Connect by Name

NLNETLABS

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What does it mean to setup a connection?

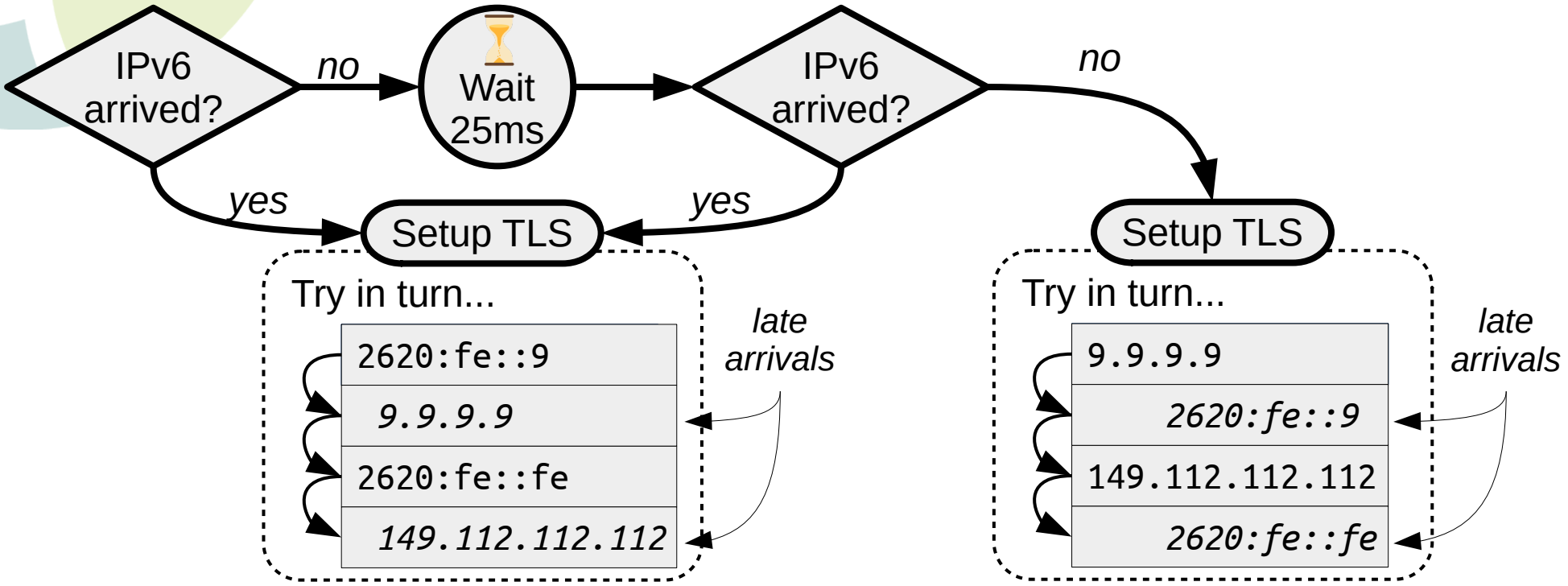
- Using modern standards...
- Securely
- Privately

```
c = connectByName(“dns.quad9.net”, “doh”);
```

