DNSSEC usage statistics

and some observations

SEE 5, Tirana

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DNSSEC history

- Defined by RFCs 4033-4035 – March 2005
- Root zone signed – July 2010
- March 2011 – the biggest zone .com signed
- New GTLD programme (2013) require to run DNSSEC
- Current state: more than 110 ccTLDs are signed

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DNSSEC principles

Put DNSKEYS in zone

Records signing

Zone publishing

```
zone.   IN SOA ns1.zone. admin@zone.
zone.   IN NS ns1.zone.
zone.   IN NS ns2.zone.

zone.    IN DNSKEY 257 3 10 AwEAbPGd04qzYZmBbhU…
zone.    IN DNSKEY 256 3 10 AwEAAbywQfdma4SxQMn…
zone.    IN RRSIG SOA 10 2 86400 20130619092425 (…
zone.    IN RRSIG NS 10 2 86400 20130619092425 (…
```

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E-mail, web request,
fax, paper letter

Dear root/TLD admin,

Please put our DS record in your zone:
zone. IN DS 64656 10 2 DF8F614B79C
Thank you.

DNSSEC principles

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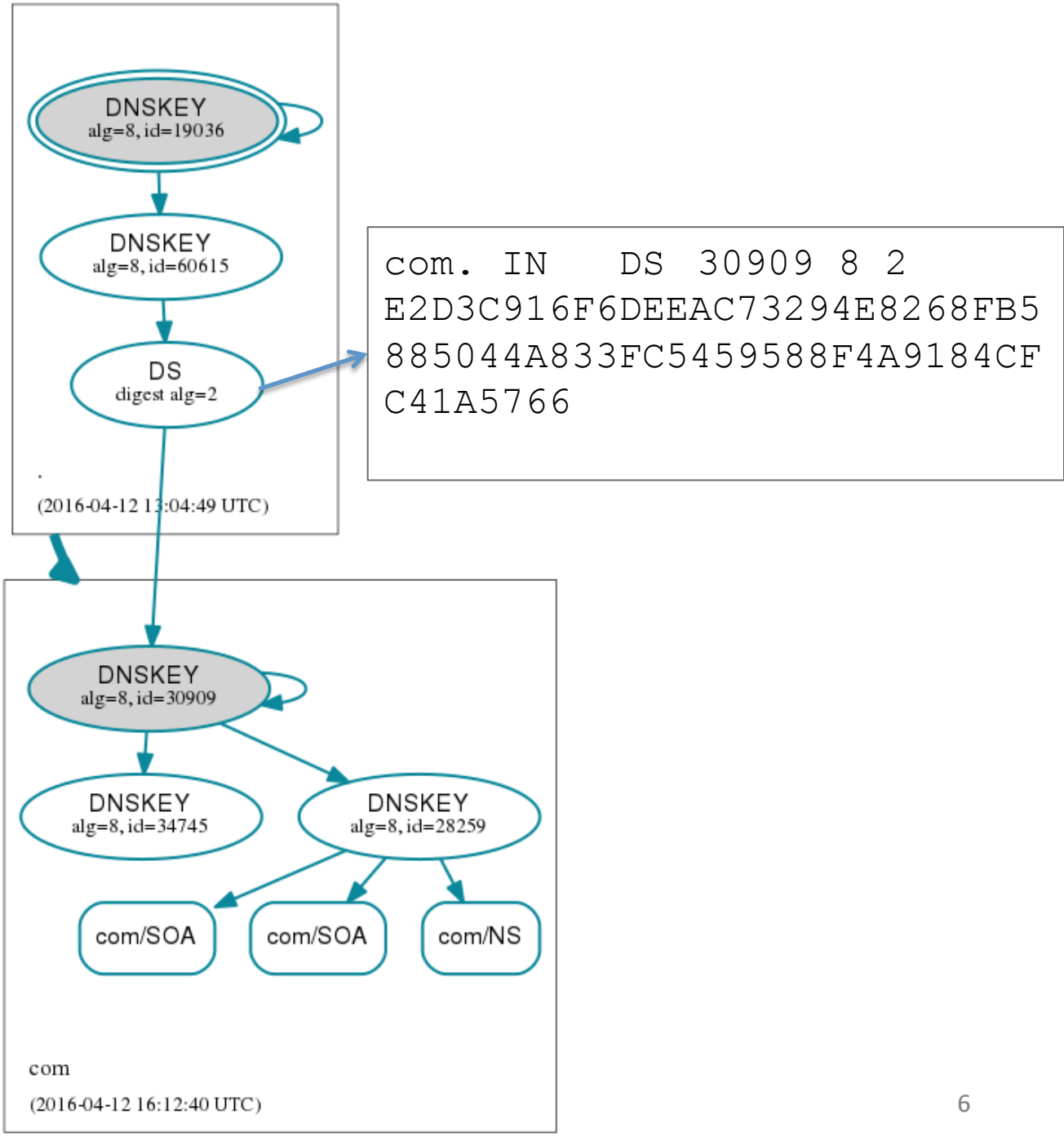
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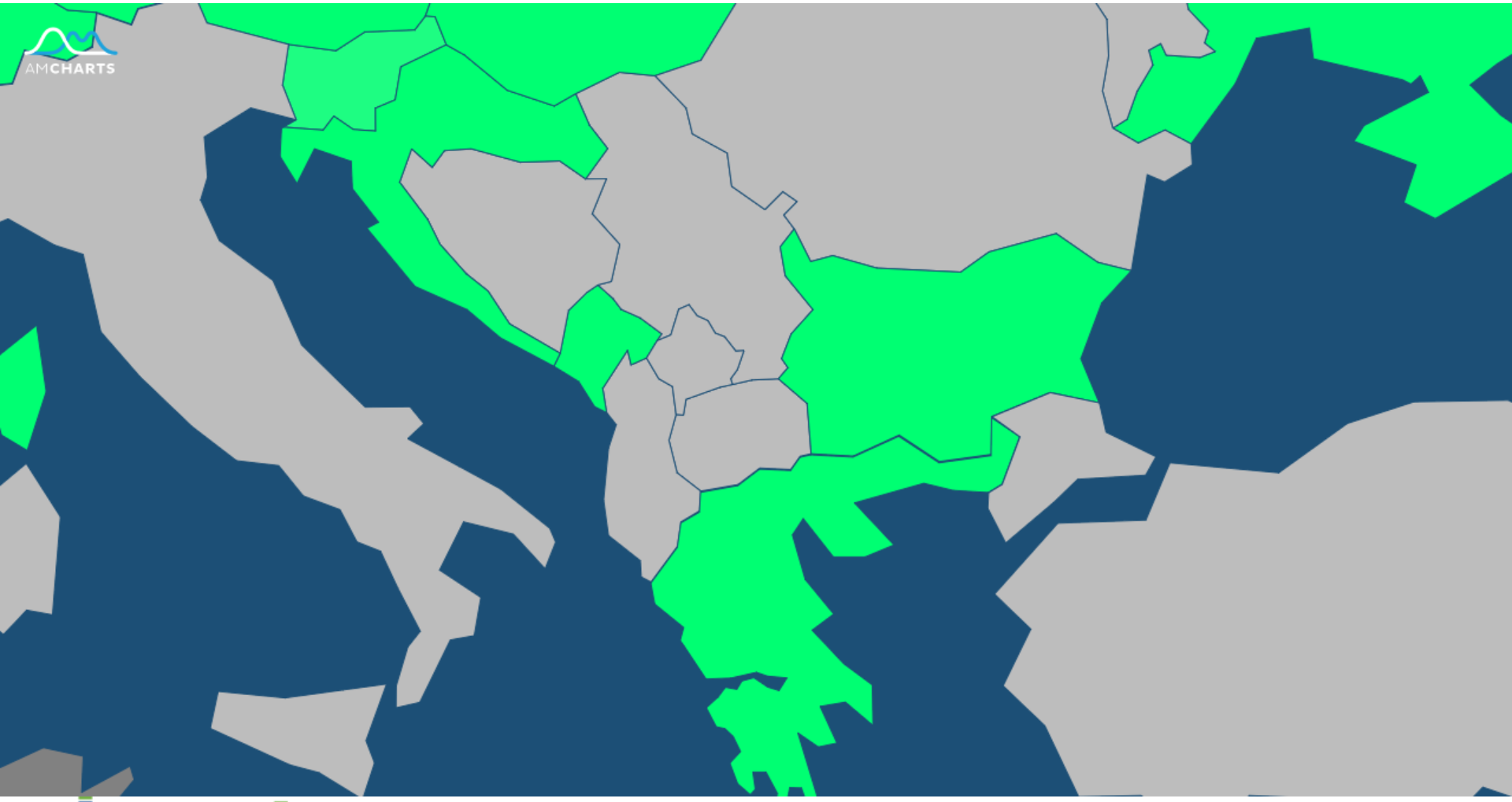
DNSKEY
alg=8, id=60615
DS
digest alg=2
.
(2016-04-12 13:04:49 UTC)
com. IN DS 30909 8 2
E2D3C916F6DEEAC73294E8268FB5
885044A833FC5459588F4A9184CF
C41A5766
DNSKEY
alg=8, id=30909
DNSKEY
alg=8, id=34745
DNSKEY
alg=8, id=28259
com/SOA
com/SOA
com/NS
com
(2016-04-12 16:12:40 UTC)

Status of ccTLD implementation of DNSSEC



Why to analyze .com zone?

- The biggest zone ever (zone file about 10 Gbytes)
- It's difficult to receive the ccTLDs zones
- Small percentage of DNSSEC-enabled domains
- But the big amount of domains - ~600k
- Different crypto parameters

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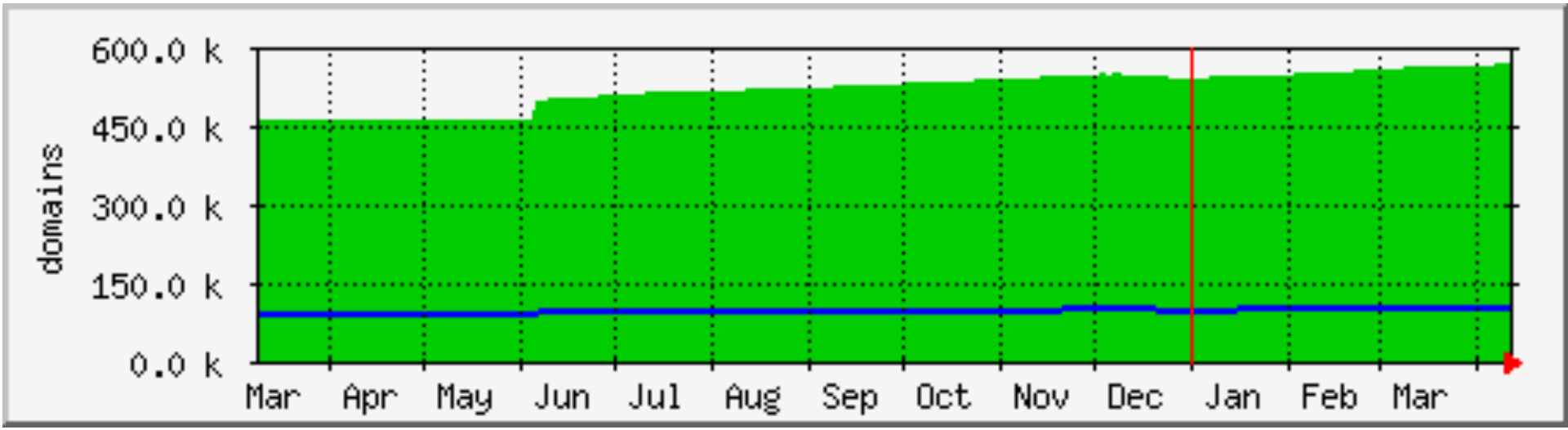
.COM / .NET statistics



2016 April's data

.com - 578.000 ds-records

.net - 102.000 ds-records

Digging into .COM

- 580.000 DS-records correspond to 550.000 domain names
- Many of them are signed by a single hoster using the same key
- Some domains have more than 1 digest published
- Some domains are clearly experimental

TOP nameservers (grouped by company)

- 100320 nsX.transip.eu/net/nl
- 64968 nsX.hyp.net
- 47651 [d]ns200.anycast.me
- 17749 *.ovh.net
- 12620 vX.pcextreme.eu
- 9999 nsX.binero.se
- 7015 nsX.webhostingserver.nl
- 5907 nsX.openprovider.eu/be/nl

Selected key parameters

Algorithms:

404091	RSASHA1-NSEC3-SHA1
153004	RSA/SHA-256
13349	RSA/SHA-1
7438	ECDSA Curve P-256 with SHA-256
602	RSA/SHA-512
67	RSA/MD5 (?)
41	DH
37	DSA
33	ECDSA Curve P-384 with SHA-384
24	GOST R 34.10-2001
15	PRIVATEDNS
10	PRIVATEOID
9	DSA-NSEC3-SHA1

Hashes:

403752	SHA-1
174675	SHA-256
175	GOST R 34.11-94
118	SHA-384

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Key re-usage

More than 10.000 domains are signed by a single key of binero.se

That's the perfect example of multiply key usage.

In the ccTLD zones I currently have, that is an extremely RARE situation.

(except .CZ where many registrars are using one key for all its (customers) domains)

.net key parameters

Algorithms:

69033	RSASHA1-NSEC3-SHA1
27128	RSA/SHA-256
6539	RSA/SHA-1
1460	ECDSA Curve P-256 with SHA-256
287	RSA/SHA-512
50	ECDSA Curve P-384 with SHA-384
22	DSA
18	RSA/MD5 (?)
6	GOST R 34.10-2001

Hashes:

77097	SHA-1
27332	SHA-256
69	GOST R 34.11-94
55	SHA-384

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Similar statistics in .net zone

Similar rate of DNSSEC penetration – 97k DNSSEC-enabled domains per 15.6 mil. domains

Same distribution of algorithms and hashes

Similar observation of key re-usage:

2400+ entries of key ID 41182 – it's a key ID of Swedish hoster Binero AB

And the same situation in .org

58k DNSSEC-enabled domains per 10.9 mil. domains

Same distribution of algorithms and hashes; but only SHA-1 and SHA-256 are present

Similar observation of key re-usage:

Binero AB is a leading DNSSEC DNS-service for .net and .org

New GTLDs

- 948 new top-level domains, including IDN
- Admins are obliged to provide access to the zone
- DNSSEC is a necessary condition
- Easy access to zone files

Crypto statistics

From 716 newGTLD:

564 – RSA/SHA-512

127 – RSASHA1-NSEC3-SHA1

18 – RSA/SHA-1

7 – RSA/SHA-512

No GOST. Surprise?

Top new GTLDs

Domains registered:

.xyz – 2665k	.top – 1854k	.wang – 1065k
.win – 886k	.club – 738k	.link – 358k

TOP DNSSEC penetration (GTLDs with 100+ domains):

.ovh – 47%	.amsterdam – 25%
.webcam – 11%	.golf – 9%
.immo – 9%	.brussels – 8%
.sarl – 8%	.taxi – 7%

Top new GTLDs

DNSSEC penetration rate for

the top new GTLDs

is in 0.00% – 0.28% range

Top new GTLDs

The higher penetration rate
(10% - 47%)
is being observed in the TLDs
with 24k - 82k domains

Specific requirements

Some TLD administrators define its own policy on DNSSEC. This policy could affect:

- The WHOIS output
- Allowed algorithms/keylength/hashes etc
- Allowance of key re-usage within the registry

One should take such policies into account

Software for DNSSEC operations

- There are about 10 open source software packages to manage your DNSSEC-enabled zone
- There are also some proprietary solutions
- With the widely deployment of DNSSEC, the number of different tools is growing
- Most of DNS servers have its own utilities
- For the relatively small number of zones, OpenDNSSEC may be the best solution

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The most common configuration error

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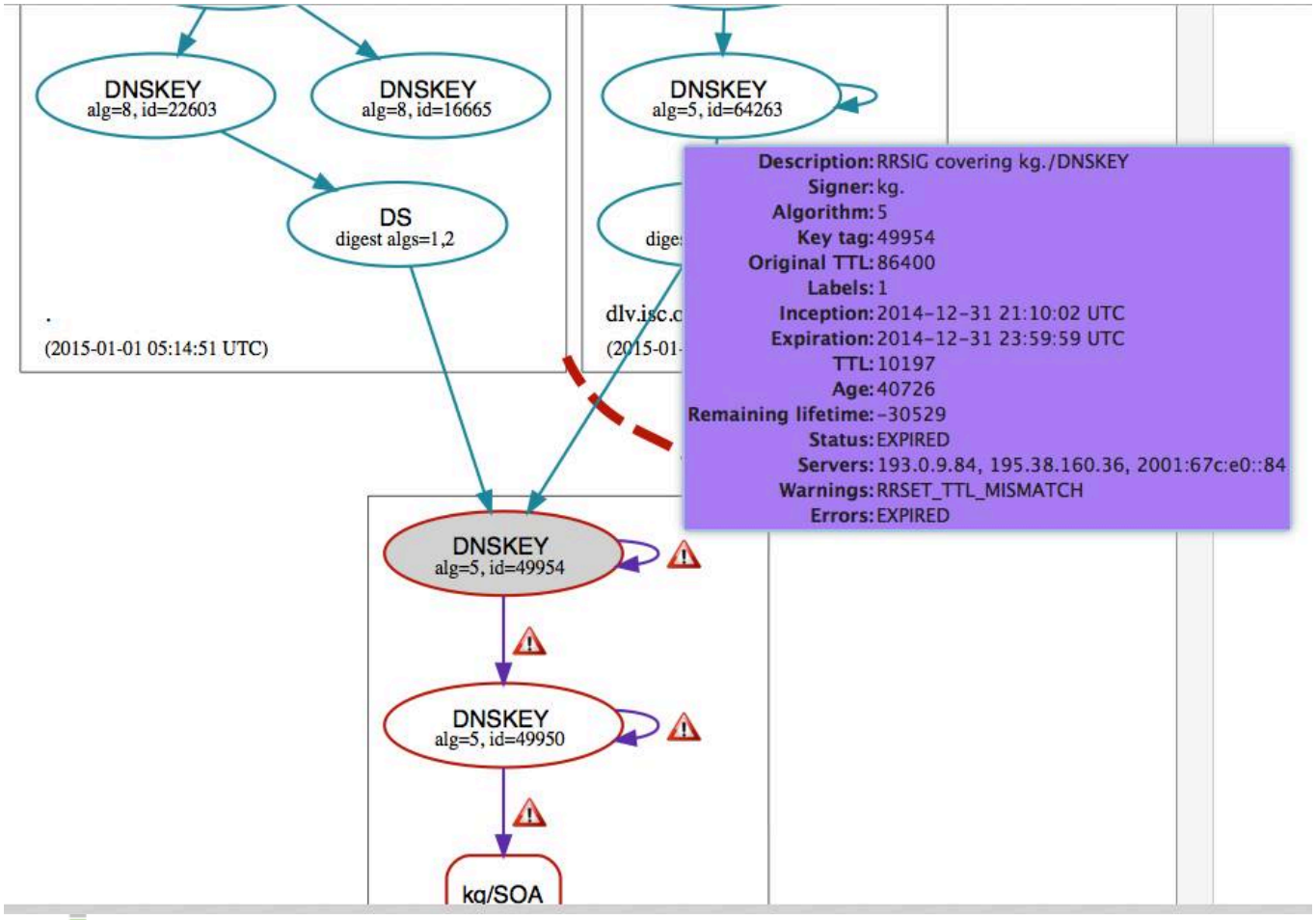
Expiration of the signature validity

All the trust chains will be broken

The most common configuration error



The most common configuration error

DANE overview

- As we have trusted DNS date with the DNSSEC, we could wish to secure other sensitive data
- So we can put the trust anchor of our website/ mailserver/whatever certificate to our secured DNS zone
- This could be either certificate fingerprint, the whole certificate or pointer to a CA root cert

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Is DANE dead?

The deployment of DANE resource record is tiny.

What could be a reason?

- Low demands from the WEB
- Implementation difficulties?

DANE usage statistics

Not measured because…

Almost nobody is using DANE

MXs is only the DANE field can be useful today

Research by Go6.si is at http://goo.gl/8QcWE1

What could be a killer app?

- Let's encrypt initiative can provide you a valid recognized certificate for your domain name
- This certificate can be published in DNS using DANE
- Then this certificate can be used to encrypt all information exchange of your server
- There will be two possibilities to check the trust chain: classic with the certificate storage and DANE

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Questions?

LinkedIn.com/in/myasoedov

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