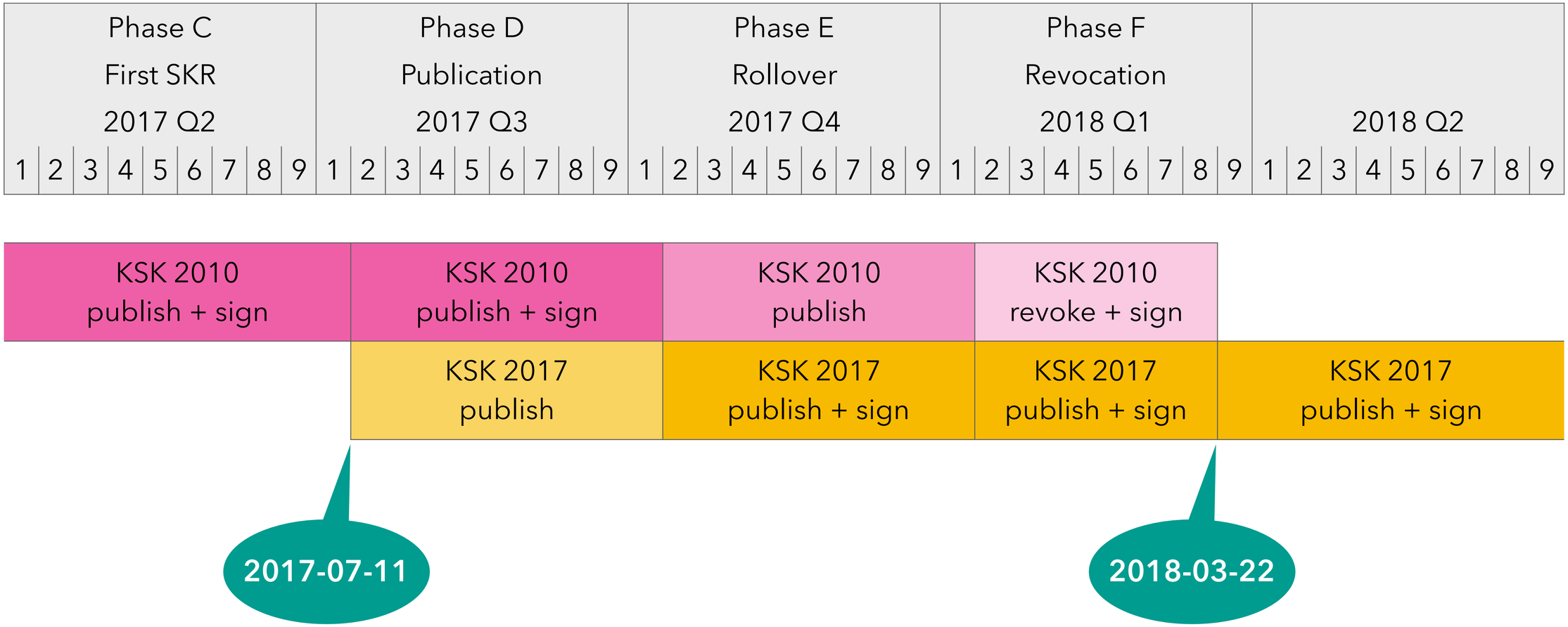
Testing Resolver Implementations of RFC 5011 for the Root KSK Roll

Martin Hoffmann

– OARC 28. San Juan. March 2018. –

OPENNETLABS

ICANN's (Original) **KSK Roll Schedule**



based on the [2017 KSK Rollover Operational Implementation Plan]

D

deckard

Test harness for DNS software.

Star 5 | HTTPS | https://gitlab.labs.nic.cz/knot/deckard.git

Files (6.9 MB) Commits (459) Branches (19) Tag (1) Readme BSD 2-clause "Simplified" License CI configuration

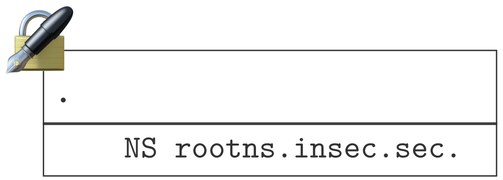
master deckard History Find file

Merge branch 'draft-ietf-dnsop-kskroll-sentinel-01' into 'master' ...
Petr Špaček authored 6 days ago

9c7c6313

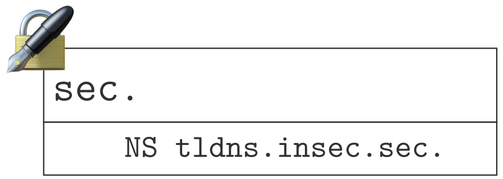
Name	Last commit	Last update
ci	Mac OS: remove readlink calls	2 months ago
contrib	contrib: update libswrap to avoid problems with CMak...	6 months ago

The Domain Name System (Complete View)



.

NS rootns.insec.sec.