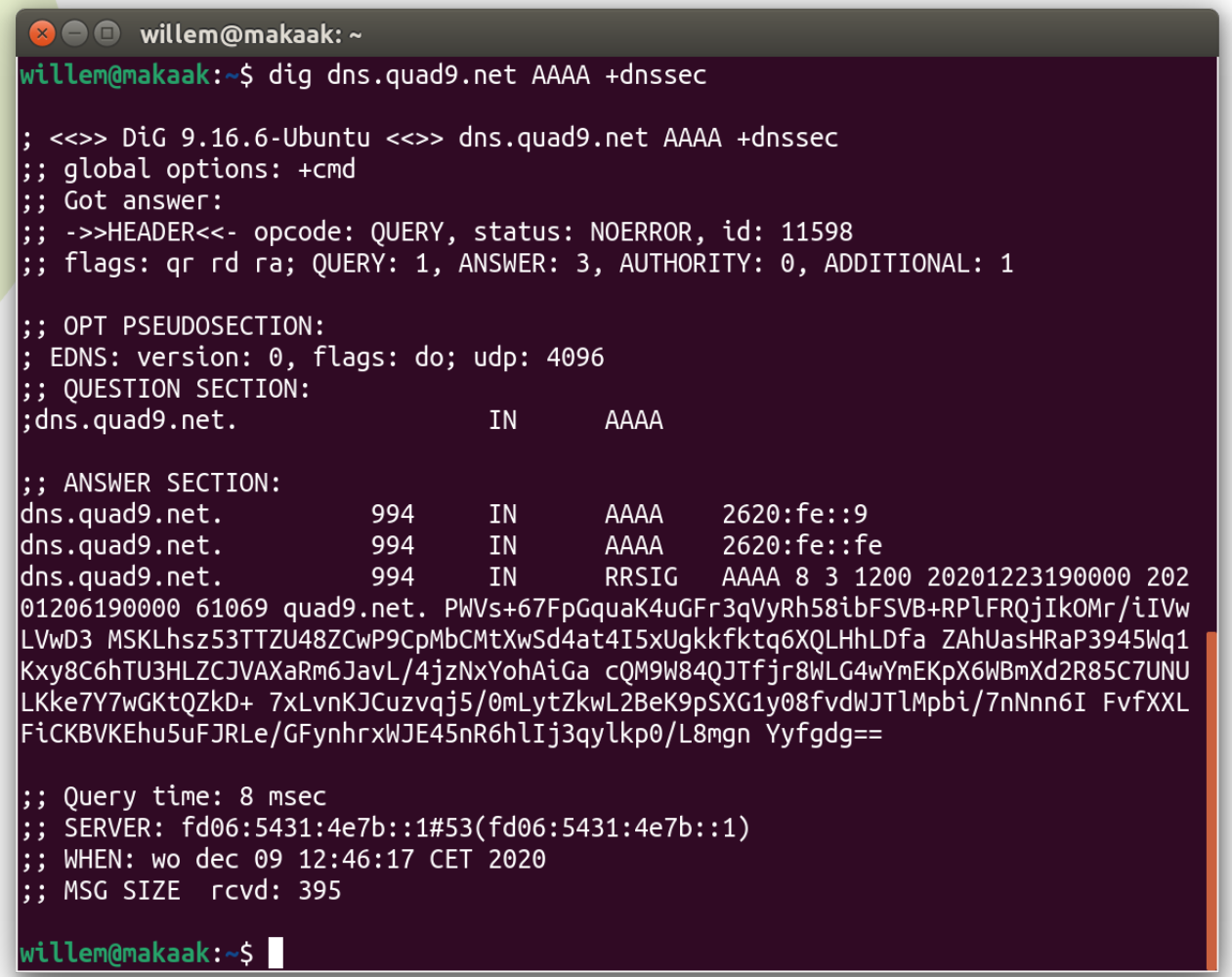
Step 1: Happy Eyeballs

- Lookup IPv6 of `dns.quad9.net`
- Lookup IPv4 of `dns.quad9.net`

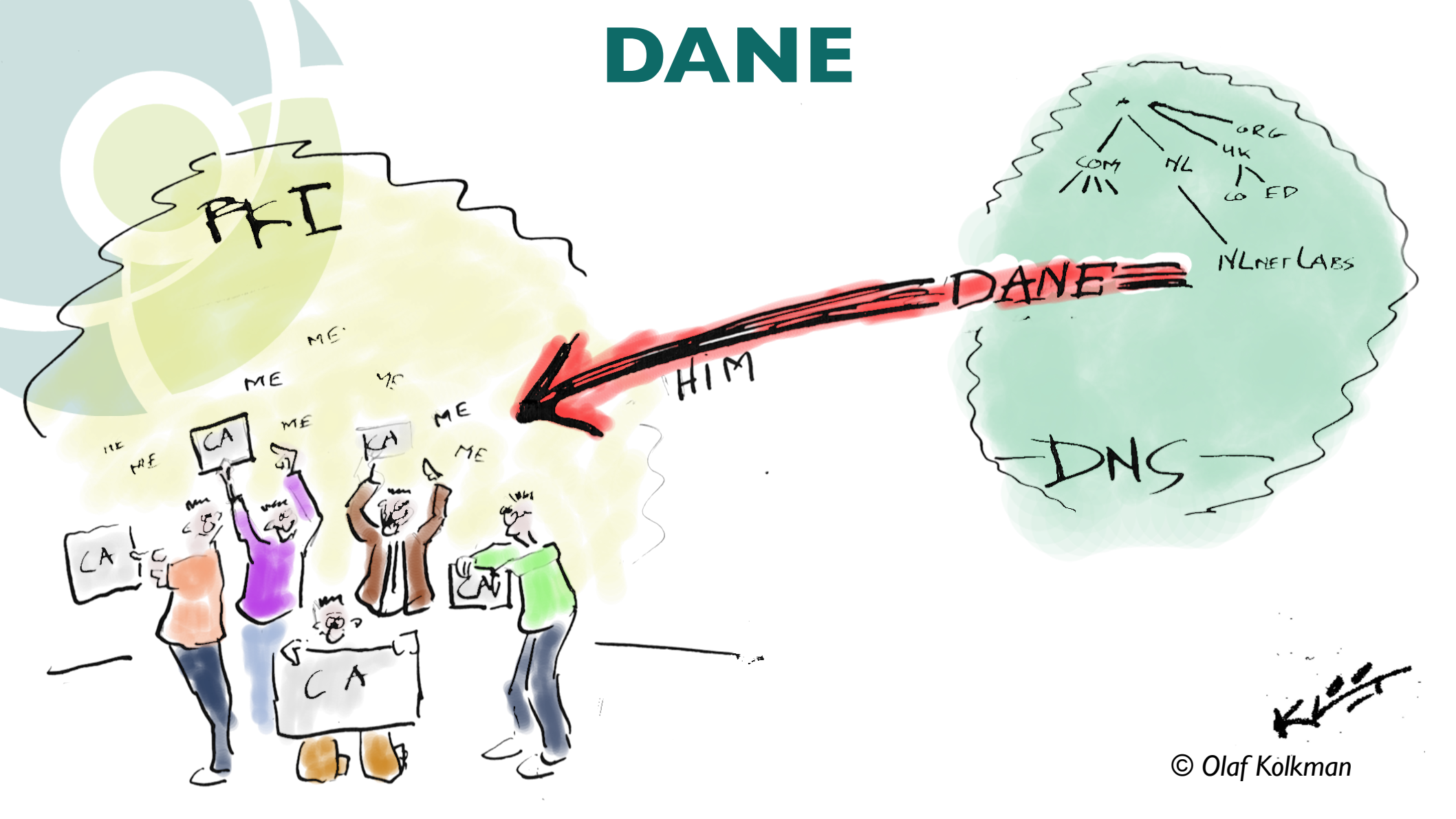
} *Simultaneously*



DNSSEC


willem@makaak: ~
willem@makaak:~$ dig dns.quad9.net AAAA +dnssec
; <<>> DiG 9.16.6-Ubuntu <<>> dns.quad9.net AAAA +dnssec
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 11598
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 4096
;; QUESTION SECTION:
;dns.quad9.net. IN AAAA
;; ANSWER SECTION:
dns.quad9.net. 994 IN AAAA 2620:fe::9
dns.quad9.net. 994 IN AAAA 2620:fe::fe
dns.quad9.net. 994 IN RRSIG AAAA 8 3 1200 20201223190000 202
01206190000 61069 quad9.net. PWVs+67FpGquaK4uGFr3qVyRh58ibFSVB+RPlFRQjIkOMr/iIVw
LVwD3 MSKLhsz53TTZU48ZCwP9CpMbCMtXwSd4at4I5xUgkkfktq6XQLHhLDfa ZAhUasHRaP3945Wq1
Kxy8C6hTU3HLZCJVAXaRm6JavL/4jzNxYohAiGa cQM9W84QJTfjr8WLG4wYmEKpX6WBmXd2R85C7UNU
LKke7Y7wGKtQZkD+ 7xLvnKJCuzvqj5/0mLytZkwL2BeK9pSXG1y08fvdWJTlMpbi/7nNnn6I FvfXXL
FiCKBVKEhu5uFJRLe/GFynhrxWJE45nR6hlIj3qylkp0/L8mgn Yyfgdg==
;; Query time: 8 msec
;; SERVER: fd06:5431:4e7b::1#53(fd06:5431:4e7b::1)
;; WHEN: wo dec 09 12:46:17 CET 2020
;; MSG SIZE rcvd: 395
willem@makaak:~$

