Sunrise DNS-over-TLS!
Sunset DNSSEC?

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Puzzlement over difference between DNSSEC and DNS-over-TLS

• DNSSEC Coordination dnssec-coord@elist.isoc.org: “People thought that using DNS-over-TLS meant they didn’t need to use DNSSEC. They have TLS, therefore are all good, right?”

• Twitter: “Will jump on DoH first, then see if dnssec is still needed.”

• draft-ietf-doh-dns-over-https: “In the absence of DNSSEC information, a DoH server can give a client invalid data in response to a DNS query. Section 4 disallows the use of DoH DNS responses that do not originate from configured servers. This prohibition does not guarantee protection against invalid data, but it does reduce the risk.”
DNSSEC

History, motivation, solution, properties and limitations
DNSSEC – History & Motivation

• UDP is easy to spoof
• Need for an immediate usable incrementally deployable solution
DNSSEC – The Solution

• Sign the zone content
• Child zones authorized \(^{(by \ parent \ zone)}\) to sign for themselves
DNSSEC – The Solution (cont’d)

• Validating resolvers can verify **origin authenticity** with root trust anchor
DNSSEC – Properties & Limitations

+ Origin Authentication
+ Integrity
- Privacy
- The first mile
DNSSEC – Properties & Limitations (2)

+ Origin Authentication + Integrity
- Privacy

+ Transitivity  - Still first mile issues
DNSSEC – Properties & Limitations (3)

+ Origin Authentication  + Integrity
+ Transitivity
- Privacy
- The first mile

- Does not protect against address hijacking
TLS
Properties and limitations
TLS – Properties & Limitations

- Protects against address hijacking
- + Authentication
- + Privacy

DNSSEC not needed anymore
TLS – Properties & Limitations (2)

Protects against address hijacking
+ Authentication
+ Privacy

Except for name redirections
- MX, CNAME, DNAME, SRV, NAPTR, ...
TLS – Properties & Limitations (3)

- Protects against address hijacking
  + Authentication
  + Privacy

- Integrity when service provider ≠ content provider
TLS – Properties & Limitations (4)

Protects against address hijacking
+ Authentication
+ Privacy

- 1500+ Certificate Authorities
  (in 2010, see https://www.eff.org/observatory)

- Integrity when service provider ≠ content provider
DNS-over-TLS

History and motivation
DNS-over-TLS and DNSSEC

From DNSSEC

+ Origin authenticity
+ Integrity
+ DANE

From DNS-over-TLS

+ Privacy (except from the resolver operator)
+ First mile (by authenticating a trusted server)
But What If …

• Everything is DNS-over-TLS

• Start with CA store with CAs of the 13 root operators
  • Or the ICANN Root CA/ICANN SSL CA?

• Learn CA of child zone operator when following delegations
Who needs reasons when you've got heroes?

Listen to reason?
• Trust zones to vouch for their own data
• Stub either DNSSEC validates itself, or
• Trusts resolver operator that vouches (via DANE) for itself

Rely on heroes!
• Trust DNS operators chosen to serve the zone
• Trust CAs to authenticate stub → resolver path