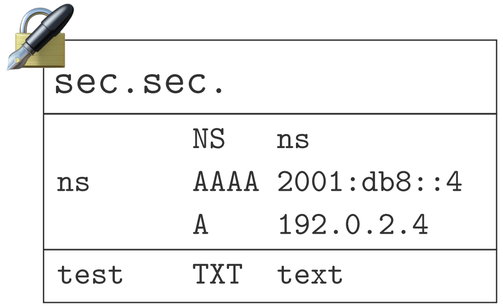


sec.

NS tldns.insec.sec.

insec.

NS tldns.insec.insec.

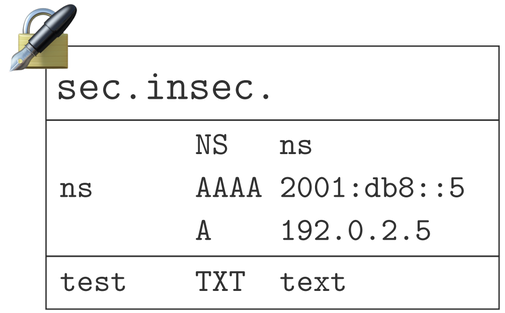


sec.sec.

	NS	ns
ns	AAAA	2001:db8::4
	A	192.0.2.4
test	TXT	text

insec.sec.

	NS	ns
rootns	AAAA	2001:db8::1
	A	192.0.2.1
tldns	AAAA	2001:db8::2
	A	192.0.2.2
ns	AAAA	2001::db8:5
	A	192.0.2.5
test	TXT	text



sec.insec.

	NS	ns
ns	AAAA	2001:db8::5
	A	192.0.2.5
test	TXT	text

sec.insec.

	NS	ns
tldns	AAAA	2001:db8::3
	A	192.0.2.3
ns	AAAA	2001::db8:7
	A	192.0.2.7
test	TXT	text

Test Scenarios

- Happy path
- Un-publish before signing
- Roll-back after signing
- Revocation of old key
- Early re-introduction of old key
- Un-revoked old key
- Late re-introduction of old key
- Missing new key
- Non-writeable state directory
- Resolver restarts
- Resolver restarts with non-writable state directory
- Late installation with old key only
- Late installation with both keys
- Post-roll installation with old key only
- Post-roll installation with new key only
- Happy path with forwarding to a non-validating resolver
- Happy path while forwarding to a non-DNSSEC resolver

Unbound

Versions

First production release	1.0.0	2008-05-20
RFC 5011 since	1.4.0	2009-11-26
Latest release	1.6.8	2018-01-19
Current Debian Stable	1.6.0	2016-12-15

Unbound

Findings

Late Installation

- Only trusts the new trust anchor after the 30 days' add hold-down.
- Even if the new trust anchor is provided on installation.
- Fixed in 1.6.5 (2017-08-21).

Re-introduction of Old Key

- accepts the old key after remove and add hold-downs.

Unbound

Operational

RFC 5011 needs to be explicitly enabled

- `trust-anchor-file` v. `auto-trust-anchor-file`

Non-writeable state directory

- initially: logs error and carries on until the next restart
- 1.5.4 (2015-07-09): logs error and stops.

Bind 9

Versions

First production release	9.0.0	2000-09-16	
First still usable release*	9.6.2	2010-03-01	* supporting RSASHA256
RFC 5011 since	9.7.0	2010-02-16	
… working since*	9.7.1	2010-06-17	* according to our tests
Latest release	9.12.0	2018-01-23	
Current Debian Stable	9.10.3	2015-09-16	

Bind 9

Findings

Re-introduction of Old Key

- initially: accepts the old key even before the hold-downs have passed
- 9.10.2 (2015-02-25): never accepts revoked key again

Post-roll Installation with Old Key

- initially: resolver goes insecure instead of bogus
- 9.10.4 (2016-04-28): fixed

Bind 9

Operational

RFC 5011 needs to be explicitly enabled

- `trusted-keys` v. `managed-keys`

Non-writeable state directory

initially:
- repeatedly logs error and carries on
- when restarted after roll: goes insecure

9.8.1 (2011-08-31):
- logs error once, carries on
- if kept running until after roll: bogus

Knot Resolver

Versions

First production release	1.0.0	2016-06-21
RFC 5011 since	1.0.0*	
Latest release	2.1.0	2018-02-16
Current Debian Stable	1.2.0	2017-01-25

* in our tests first working in 1.2.0, faulty in 1.2.2, then working again in 1.2.5.

Knot Resolver

Findings

Re-introduction of old key

- accepts the old key after remove and add hold-downs

Late installation with old key only

- 1.2.0: accepts the new key during the add hold-down but not after
- 1.2.5: accepts the new key for one day

Revocation of old key

- 1.5.0: accepts the old key for one day after removal from DNSKEY record

Knot Resolver

Operational

Trust anchors are always updated via RFC 5011 🥂

Non-writeable state directory

- initially: stops at start with `permission denied`
- 1.5.1: same message but keeps running and goes bogus one day late
- 2.0.0: stops at start again

Knot Resolver

Operational

Resolver restarts

- 1.2.0: add hold-down restarts with every restart if trust anchor is kept but config directory recreated, otherwise bogus three days after key roll.

- 2.0.0: fixed

Thank you!

Martin Hoffmann
martin@opennetlabs.com