# Post Quantum Cryptography in the DNS

Elmer Lastdrager | Lecture Leiden University

19 November 2025


SIDN LABS

# SIDN

... is the registry and operator of the Netherlands' **.nl** country-code top-level domain (ccTLD).

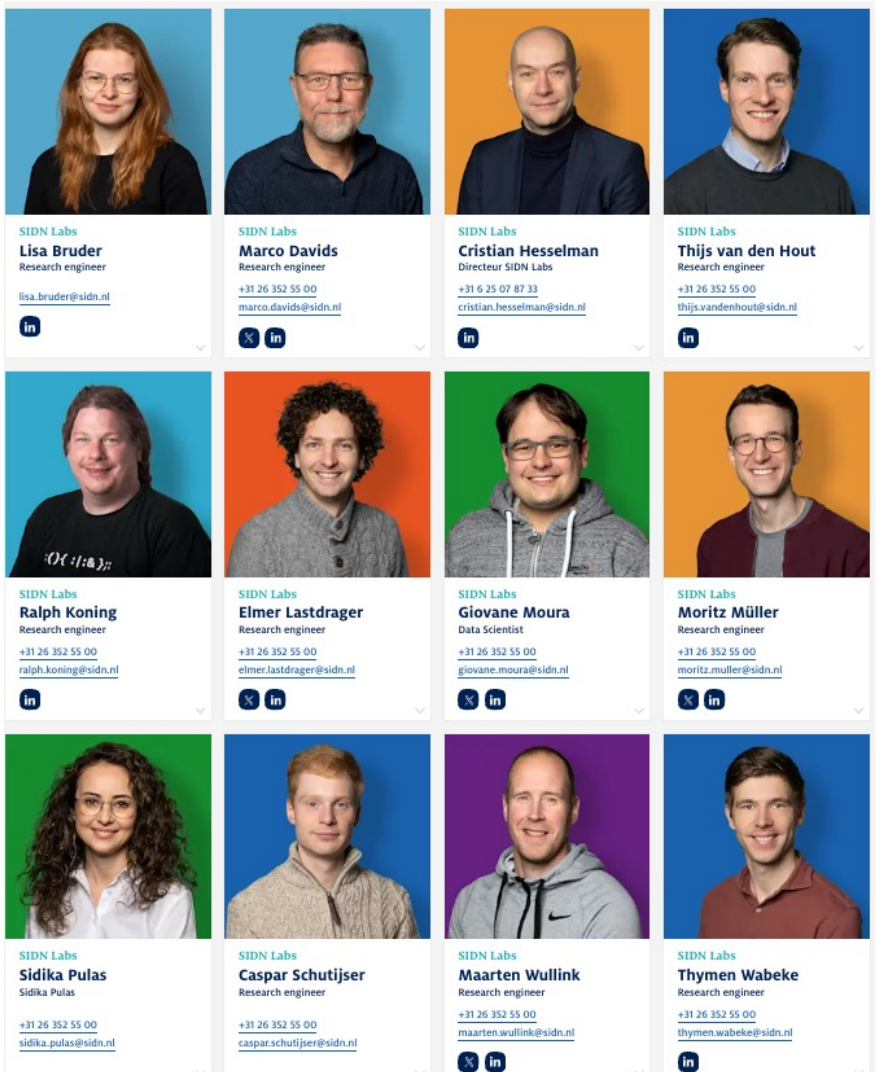
... is a not-for-profit private organization with a public role based in **Arnhem**, the Netherlands.

... aims to increase society's confidence in the Internet.

**.nl = the Netherlands**
18M inhabitants
6.0M domain names
3.7M DNSSEC-signed
5.3B DNS queries/day
8.6B NTP queries/day

SIDN LABS

# SIDN Labs

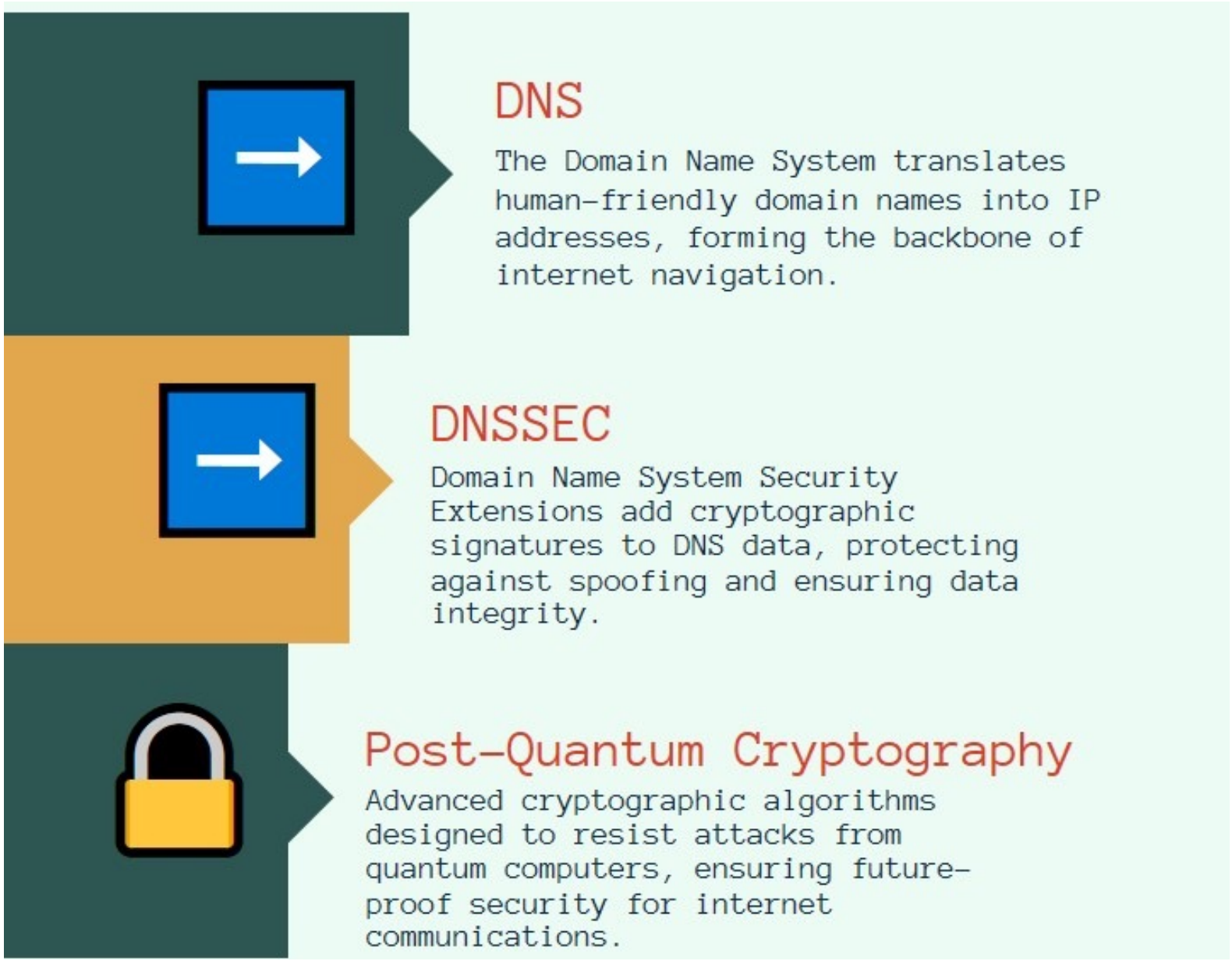


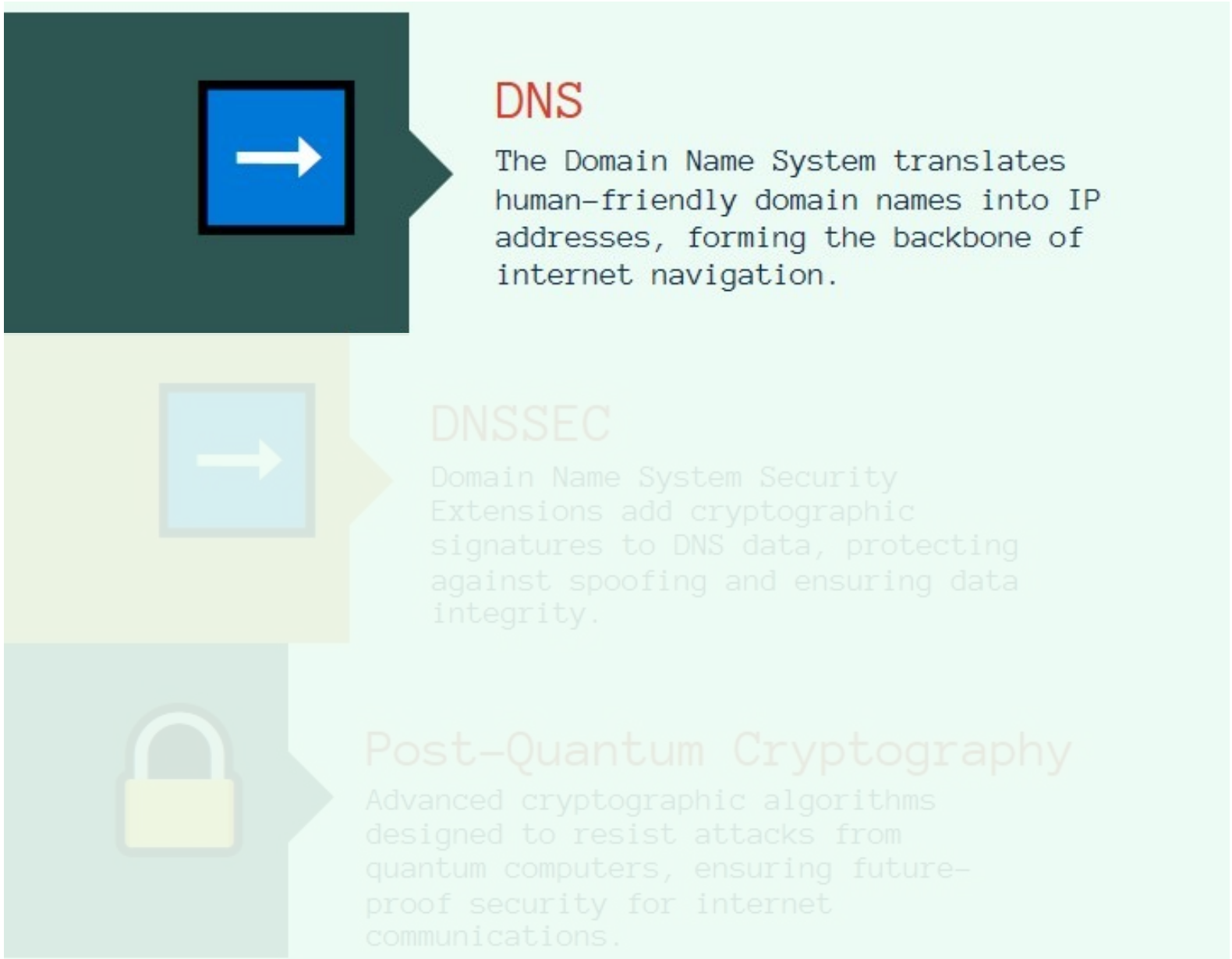

Technical experts, divers in seniority and nationality

Help SIDN teams, write open-source software, analyze large amounts of data, conduct experiments, write articles, collaborate with universities

