Future Root Zone KSK Rolls

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Problem Statement

- First KSK was created in 2010 (“KSK-2010”)
- Design team was formed to develop a set of recommendations on how to perform a rollover
- Originally scheduled for 2017, the second KSK (“KSK-2017”) ultimately started signing the zone on 11 October 2018
  - One year pause in process to consider impact of anomalous telemetry data
- Rollover successfully occurred with minimal disruption
- **What do we want to do now?**

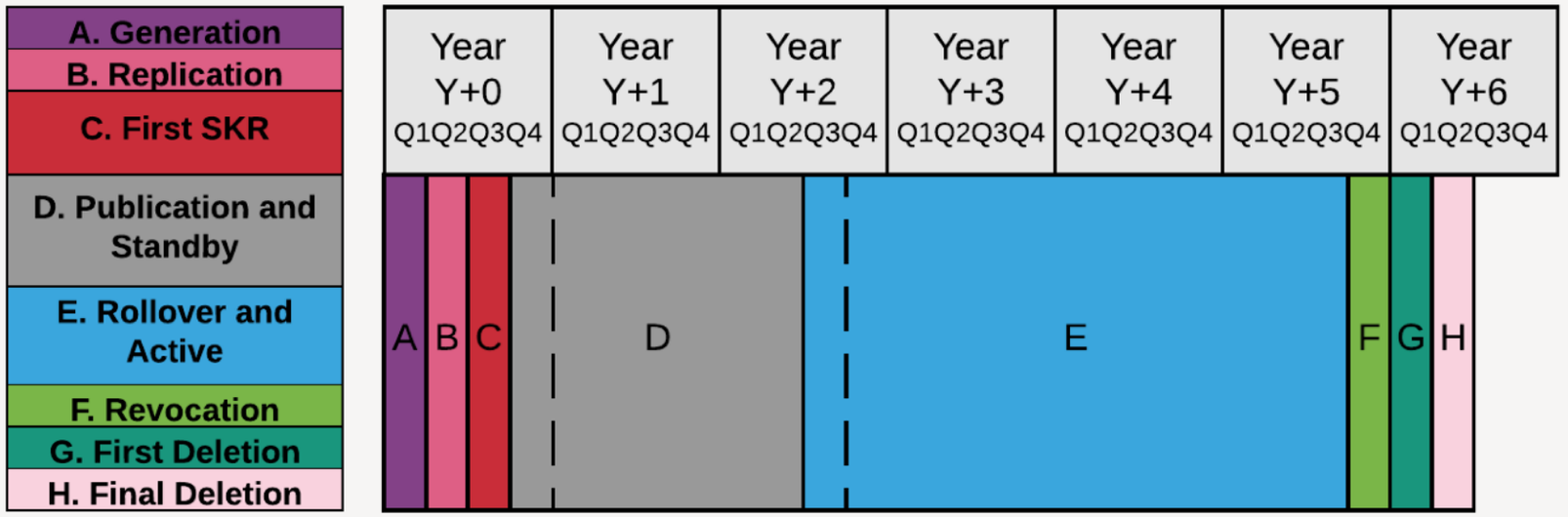
Initial feedback

- Recognizing community interest in the rollover was at its peak during and shortly after the rollover, we solicited comments and directed responses to the ksk-rollover list for capture.
- We undertook to analyze those comments in 2019H2 and produce a recommendation for future rollovers
- Common themes in this early commentary:
  - KSK rollover should be a routine event
  - KSK should be rolled over annually
  - Introduce backup and/or standby keys
  - Perform more monitoring of impacts of larger keysets
  - Consider alternate signing algorithms