DANE

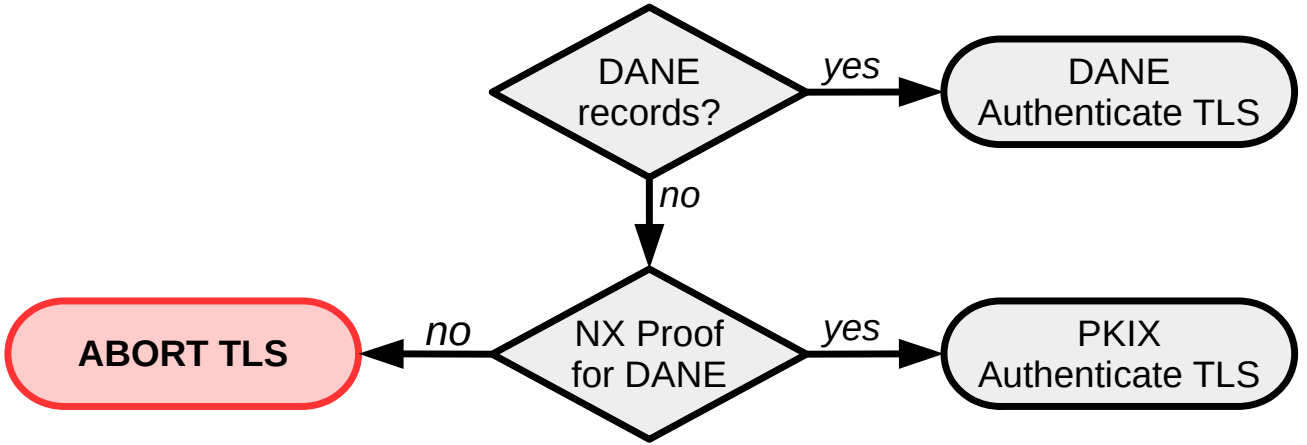


Happy Eyeballs, DNSSEC & DANE

Step 1:

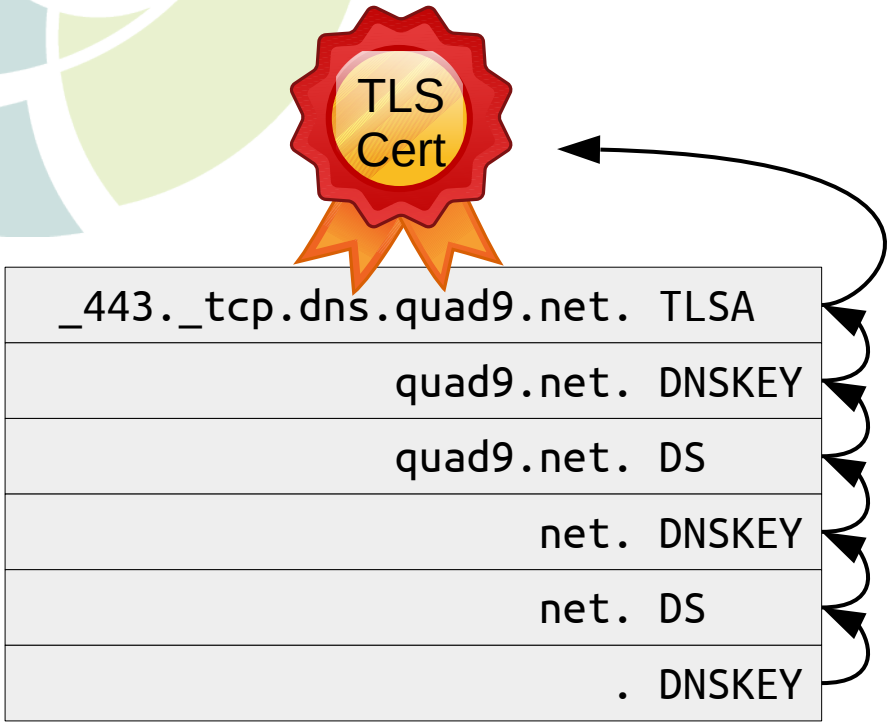
- Lookup IPv6 of `dns.quad9.net +dnssec`
- Lookup IPv4 of `dns.quad9.net +dnssec`
- Lookup `_443._tcp.dns.quad9.net TLSA +dnssec`