M.Sc students help us advance specific areas

# Post Quantum Cryptography in the DNS


DNS
The Domain Name System translates human-friendly domain names into IP addresses, forming the backbone of internet navigation.
DNSSEC
Domain Name System Security Extensions add cryptographic signatures to DNS data, protecting against spoofing and ensuring data integrity.
Post-Quantum Cryptography
Advanced cryptographic algorithms designed to resist attacks from quantum computers, ensuring future-proof security for internet communications.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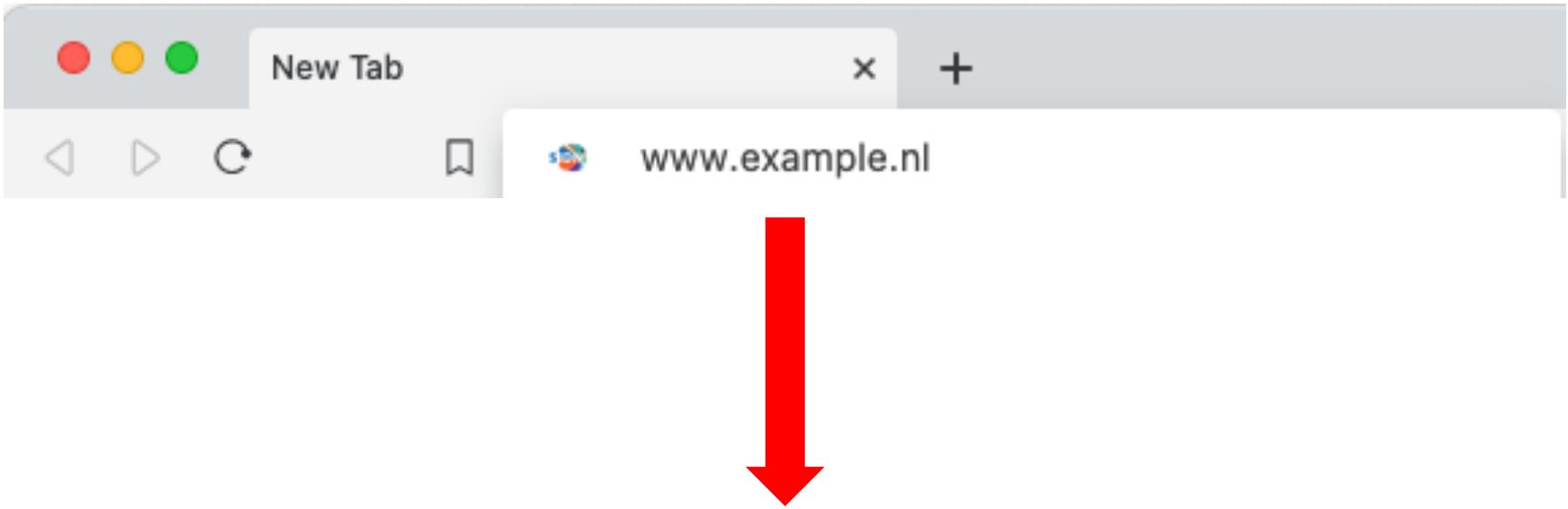
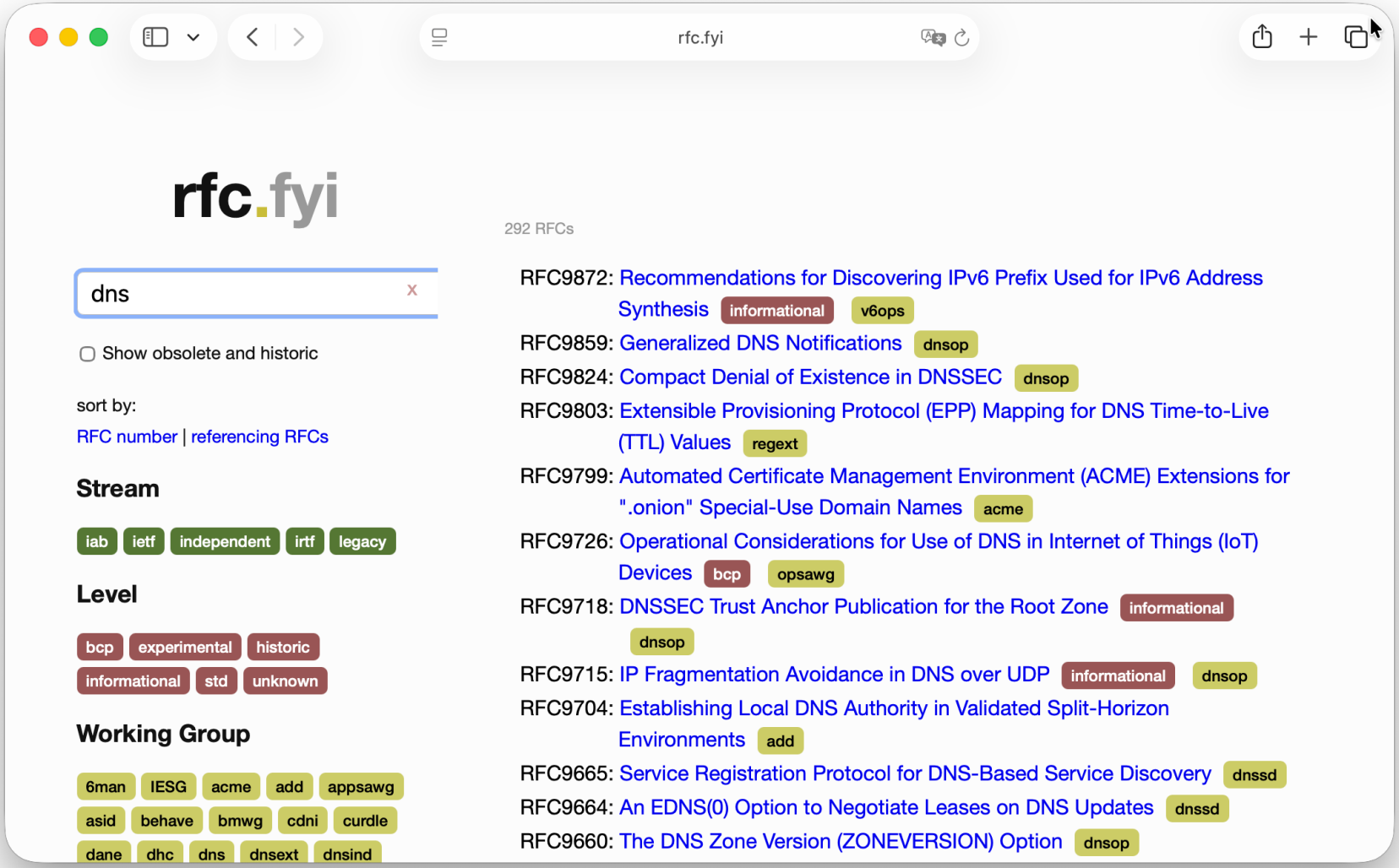
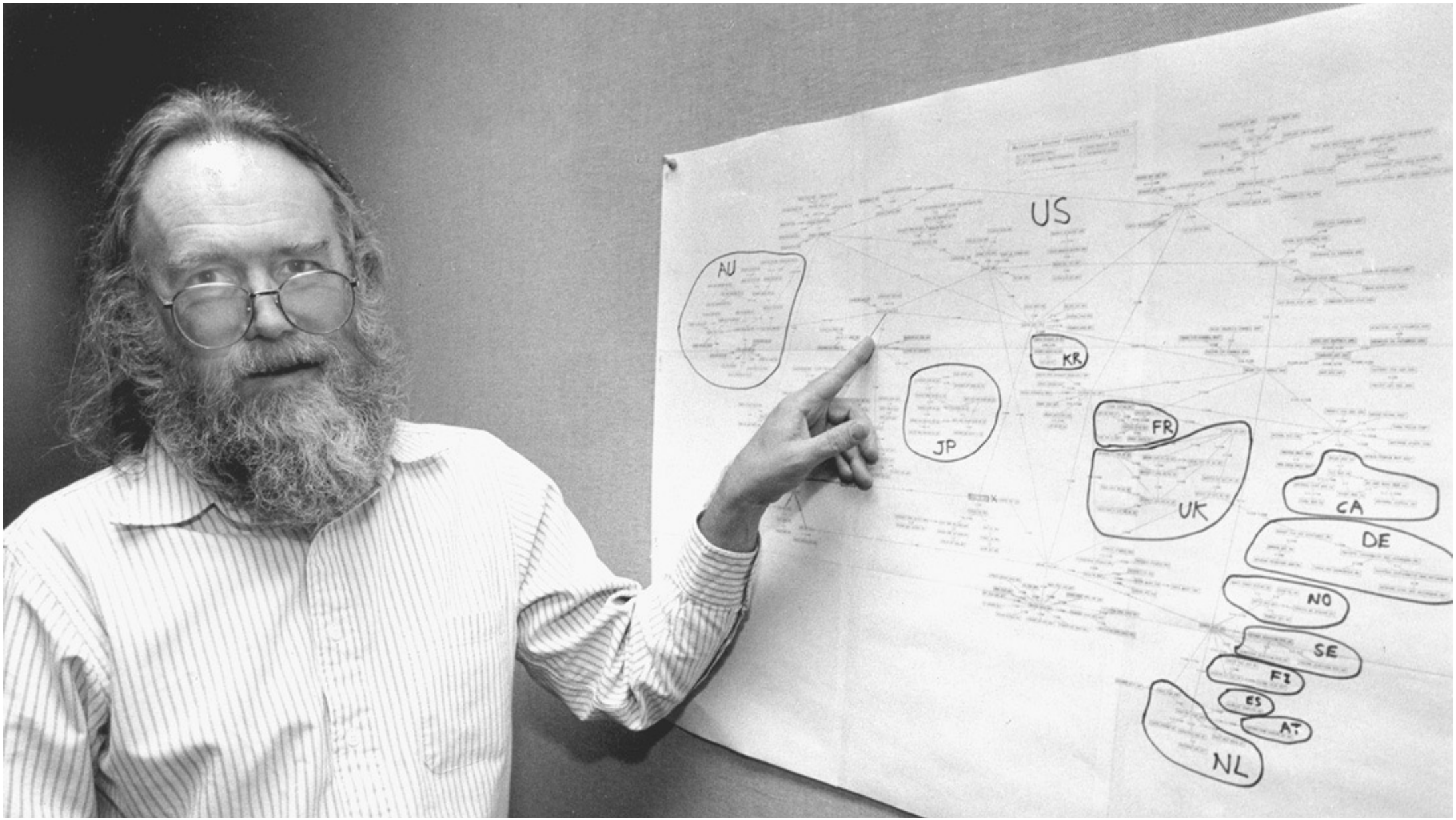
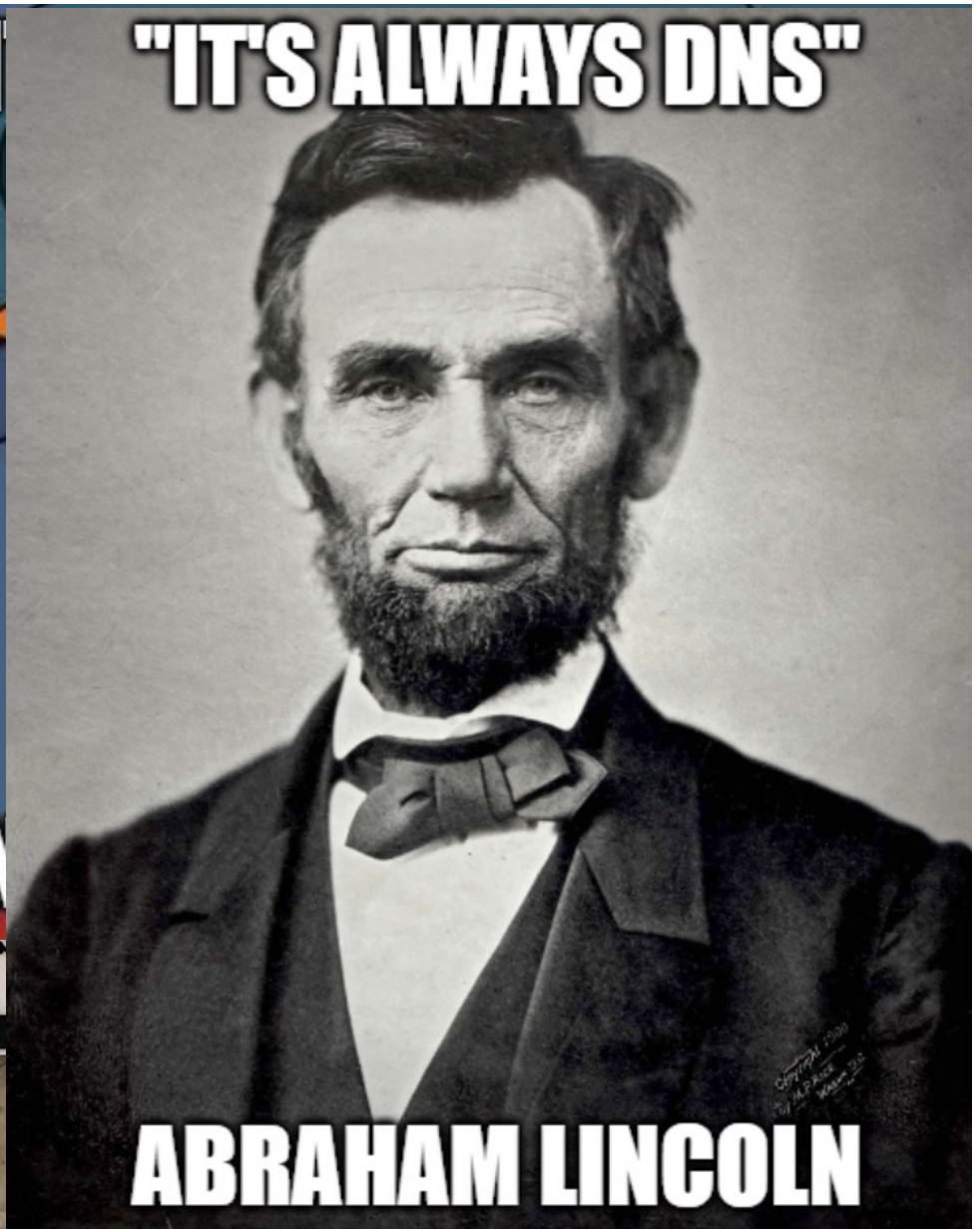


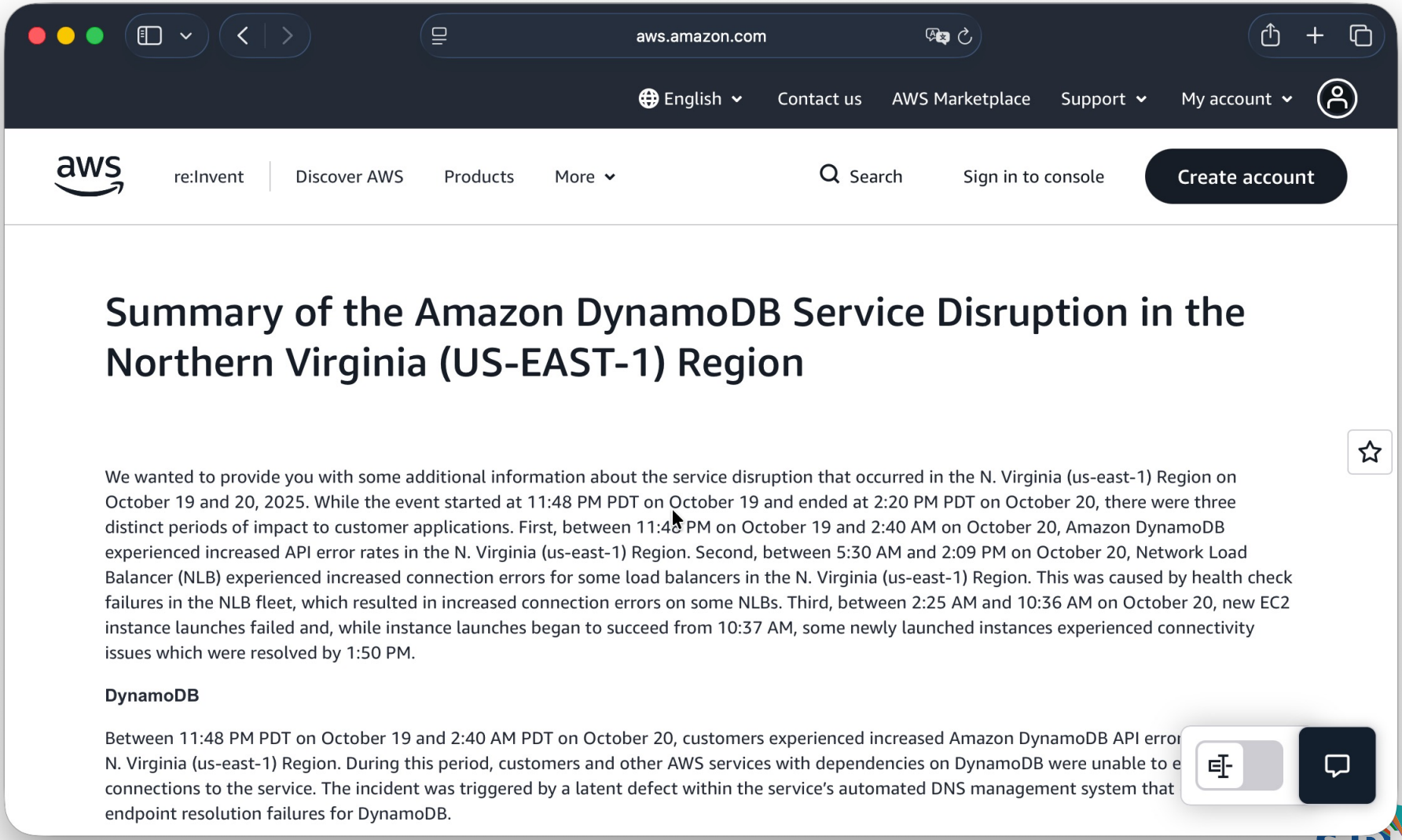

2a00:d78:0:712:94:198:159:35

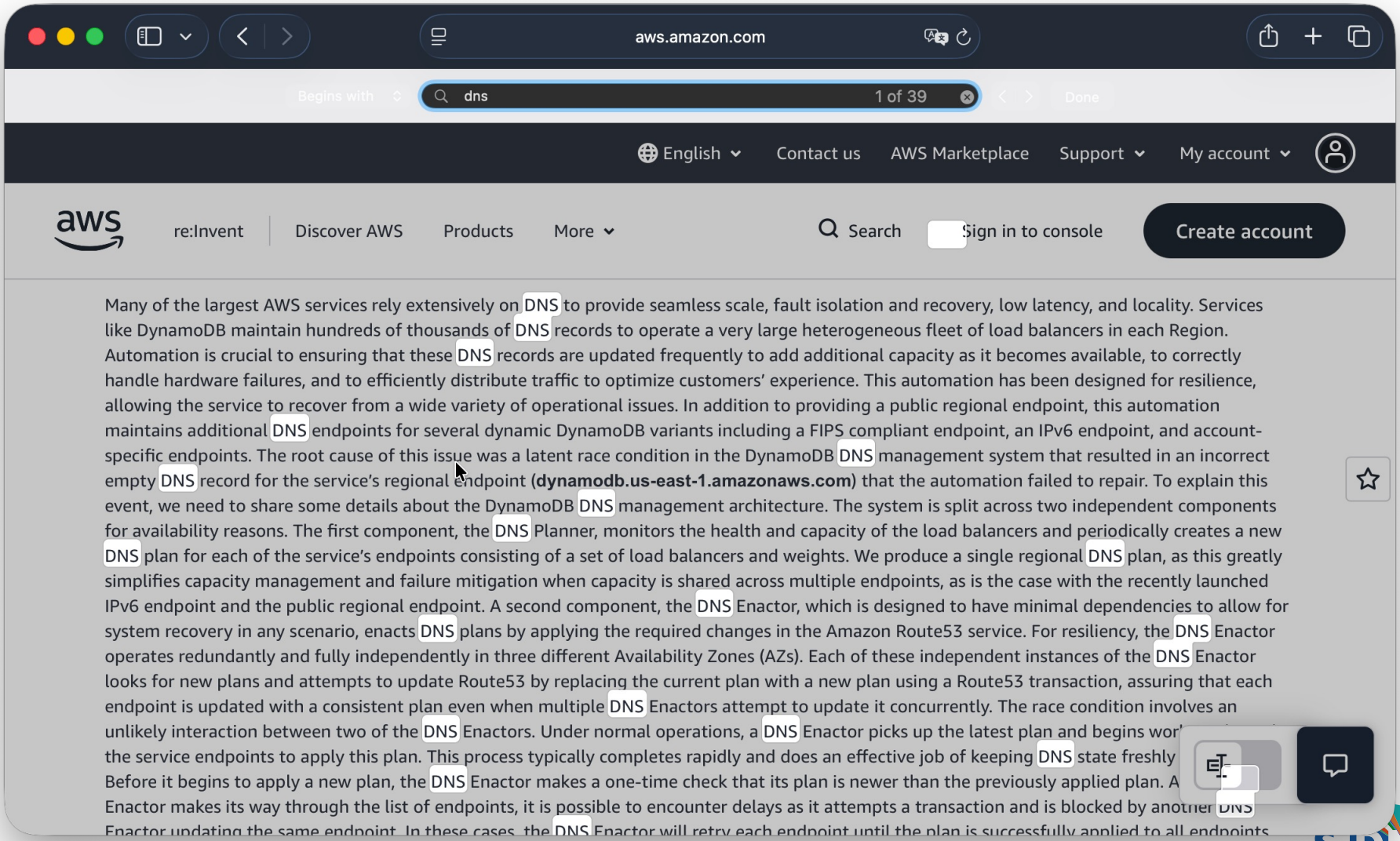

rfc.fyi
rfc.fyi
292 RFCs
dns
Show obsolete and historic
sort by:
RFC number | referencing RFCs
Stream
iab ietf independent irtf legacy
Level
bcp experimental historic
informational std unknown
Working Group
6man IESG acme add appsawg
asid behave bmwg cdni curdle
dane dhc dns dnsext dnsind
RFC9872: Recommendations for Discovering IPv6 Prefix Used for IPv6 Address Synthesis informational v6ops
RFC9859: Generalized DNS Notifications dnsop
RFC9824: Compact Denial of Existence in DNSSEC dnsop
RFC9803: Extensible Provisioning Protocol (EPP) Mapping for DNS Time-to-Live (TTL) Values regext
RFC9799: Automated Certificate Management Environment (ACME) Extensions for ".onion" Special-Use Domain Names acme
RFC9726: Operational Considerations for Use of DNS in Internet of Things (IoT) Devices bcp opsawg
RFC9718: DNSSEC Trust Anchor Publication for the Root Zone informational dnsop
RFC9715: IP Fragmentation Avoidance in DNS over UDP informational dnsop
RFC9704: Establishing Local DNS Authority in Validated Split-Horizon Environments add
RFC9665: Service Registration Protocol for DNS-Based Service Discovery dnssd
RFC9664: An EDNS(0) Option to Negotiate Leases on DNS Updates dnssd
RFC9660: The DNS Zone Version (ZONEVERSION) Option dnsop


US
AU
KR
JP
FR
UK
CA
DE
NO
SE
FI
ES
AT
NL


Why is it when something happens, it's always you three?
DNS
BGP
DHCP


"IT'S ALWAYS DNS"
ABRAHAM LINCOLN


aws.amazon.com
English
Contact us
AWS Marketplace
Support
My account
aws
re:Invent
Discover AWS
Products
More
Search
Sign in to console
Create account
Summary of the Amazon DynamoDB Service Disruption in the Northern Virginia (US-EAST-1) Region
We wanted to provide you with some additional information about the service disruption that occurred in the N. Virginia (us-east-1) Region on October 19 and 20, 2025. While the event started at 11:48 PM PDT on October 19 and ended at 2:20 PM PDT on October 20, there were three distinct periods of impact to customer applications. First, between 11:48 PM on October 19 and 2:40 AM on October 20, Amazon DynamoDB experienced increased API error rates in the N. Virginia (us-east-1) Region. Second, between 5:30 AM and 2:09 PM on October 20, Network Load Balancer (NLB) experienced increased connection errors for some load balancers in the N. Virginia (us-east-1) Region. This was caused by health check failures in the NLB fleet, which resulted in increased connection errors on some NLBs. Third, between 2:25 AM and 10:36 AM on October 20, new EC2 instance launches failed and, while instance launches began to succeed from 10:37 AM, some newly launched instances experienced connectivity issues which were resolved by 1:50 PM.
DynamoDB
Between 11:48 PM PDT on October 19 and 2:40 AM PDT on October 20, customers experienced increased Amazon DynamoDB API error
N. Virginia (us-east-1) Region. During this period, customers and other AWS services with dependencies on DynamoDB were unable to e
connections to the service. The incident was triggered by a latent defect within the service's automated DNS management system that
endpoint resolution failures for DynamoDB.


aws.amazon.com
Begins with
dns
1 of 39
Done
English
Contact us
AWS Marketplace
Support
My account
aws
re:Invent
Discover AWS
Products
More
Search
Sign in to console
Create account
Many of the largest AWS services rely extensively on DNS to provide seamless scale, fault isolation and recovery, low latency, and locality. Services like DynamoDB maintain hundreds of thousands of DNS records to operate a very large heterogeneous fleet of load balancers in each Region. Automation is crucial to ensuring that these DNS records are updated frequently to add additional capacity as it becomes available, to correctly handle hardware failures, and to efficiently distribute traffic to optimize customers' experience. This automation has been designed for resilience, allowing the service to recover from a wide variety of operational issues. In addition to providing a public regional endpoint, this automation maintains additional DNS endpoints for several dynamic DynamoDB variants including a FIPS compliant endpoint, an IPv6 endpoint, and account-specific endpoints. The root cause of this issue was a latent race condition in the DynamoDB DNS management system that resulted in an incorrect empty DNS record for the service's regional endpoint (dynamodb.us-east-1.amazonaws.com) that the automation failed to repair. To explain this event, we need to share some details about the DynamoDB DNS management architecture. The system is split across two independent components for availability reasons. The first component, the DNS Planner, monitors the health and capacity of the load balancers and periodically creates a new DNS plan for each of the service's endpoints consisting of a set of load balancers and weights. We produce a single regional DNS plan, as this greatly simplifies capacity management and failure mitigation when capacity is shared across multiple endpoints, as is the case with the recently launched IPv6 endpoint and the public regional endpoint. A second component, the DNS Enactor, which is designed to have minimal dependencies to allow for system recovery in any scenario, enacts DNS plans by applying the required changes in the Amazon Route53 service. For resiliency, the DNS Enactor operates redundantly and fully independently in three different Availability Zones (AZs). Each of these independent instances of the DNS Enactor looks for new plans and attempts to update Route53 by replacing the current plan with a new plan using a Route53 transaction, assuring that each endpoint is updated with a consistent plan even when multiple DNS Enactors attempt to update it concurrently. The race condition involves an unlikely interaction between two of the DNS Enactors. Under normal operations, a DNS Enactor picks up the latest plan and begins wor
the service endpoints to apply this plan. This process typically completes rapidly and does an effective job of keeping DNS state freshly
Before it begins to apply a new plan, the DNS Enactor makes a one-time check that its plan is newer than the previously applied plan. A
Enactor makes its way through the list of endpoints, it is possible to encounter delays as it attempts a transaction and is blocked by another DNS
Enactor updating the same endpoint. In these cases, the DNS Enactor will retry each endpoint until the plan is successfully applied to all endpoints

## User

## Resolver

## Authoritative name servers

## User

## Resolver

## Authoritative name servers

Where can I find www.example.nl ?

