

# Incentivizing the adoption of (new) standards

Maarten Wullink | DNS-OARC 30 Bangkok  
12-13 May 2019



# Problem

"Slow adoption of IPv6 risks harming Dutch innovation climate" <sup>1</sup>

1) [https://www.sidn.nl/a/about-sidn/slow-adoption-of-ipv6-risks-harming-dutch-innovation-climate?language\\_id=2](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**
    - $\geq 1$  authoritative NS responding within 7 secs
  - **SMTP**
    - $\geq 1$  mail server responding within 7 secs
  - **HTTP**
    - $\geq 1$  web server responding within 7 secs

# Incentives

- Secure Mail
  - **STARTTLS**
    - $\geq 1$  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  $\leq 10$  DNS queries (1% fail)
    - SPF result must be FAIL, SOFTFAIL or NEUTRAL

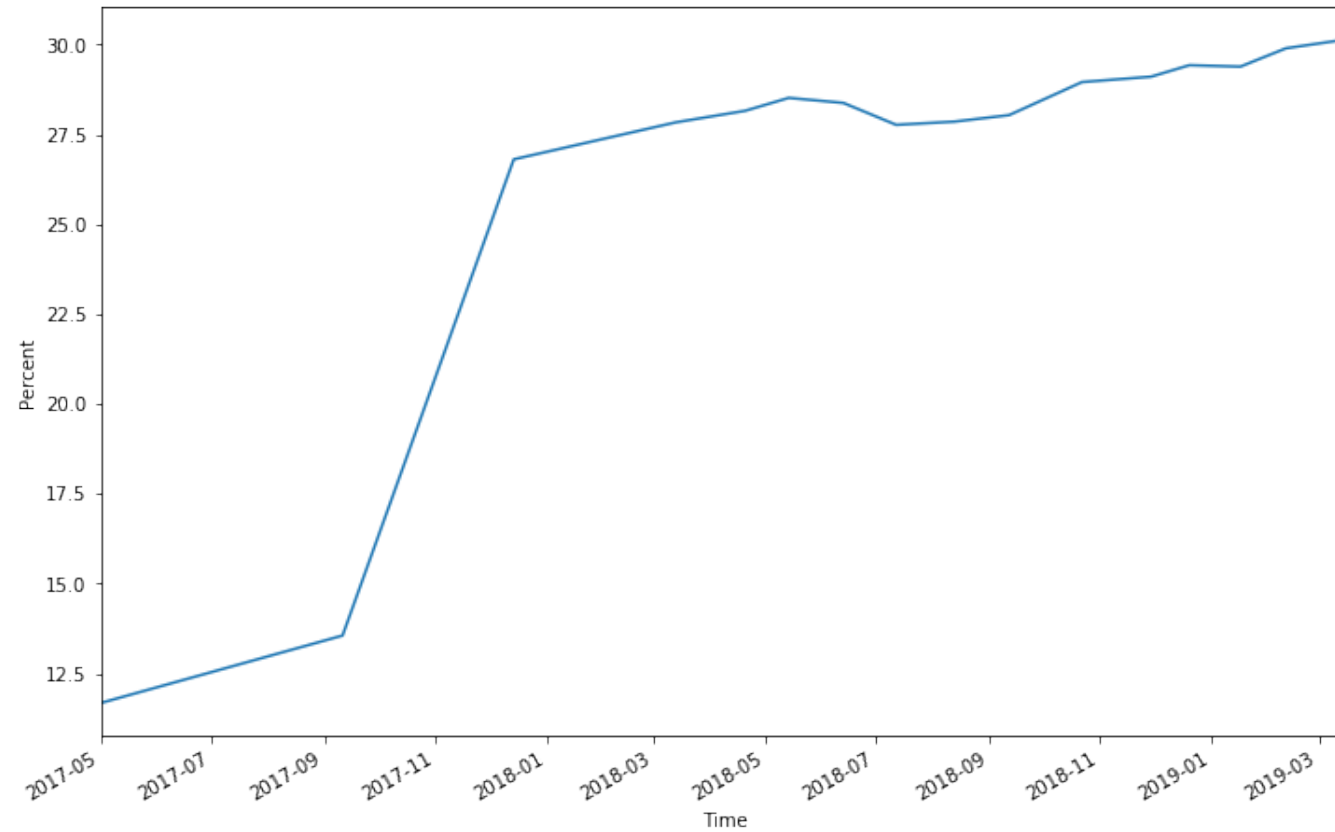
# Measurement

- 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



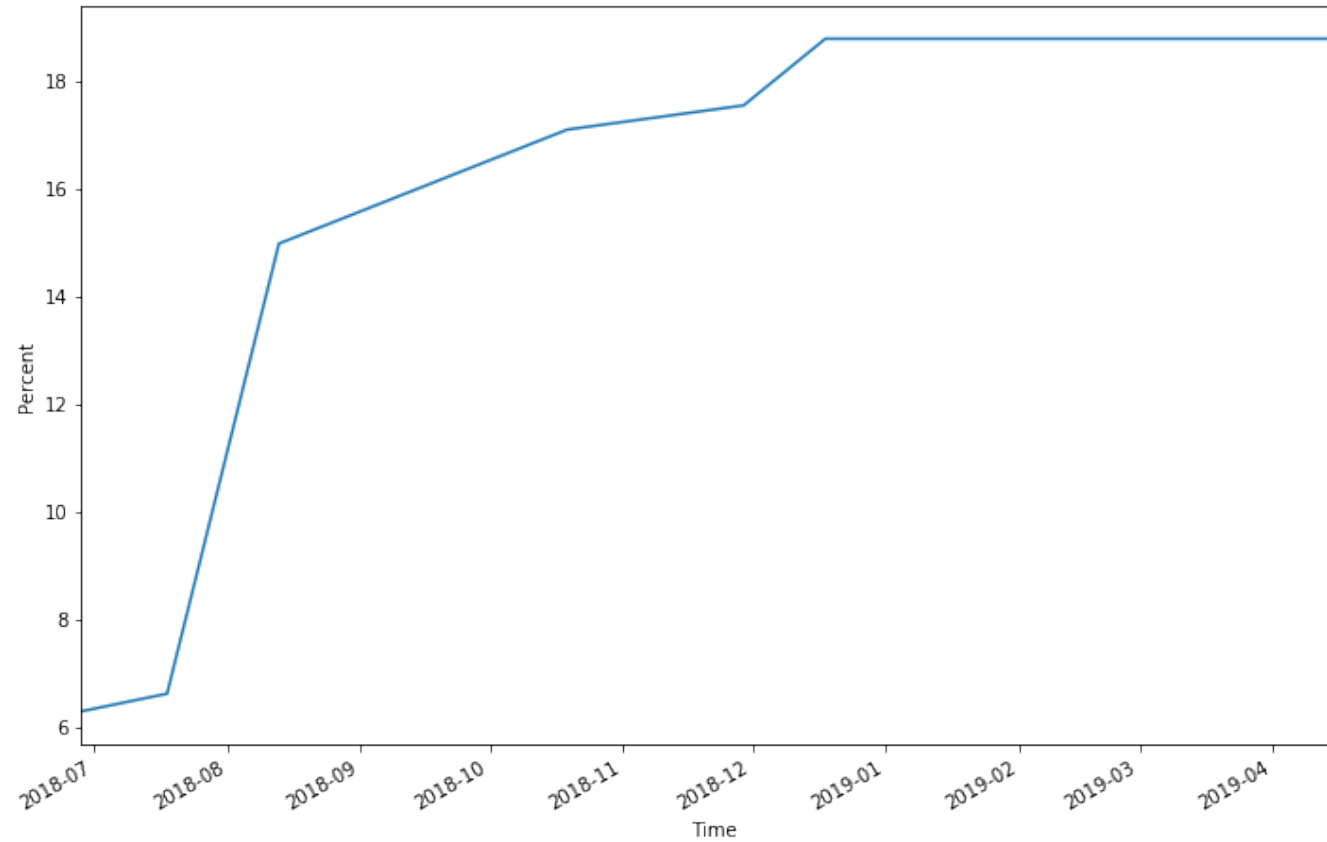
# Results IPv6

IPv6 deployment .nl-zone (%)



