR
Phase D – Publication
Phase E – Rollover
Phase F – Revocation

2016 Q4
2017 Q1
2017 Q2
2017 Q3
2017 Q4
2018 Q1

Slot 1…9
Slot 1…9
Slot 1…9
Slot 1
Slot 2…8
Slot 9
Slot 1
Slot 2…8
Slot 9
Slot 1
Slot 2…8
Slot 9

... normal ZSK publishing ...

ZSK-earlier post-publish

ZSK-q1
ZSK-q1
ZSK-q1
ZSK-q1 post-publish

ZSK-q2 pre-publish
ZSK-q2
ZSK-q2
ZSK-q2
ZSK-q2 post-publish

ZSK-q3 pre-publish
ZSK-q3
ZSK-q3
ZSK-q3

ZSK-… pre-publish

... normal KSK-2010 publishing and signing ...

KSK-2010 publish+sign
KSK-2010 publish+sign
KSK-2010 publish+sign
KSK-2010 publish+sign
KSK-2010 publish+sign
KSK-2010 publish+sign
KSK-2010 publish
KSK-2010 publish
KSK-2010 publish
KSK-2010 revoke+sign

KSK-2017 publish
KSK-2017 publish
KSK-2017 publish
KSK-2017 publish+sign
KSK-2017 publish+sign
KSK-2017 publish+sign
KSK-2017 publish+sign
KSK-2017 publish+sign

KSK-2017 created in 1st KMF

KSK-2017 replicated to 2nd KMF

First SKR with KSK-2017 signed

First packet size increase

Second packet size increase

Rollover

Delayed revocation of KSK-2010

Trust Anchor Management

- How do you trust and configure?
  - Are trust anchors subject to configuration control?
  - Rely on embedded data in software?
  - Are DNSSEC validation failures monitored?

- Automated Updates of DNSSEC Trust Anchors
  - Most direct, reliable means for getting the key (RFC5011, RFC7958, and other drafts)

- Negative Trust Anchor management RFC7646
  - Protects against errors made by others

Tools & Testbeds

- We are working with DNS software and tool developers and distributors
  - Management/troubleshooting aids
  - Updates of bundled keys
- Testbeds for Code Developers
  - Automated updates: *http://keyroll.systems/*
  - Root zone model: *https://www.toot-servers.net/*
- Testbeds for Service Operators
  - I.e., using "off-the-shelf" parameters
  - Planned for end-of-2016

For More Information

- Join the ksk-rollover@icann.org mailing list:
  - https://mm.icann.org/listinfo/ksk-rollover
- Follow on Twitter
  - @ICANN
  - Hashtag: #KeyRoll
- Visit the web page:
  - https://www.icann.org/kskroll

Engage with ICANN

Thank You and Questions

Reach me at:
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