???

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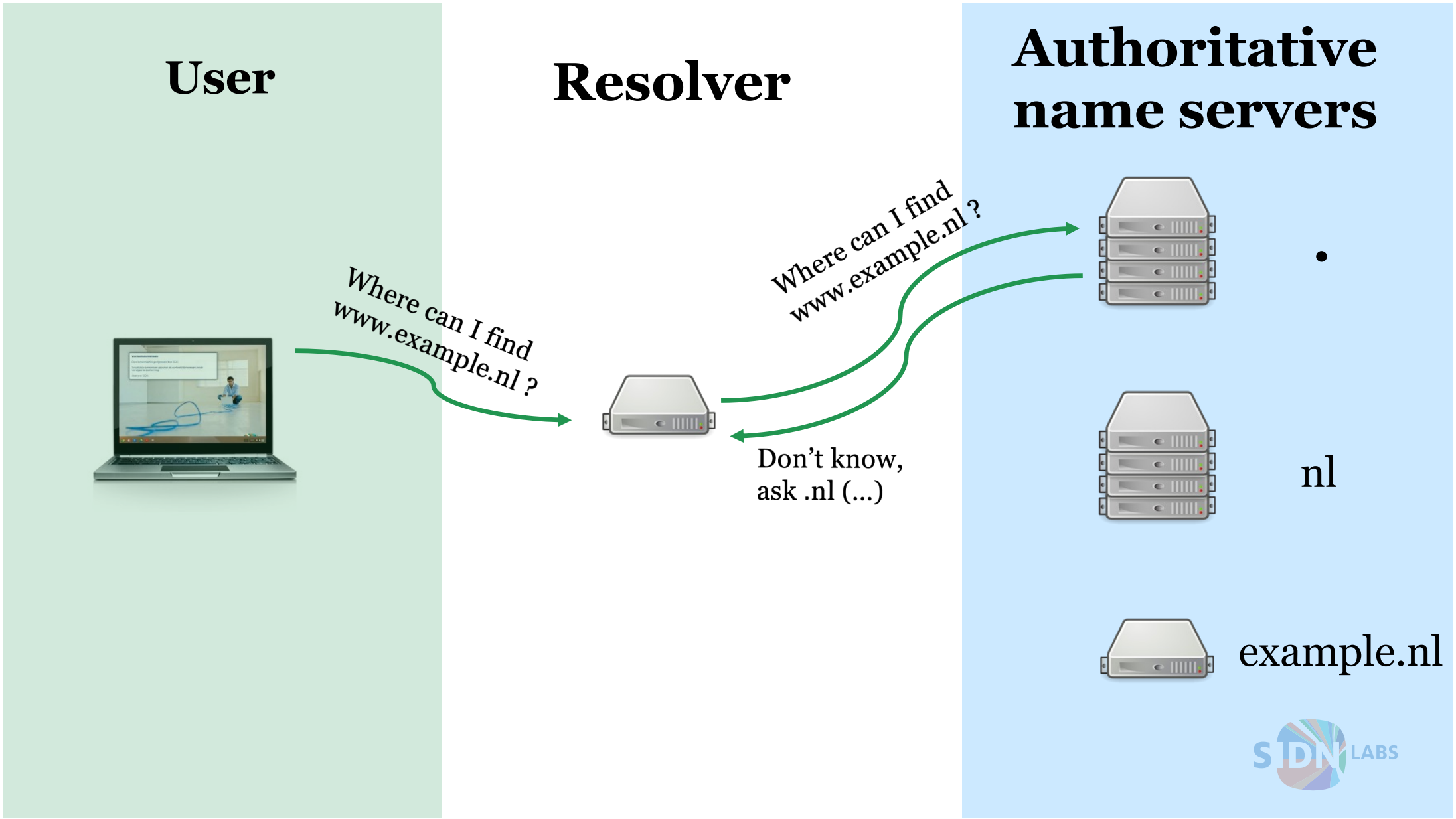
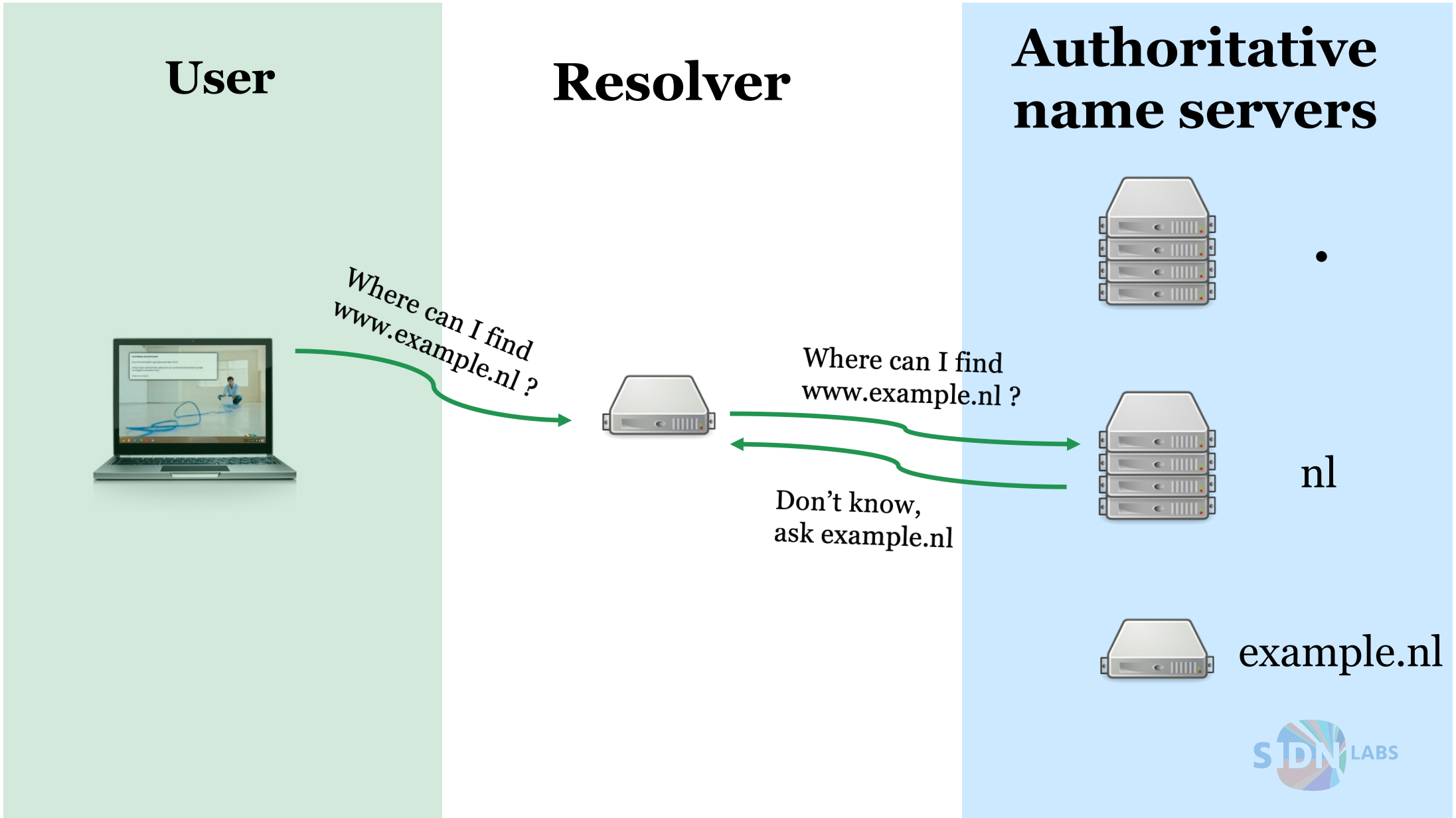
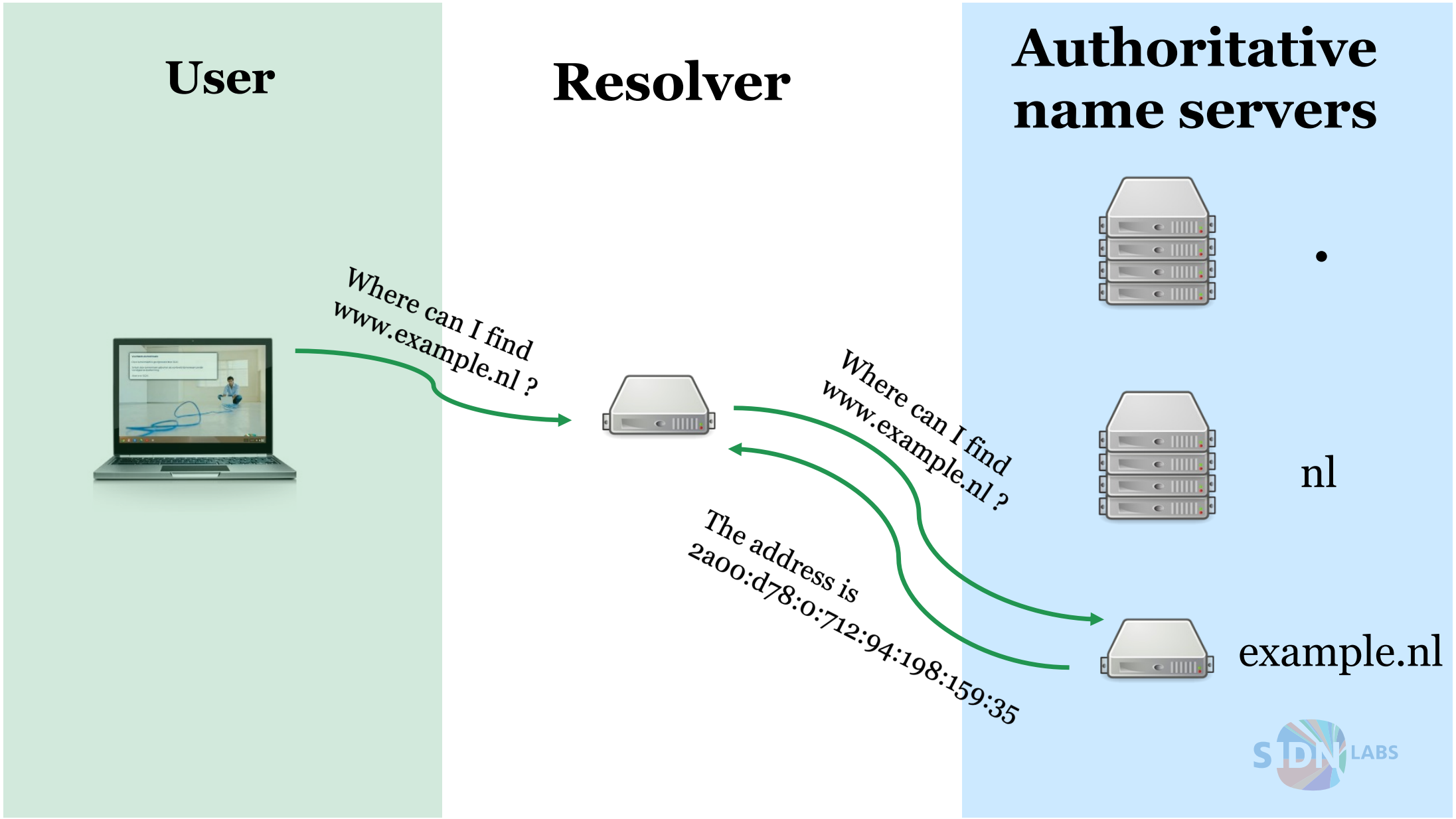

User
Resolver
Authoritative name servers
Where can I find www.example.nl ?
Where can I find www.example.nl ?
Don't know, ask .nl (...)
.
nl
example.nl
SIDN LABS


User
Resolver
Authoritative name servers
Where can I find www.example.nl ?
Where can I find www.example.nl ?
Don't know, ask example.nl
.
nl
example.nl
SIDN LABS


User
Resolver
Authoritative name servers
Where can I find www.example.nl ?
Where can I find www.example.nl ?
The address is 2a00:d78:0:712:94:198:159:35
.
nl
example.nl
SIDN LABS

## User

## Resolver

## Authoritative name servers

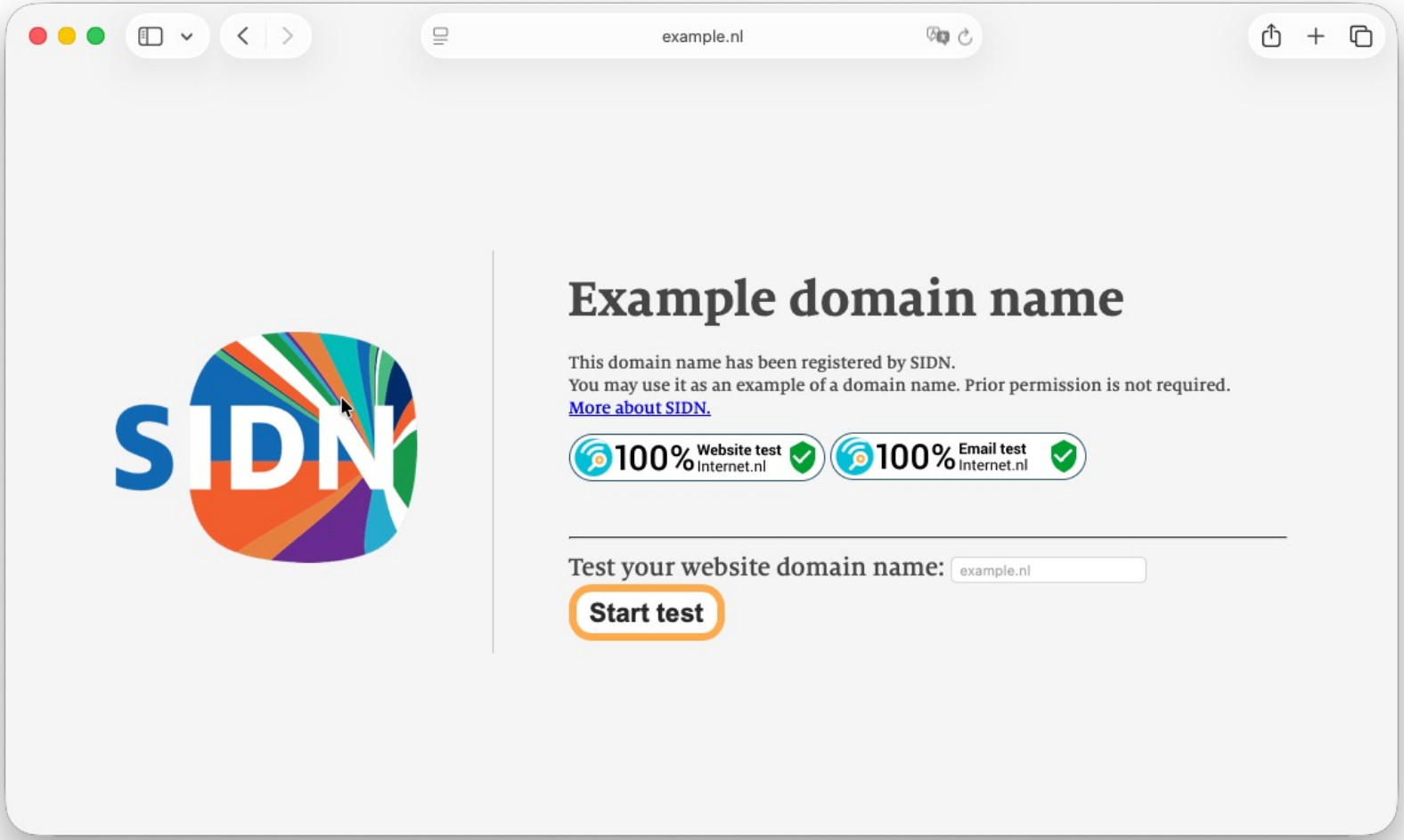
Where can I find www.example.nl ?