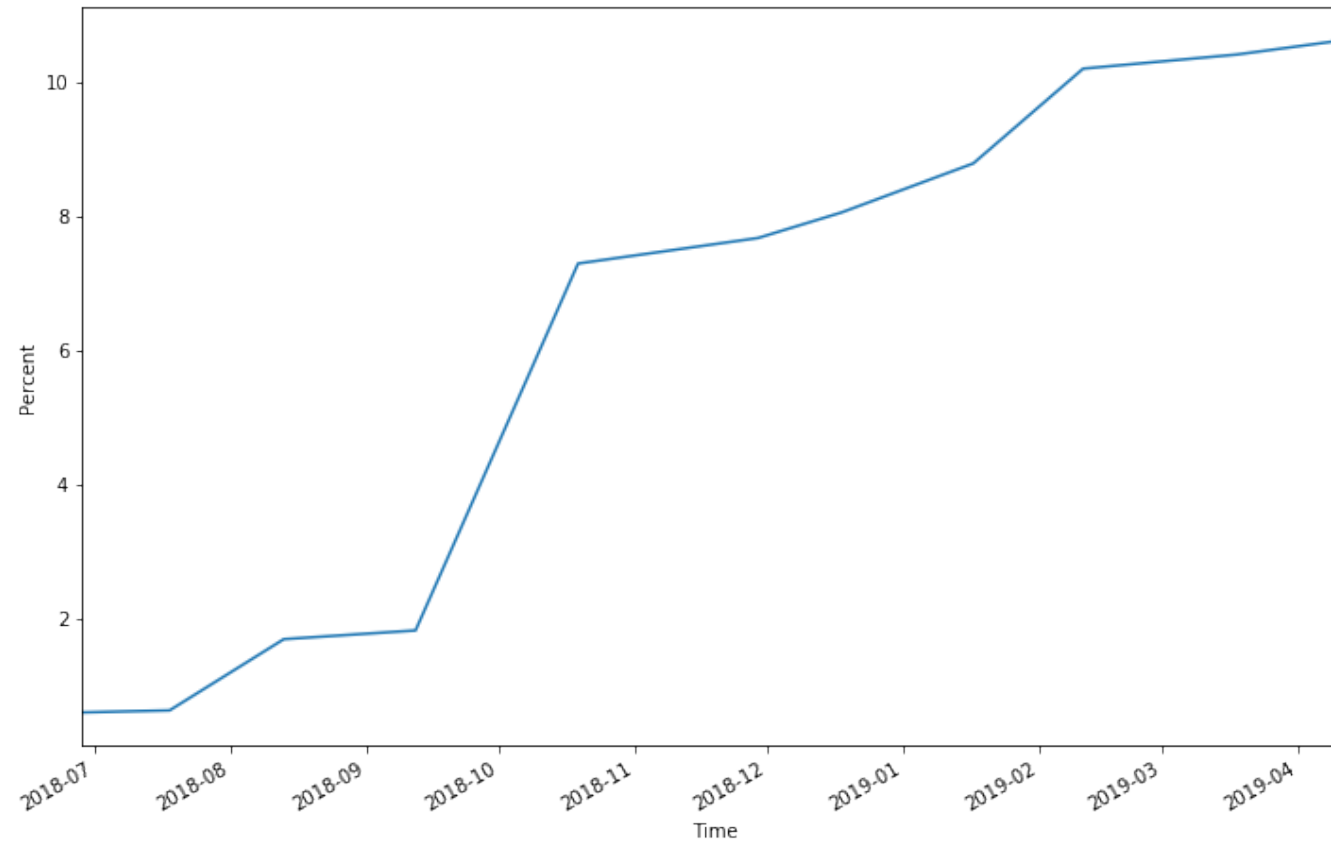
# Results DKIM

DKIM deployment .nl-zone (%)



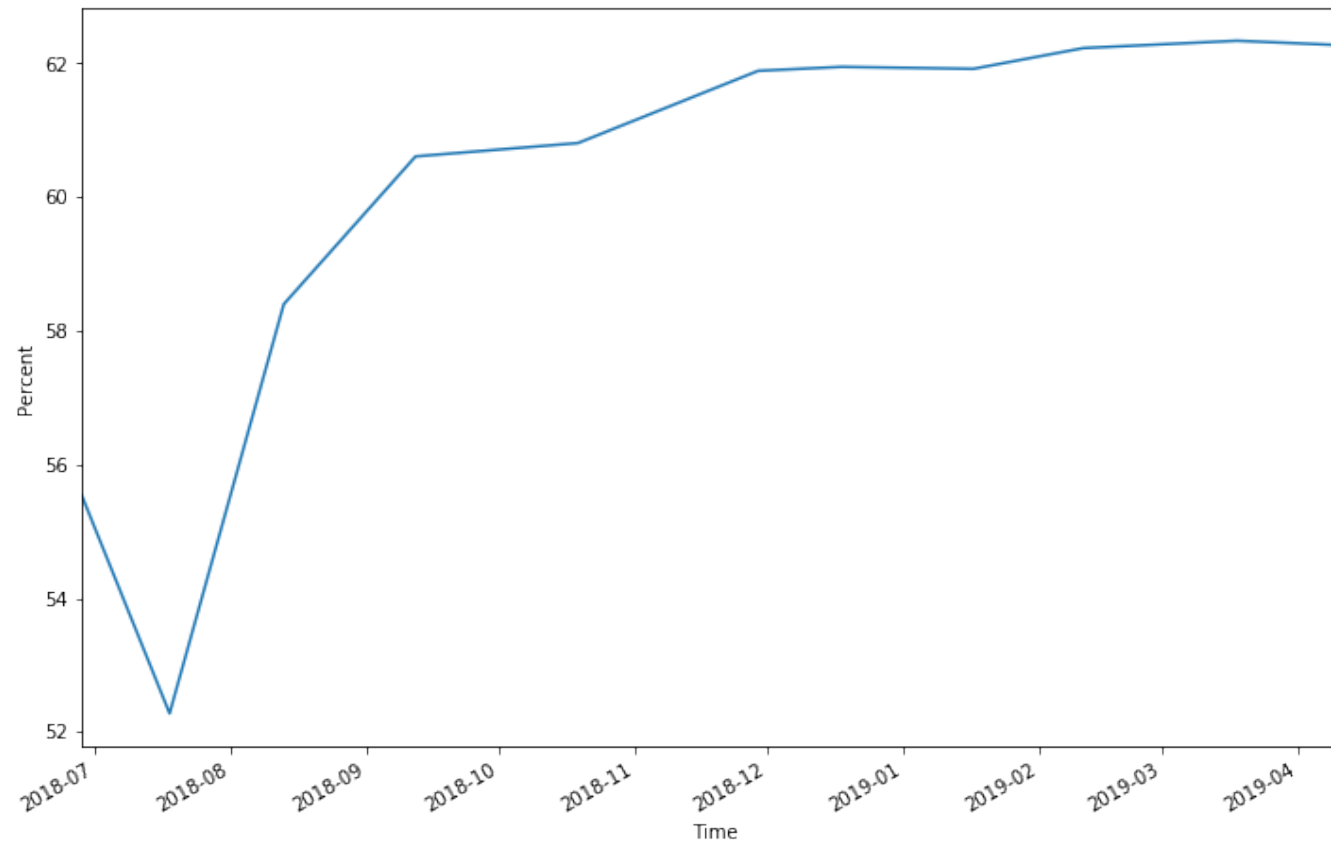
# Results DMARC

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

 SIDN.nl

 @SIDN

 SIDN

Q&A

[www.sidnlabs.nl](http://www.sidnlabs.nl) | [stats.sidnlabs.nl](http://stats.sidnlabs.nl)