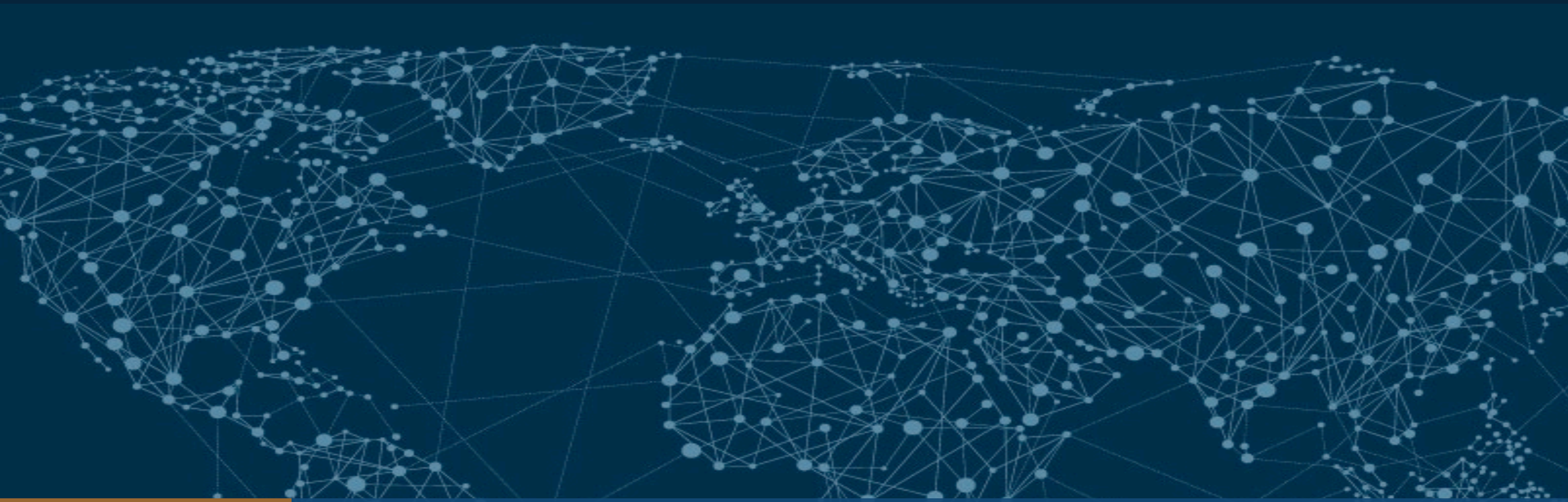

2017 DNSSEC KSK Rollover

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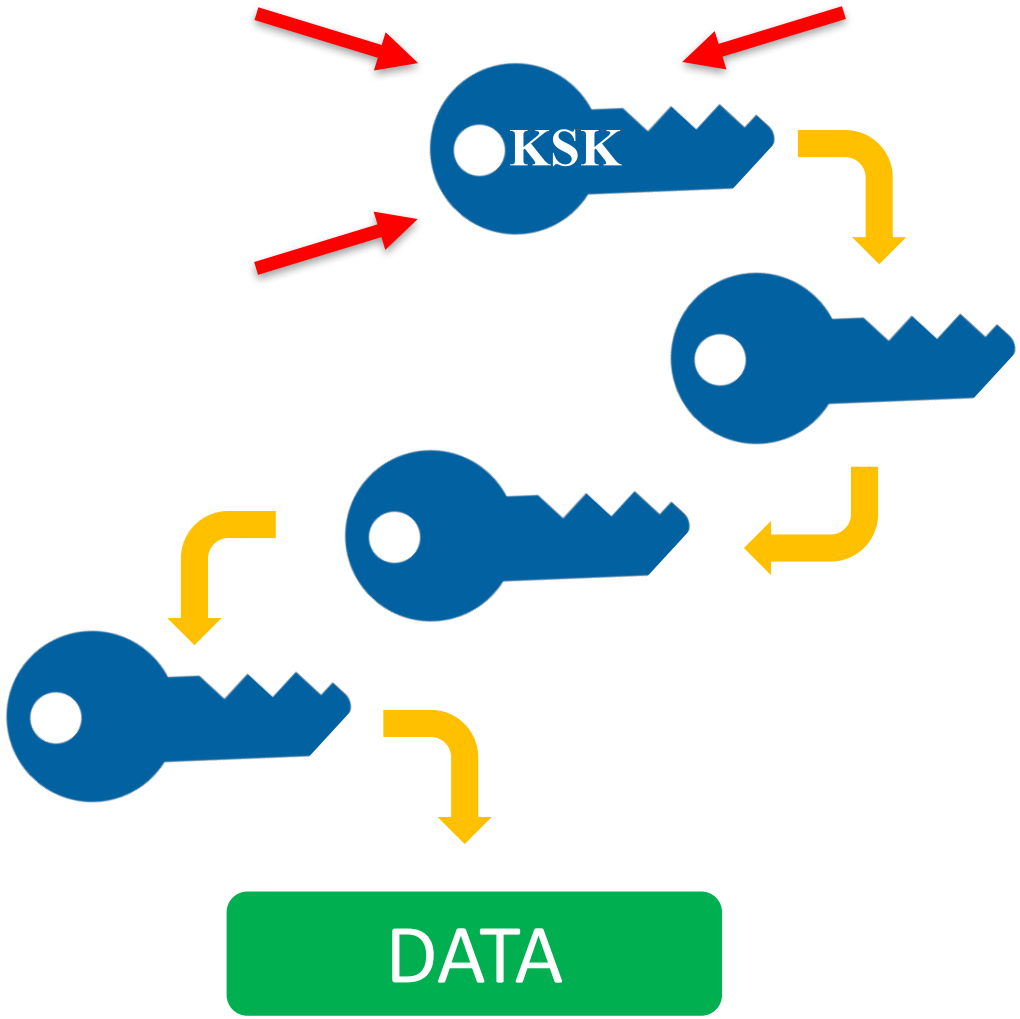
Purpose of this Talk

1. To publicize the new Root Zone DNSSEC KSK
2. Provide status, upcoming events, and contact information
3. Provide helpful resources on the KSK roll

The Root Zone DNSSEC KSK

- The Root Zone DNSSEC Key Signing Key "**KSK**" is the top most cryptographic key in the DNSSEC hierarchy
- Public portion of the KSK is configuration parameter in DNS validating revolvers



Rollover of the Root Zone DNSSEC KSK

- **There has been one functional, operational Root Zone DNSSEC KSK**
  - Called "KSK-2010"
  - Since 2010, nothing before that
- **A new KSK will be put into production later this year**
  - Call it "KSK-2017"
  - An orderly succession for continued smooth operations
- **Operators of DNSSEC recursive servers may have some work**
  - As little as review configurations
  - As much as install KSK-2017

Important Milestones

Event	Date
Creation of KSK-2017	~~October 27, 2016~~
Production Qualified	~~February 2, 2017~~
Out-of-DNS-band Publication	Now, onwards
In-band (*Automated Updates*) Publication	July 11, 2017 and onwards
Sign (Production Use)	October 11, 2017 and onwards
Revoke KSK-2010	January 11, 2018
Remove KSK-2010 from systems	Dates TBD, 2018

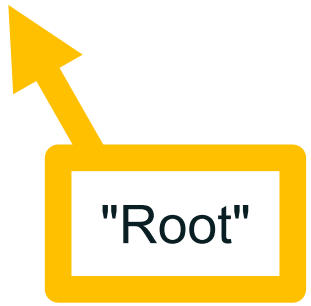
Recognizing KSK-2017

- **The KSK-2017's Key Tag is**

  20326

- **The Delegation Signer (DS) Resource Record for KSK-2017 is**

```
.    IN   DS     20326 8 2
                 E06D44B80B8F1D39A95C0B0D7C65D084
                 58E880409BBC683457104237C7F8EC8D
```