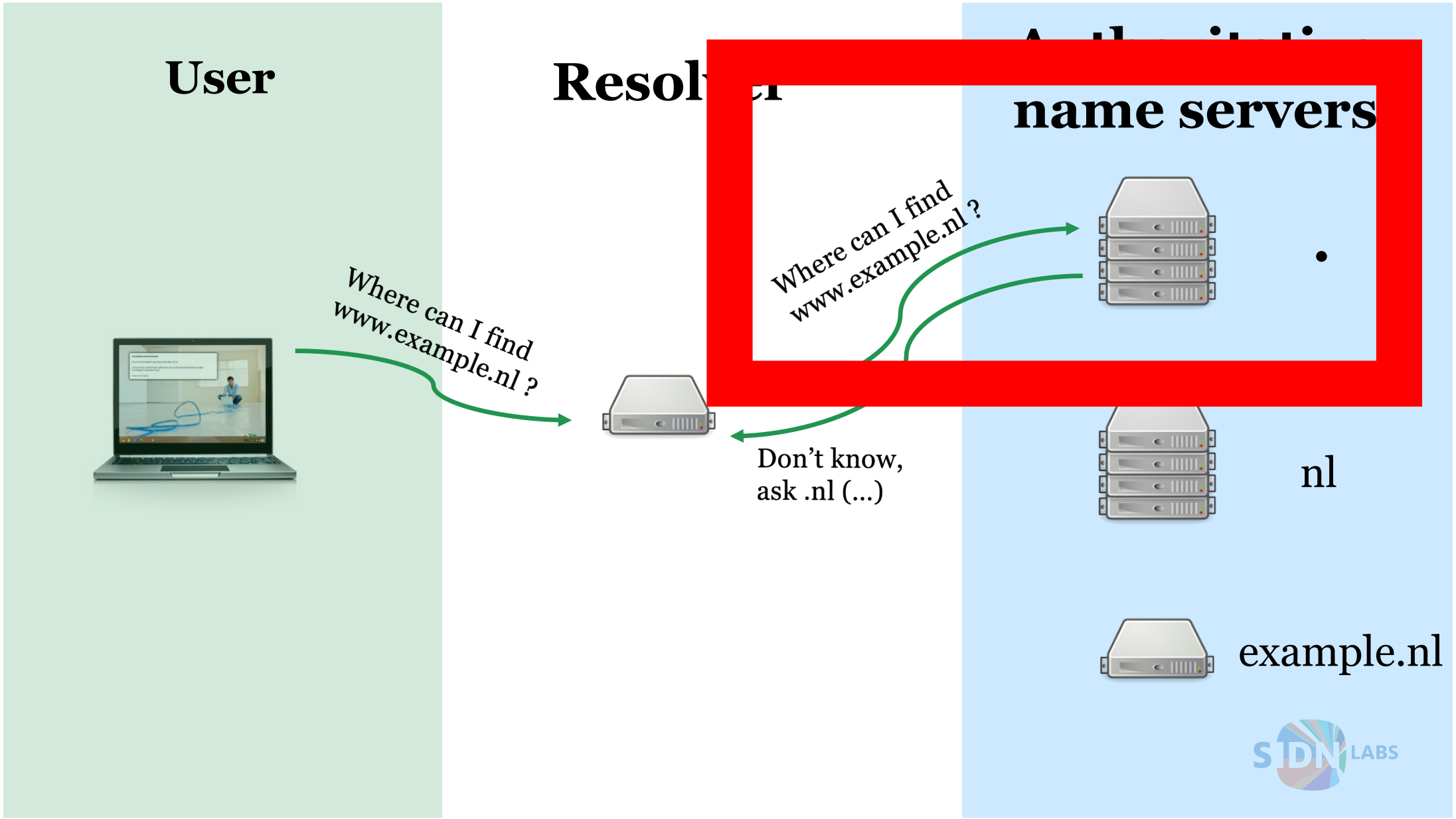
The address is 2a00:d78:0:712:94:198:159:35

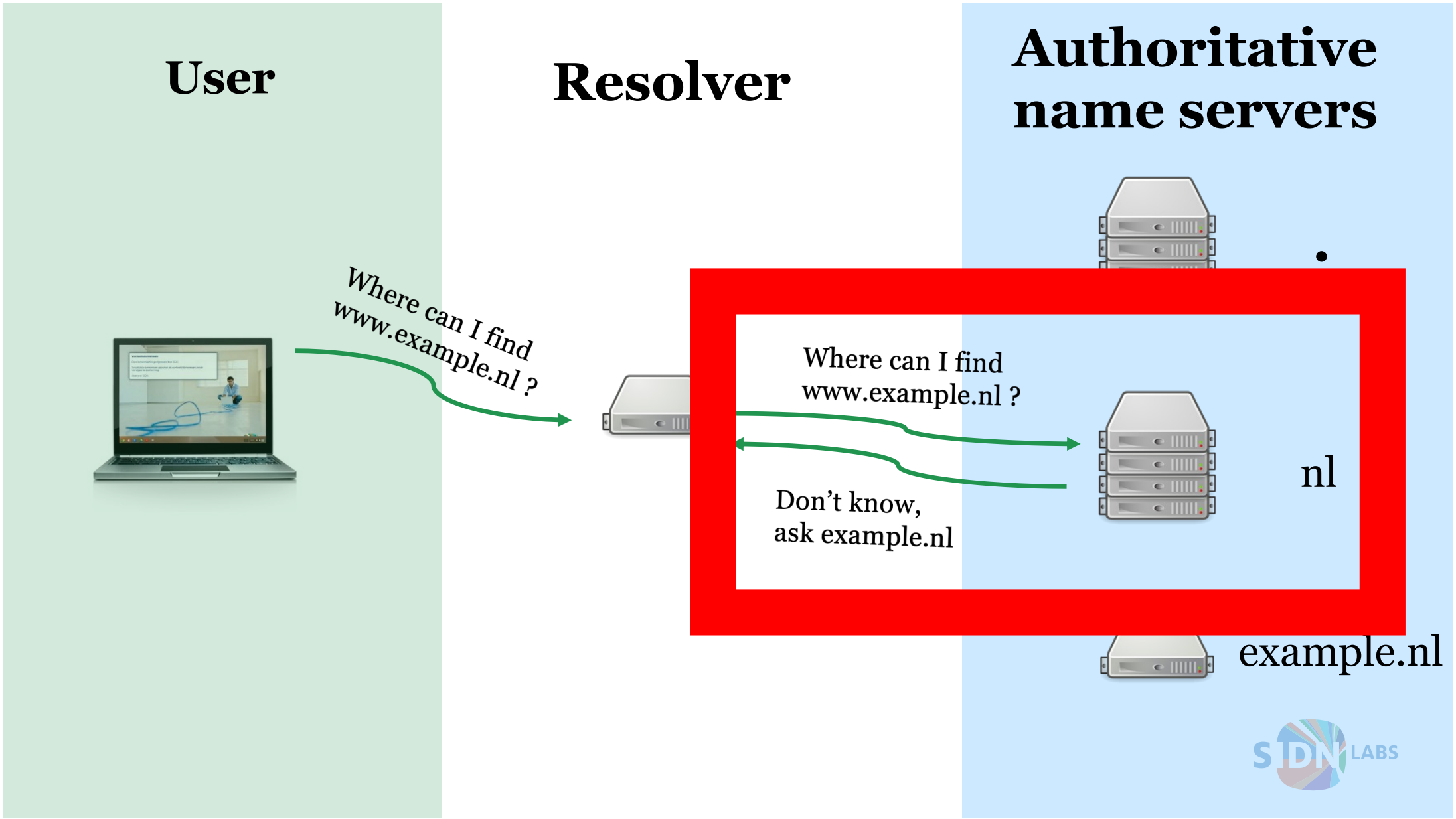
.

nl

example.nl


example.nl
Example domain name
This domain name has been registered by SIDN.
You may use it as an example of a domain name. Prior permission is not required.
More about SIDN.
100% Website test Internet.nl
100% Email test Internet.nl
Test your website domain name:
example.nl
Start test


User
Resol
name servers
Where can I find
www.example.nl ?
Where can I find
www.example.nl ?
Don't know,
ask .nl (...)
.
nl
example.nl
SIDN LABS


User
Resolver
Authoritative name servers
Where can I find www.example.nl ?
Where can I find www.example.nl ?
Don't know, ask example.nl
.
nl
example.nl
SIDN LABS

# Command line example (1)

We ask for AAAA record

```
$ dig +nodnssec www.example.nl AAAA
@k.root-servers.net

;; AUTHORITY SECTION:

nl. 172800 IN NS ns1.dns.nl.

nl. 172800 IN NS ns3.dns.nl.

nl. 172800 IN NS ns4.dns.nl.
```

Results are NS records

TTL

```
;; ADDITIONAL SECTION:

ns1.dns.nl. 172800 IN A 194.0.28.53

ns1.dns.nl. 172800 IN AAAA
2001:678:2c:0:194:0:28:53

ns3.dns.nl. 172800 IN A 194.0.2
```

Glue records

```
ns3.dns.nl. 172800 IN AAAA
2001:678:20::24

ns4.dns.nl. 172800 IN A
185.159.199.200

ns4.dns.nl. 172800 IN AAAA
2620:10a:80ac::200


;; Query time: 7 msec

;; SERVER:
2001:7fd::1#53(k.root-
servers.net) (UDP)

;; WHEN: Tue Nov 11 09:49:01
CET 2025

;; MSG SIZE  rcvd: 221
```

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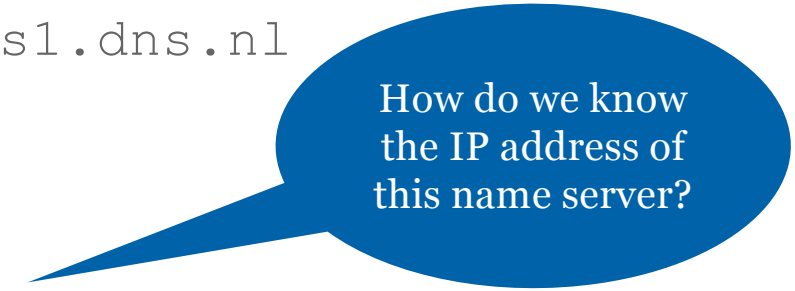
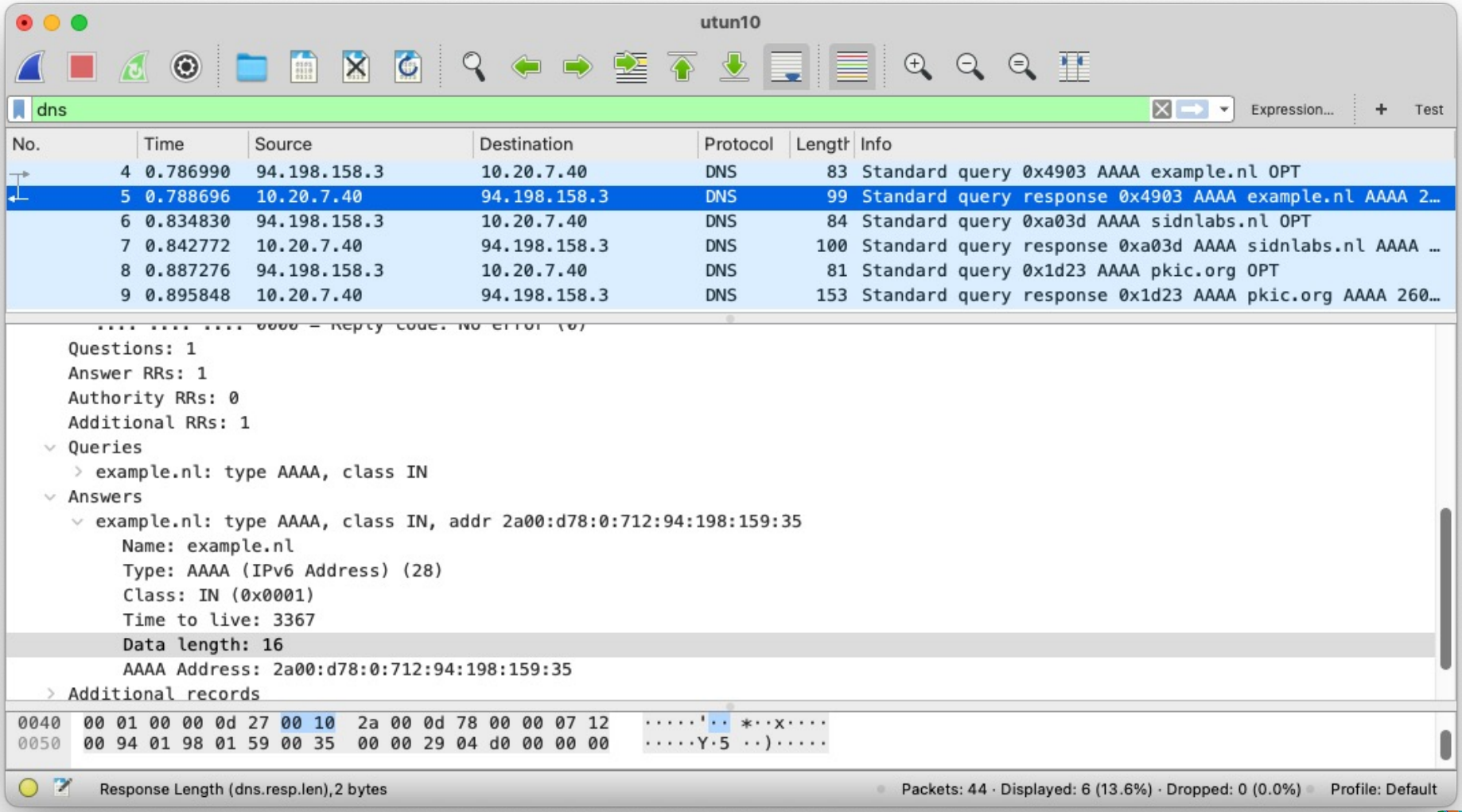
# Command line example (2)

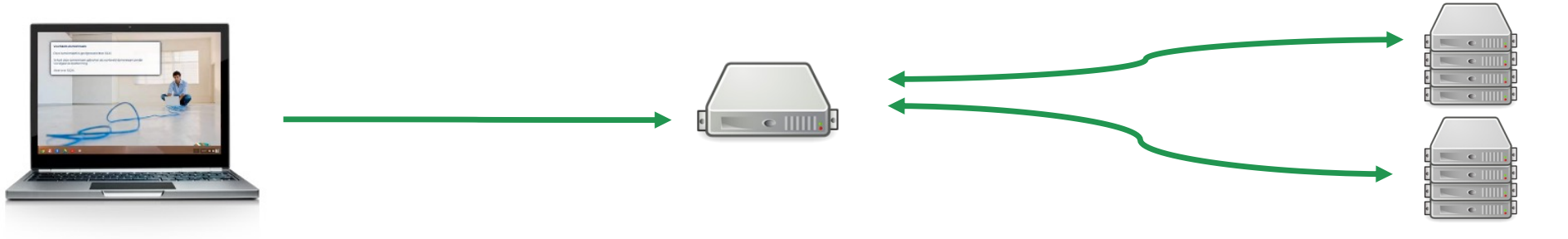
```
$ dig +nodnssec www.example.nl AAAA @ns1.dns.nl

;; AUTHORITY SECTION:
example.nl. 3600 IN NS ex1.sidnlabs.nl.
example.nl. 3600 IN NS ex2.sidnlabs.nl.
example.nl. 3600 IN NS anytest1.sidnlabs.nl.

;; Query time: 31 msec
;; SERVER: 2001:678:2c:0:194:0:28:53#53(ns1.dns.nl) (UDP)
;; WHEN: Tue Nov 11 09:53:26 CET 2025
;; MSG SIZE  rcvd: 111
```



# Command line example (3)

```
$ dig +nodnssec www.example.nl AAAA @anytest1.sidnlabs.nl

www.example.nl. 3600 IN AAAA 2a00:d78:0:712:94:198:159:35

;; Query time: 4 msec
;; SERVER: 2001:678:8::53#53(anytest1.sidnlabs.nl.) (UDP)
;; WHEN: Tue Nov 11 10:49:39 CET 2025
;; MSG SIZE  rcvd: 99
```


utun10
dns
Expression...
Test
No. Time Source Destination Protocol Length Info
4 0.786990 94.198.158.3 10.20.7.40 DNS 83 Standard query 0x4903 AAAA example.nl OPT
5 0.788696 10.20.7.40 94.198.158.3 DNS 99 Standard query response 0x4903 AAAA example.nl AAAA 2…
6 0.834830 94.198.158.3 10.20.7.40 DNS 84 Standard query 0xa03d AAAA sidnlabs.nl OPT
7 0.842772 10.20.7.40 94.198.158.3 DNS 100 Standard query response 0xa03d AAAA sidnlabs.nl AAAA …
8 0.887276 94.198.158.3 10.20.7.40 DNS 81 Standard query 0x1d23 AAAA pkic.org OPT
9 0.895848 10.20.7.40 94.198.158.3 DNS 153 Standard query response 0x1d23 AAAA pkic.org AAAA 260…
Questions: 1
Answer RRs: 1
Authority RRs: 0
Additional RRs: 1
Queries
example.nl: type AAAA, class IN
Answers
example.nl: type AAAA, class IN, addr 2a00:d78:0:712:94:198:159:35
Name: example.nl
Type: AAAA (IPv6 Address) (28)
Class: IN (0x0001)
Time to live: 3367
Data length: 16
AAAA Address: 2a00:d78:0:712:94:198:159:35
Additional records
0040 00 01 00 00 0d 27 00 10 2a 00 0d 78 00 00 07 12
0050 00 94 01 98 01 59 00 35 00 00 29 04 d0 00 00 00
Response Length (dns.resp.len),2 bytes
Packets: 44 · Displayed: 6 (13.6%) · Dropped: 0 (0.0%)
Profile: Default



User

Resolver

Name servers

DoH, DoT, DoQ, DNScrypt

DNSSEC

## DNS

The Domain Name System translates human-friendly domain names into IP addresses, forming the backbone of internet navigation.