Our proposal

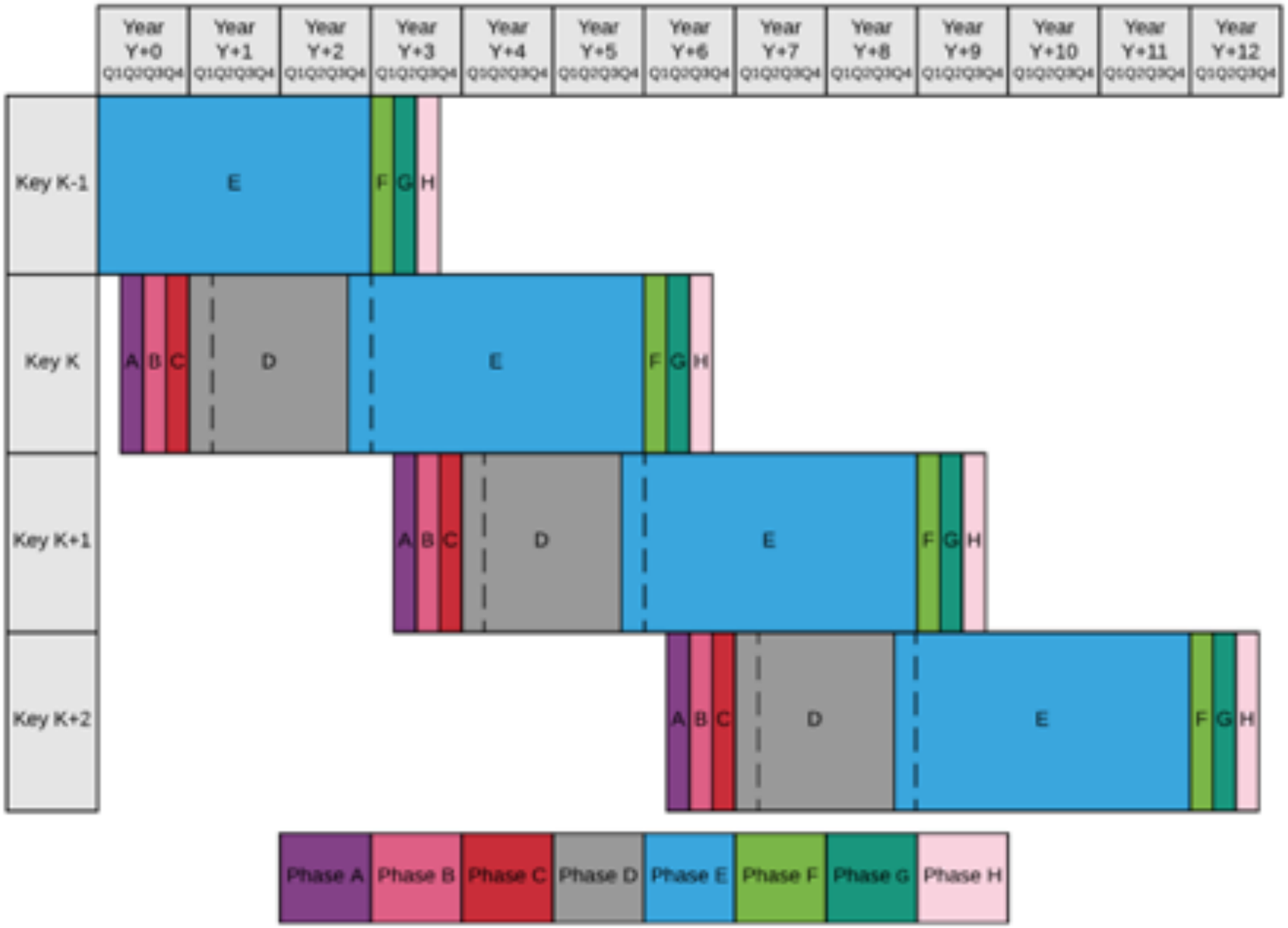
- Create a predictable approach to future rollovers
- Plan for a three-year rollover interval to balance desire for more regular rollovers with the operational complexity involved
- At least two years for the new trust anchor to be published in advance, allowing greater propagation before the rollover
- Use similar phased approach aligned with the quarterly key ceremony schedules

