



Rolling the Root Zone DNSSEC Key Signing Key

Presented by Carlos Martínez, on behalf of ICANN

Motivation for the Talk

- ⦿ ICANN is about to change an important configuration parameter in DNSSEC
- ⦿ For a network DNS operator, this may create a need for action
- ⦿ This discussion is meant to inform: What is happening, when, and what to do if troubleshooting is needed

DNSSEC in the Root Zone

- ⦿ DNSSEC in the Root Zone is managed by:
 - ICANN, as the IANA Functions Operator
 - Verisign, as the Root Zone Maintainer (RZM)
- ⦿ In coordination with U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) per agreements

DNSSEC Key Management in the Root Zone

- ⦿ DNSSEC key management is divided into:
 - Key Signing Key (KSK), self-signs the key set
 - Zone Signing Key (ZSK), signs other zone data
- ⦿ These roles are meaningful to the operators of signed zones
 - The significance is that the roles are separated

DNSSEC

KSK and ZSK

- ⦿ ICANN, as IANA Functions Operator, manages the KSK
 - Same KSK since operations began in 2010
 - The KSK signs the ZSK quarterly in a ceremony
- ⦿ Verisign, as Root Zone Maintainer, manages the ZSK
 - ZSK is changed quarterly

Activities Underway

- ⦿ Extending signature durations
 - Recommendations in Root Server System Advisory Committee's (RSSAC) report on root zone TTLs (RSSAC003)
- ⦿ The ZSK lengthening (visible late 2016)
 - Activity managed by Verisign, covered elsewhere
- ⦿ The KSK changing (visible throughout 2017)
 - A new trust anchor is needed by all DNSSEC validating DNS caches/clients
- ⦿ Separate but coordinated activities

Why Change the KSK?

- ⊙ Primary reason – operational preparedness
 - KSK has no expiration date, currently no weakness
 - No key should live forever: bad crypto practice
 - DNSSEC Practice Statement states the key will be rolled
 - Prefer to exercise process in normal conditions
 - As opposed to abnormal, such as key compromise
- ⊙ Big challenge
 - Involves countless/uncountable participants
 - No test environment can cover all possibilities

The KSK Roll Plan Documents

- ◎ The plan consists of five documents:
 - 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

- ◎ The documents are available at:
<https://www.icann.org/kskroll>

Communications Approach

- ⊙ Target technical audiences performing DNSSEC validation (e.g., Network Operating Groups)
 - How to participate in the KSK rollover
- ⊙ Broader communication
 - General awareness, resources available
- ⊙ Integrated communications approach
 - Traditional channel (email, presentations)
 - Social media (#KeyRoll)
 - Leverage ICANN staff and stakeholder groups

Operational Implementation Plan Phases

⦿ Preparation Phases

- System engineering, KSK creation and replication
- Little to no operational impact on Internet

⦿ Automated Updates (RFC 5011) Phases

- KSK-2017 (new) pre-published, signs DNSKEY set
- KSK-2010 (current) is revoked

⦿ Post Rollover Phases

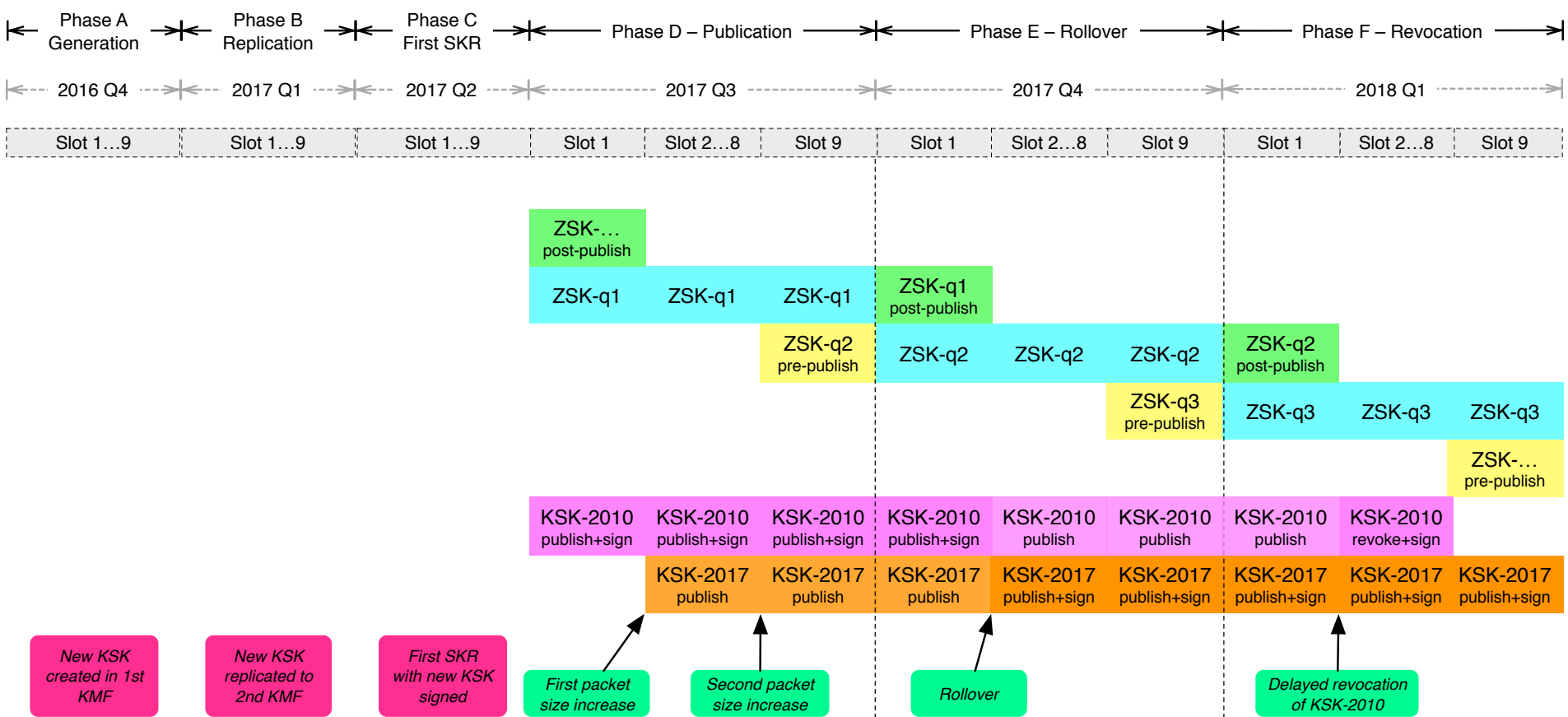
- Deletion of KSK-2010 from system
- Project experiences documented

Operational Implementation Plan Dates

- ⦿ Plans publicly available from July 22, 2016
- ⦿ Key signing ceremonies
 - Q4 2016 ceremony (October 27): generate new KSK
 - Q1 2017 ceremony (February): KSK operationally ready
- ⦿ DNS changes
 - New KSK in root zone on July 11, 2017
 - New KSK signs DNSKEY RRset beginning October 11, 2017
 - Current KSK revoked on January 11, 2018

(Timing contingent on successful ZSK size increase)

Operational Implementation Plan Timeline



Systems Test Plan

- ⦿ Testing internal systems for these components
- ⦿ Key Management
 - Lifecycle
- ⦿ Key Processing
 - Key Signing Request to Signed Key Response
- ⦿ Trust Anchor Publication
 - Generation of the trust anchor file as formatted in eXtensible Markup Language (XML)

Monitoring Plan

- ⊙ Automated monitoring involving
 - ICANN's L-root server
 - Information Science Institute's B-root server
- ⊙ Looking for
 - Low-level fragmentation issues, indicating responses are too large
 - Elevated query rates for the DNSKEY resource record set, indicating misconfigured trust anchors
- ⊙ Plus a means for ad hoc reporting

External Test Plan

- ⦿ Resources targeted for software developers
 - Two third-party “accelerated” RFC 5011 test environments with accelerated clocks
 - <http://toot-servers.net>
 - <http://keyroll.systems>
- ⦿ Resources more suitable for operators
 - “Real time” RFC 5011 test environment being developed by ICANN
 - Roll a test zone trust anchor with actual 30-day Add Hold-Down timer

Back Out Plan

- ⦿ Plan includes back out capability
 - If necessary, can stay in current state or back out at every phase
 - Until old key revoked in Q1 2018
- ⦿ Multiple back out DNSKEY Resource Record Sets (RRsets) signed at each ceremony
 - Back out can be immediate
 - No need for extra key ceremony

What You Need to Know

⦿ Manage Your Trust Anchors

- Be aware of your software tools for managing trust anchors
- Be aware of the new KSK

⦿ When Events Happen

- Keep an eye on dates
- Be mindful of when changes are scheduled and monitor appropriately

Managing Trust Anchors

- ⦿ Trust anchors are configured data in DNSSEC validators
 - If Automated Updates of DNSSEC Trust Anchors (RFC 5011) is enabled and working, the rollover is automatic
 - Otherwise manual intervention is required
 - Add the new KSK before October 11, 2017 (assuming all is on track)
 - Remove the old KSK at a later date

Planned KSK Rollover Dates

- ⦿ Plans publicly available from July 22, 2016
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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

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