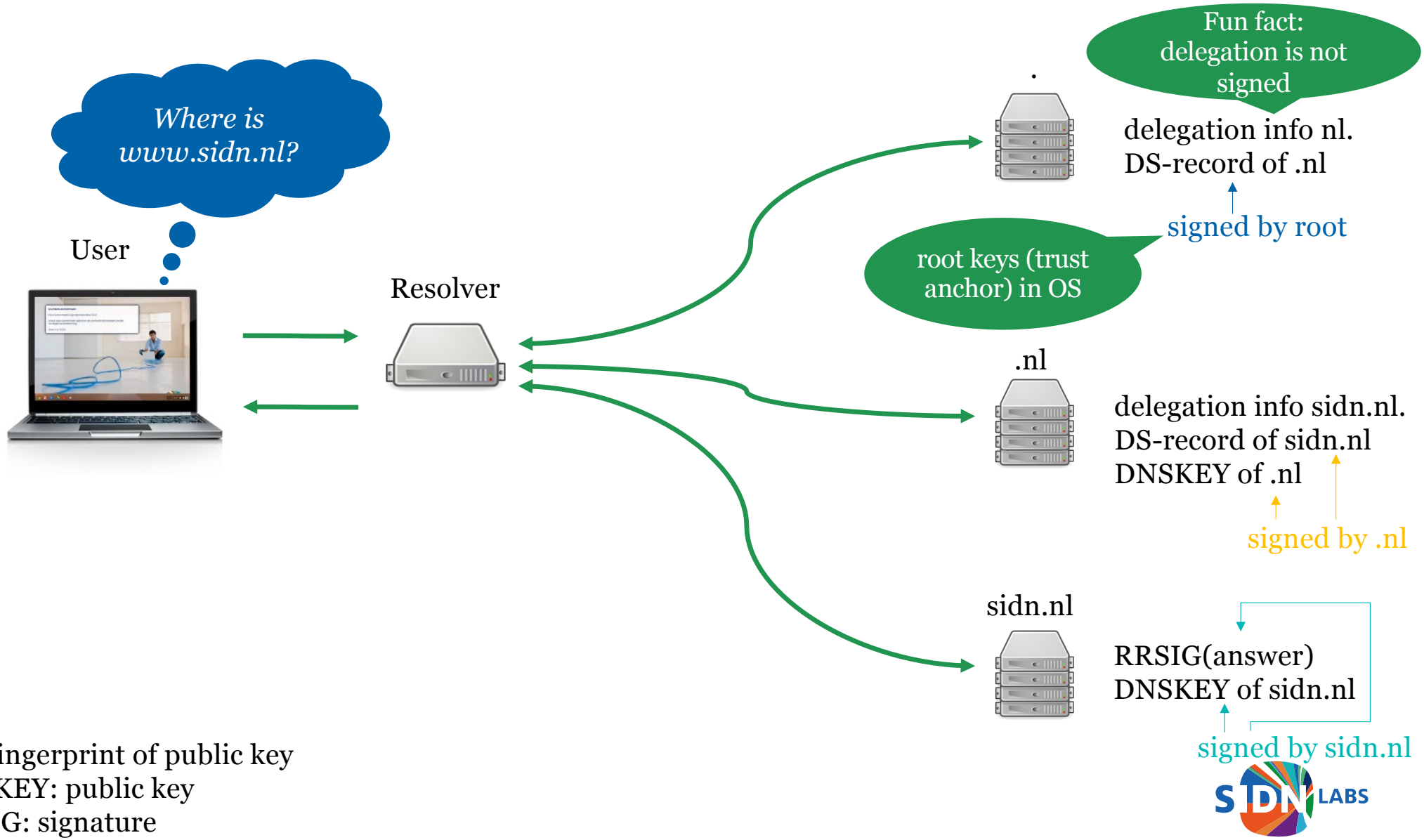
## DNSSEC

Domain Name System Security Extensions add cryptographic signatures to DNS data, protecting against spoofing and ensuring data integrity.



## Post-Quantum Cryptography

Advanced cryptographic algorithms designed to resist attacks from quantum computers, ensuring future-proof security for internet communications.




DS: fingerprint of public key
DNSKEY: public key
RRSIG: signature

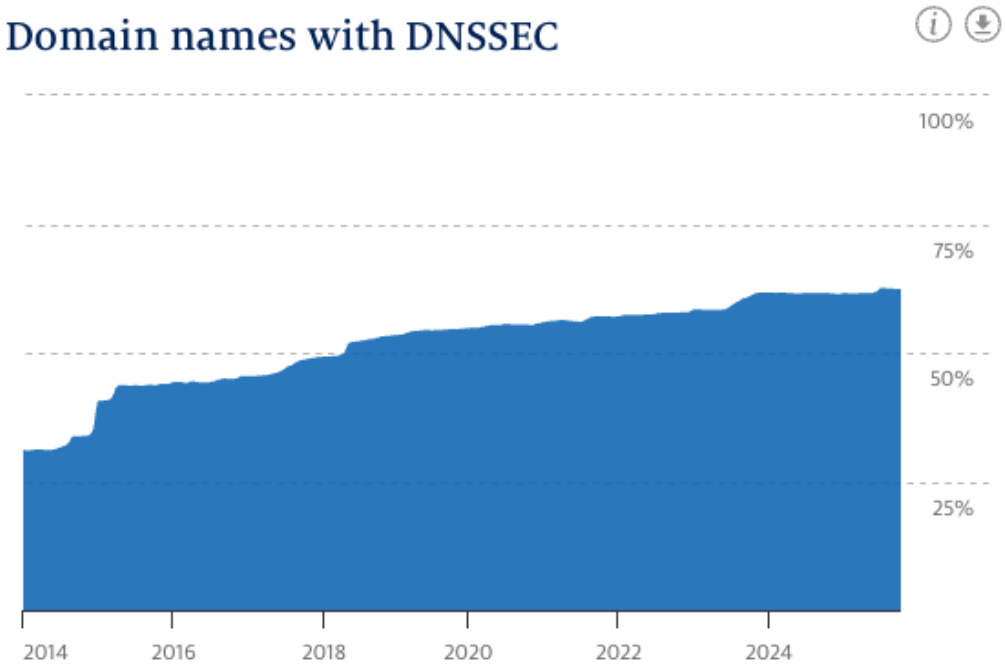
# Command line example DNSSEC

```
$ dig +dnssec +nocrypto nl NS @k.root-servers.net

nl. 172800 IN NS ns1.dns.nl.
nl. 172800 IN NS ns3.dns.nl.
nl. 172800 IN NS ns4.dns.nl.
nl. 86400 IN DS 17153 13 2 ([omitted] )
nl. 86400 IN RRSIG DS 8 1 86400 (
                20251124050000 20251111040000 61809 .
                [omitted] )

[.....]
```

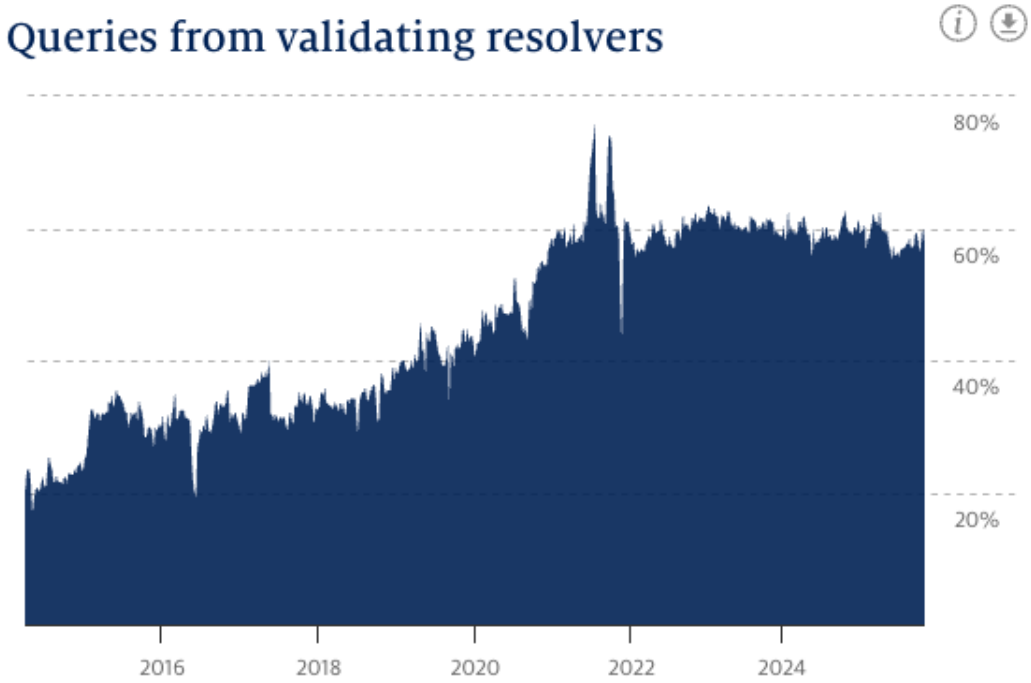
# Command line example DNSSEC (2)

```
$ dig +dnssec +nocrypto nl NS @ns1.dns.nl

nl. 172800 IN NS ns1.dns.nl.

[…]

nl. 172800 IN RRSIG NS 13 1 172800 (20251120235718
20251106230727 12711 nl. [omitted] )


;; ADDITIONAL SECTION:

ns1.dns.nl. 3600 IN A 194.0.28.53

ns1.dns.nl. 3600 IN RRSIG A 13 3 3600 (20251120083310
20251106050725 12711 nl. [omitted] )
```


# DNSSEC for .nl




~62%

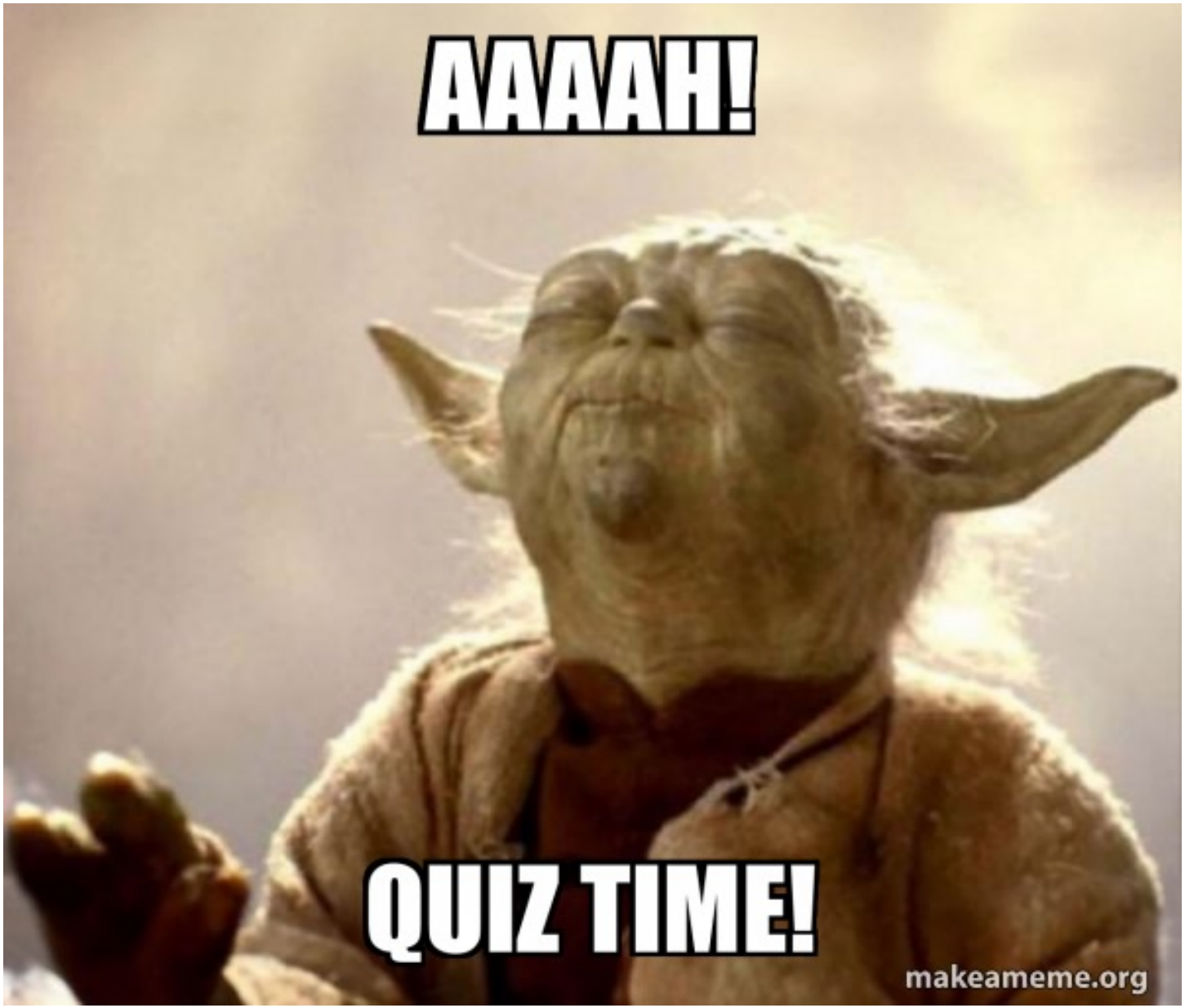



~60%

Source: https://stats.sidnlabs.nl/en


*Jürgen Henn – 11foot8.com*


gifbin.com


AAAAH!
QUIZ TIME!
makeameme.org

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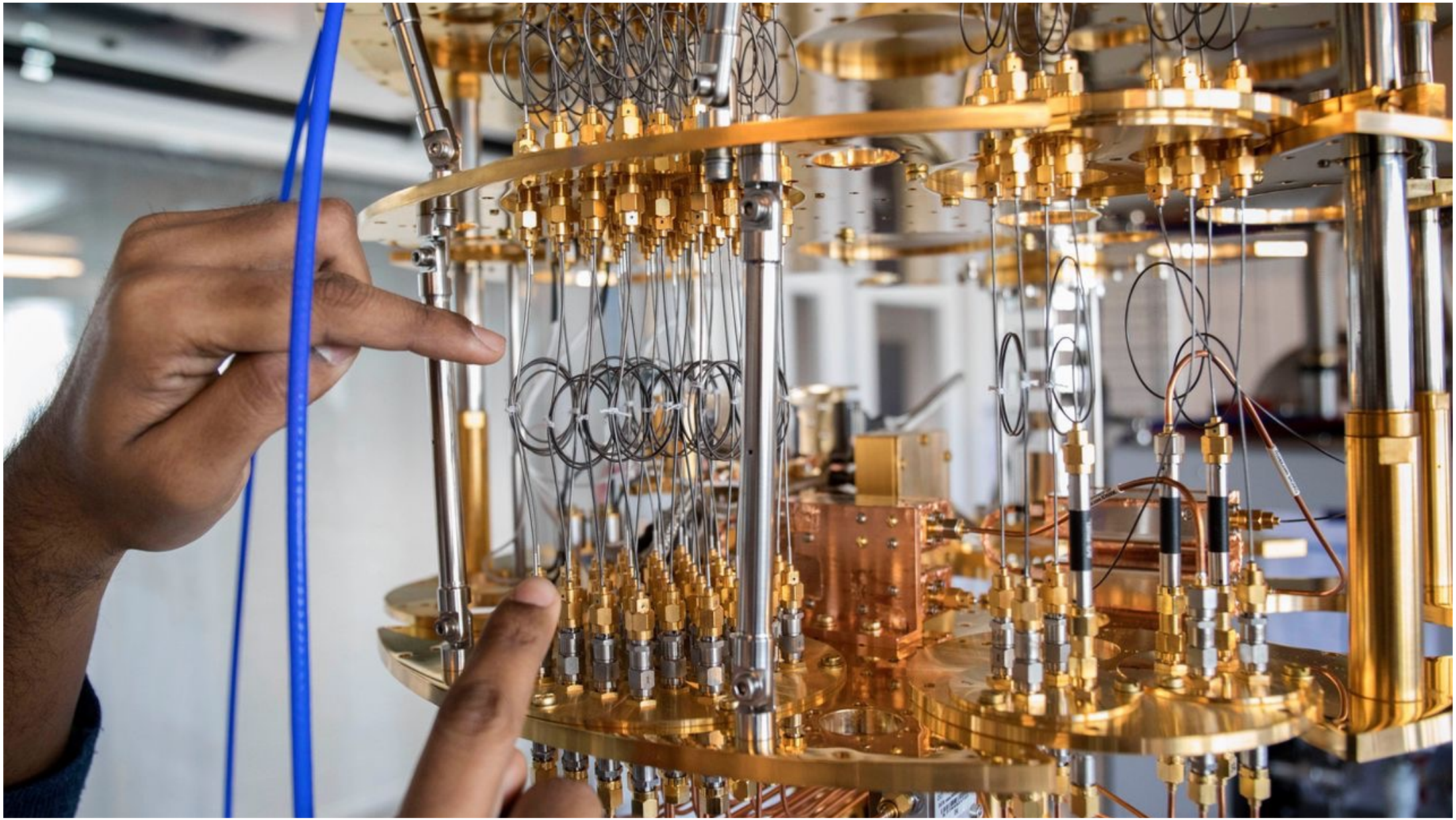
Advanced cryptographic algorithms designed to resist attacks from quantum computers, ensuring future-proof security for internet communications.



# Polynomial-Time Algorithms for Prime Factorization and Discrete Logarithms on a Quantum Computer*

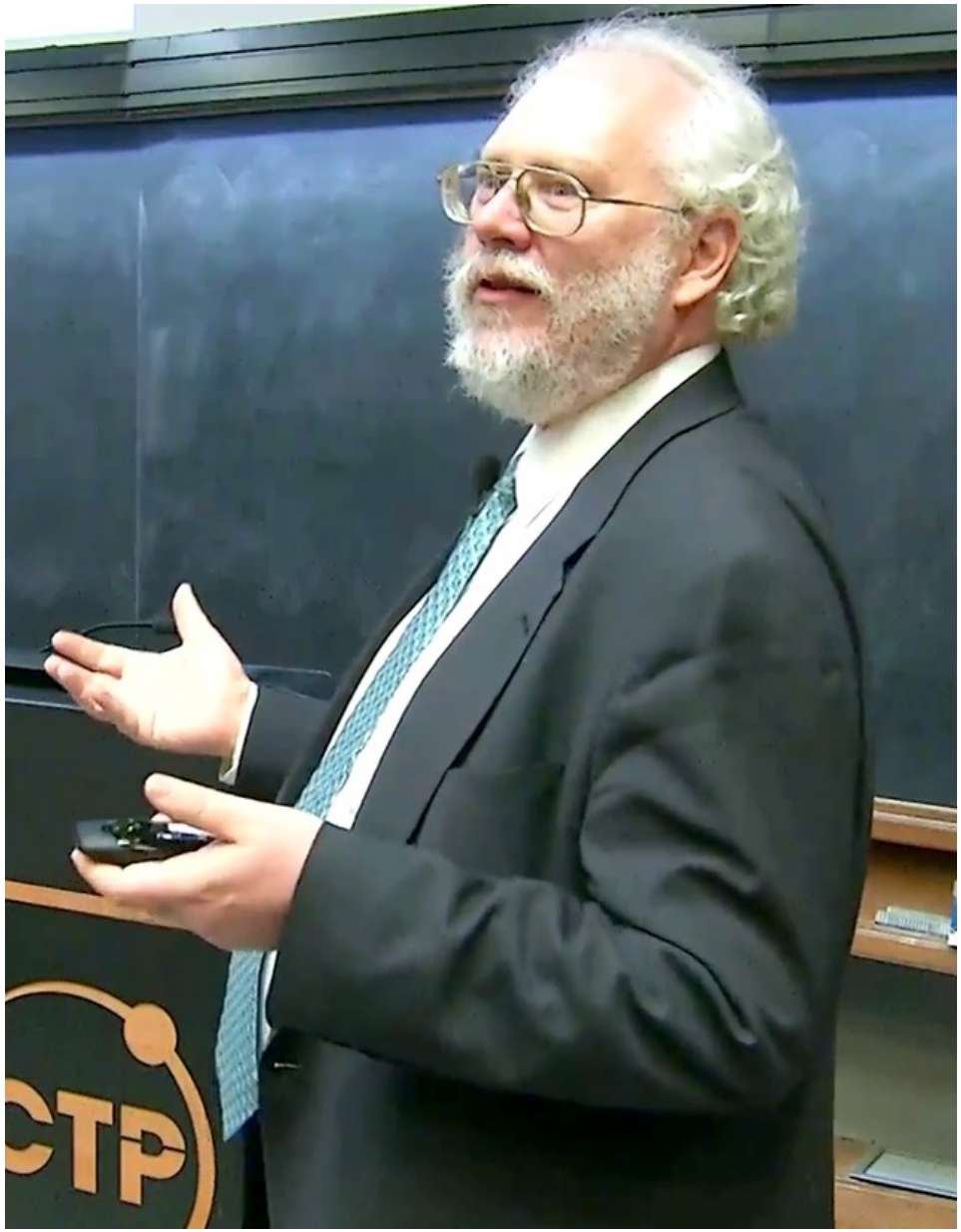
Peter W. Shor†

**Abstract**

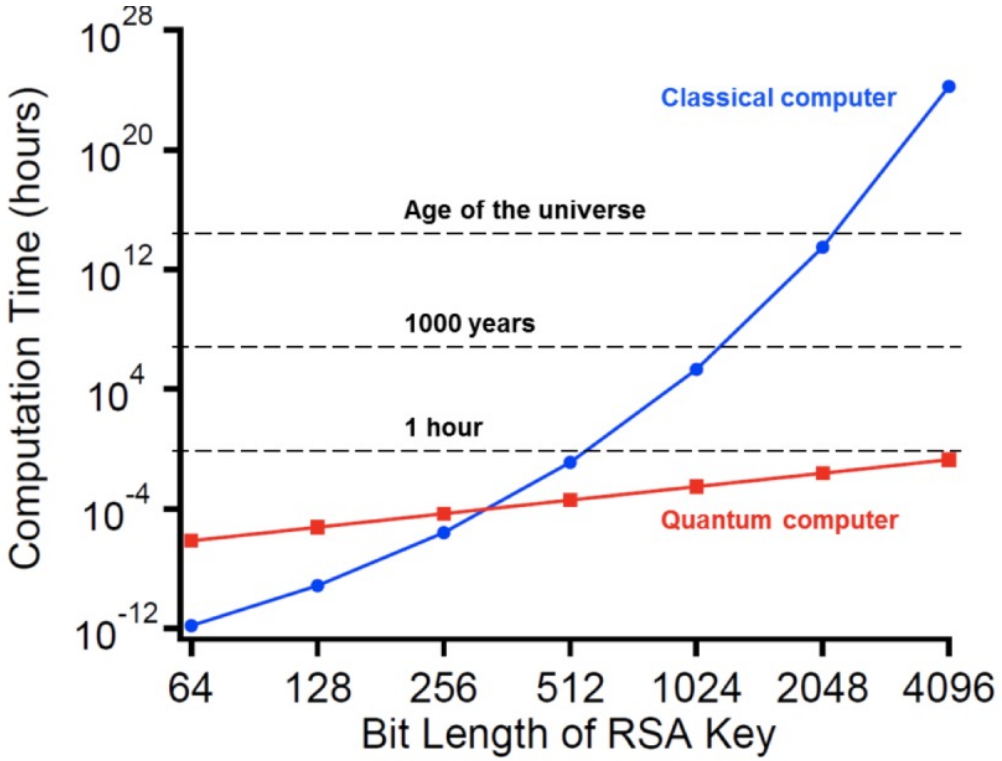
A digital computer is generally believed to be an efficient universal computing device; that is, it is believed able to simulate any physical computing device with an increase in computation time by at most a polynomial factor. This may not be true when quantum mechanics is taken into consideration. This paper considers factoring integers and finding discrete logarithms, two problems which are generally thought to be hard on a classical computer and which have been used as the basis of several proposed cryptosystems. Efficient randomized algorithms are given for these two problems on a hypothetical quantum computer. These algorithms take a number of steps polynomial in the input size, e.g., the number of digits of the integer to be factored.

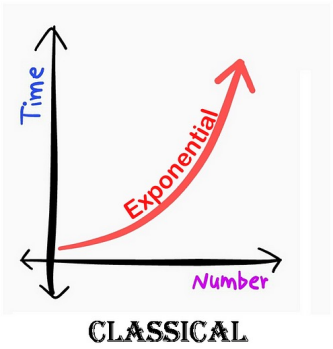
**Keywords:** algorithmic number theory, prime factorization, discrete logarithms, Church's thesis, quantum computers, foundations of quantum mechanics, spin systems, Fourier transforms

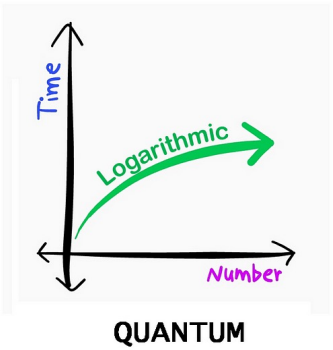
**AMS subject classifications:** 81P10, 11Y05, 68Q10, 03D10

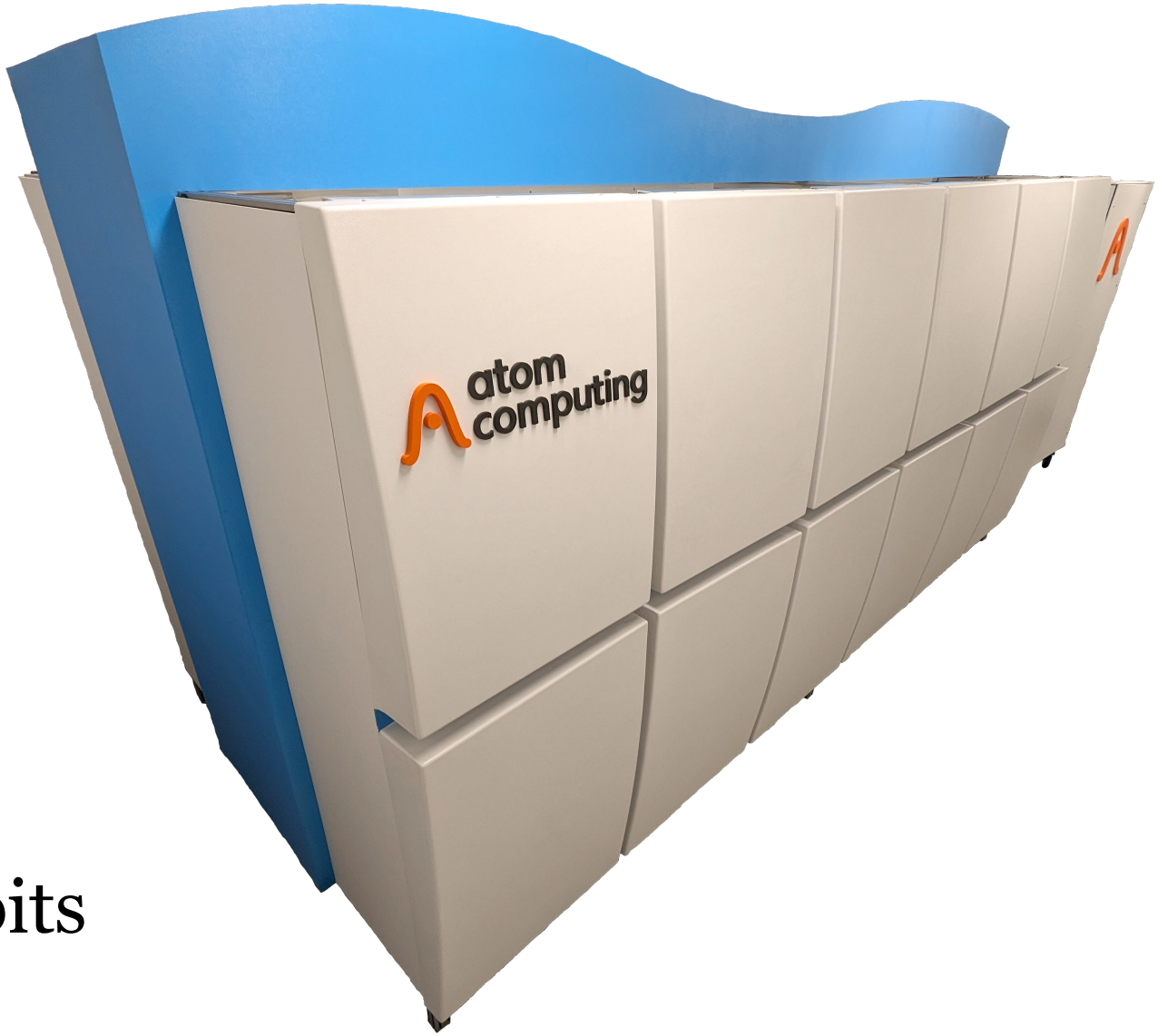


# Quantum computers and cryptographic keys






1180 qubits

| Algorithm | Key size | Security | Logical qubits | Physical qubits | Time to break |
|---|---|---|---|---|---|
| RSA | 1024 bits | 80 bits | 2.290 | ~ 2.560.000 bits | 3.5 uur |
| **RSA** | **2048 bits** | **112 bits** | **4.338** | **~ 6.200.000 bits** | **29 uur** |
| RSA | 4096 bits | 128 bits | 8.434 | ~ 14.700.000 bits | 10 dagen |
| ECC | 256 bits | 128 bits | 2.330 | ~ 3.210.000 bits | 11 uur |

Source: National Academies of Sciences, Engineering, and Medicine 2018. Quantum Computing: Progress and Prospects. Washington, DC: The National Academies Press. https://doi.org/10.17226/25196. Tabel 4.1

SIDN LABS

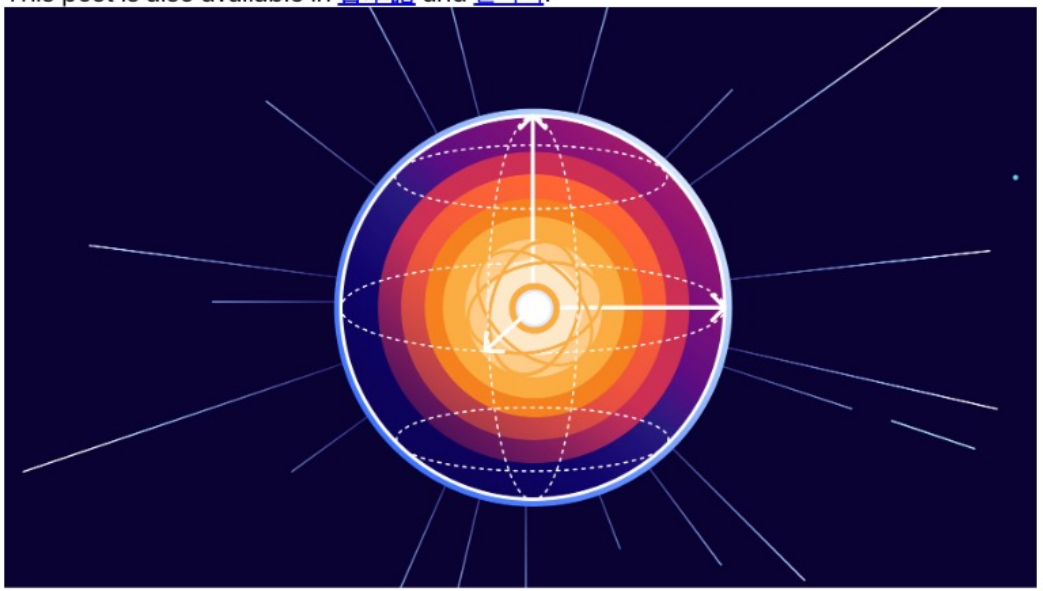
# State of the post-quantum Internet in 2025

2025-10-28

Bas Westerbaan

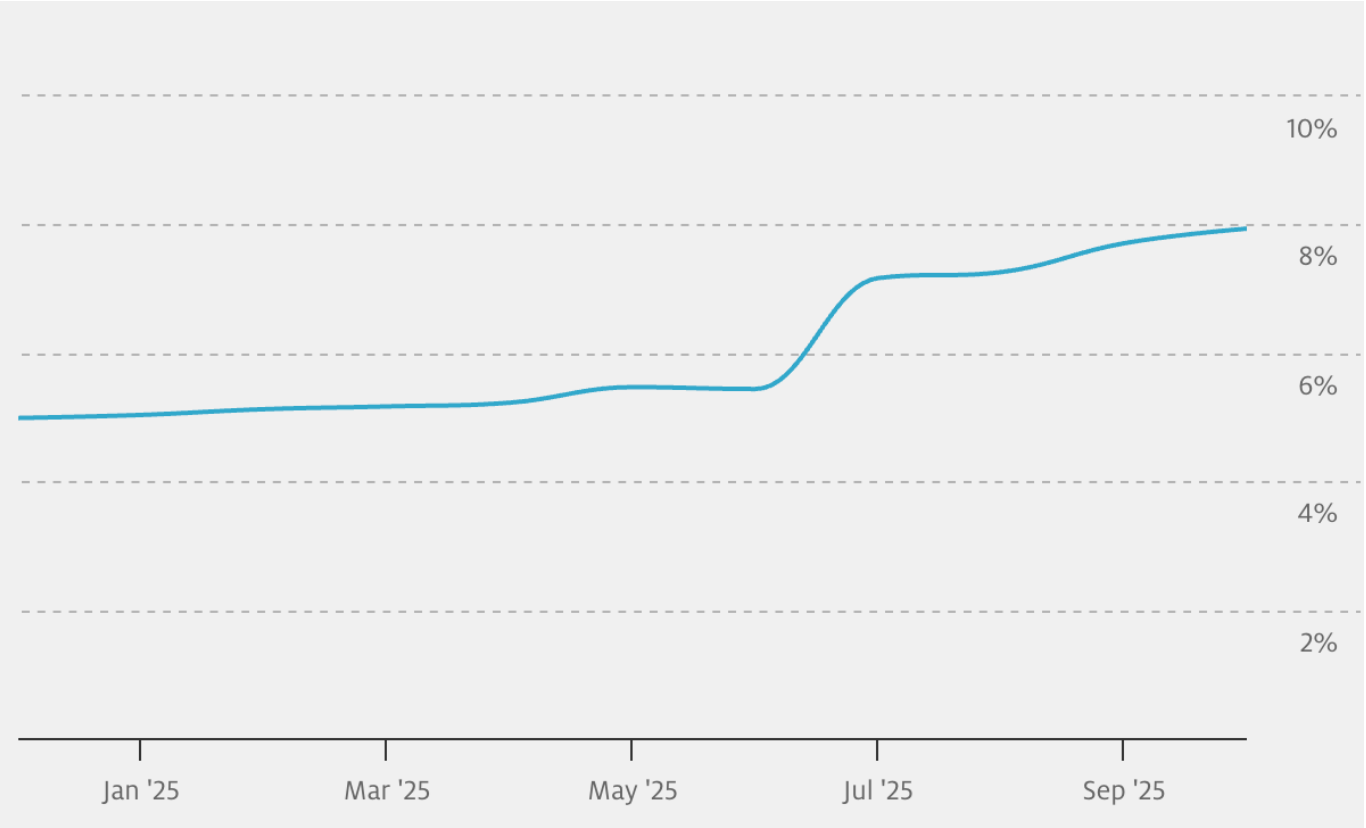
41 min read

This post is also available in 日本語 and 한국어.



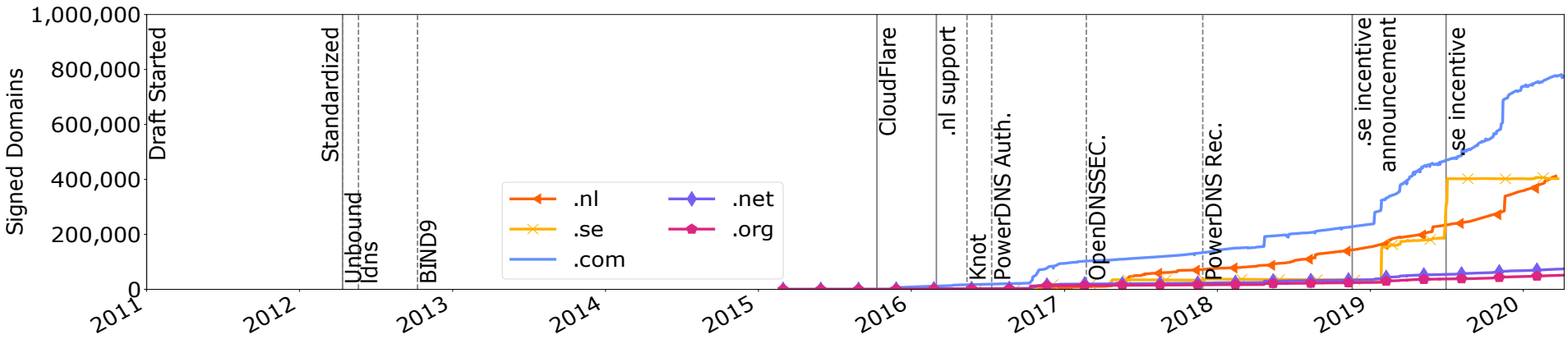
This week, the last week of October 2025, we reached a major milestone for Internet security: the majority of human-initiated traffic with Cloudflare is using post-quantum encryption mitigating the threat of harvest-now/decrypt-later.