Proposed key lifetime



- It takes 3 quarters to generate and successfully replicate the new KSK
- 7+ quarters in standby state: pre-populated and capable for unscheduled roll
- 12 quarters in active state: signing the zone
- 3 quarters to revoke: revocation period plus destruction in KSKs

Subsequent key lifetimes



Choice of Interval

- A common suggestion from early commenters was to perform an annual rollover.
- Because of the multiple quarters in advance to generate, pre-populate and pre-publish KSKs, plus quarters following for revocation and destruction, and annual cycle (without any delays) would have 4 or more KSKs in play at some times.
- We consider this to result in too much unneeded complexity for KSK operations
  - KSK handling operations in the key ceremony context is time-intensive and each additional act introduces risk of error.
  - KSK ceremonies are already more lengthy due to:
    - Multiple KSRs being signed for multiple phase/fallback scenarios
    - Replacement cycles (HSMs, TCRs, Smart cards, etc.)
  - We want to keep ceremonies to a manageable length to ensure participant focus on the key items

Earlier generation

- The lifecycle results in the earlier generation of the KSK than was used in the KSK-2017 plan
- Provides several benefits:
  - At least two years for software vendors and other distributors of the trust anchor to upgrade their distributions
  - Provides a greater window when, should an emergency unscheduled rollover be performed, have a ready KSK to use that is at least partially shared with operators
- Any negative impacts of sharing the key earlier on security outcomes was considered negligible

No backup or standby key

- We have not proposed a dedicated backup or standby key, other than the pre-published key acting in a standby capacity.
- As we do not have alternate facilities to a suitable specification to store any additional key, the benefit appears to be marginal
  - Storage in the existing 2 KMFs would result in fate-sharing that mitigates the benefits for most scenarios
  - Detailed consideration needed for any kind of storage alternative

Algorithm Change

- We agree this needs to be investigated.
- However, we don’t believe a mature approach is known, and thus it is not an IANA operationalization exercise, but rather first a research exercise.
- We propose activity relating to research into algorithm change be performed as a separate activity, perhaps much like the original rollover explorations.

Public Consultation

- We’ve published a paper that outlines the approach.
- It is now open for public comment
- https://www.icann.org/public-comments/proposal-future-rz-ksk-rollovers-2019-11-01-en
- Public comment period is posted now, open until end of January
- We will distill the feedback in the new year and turn them into operational practice

In Summary

- The rollover from KSK-2010 to KSK-2017 was widely considered successful
- We seek to replicate this success with a similar methodology
- Our aim is to target a 3-year active period for each KSK
  - Annual rollovers would result in too much overlap between lifecycles, too much operational complexity
  - We create the KSK early to allow greater period of time for pre-population and provides more time for use in an unscheduled/ emergency scenario
- Please provide feedback to us, either endorsing the approach and suggesting alternatives
- We will try to finalize the approach in the new year and communicate our operational plan

Bonus Slide: Trusted Community Representatives

- We are almost at the 10 year anniversary for KSK operations
- Trusted Community Representatives are the community volunteers that observe ceremonies, and oversee key shares used to activate the KSK
- Current class of TCRs all originate from the 2010 selection round
- Recognizing some wished to retire and our backup pool of pre-selected TCRs was shrinking, we created an evergreen solicitation for Statements of Interest
  - http://iana.org/tcr
- First selections have been made with the new process
  - Backup pool back to 10 per our target
- Additional selections will be made as backups are promoted to replace active TCRs
- If you are interested, please apply!

Useful reading on the history to date

- Root Zone KSK Rollover Plan (March 2016)
  https://www.iana.org/reports/2016/root-ksk-rollover-design-20160307.pdf
- Review of the 2018 DNSSEC KSK Rollover (March 2019)
  https://www.icann.org/en/system/files/files/review-2018-dnssec-ksk-rollover-04mar19-en.pdf
- ICANN Project page for last rollover
  https://www.icann.org/resources/pages/ksk-rollover

Thank you!

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