TACK (for pinning)

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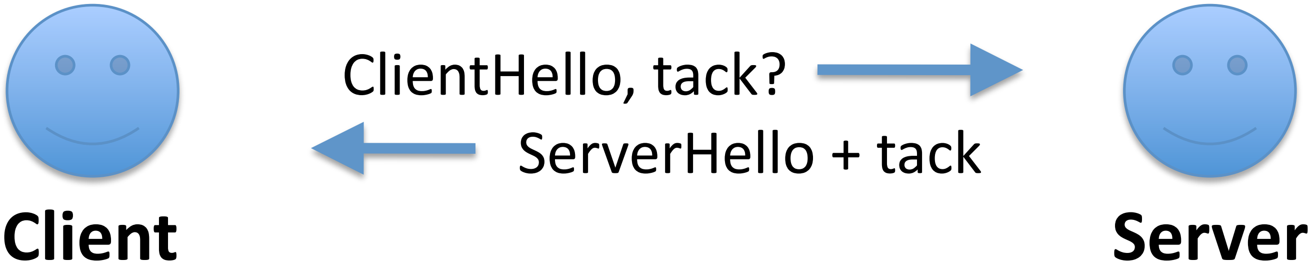
Goals

- Pinning in TLS
  - Authenticate servers using “pins” from previous connections (“key continuity”)
  - Allow servers to “assert” pins

- Coexist with other server auth methods
  - As secondary method (e.g. HTTPS)
  - As primary method (e.g. SMTP between MTAs)
  - Usable for preloads, lookups, logs, etc…

TACK Overview



ClientHello, tack? →

← ServerHello + tack

Client

Server

public_key : ECDSA-256
min_generation : 0-255
initial_time : UTC
end_time : UTC

pin

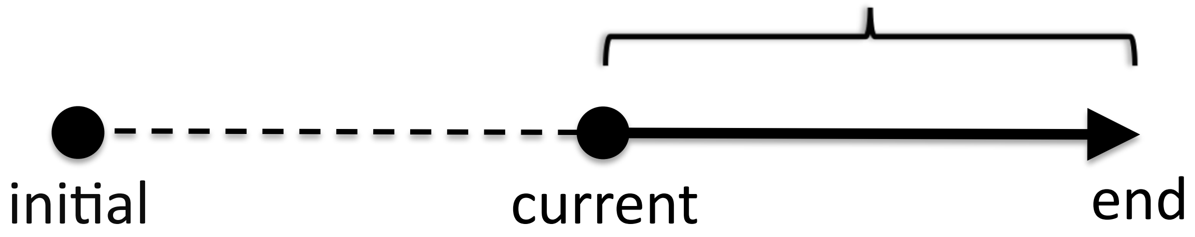
(pins are created from tacks
or received out-of-band)

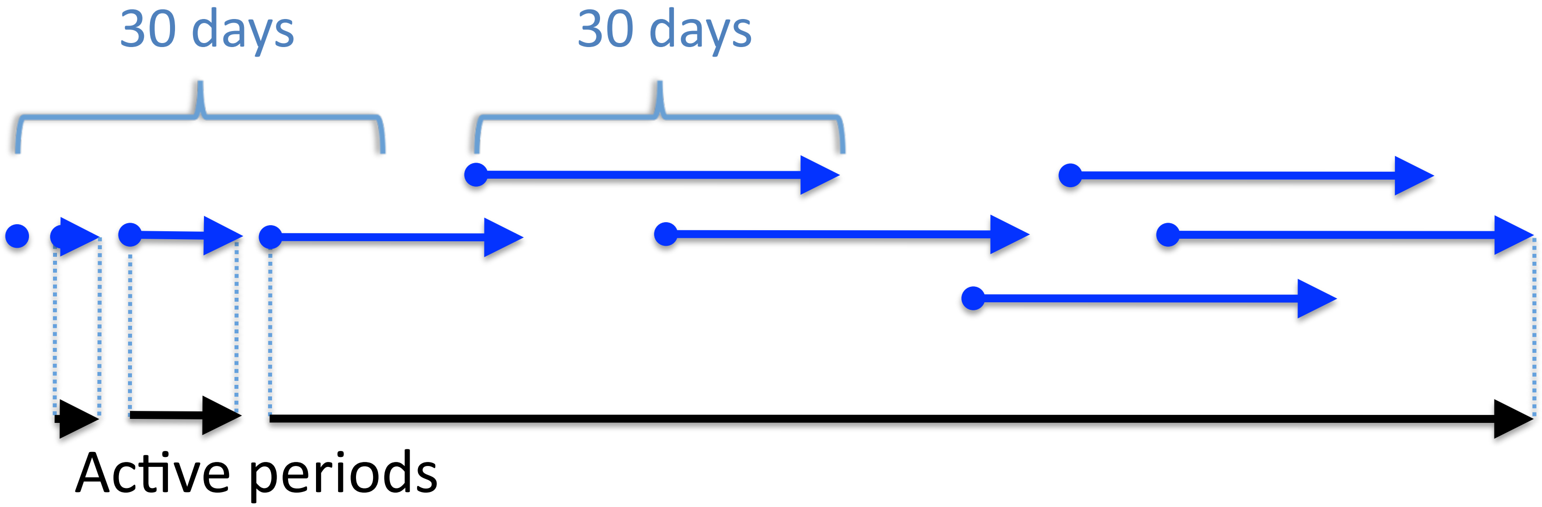
public_key : ECDSA-256
min_generation : 0-255
generation : 0-255
expiration : minutes UTC
target_hash : SHA256
signature : ECDSA-256