.nl websites HTTPS secured with PQC algorithm




https://stats.sidnlabs.nl/en/web.html#websites%20secured%20with%20pqc%20algorithm

Time to deploy new algorithm in DNSSEC, +- 10 years



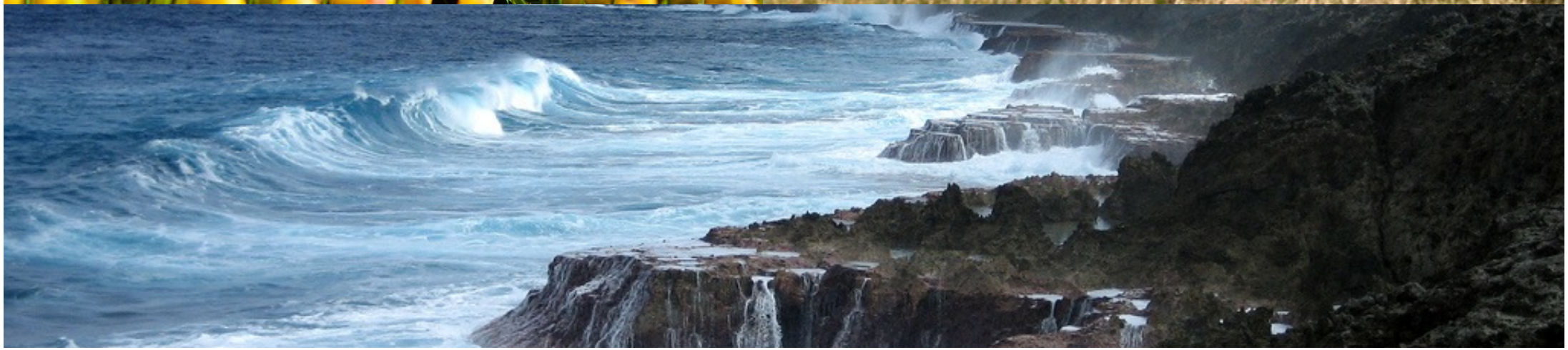

Timeline showing deployment of ECDSA256
from '*Making DNSSEC Future Proof*' by Moritz Müller.

# Post-quantum Algorithms Testing and Analysis for the DNS

| | |
|---|---|
| Hardware support (AVX2) | Proof of nonexistence |
| 4 algorithms | 3 zone files |

| Algorithm | Public key size | Signature size |
|---|---|---|
| RSA-1280 | 162* | 160 |
| ECDSA-P256 | 64 | 64 |
| Falcon-512 | 897 | 666 |
| MAYO-2 (R1) | 5488 | 180 |

*all numbers are in bytes*

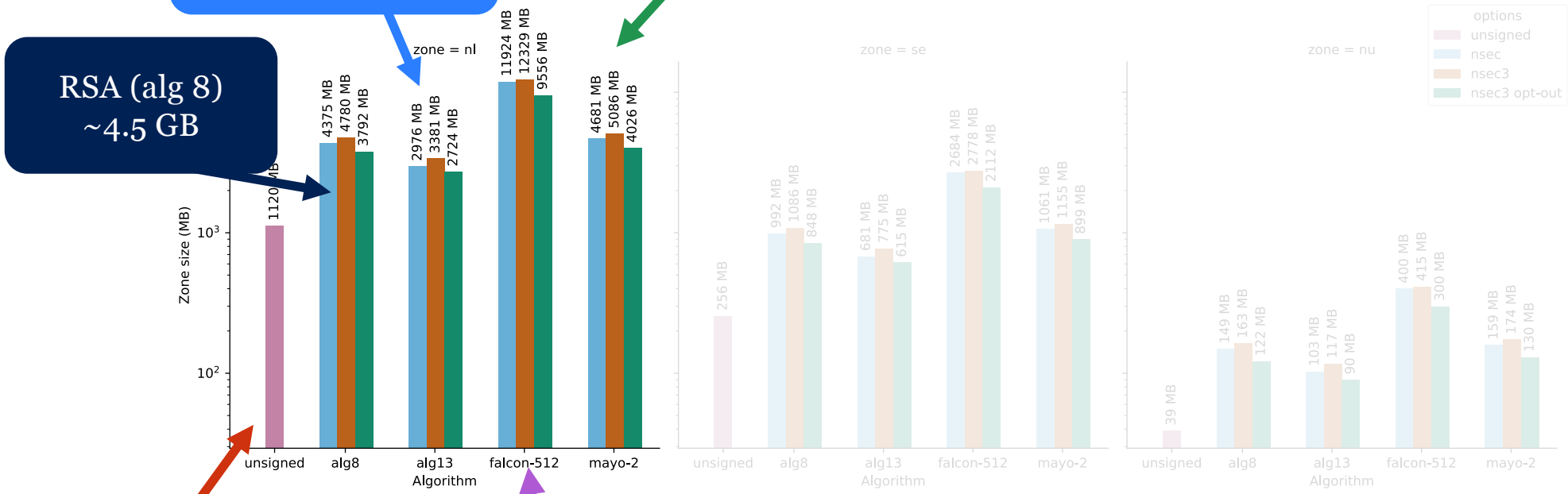


# Zone sizes

ECC (alg 13)
~3 GB

Mayo ~5 GB

RSA (alg 8)
~4.5 GB




Unsigned ~1 GB

Falcon ~12 GB

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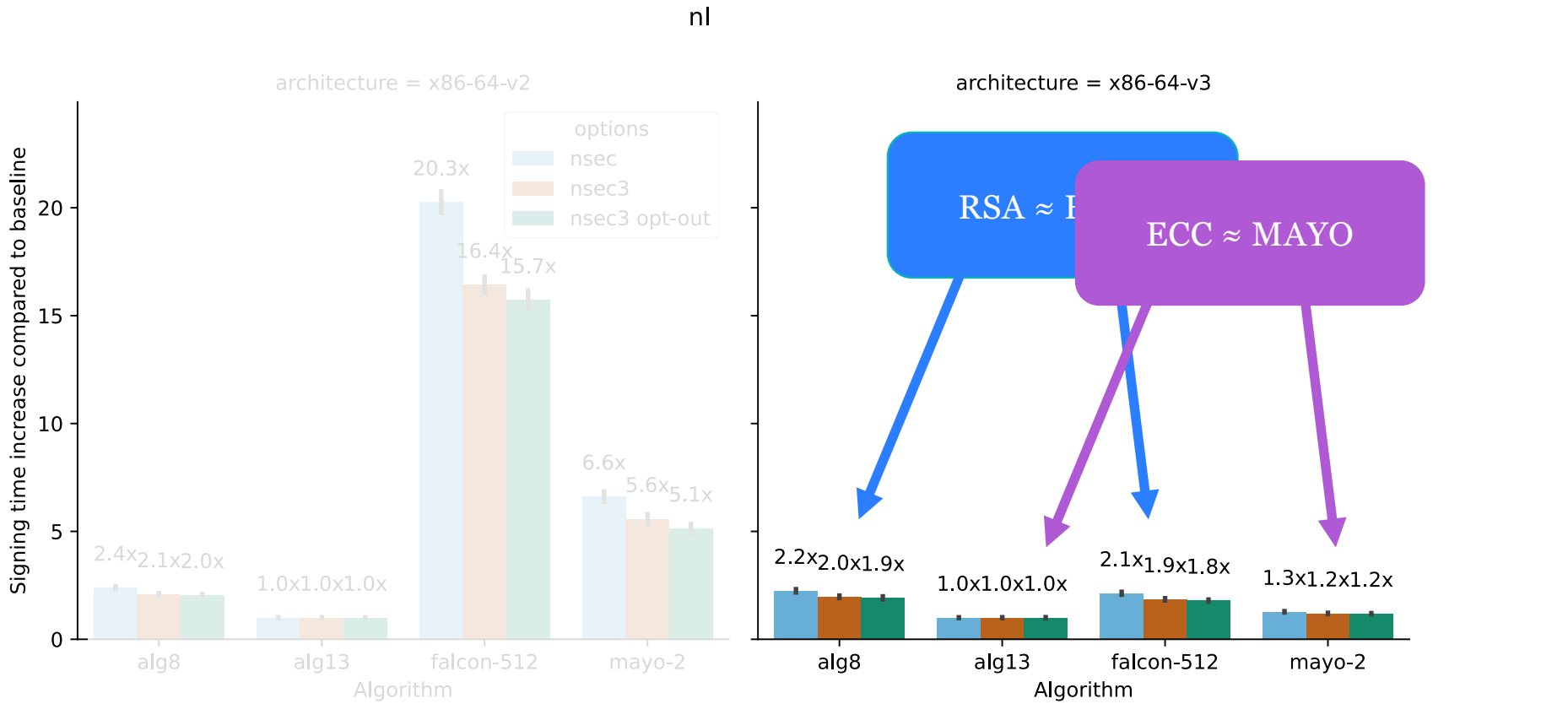
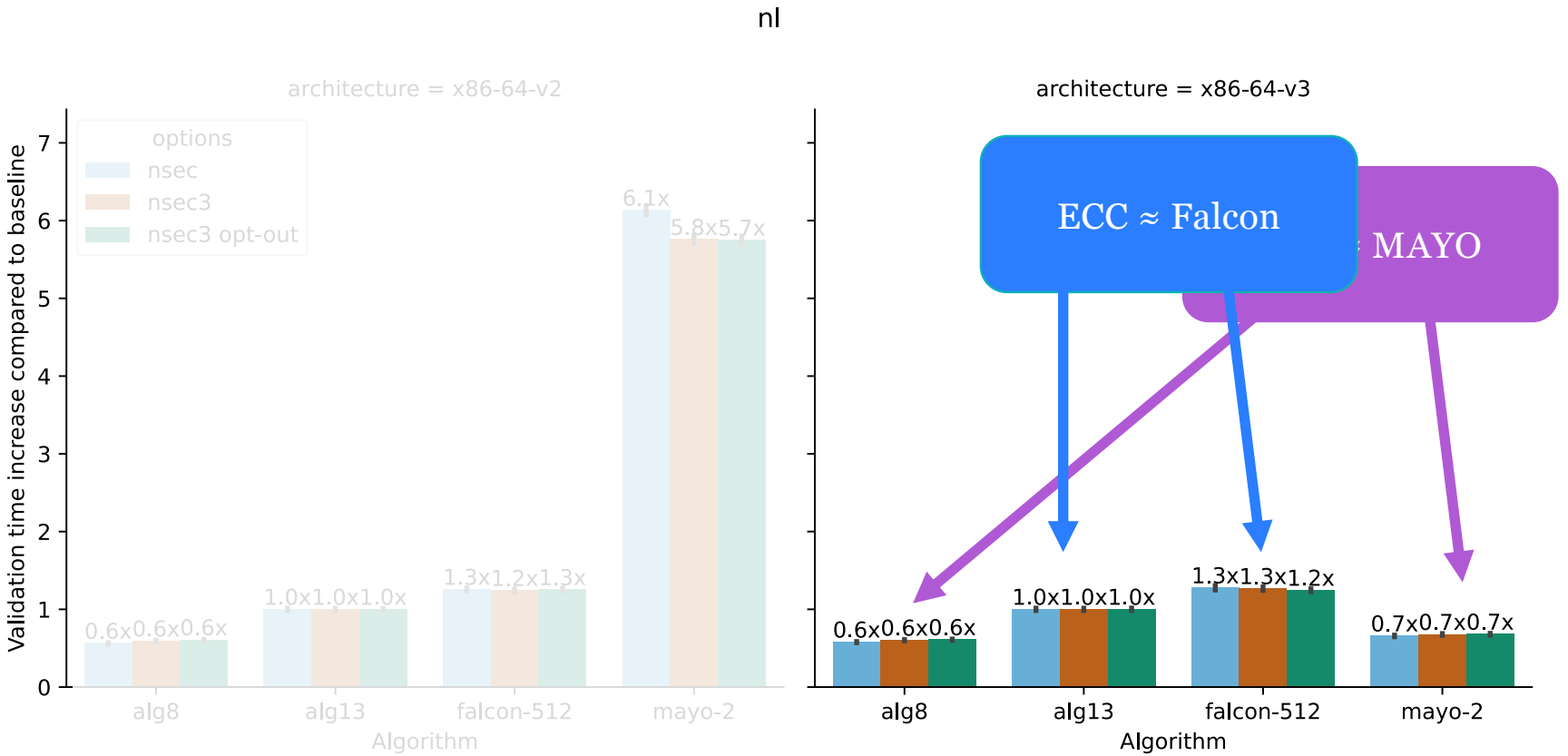
# Signing time of entire .nl zone



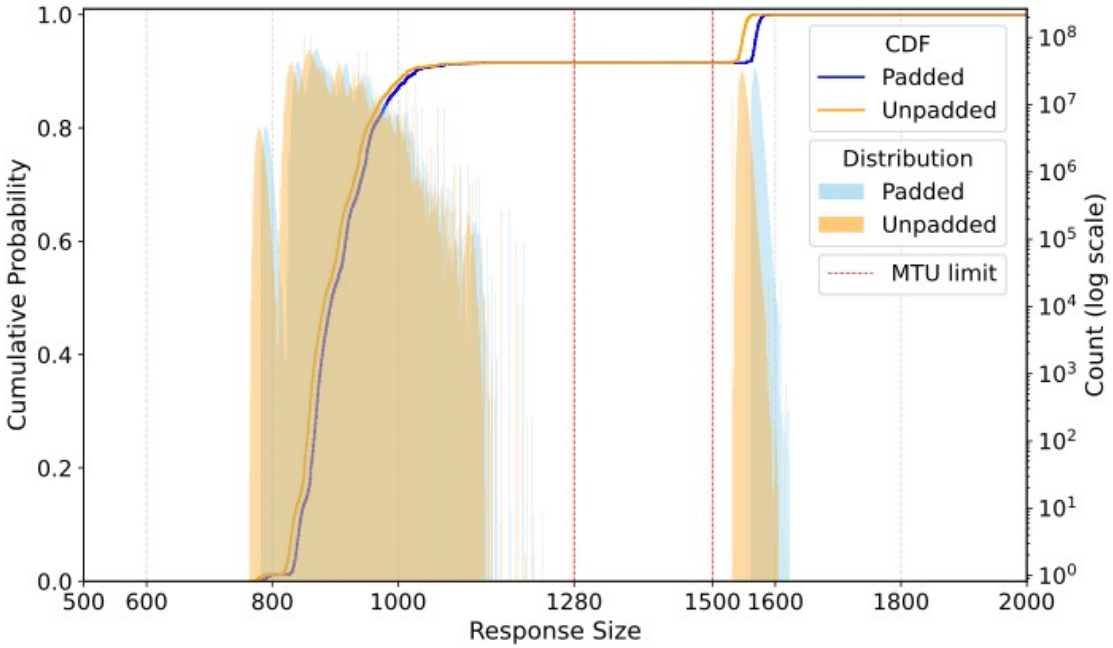
# Validating the entire .nl zone




CAN WE FIX IT ?
YES WE CAN!!


WHAT'S
NEXT?

# Falcon for .nl: padded or unpadded




Fabrizio et al, *PQC for DNSSEC: a format size analysis on Falcon signatures*
In: ANRW 2025.

https://doi.org/10.1145/3744200.3744767

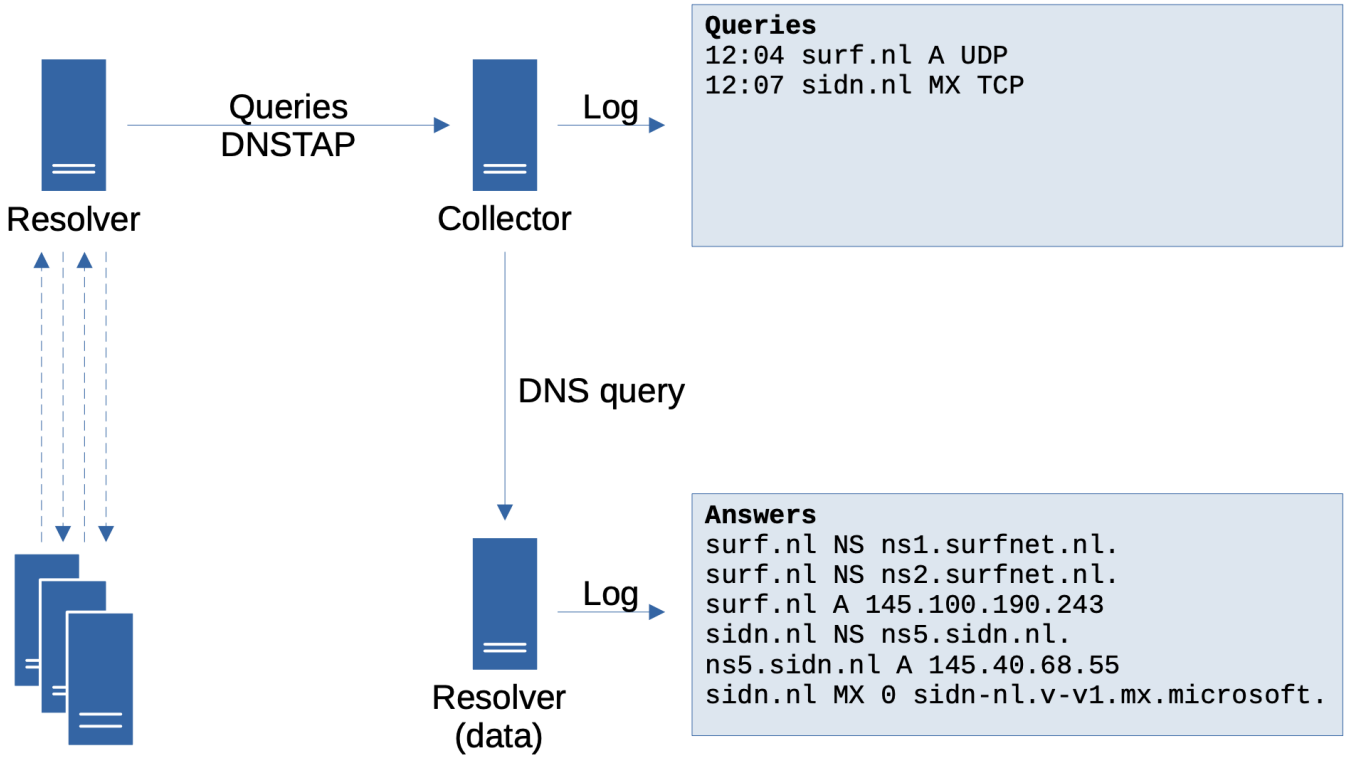
| Response size | Response code | Response behavior |
|---|---|---|
| <77* | REFUSED (5)* | empty response* |
| 764–1,229 | NOERROR (0) | the requested records |
| 1,532–1,622 | NOERROR (0) | 1 signed NSEC3 record |
| 2,269–2,420 | NXDOMAIN (3) | 2 signed NSEC3 records |
| 3,075–3,767 | NXDOMAIN (3) | 3 signed NSEC3 records |

*Not shown in Figures 2 and 3.