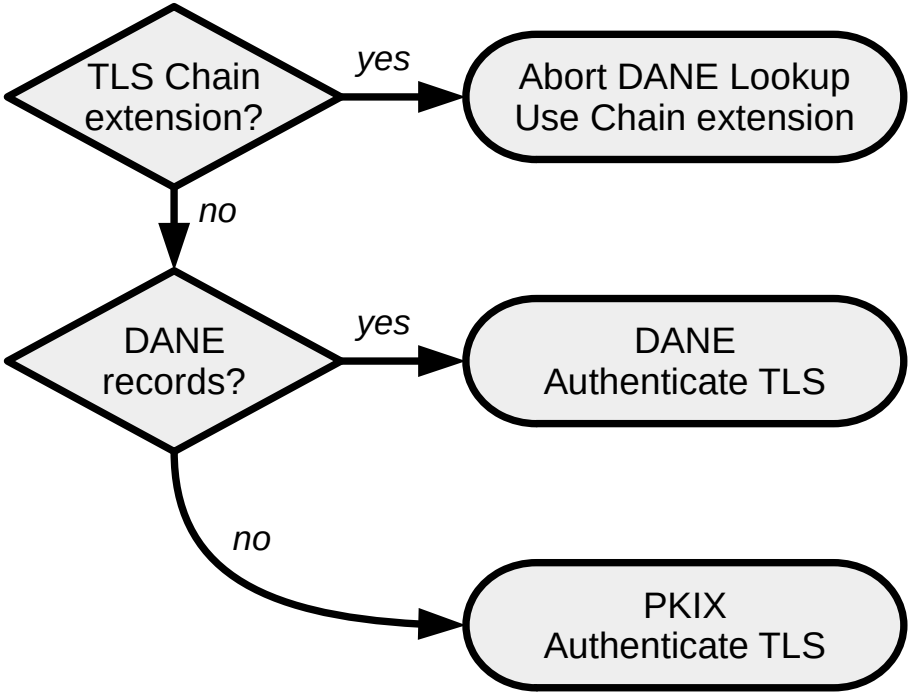
} *Simultaneously*



DNSSEC Chain TLS Extension

- DANE Embedded in the TLS Handshake:





Zero config DNSSEC

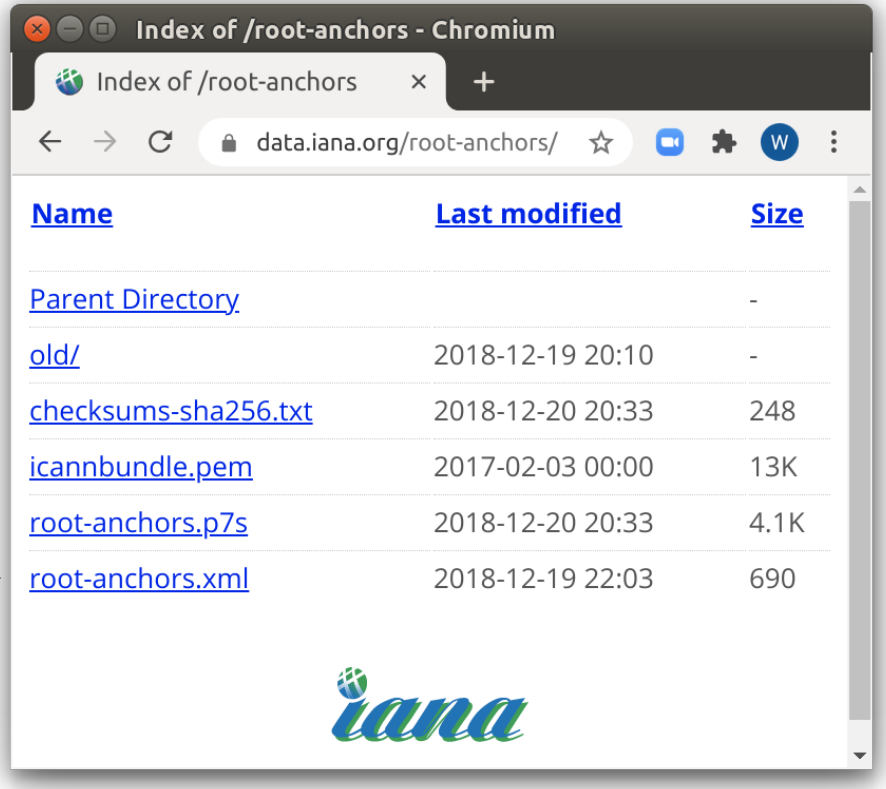
System requirement for DNSSEC:

