

Incentivizing the adoption of (new) standards

Maarten Wullink | DNS-OARC 30 Bangkok
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Problem

"Slow adoption of IPv6 risks harming Dutch innovation climate" ¹

1) https://www.sidn.nl/a/about-sidn/slow-adoption-of-ipv6-risks-harming-dutch-innovation-climate?language_id=2

Goal

- Promote adoption of IPv6 and other standards that help increase online security
- This proved successful for DNSSEC, the .nl-zone has largest number of DNSSEC secured domain names.

How?

- Financial incentives for domain name registrars
 - Per qualifying domain name (1 year period, wholesale price 3,40 euro)
 - IPv6 20 cent
 - DMARC 16 cent
 - STARTTLS 4 cent
- Total discount (1,7 million euro projected for 2019)
 - up to 0,40 euro for IPv6 and Secure email (11,8%)
 - Up to 0,60 euro combined with other incentives (17,6%)

Incentives

- IPv6 responsiveness
 - **DNS**
 - ≥ 1 authoritative NS responding within 7 secs
 - **SMTP**
 - ≥ 1 mail server responding within 7 secs
 - **HTTP**
 - ≥ 1 web server responding within 7 secs

Incentives

- Secure Mail
 - **STARTTLS**
 - ≥ 1 MX IP responding (< 35 sec, spambot defenses) all responding IPs must support STARTTLS
 - **DMARC**
 - `_dmarc` RR found in DNS with valid syntax AND combination with DKIM/SPF must satisfy RSC requirements
 - **DKIM**
 - `<random>_domainkey` RR found in DNS (checking for white lies)

Incentives

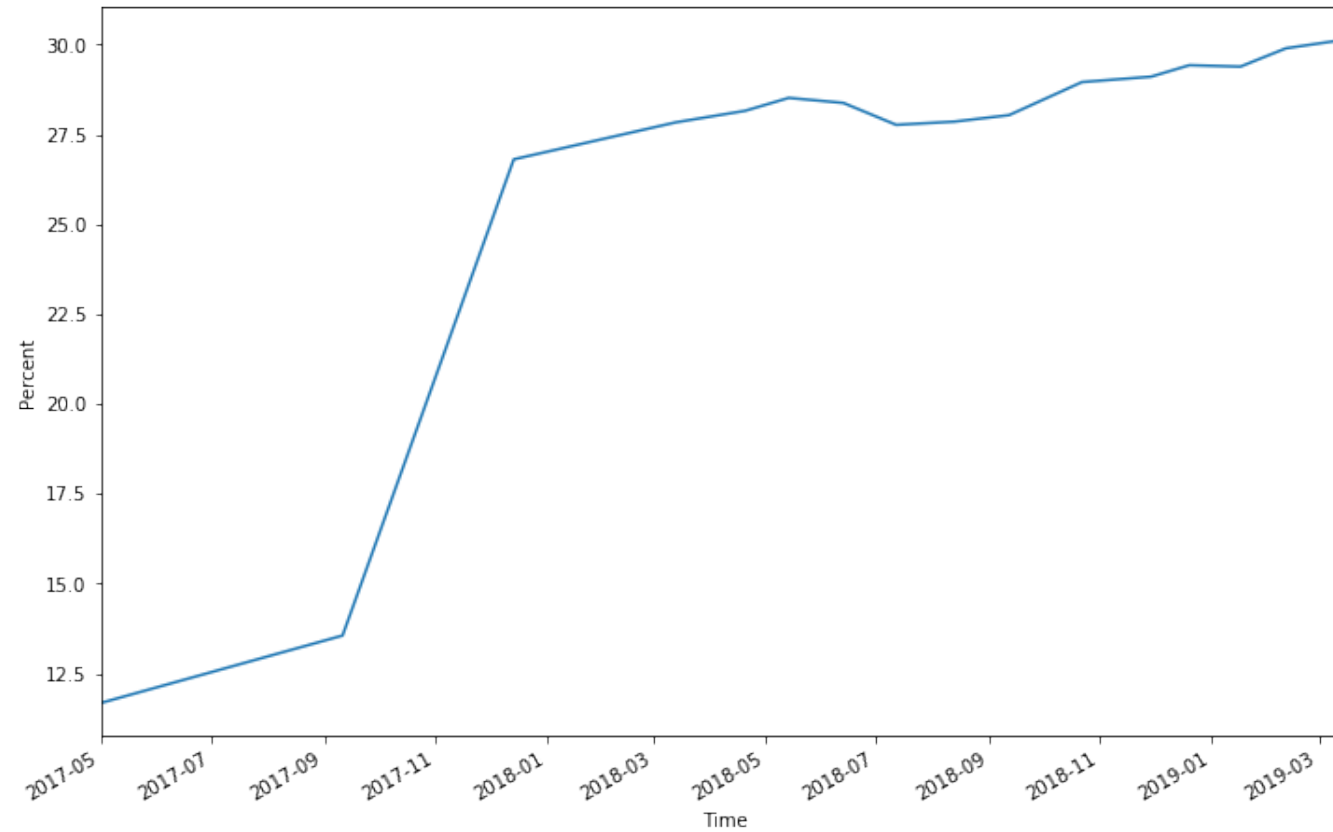
- Secure Mail
 - **SPF**
 - SPF TXT record (v=spf) found with valid syntax
 - Validation requires ≤ 10 DNS queries (1% fail)
 - SPF result must be FAIL, SOFTFAIL or NEUTRAL

Measurement

- Developed multiprotocol crawler for HTTP, TLS, DNS and SMTP
- Scan entire .nl-zone once very month
- Duration, 10 days on modest VM
 - Retry failed checks (max 3 times)
 - Shallow web crawl (limit # of pages)
 - Low impact on hosts

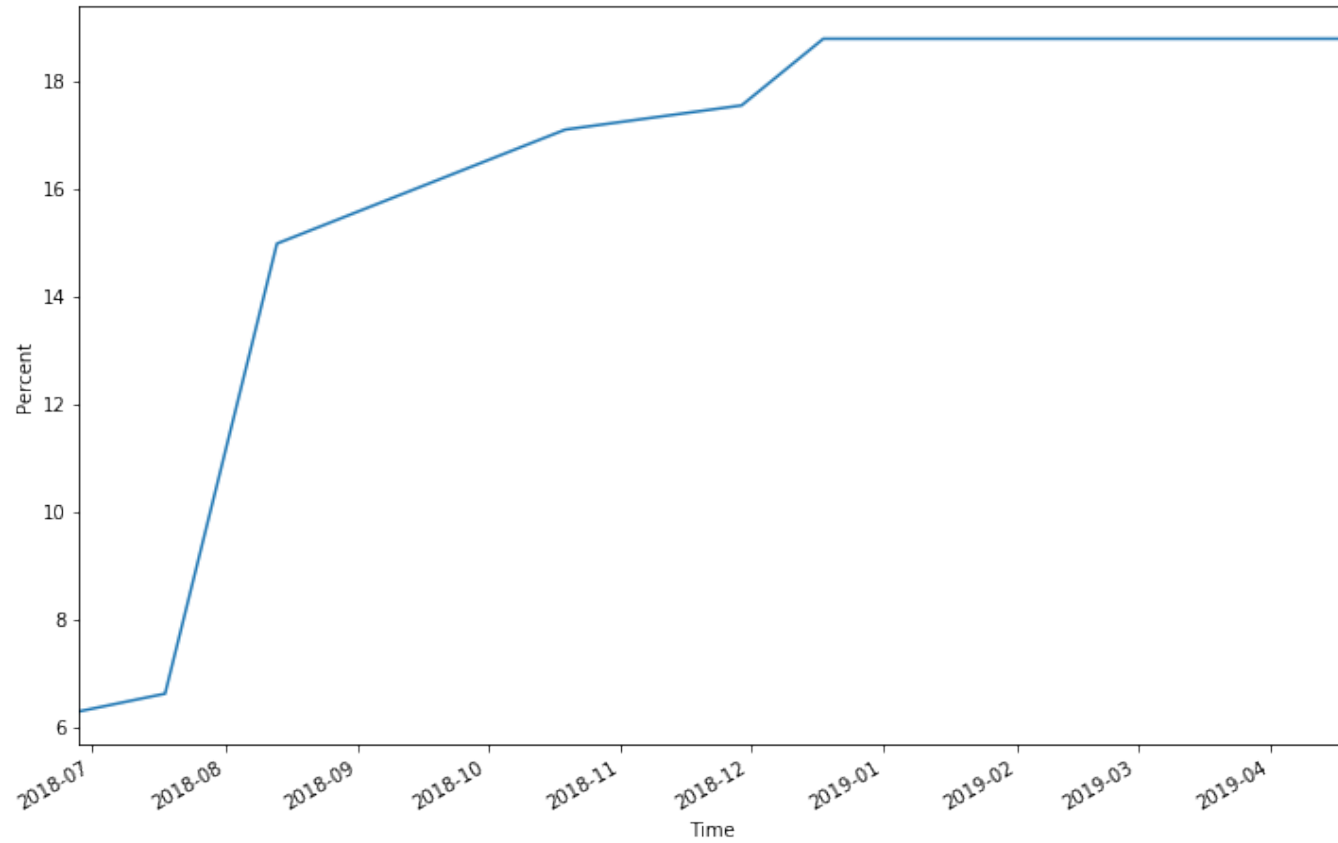
Results IPv6

IPv6 deployment .nl-zone (%)



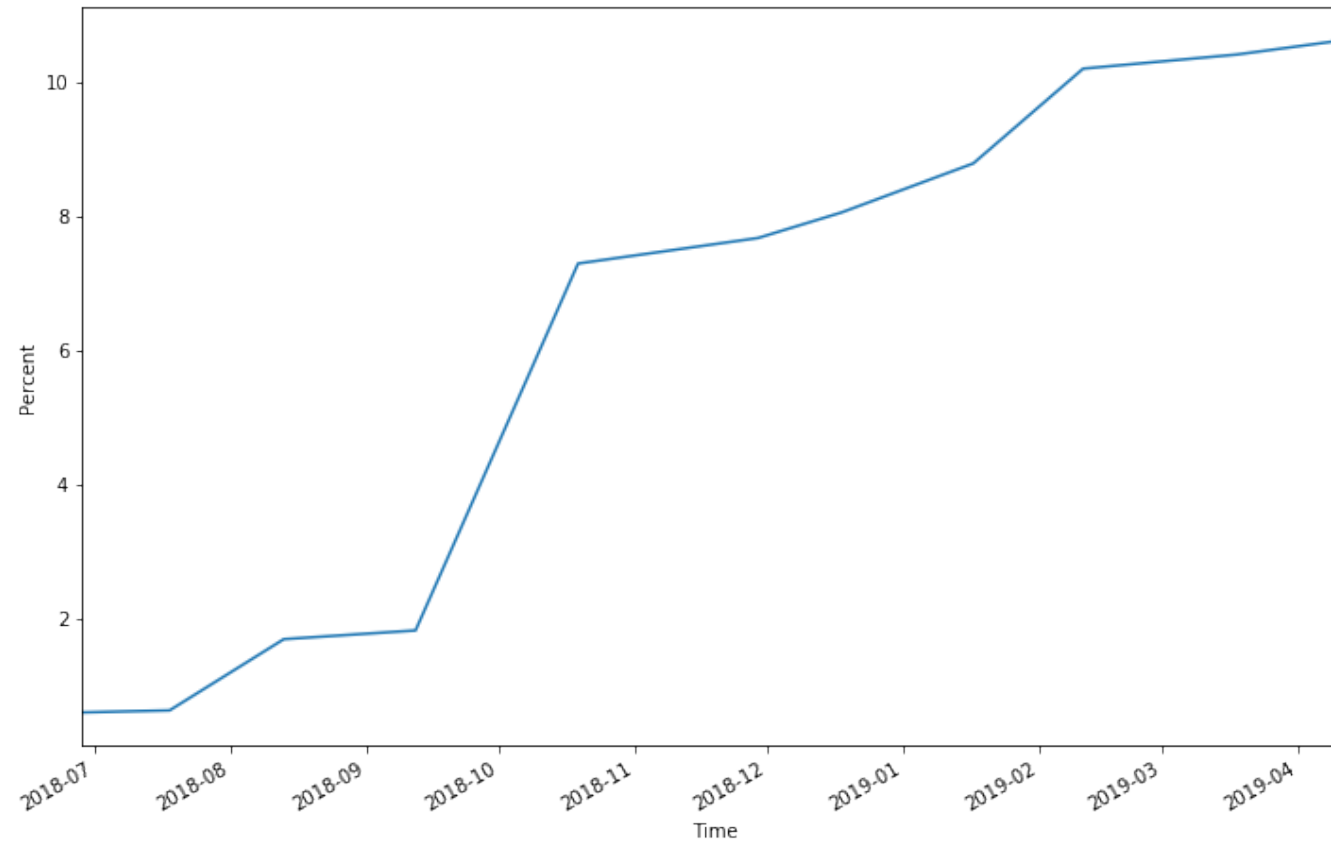
Results DKIM

DKIM deployment .nl-zone (%)



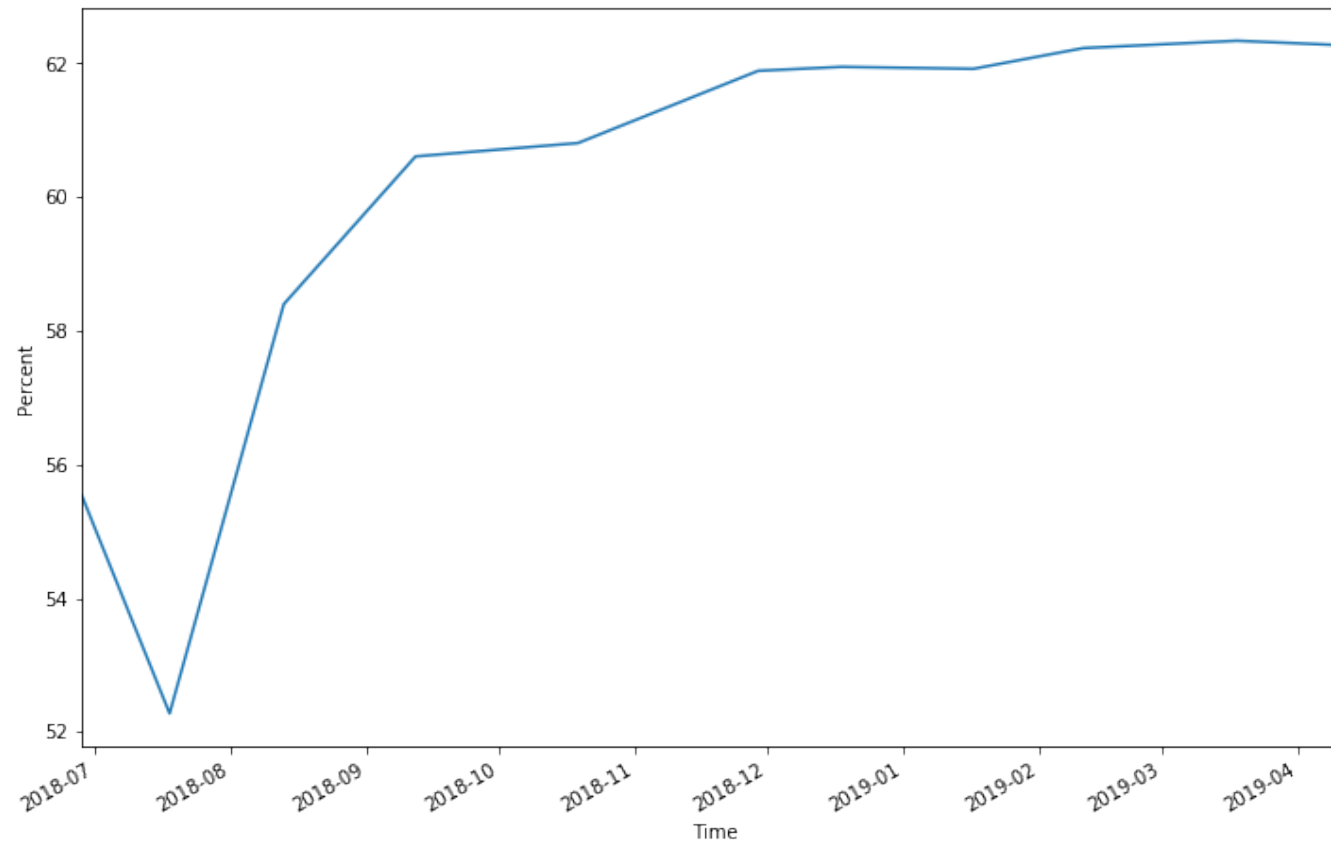
Results DMARC

DMARC deployment .nl-zone (%)



Results STARTTLS

STARTTLS deployment .nl-zone (%)



Conclusion

- Signed up 370 registrars (86% of .nl zone domains)
- Incentives help to increase adoption, in first 6 months;
 - STARTTLS increased from 3.2 to 3.6 million domain names
 - DMARC increased from 36k to 460k domain names
 - DKIM increased from 365k to 1,1 million domain names
 - SPF increased from 400k to 2.6 million domain names

Future work

- Include DANE in our program ¹
 - Get TLSA records both Mail and Web service
 - Validate service TLS certificate using TLSA record

1) https://www.sidnlabs.nl/a/weblog/sidn-to-promote-adoption-of-the-dane-internet-standard?language_id=2

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