**Table 2: DNS response sizes clearly map to certain response behaviors**

# Impact of more TCP on authoritative nameservers

# Measuring impact on resolvers



# Add more algorithms to our testbed


## About QR-UOV

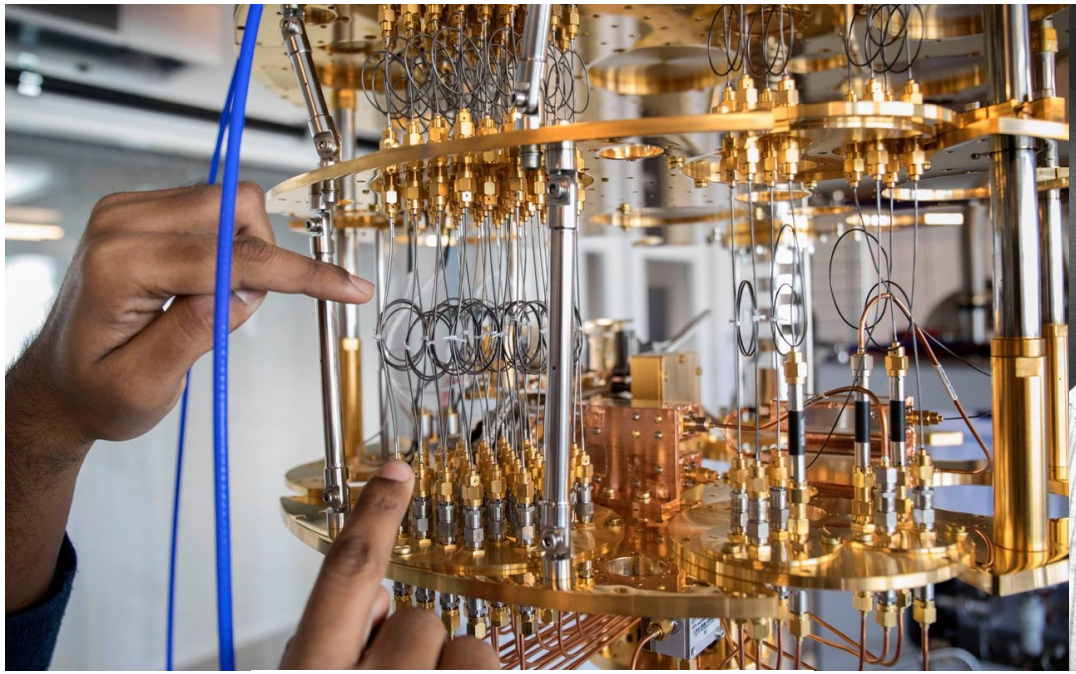
The QR-UOV is an efficient signature scheme for the UOV scheme by using a polynomial quotient ring. The polynomial multiplication is embedded in a special matrix for fast processing.

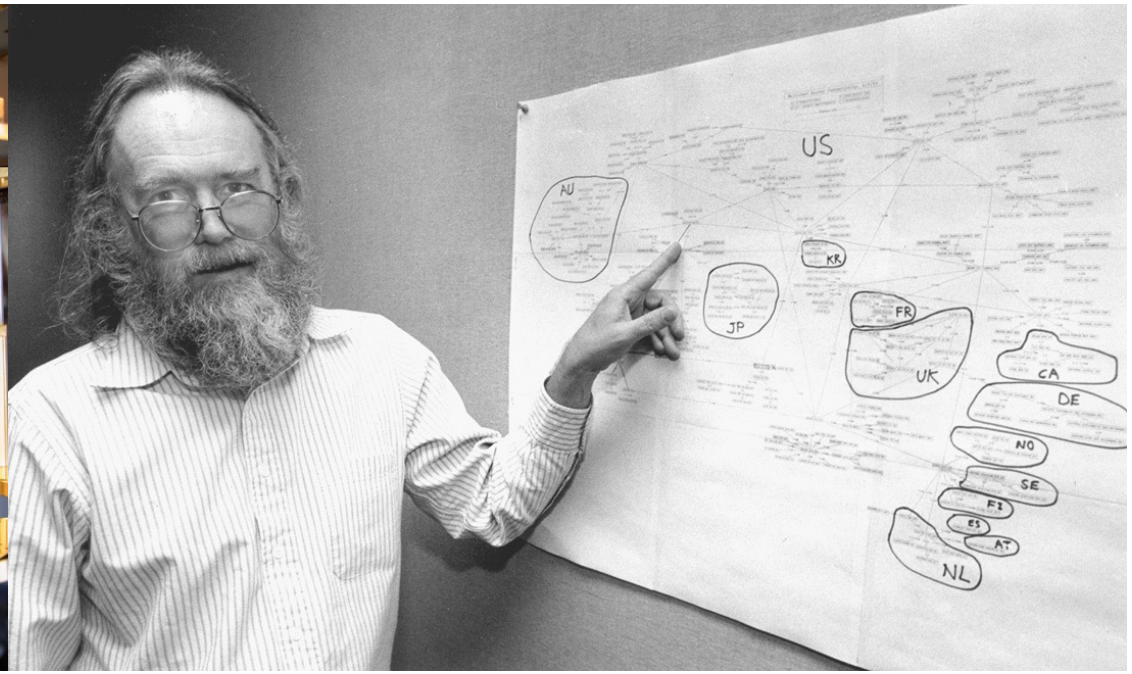
## MTL

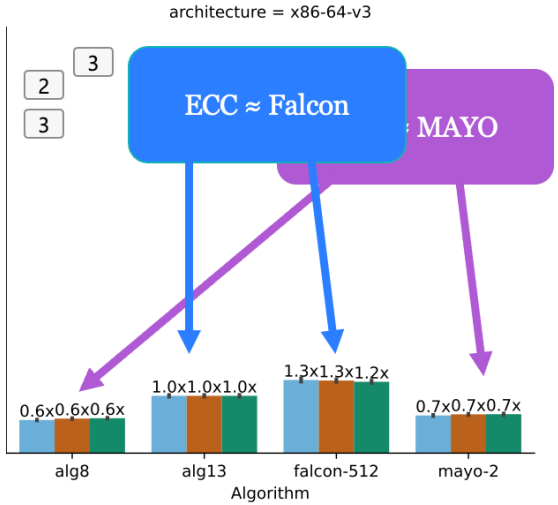
MTL Reference Library Implementation based on draft-harvey-cfrg-mtl-mode-00

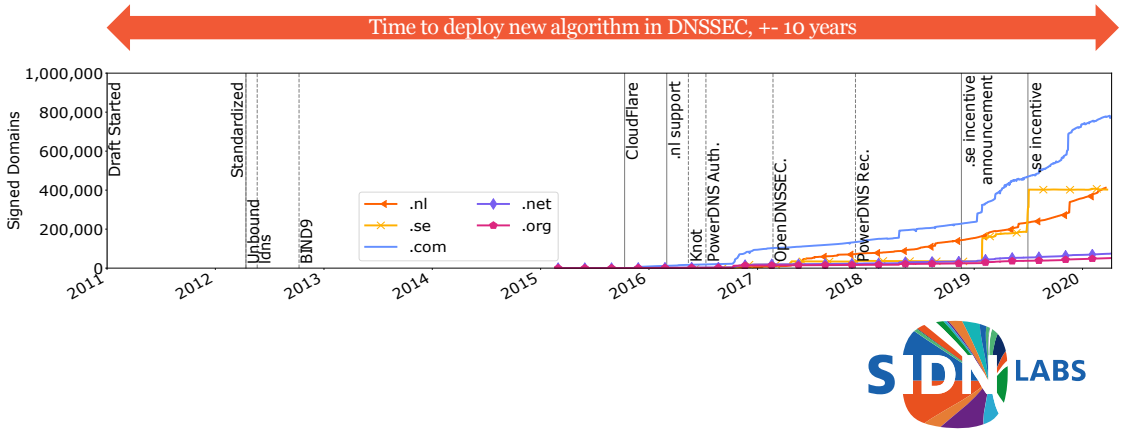
### Dependencies

- libcrypto from openssl version 3.1.0 or newer (or substitute crypto operations t functions)
- liboqs version 0.7.2 or newer (for the examples). To include the liboqs library as change the -loqs to -l:*path*/liboqs.a in the examples/Makefile.am.
- Applications using the MTL Reference Library should also link with the C math




US
AU
KR
JP
FR
UK
CA
DE
NO
SE
FI
ES
AT
NL


architecture = x86-64-v3
2
3
3
ECC ≈ Falcon
MAYO
0.6x0.6x0.6x
1.0x1.0x1.0x
1.3x1.3x1.2x
0.7x0.7x0.7x
alg8
alg13
falcon-512
mayo-2
Algorithm


Time to deploy new algorithm in DNSSEC, +- 10 years
Signed Domains
1,000,000
800,000
600,000
400,000
200,000
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Draft Started
Standardized
Unbound dns
BIND9
CloudFlare
.nl support
Knot
PowerDNS Auth.
OpenDNSSEC.
PowerDNS Rec.
.se incentive announcement
.se incentive
.nl
.se
.com
.net
.org

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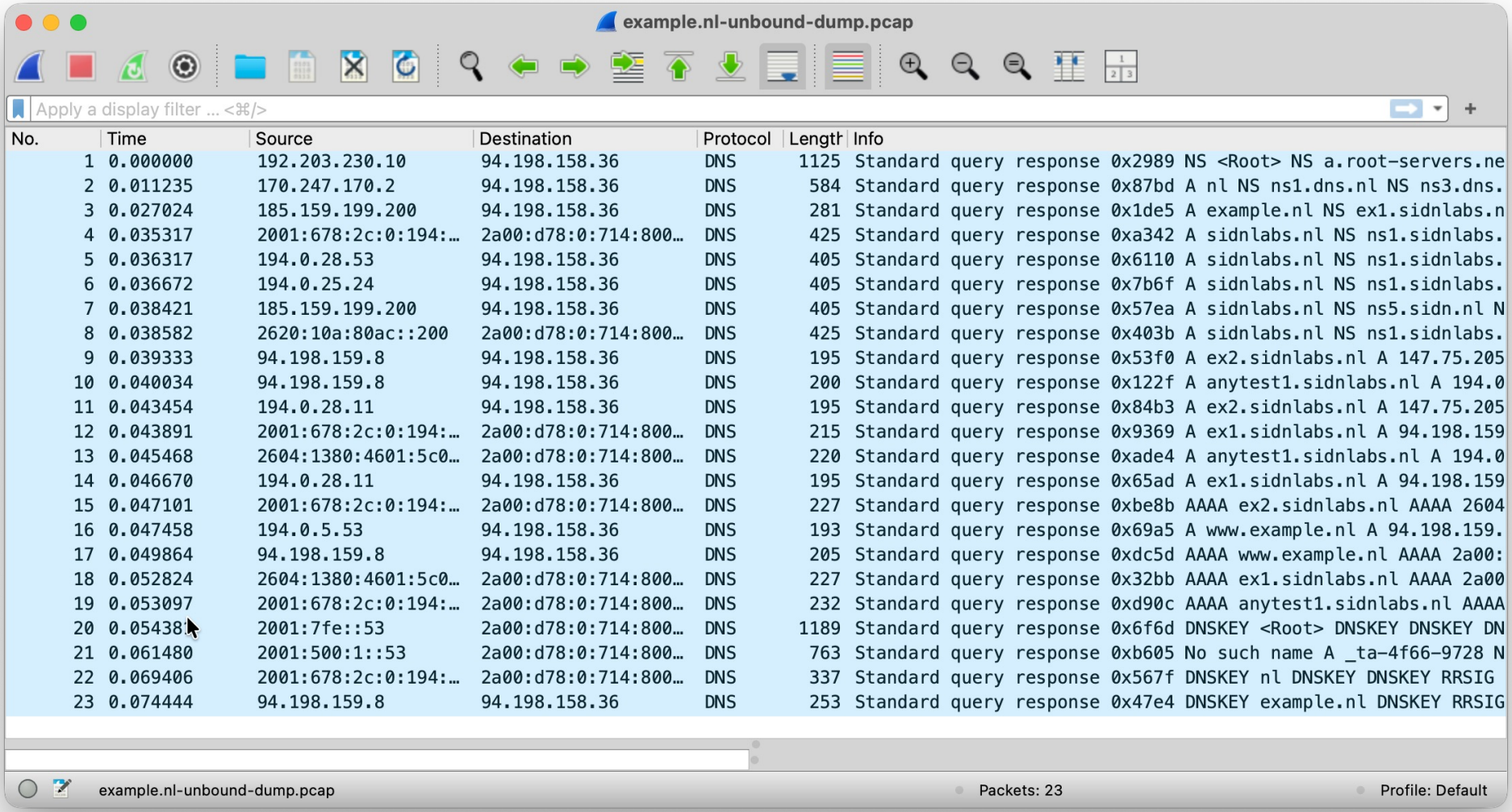
# Thank you for your attention!

**Elmer Lastdrager**
Research Engineer SIDN Labs
elmer.lastdrager@sidn.nl


example.nl-unbound-dump.pcap
Apply a display filter ... <⌘/>
No. Time Source Destination Protocol Length Info
1 0.000000 192.203.230.10 94.198.158.36 DNS 1125 Standard query response 0x2989 NS <Root> NS a.root-servers.ne
2 0.011235 170.247.170.2 94.198.158.36 DNS 584 Standard query response 0x87bd A nl NS ns1.dns.nl NS ns3.dns.
3 0.027024 185.159.199.200 94.198.158.36 DNS 281 Standard query response 0x1de5 A example.nl NS ex1.sidnlabs.n
4 0.035317 2001:678:2c:0:194:… 2a00:d78:0:714:800… DNS 425 Standard query response 0xa342 A sidnlabs.nl NS ns1.sidnlabs.
5 0.036317 194.0.28.53 94.198.158.36 DNS 405 Standard query response 0x6110 A sidnlabs.nl NS ns1.sidnlabs.
6 0.036672 194.0.25.24 94.198.158.36 DNS 405 Standard query response 0x7b6f A sidnlabs.nl NS ns1.sidnlabs.
7 0.038421 185.159.199.200 94.198.158.36 DNS 405 Standard query response 0x57ea A sidnlabs.nl NS ns5.sidn.nl N
8 0.038582 2620:10a:80ac::200 2a00:d78:0:714:800… DNS 425 Standard query response 0x403b A sidnlabs.nl NS ns1.sidnlabs.
9 0.039333 94.198.159.8 94.198.158.36 DNS 195 Standard query response 0x53f0 A ex2.sidnlabs.nl A 147.75.205
10 0.040034 94.198.159.8 94.198.158.36 DNS 200 Standard query response 0x122f A anytest1.sidnlabs.nl A 194.0
11 0.043454 194.0.28.11 94.198.158.36 DNS 195 Standard query response 0x84b3 A ex2.sidnlabs.nl A 147.75.205
12 0.043891 2001:678:2c:0:194:… 2a00:d78:0:714:800… DNS 215 Standard query response 0x9369 A ex1.sidnlabs.nl A 94.198.159
13 0.045468 2604:1380:4601:5c0… 2a00:d78:0:714:800… DNS 220 Standard query response 0xade4 A anytest1.sidnlabs.nl A 194.0
14 0.046670 194.0.28.11 94.198.158.36 DNS 195 Standard query response 0x65ad A ex1.sidnlabs.nl A 94.198.159
15 0.047101 2001:678:2c:0:194:… 2a00:d78:0:714:800… DNS 227 Standard query response 0xbe8b AAAA ex2.sidnlabs.nl AAAA 2604
16 0.047458 194.0.5.53 94.198.158.36 DNS 193 Standard query response 0x69a5 A www.example.nl A 94.198.159.
17 0.049864 94.198.159.8 94.198.158.36 DNS 205 Standard query response 0xdc5d AAAA www.example.nl AAAA 2a00:
18 0.052824 2604:1380:4601:5c0… 2a00:d78:0:714:800… DNS 227 Standard query response 0x32bb AAAA ex1.sidnlabs.nl AAAA 2a00
19 0.053097 2001:678:2c:0:194:… 2a00:d78:0:714:800… DNS 232 Standard query response 0xd90c AAAA anytest1.sidnlabs.nl AAAA
20 0.05438 2001:7fe::53 2a00:d78:0:714:800… DNS 1189 Standard query response 0x6f6d DNSKEY <Root> DNSKEY DNSKEY DN
21 0.061480 2001:500:1::53 2a00:d78:0:714:800… DNS 763 Standard query response 0xb605 No such name A _ta-4f66-9728 N
22 0.069406 2001:678:2c:0:194:… 2a00:d78:0:714:800… DNS 337 Standard query response 0x567f DNSKEY nl DNSKEY DNSKEY RRSIG
23 0.074444 94.198.159.8 94.198.158.36 DNS 253 Standard query response 0x47e4 DNSKEY example.nl DNSKEY RRSIG
example.nl-unbound-dump.pcap
Packets: 23
Profile: Default