Note: liberties taken with formatting for presentation purposes

KSK-2017 in a DNSKEY Resource Record

- **The DNSKEY resource record will be:**

```
. IN DNSKEY  257 3 8
     AwEAAaz/tAm8yTn4Mfeh5eyI96WSVexTBAvkMgJzkKTOiW1vkIbzxeF3
     +/4RgWOq7HrxRixHlFlExOLAJr5emLvN7SWXgnLh4+B5xQlNVz8Og8kv
     ArMtNROxVQuCaSnIDdD5LKyWbRd2n9WGe2R8PzgCmr3EgVLrjyBxWezF
     0jLHwVN8efS3rCj/EWgvIWgb9tarpVUDK/b58Da+sqqls3eNbuv7pr+e
     oZG+SrDK6nWeL3c6H5Apxz7LjVc1uTIdsIXxuOLYA4/ilBmSVIzuDWfd
     RUfhHdY6+cn8HFRm+2hM8AnXGXws9555KrUB5qihylGa8subX2Nn6UwN
     R1AkUTV74bU=
```

"Root"

Note: liberties taken with formatting for presentation purposes

Why are there DS and DNSKEY forms of KSK-2017?

- **Tools that you will use to manage DNSSEC trust anchor configurations work on either the DS form, the DNSKEY form or both**
  - For each tool there are historical reasons
  - The DS record contains a hash of KSK-2017
  - The DNSKEY record contains the public key of KSK-2017

- **Consult your tool's documentation to know which is appropriate**

Current "State of the System"

- **Sunny, as in “sunny day scenario”**
  - We are changing the KSK under good conditions
  - Leverage trust in KSK-2010 to distribute KSK-2017
  - Recommended course of action – rely on RFC 5011’s *Automated Updates of DNSSEC Trust Anchors* protocol
- **Why mention this?**
  - Alternative to *Automated Updates* is bootstrapping (or establishing an initial state of trust in) a trust anchor
  - That would be necessary in stormy (emergency) conditions

Automated Updates timetable

Important dates when following *Automated Updates*

- **On 11 July 2017**
  - KSK-2017's DNSKEY record will appear in the DNS root key set
  - Tools following RFC 5011 will start counting days
- **After 11 August 2017 (give or take a day)**
  - Your tool should see KSK-2017 in its trust anchor database
  - If not, debugging is needed, you have a few weeks to fix
  - (Don't panic if it it's not immediate, remember time zone, etc.)
- **On 11 October 2017**
  - KSK-2017 goes "live," validation ought to be confirmed

What if KSK-2017 isn't trusted on August 11, 2017?

- **Don't Panic!**
  - There are nearly two months to examine why, fix, and test before KSK-2017 "goes live"
  - Begin to investigate early but there is no need to rush a fix
  - Resources to consult are listed later in the slides

Why is *Automatic Updates* in use?

- **Many DNSSEC validation tools have RFC 5011 support built-in**
  - The support needs to be configured properly, consult your administrator guide
  - All in all, nothing an operator can't handle
- **You can choose to "do it the hard way"**
  - You do have options
  - ICANN is publishing KSK-2017 in different ways to help

Preferred Approach

- **Mindful that the choice is a matter of local policy**
  - DNSSEC validation is for the benefit of the receiver
  - Not all operational environments are the same, not all validating tools implement *Automated Updates*
  - ICANN is doing its best to accommodate different approaches
- ***Automated Updates* is likely the preferred approach**
  - Relies only on what has been trusted before
  - It's the most reliable/stable approach, simplest basis for trust

Establishing Trust in KSK-2017 Automatically

- **If you are DNSSEC validating with KSK-2010**
  - You can simply follow *Automated Updates of DNSSEC Trust Anchors* by configuring your tool of choice to do so

Establishing Trust in KSK-2017 Manually

- **Via the official IANA trust anchor XML file at https://data.iana.org/root-anchors/root-anchors.xml**
  - Contains the same information as a DS record for KSK-2017
  - Validate root-anchors.xml with the detached signature at https://data.iana.org/root-anchors/root-anchors.p7s
- **Via DNS (i.e., ask a root server for "./IN/DNSKEY")**
  - Validate the KSK-2017 by comparison with other trusted copies
- **Via "Other means" ...**

What “other means” for a manual approach?

- **Most software/OS distributions of DNSSEC**
  - Embed copies of the KSK (now KSK-2010, later KSK-2017)
  - In contact with as many distributors as possible
- **Compare with the key from these slides**
  - If you trust the presentation copy you've seen here
- **Obtain a copy from another operator, or other trusted source**
  - How well do you trust "them"?
- **Perhaps it will be on a trinket too**
  - Not promising one, but...

Call to Action

- All the work is for operators, developers and distributors of software that performs DNSSEC validation – keep reading/listening!

- What if you're not one of them? What if you're an Internet user?
  - Be aware that the root KSK rollover is happening on **11 October 2017**
  - Do you know a DNS operator, software developer or software distributor?
    - Ask them if they know about the root KSK rollover and if they're ready
    - Direct them to ICANN's educational and information resources

What does an operator need to do?

- **Be aware whether DNSSEC is enabled in your servers**
- **Be aware of how trust is evaluated in your operations**
- **Test/verify your set ups**
- **Inspect configuration files, are they (also) up to date?**
- **If DNSSEC validation is enabled or planned in your system**
  - Have a plan for participating in the KSK rollover
  - Know the dates, know the symptoms, solutions

DNSSEC validation-enabled tools

- ISC's BIND
- NLnet Lab's Unbound
- Microsoft Windows
- Nominum Vantio
- CZnic's Knot Resolver
- DNSMASQ
- Secure64 DNS Cache
- PowerDNS Recursor

Symptoms of a Problem Related to the Rollover

- **Problems caused by IPv6 fragmentation-related issues**
  - DNSSEC validation fails for everything, resulting from an inability to get the Root Zone DNSKEY set with KSK-2017
  - Look for a large number of queries leaving a recursive server "retrying" the question
- **Problems caused by using the wrong trust anchor**
  - DNSSEC validation fails for everything, resulting from an inability to build a chain of trust
  - Look in logs for check failures, implementation specific

Recommendation for IPv6

- **What you should do**
  - Make sure your servers can query over TCP (especially in IPv6)
  - Test and verify that you can receive large DNSKEY sets
    http://keysizetest.verisignlabs.com/
    https://www.dns-oarc.net/oarc/services/replysizetest
  - This should be a "permanent fix", not just for the KSK key rollover, TCP is an important piece of DNS operations

Three Steps to Recovery

1. **Stop the tickets!** It's OK to turn off DNSSEC validation while you fix (but do turn it back on!)

2. **Debug.** If the problem is the trust anchor, find out why it isn't correct

   - Did RFC 5011 fail? Did configuration tools fail to update the key?
   - If the problem is fragmentation related, make sure TCP is enabled and/or make other transport adjustments

3. **Test the recovery.** Make sure your fixes take hold

Tools and Resources Provided by ICANN

- **A python-language script to retrieve KSK-2010 and KSK-2017**
  - get_trust_anchor.py
- **An *Automated Updates* testbed for production(test) servers**
  - https://automated-ksk-test.research.icann.org
- **Documentation**
  - https://www.icann.org/resources/pages/ksk-rollover

How can you engage with ICANN?

Thank You and Questions

Join the ksk-rollover@icann.org mailing list

Archives: https://mm.icann.org/listinfo/ksk-rollover

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