tack

Pin Activation

Active period duration = MIN(30 days, current – initial)





Deployment

- Command-line tool
  - tack genkey > KEY.pem
  - tack sign -k KEY.pem -c CERT.pem > TACK.pem

- Apache
  - SSLTACKTackFile: TACK.pem
  - SSLTACKActivationFlags: 1

Private key handling

- Password-protected file on laptop, smartcard, HSM…

- Can be deployed such that compromised/lost TACK key does not harm server availability
  - nonrevokable / nonexpiring tacks

- Make lots of backups
  - for safety, prefer compromised key to lost key

- Could outsource TACK private key

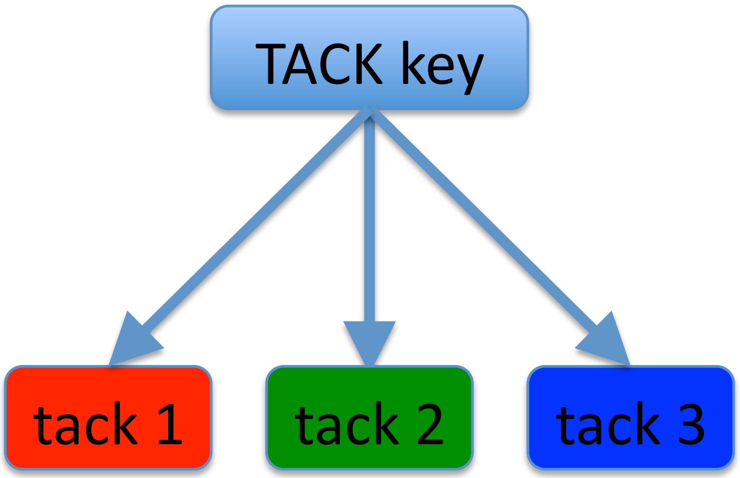
Alternative: “shifting” pins

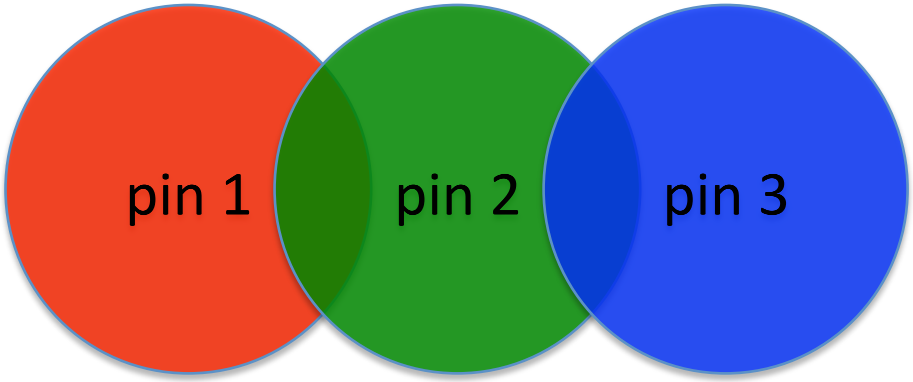
Challenges with shifting pins

- pin activation
- network perspective
- overlapping pins
- other sig uses (break sigs etc?)

Challenges with shifting “EE” pins

- complex private key mgmt
- multiple-key sites
- short-lived keys
- out-of-band pinning





Ex: (**K1**,K2,K3,K4) → (**K3**,K4,K5,K6) → …

Shifting pins could use CA or EE keys

Alternative: CA pins

- Choosing CAs and pinning correctly is complex
  - CAs may issue or alter cert chains unexpectedly
  - Clients may construct cert paths unexpectedly

- Likely less secure than pinning a TACK key
  - Multiple CAs; weak authentication of cert requests

- But easy if someone tells you what keys to pin and what CAs to use
  - Is that a good model?
  - Is key pinning the best way to achieve that?
  - Might some users prefer different models?

Thanks!

- http://tack.io
  - Github (cmdline tool, server patches, client libs)
  - Test server
  - Mailing list