

DNSSEC

Is the Juice Worth the Squeeze

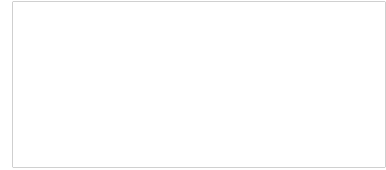
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UKNOF 35 - Glasgow

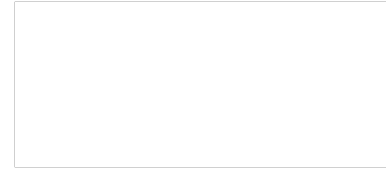
The Juice

So what do you get with DNSSEC



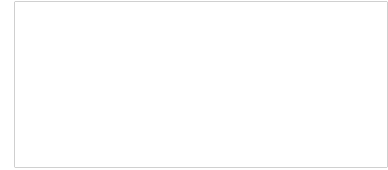
- Cache protection
- Data integrity
- Secure certificates without CAs

Cache protection



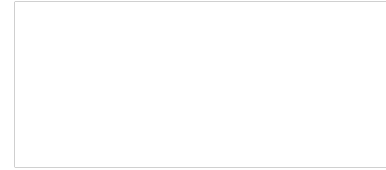
- DNS is primarily UDP
- Easily spoofed
- Cache poisoning quite easy (Kaminsky)
- Cache poisoning very effective MitM (Man in the Middle) attack, even remotely

Data Integrity



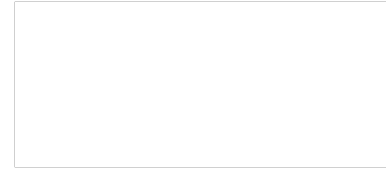
- Important to know you got the answer the zone owner wants you to get.
- Important to be able to prove ***non-existence*** of records too
- Lets you validate that the whole delegation chain is valid.

Certificate Authorities



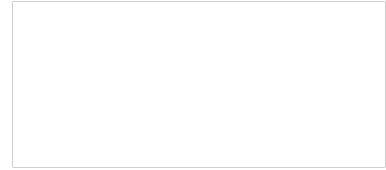
- Popular browser have 1300 CAs
- CAs can sign any domain
- How trustworthy are all CAs

How trustworthy are CAs



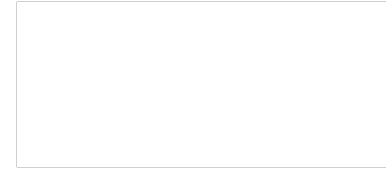
- DNSSEC: family reunion
- CA: old room-mate's dealer

Self-signed certificates



- You're already trusting the A record
- Trusting the certificate same leap of trust

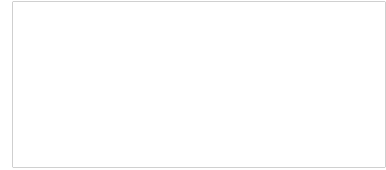
Tech enabled by DNSSEC



- DANE (DNS-Based Authentication of Named Entities):
 - Email (TLS certs)
 - Alternate to CA (Certificate Authority) certs for web
 - Jabber/XMPP
 - SIP
- Other applications will get developed. API to make this all easier to use:
 - <https://getdnsapi.net/>

The Squeeze

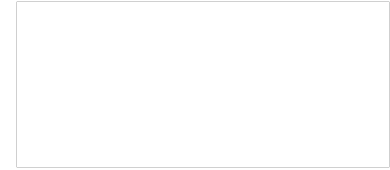
What is required



- Clean up your current DNS
- Authoritative server issues
- Recursive server issues

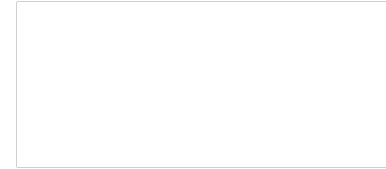
DNS Cleanliness & DNSSEC

DNS cleanliness



- Most DNS servers very forgiving.
- We've gotten away with things that were never legal or recommended:
 - Dotted hosts (label foo.bar in zone example.com)
 - Mismatches in parent/child delegations
 - Being authoritative for zones on recursive servers
 - Views
 - NX Domain rewriting and other DNS lying
 - RPZ zones

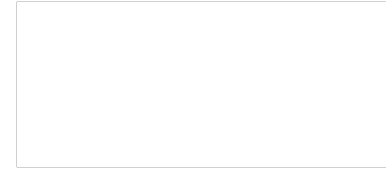
DNS cleanliness



- DNSSEC == Wonder Woman Golden Lasso

We aren't allowed to lie!

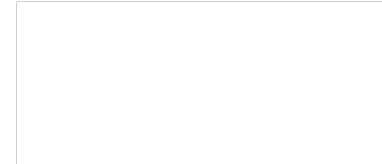
DNS cleanliness



- “We aren’t allowed to lie!”
- Well, not exactly. More like with our parents/spouses. We have to be much more careful when we lie and we need a really good reason...

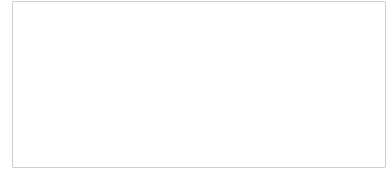
Authoritative server choices & issues

DNSSEC auth server choices



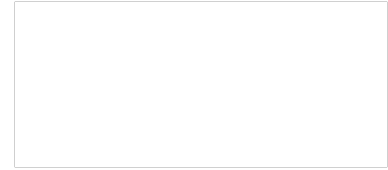
- Key sizes for ZSK/KSK
- Expirations for ZSK/KSK
- Algorithm
- TTLs
- Rollover method
- NSEC vs NSEC3

Real secret to DNSSEC for auth



Automate!!!

Auth server issues

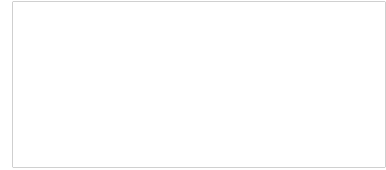


- Use in DNS Amplification attacks
- Key rollovers
- Complications with zone transfers and dynamic updates
- System capacity issues

Use in DNS Amplification attacks

- Use algorithms with smaller hashes/keys (like ECDSA)
- Use rate limiting, particularly on RRs like ANY
- Set “minimal responses”
- Log as much as you can

Key rollovers

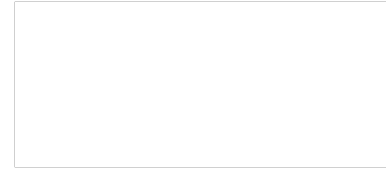


- Automate!!!
- Monitor to check validation

Zone transfers and dynamic updates

- Sign on a hidden master, have all listed servers in the zone be secondary servers
- Doing multi-master and DNSSEC is hard...
- Sign in only one place

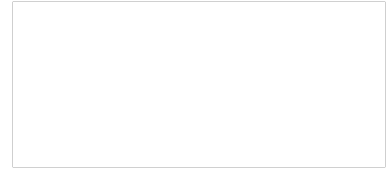
System Capacity Issues



- Faster CPU for signing host
- Need good source of randomness on signing host. Hard on VMs
- Signed zones much larger (3-10x), so more disk and more AXFR time

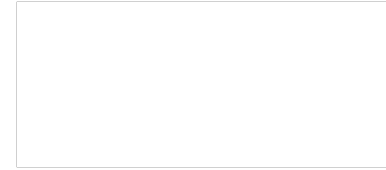
DNSSEC issues for validating servers

Validating server issues



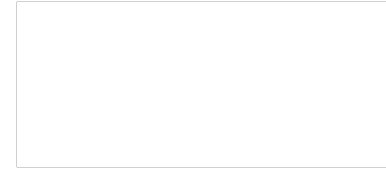
- Use in amplification/DDOS attacks
- Someone else's mistake gets you support calls
- It's not your zone so you can't fix it
- Lots of user training
- Lots of staff training

Amplification/DDOS



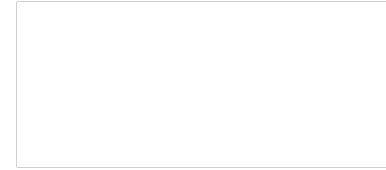
- Do whatever BCP38/84 filtering you can to limit packet spoofing.
- Use ACLs to limit who can use your server
- Use response rate limiting for zones under attack
- Set “minimal responses” on your server
- Log everything you can

Not your mistake



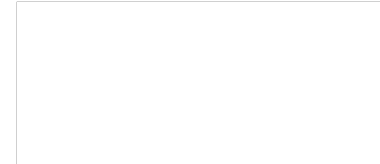
- Most common problems seen are:
 - Someone turns on DNSSEC by mistake and wrong
 - Key rollovers done wrong
 - Expired keys or signatures due to bad automation
 - Someone deletes DS or DNSKEY by mistake
- Try to reach the zone owner, but this can be hard
- Explain to them that they will be unreachable with anyone using google DNS or anyone who validates.
- When all else fails, use an NTA (Negative Trust Anchor, RFC 7646)

Not your zone...



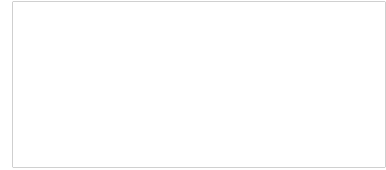
- Keep a file/DB of contacts for large registrars and service providers' NOC
- DNSVIZ output saved and sent to person complaining can help
- DNSVIZ output can also convince skeptical zone owners that it really is them that is broken

User training



- DNSVIZ output is good
- Have a reference page like [deploy360](#) for folks that want more information
- Have pre-done files that your NOC staff can cut and paste explaining DNSSEC, what it is, why you do it, how it works

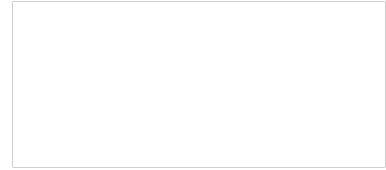
Staff training



- The more your first tier knows, the less you get called in the middle of the night
- The more material and tools you give your staff, the better it looks to the customer

Is it worth it?

Is it worth it?



- You should clean your DNS anyway
- DDoS vectors available anyway
- Cache poisoning is bad
- If you automate and train, not much extra work

Q & A

Thank you!