

cryptdomainmgr

automating Cert, TLSA, DKIM and many more

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Content

Motivation

fine

not so fine

Basics

SSL Certificate

TLSA

CAA

DNSSEC

DANE – all steps

DKIM

additional DNS records

DKIM – overview

Cryptdomainmgr

autorenew process

structure

update cycle

Configuration

DNS credential

Certificates

DKIM

Domain

Implementation

cryptdomainmgr

simplelogger

dnsuptools

Discussion

Motivation

→ **let's make a web app** ←

- ▶ DNS
- ▶ Webpage
- ▶ E-Mail
- ▶ Mailinglist
- ▶ **and the s for security**

DeMotivation

→ **let's make a web app** ←

- ▶ DNS
 - ▶ SOA
 - ▶ DNSSEC
- ▶ Webpage
 - ▶ HTTPS
 - ▶ Certificate
 - ▶ HSTS
 - ▶ SRV
 - ▶ TLSA
- ▶ E-Mail
 - ▶ Spam
 - ▶ DKIM
 - ▶ SPF
 - ▶ ADSP
 - ▶ DMARC
 - ▶ SRV
- ▶ Mailinglist
 - ▶ SRS

DeMotivation

fine

A screenshot of a web browser window displaying a login page for "Tine 2.0". The title bar shows "Tine 2.0 - Please enter". The address bar shows the URL "https://testserver.smartrns.net/tine20". A green lock icon and the text "testserver.smartrns.net Secure Connection" indicate a secure connection.

Permissions
You have not granted this site any special permissions.

Login

Language:

Username:

Password:

The right side of the browser window shows vertical scroll bars with the letters "T" repeated multiple times.

DeMotivation

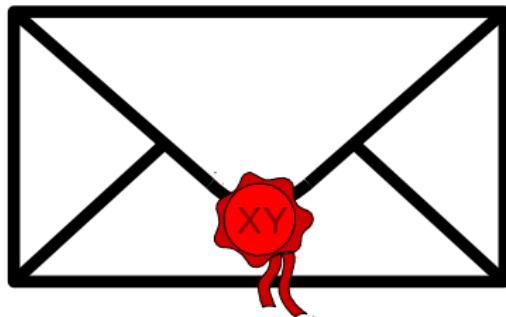
not so fine

The screenshot shows a Firefox browser window with the following details:

- Title Bar:** Insecure Connection
- Address Bar:** https://testserver.smartrns.net/tine20/
- Main Content:** Your connection is not secure
The owner of testserver.smartrns.net has configured their web site improperly. To protect your information from being stolen, Firefox has not connected to this web site.
- Buttons:** Learn more..., Report errors like this to help Mozilla identify and block malicious sites, Go Back, Advanced
- Bottom Panel:** testserver.smartrns.net uses an invalid security certificate.
The certificate expired on 15 June 2018, 18:53. The current time is 29 May 2019, 14:14.
Error code: SEC_ERROR_EXPIRED_CERTIFICATE
Add Exception...

Basics

SSL Certificate



- ▶ authentication (phishing)
 - ▶ integrity (man in the middle)
 - ▶ privacy (spy)
- certbot renew

Basics

TLSA

DANE – DNS-based Authentication of Named Entities



TLSA – Transport Layer Security Authentication

- ▶ locks certificate to domain/DNS (fraudulent CA, stolen cert)
- to do

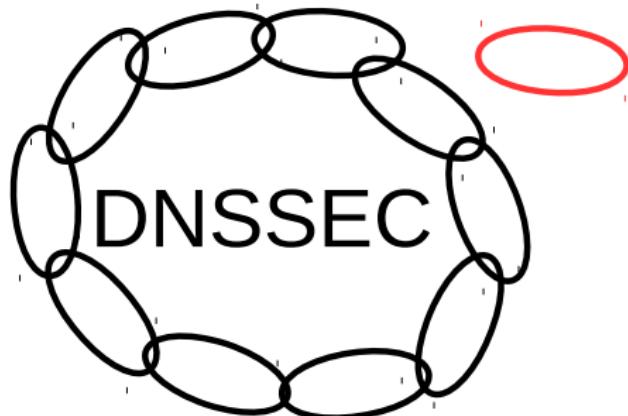
Basics

CAA



CAA – Certification Authority Authorization

- ▶ specifies allowed CA
- ▶ checked by CA

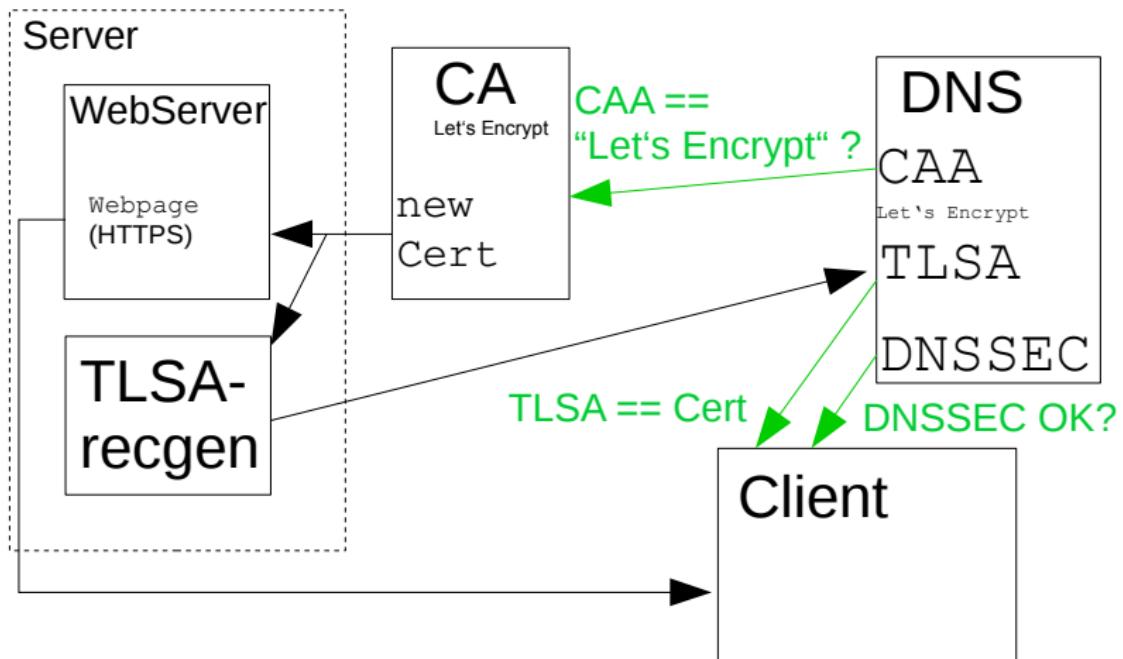


Domain Name System Security Extensions

- ▶ authenticate domain owner
 - ▶ integrity (DNS cache poisoning)
- done by domain provider

Basics

DANE – all steps



Basics

DKIM



DomainKeys Identified Mail

- ▶ authenticate MTA (fake/spam server)
- ▶ integrity (man in the middle)

→ to do

Basics

additional DNS records

SPF – Sender Policy Framework

- ▶ which server is allowed to send email

ADSP – Author Domain Signing Practices

- ▶ defines, if email must be DKIM signed

DMARC – Domain-based Message Authentication, Reporting and Conformance

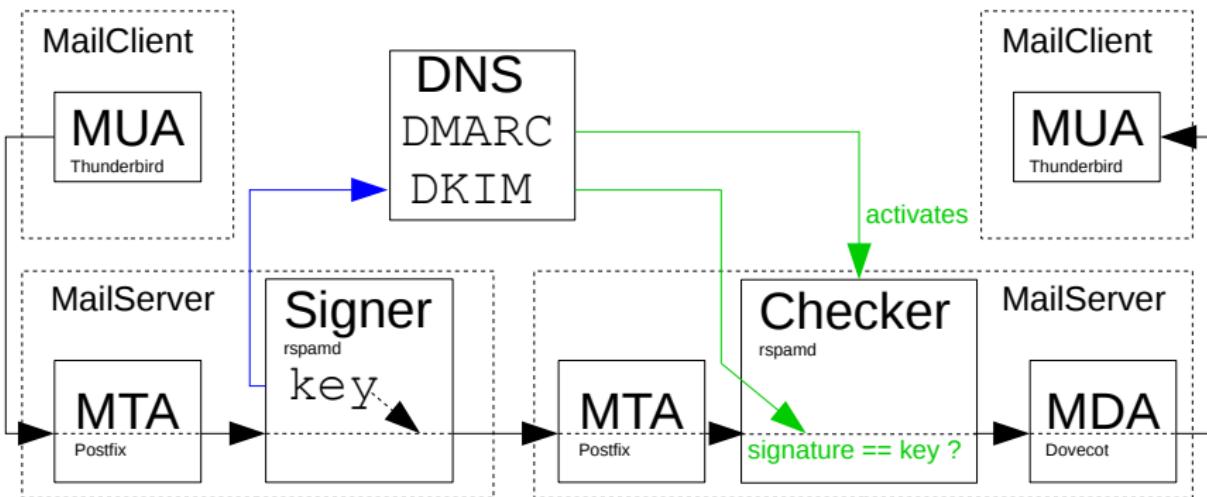
- ▶ successor of SPF and ADSP
- ▶ overrides SPF and ADSP
- ▶ additional parameters: report email

SRV – Service

- ▶ announces services

Basics

DKIM – overview



Cryptdomainmgr

autorenew process

- ▶ prepare
 - ▶ generate certificate
 - ▶ calculate TLSA from certificate
 - ▶ add TLSA RR
 - ▶ generate key pair for DKIM
 - ▶ calculate DKIM
 - ▶ add DKIM RR
- ▶ rollover
 - ▶ use new certificate
 - ▶ use new DKIM key
- ▶ cleanup
 - ▶ remove old TLSA RR
 - ▶ remove old DKIM RR
 - ▶ delete old certificates
 - ▶ delete old DKIM keys

Cryptdomainmgr

structure

- ▶ cryptdomainmgr
 - ▶ dnsuptools
 - ▶ domrobot
 - ▶ certbot

Cryptdomainmgr

update cycle

update – set a, aaaa, srv, dmarc, spf, adsp

```
~/cryptdomainmgr$ ./update.py inwxcred.conf example.conf
```

prepare cycle – generate Cert, TLSA, DKIM

```
~/cryptdomainmgr$ ./prepare.py inwxcred.conf example.conf
```

rollover cycle – use Cert, TLSA, DKIM

```
~/cryptdomainmgr$ ./rollover.py inwxcred.conf example.conf
```

cleanup cycle – remove outdated

```
~/cryptdomainmgr$ ./cleanup.py inwxcred.conf example.conf
```

Configuration

DNS credential

```
~/cryptdomainmgr$ cat inwxcred.conf
```

```
[domain]
user = myusername
passwd = mypassword
```

Configuration

Certificates

```
~/cryptdomainmgr$ cat example.conf
```

```
[certificate]
generator = certbot
email = stefan.helmert@t-online.de
keysize = 4096
```

```
[certificate:maincert]
destination = /etc/ssl
extraflags = --staging, --renew-with-new-domains, --hsts
certname = fullchain.pem
```

- ▶ multiple domains using maincert → SAN certificate

Configuration

DKIM

```
~/cryptdomainmgr$ cat example.conf

[dkim]
generator = rspamd

[dkim:maindkim]
signingConfTemplateFile
= ~/cryptdomainmgr/dkim_signing_template.conf
signingConfTemporaryFile
= /etc/rspamd/dkim_signing_new.conf
signingConfDestinationFile
= /etc/rspamd/local.d/dkim_signing.conf
```

Configuration

Domain

```
~/cryptdomainmgr$ cat example.conf

[domain]
user = myusername
handler = dnsuptools

[domain:domain.example]
soa.hostmaster = stefan.helmert@t-online.de
soa.refresh = 7200

[domain:sub.domain.example]
ip4 = auto, 192.168.0.1
ip6+ = auto, 0ffc::0030
mx = mail20.domain.example:20, mail30.domain.example:30
mx.40 = mail40.domain.example, mail50.domain.example:50
mx.10+= mail10.domain.example
```

Configuration

Domain

set A record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
```

```
ip4 = auto, 192.168.0.1
```

means:

- ▶ add external ip and 192.168.0.1 to sub.domain.example
- ▶ delete all other A records of sub.domain.example

Configuration

Domain

add A record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
```

```
ip4+ = auto, 192.168.0.1
```

means:

- ▶ add external ip and 192.168.0.1 to sub.domain.example
- ▶ ~~delete all other A records of sub.domain.example~~

Configuration

Domain

set MX record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
```

```
mx = mail20.domain.example:20, mail30.domain.example:30
```

means:

- ▶ add MX records
 - ▶ mail20.domain.example with prio 20
 - ▶ mail30.domain.example with prio 30
- ▶ delete all other MX records from sub.domain.example

Configuration

Domain

set MX record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
```

```
mx.40 = mail40.domain.example, mail50.domain.example:50
```

means:

- ▶ add MX records
 - ▶ mail40.domain.example with prio 40
 - ▶ mail50.domain.example with prio 50
- ▶ delete all other MX records with prio 40 from sub.domain.example

Configuration

Domain

set SRV record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
srv.service.proto.port.weight.prio
= sub.domain.example:PRIO:WEIGHT:PORT:PROTO:SERVICE
```

Configuration

Domain

set DMARC entries

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
dmarc.p = quarantine
dmarc.rua = mailto:stefan.helmert@t-online.de
dmarc.ruf = mailto:stefan.helmert@gmx.net
```

- ▶ changes the entries p, rua, ruf of the DMARC record
- ▶ entries adkim, aspf, pct do not change
- ▶ „atomic“ operation
- ▶ only one DMARC record allowed!

Configuration

Domain

set DMARC record

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
dmarc =
dmarc.p = quarantine
dmarc.rua = mailto:stefan.helmert@t-online.de
dmarc.ruf = mailto:stefan.helmert@gmx.net
```

- ▶ changes the entries p, rua, ruf of the DMARC record
- ▶ remove all other entries of this record
- ▶ „atomic“ operation
- ▶ at most one DMARC record allowed!

Configuration

Domain

set SOA entries

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:domain.example]
```

```
soa.hostmaster = stefan.helmert@t-online.de  
soa.refresh = 7200
```

- ▶ changes the entries hostmaster, refresh of the SOA record
- ▶ primns, serial, retry, expire, ncttl not changed
- ▶ „atomic“ operation
- ▶ exact one SOA record in top level allowed!

Configuration

Domain

set SPF flags

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:domain.example]
spf = -mx, a, ?all, +aaaa
```

- ▶ add given flags to SPF record
- ▶ remove all other flags from SPF record
- ▶ „atomic“ operation
- ▶ at most one SPF record is allowed!

Configuration

Domain

set ADSP and CAA records

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:domain.example]
adsp = all
caa = 0 issue letsdecrypt.org,
      128 issuewild examplecert.example
```

- ▶ atomic update ADSP record
- ▶ add the CAA records
- ▶ remove all other CAA records

Configuration

Domain

combine stuff – TLSA and DKIM

```
~/cryptdomainmgr$ cat example.conf
```

```
[domain:sub.domain.example]
tlsa = 3 0 1, 3 1 1
certificate = maincert
dkim = maindkim
```

prepare cycle

- ▶ add TLSA and DKIM records

rollover cycle

- ▶ no DNS changes
- ▶ apply certificates and keys on server

cleanup cycle

- ▶ add TLSA and DKIM records (again)
- ▶ remove all other TLSA and DKIM records

Implementation

cryptdomainmgr

cryptdomainmgr.py core, brings everything together

cdmconfighandler.py reads/interpretes config (ini) files

update.py command line interface for generic DNS update

prepare.py command line interface for prepare cycle

rollover.py command line interface for rollover cycle

cleanup.py command line interface for cleanup cycle

simplelogger/ logging abstraction, password → ****

dnsuptools/ domrobot interface abstraction, TLSA, DKIM
calculation

Implementation

simplelogger

simplelogger.py core, produces output

deepops.py deep dict/list operations, password → *****

Implementation

dnsuptools

`dnsuptools.py` core, high level, record change & query methods

`dnsupdate.py` interface to domrobot, low level

`dkimrecgen.py` reads/interpretes dkim key file

`tlsarecgen.py` reads/interpretes certificate file

`simplelogger/` see simplelogger 2

`inxclient/` domrobot client

Discussion

???