root KSK

validate with ICANN CA

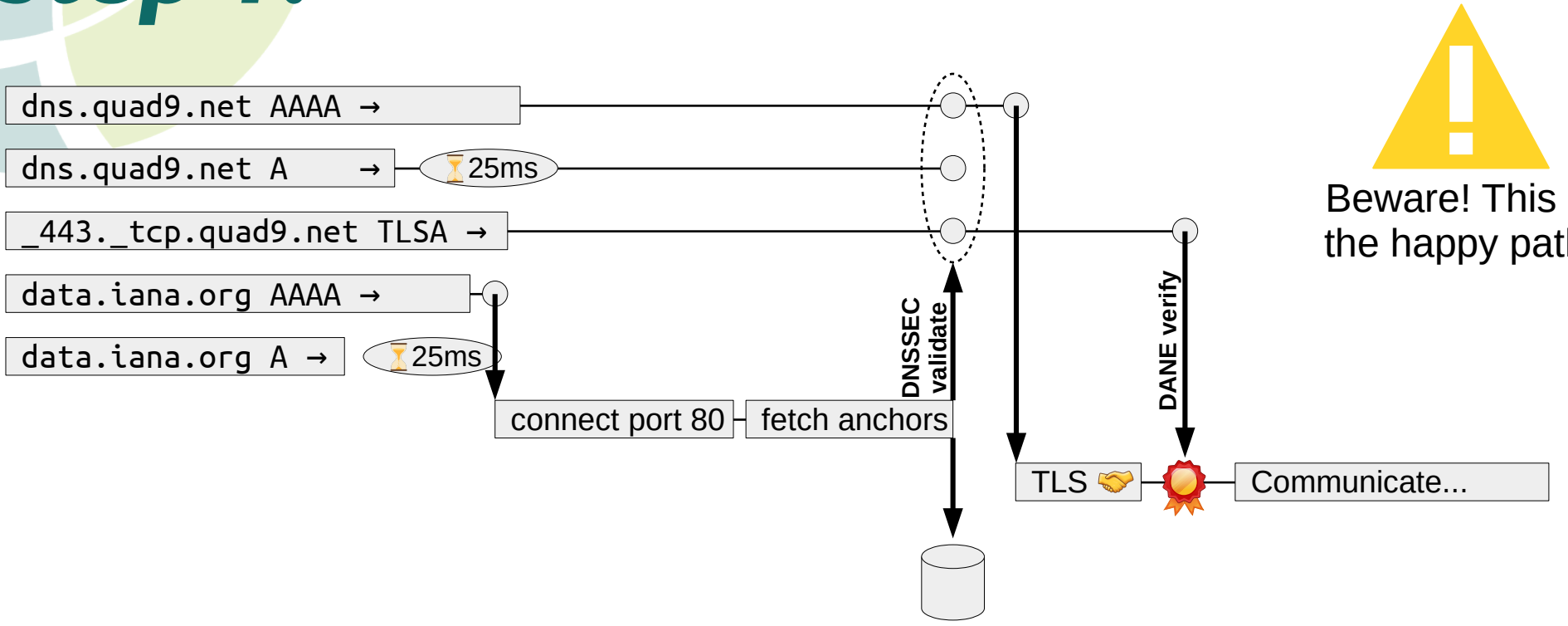
Alternatively, from application fetch:

RFC7958



Happy Eyeballs, DNSSEC & DANE + fetching/renewing DNSSEC TA

Step 1:



DNS-over-TLS (DoT)
DNS-over-HTTPS (DoH)

- Do all DNS lookups ***privately***
- Setting up DoT or DoH in itself involves:
  - Happy Eyeballs
  - DANE Authentication
    - With DNSSEC Chain, or
    - DANE records acquired over the as of yet unauthenticated DoT or DoH session

Much, much, more ...

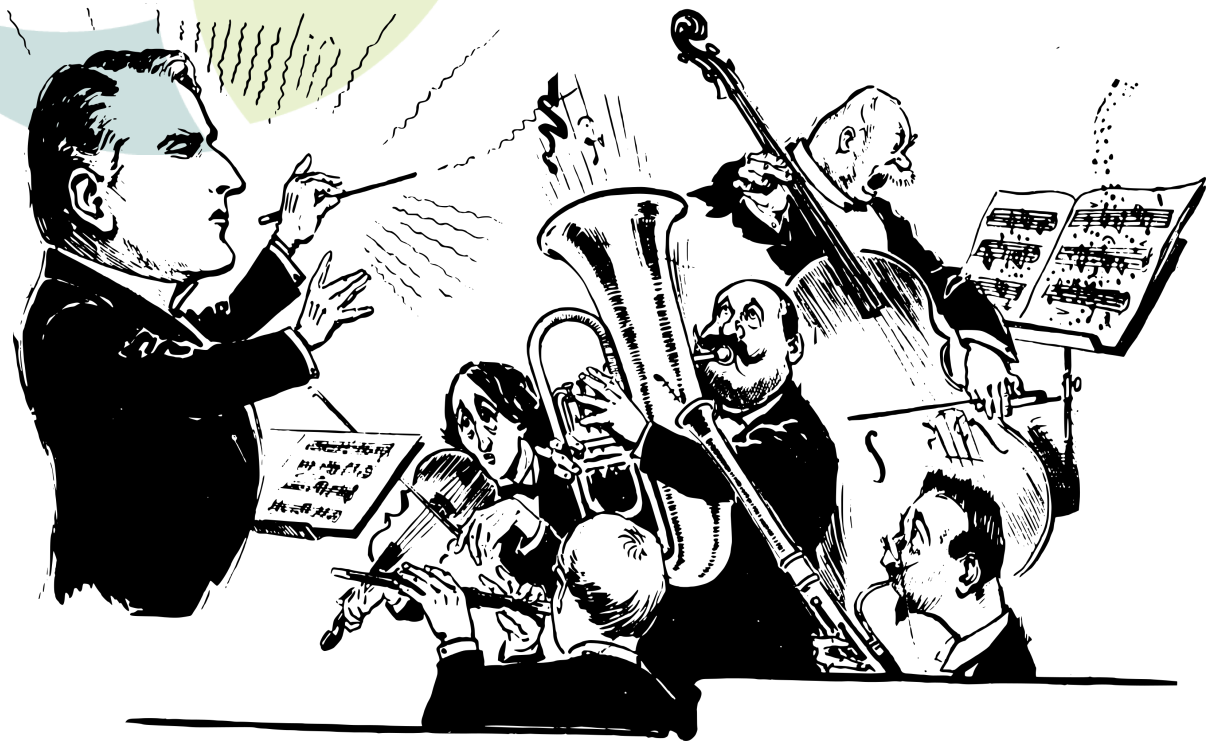
- DNSSEC Roadblock avoidance RFC8027
- DNSSEC with DNS64 / NAT64 RFC7050
- DNS-over-Quick (DoQ)
- Oblivious DNS-over-HTTPS (ODoH)
- Multiple Provisioning Domains RFC7556
- etc.

What does it mean to setup a connection?

- Using modern standards...
- Securely
- Privately

What is Connect by Name?

Turn this:



Into this: