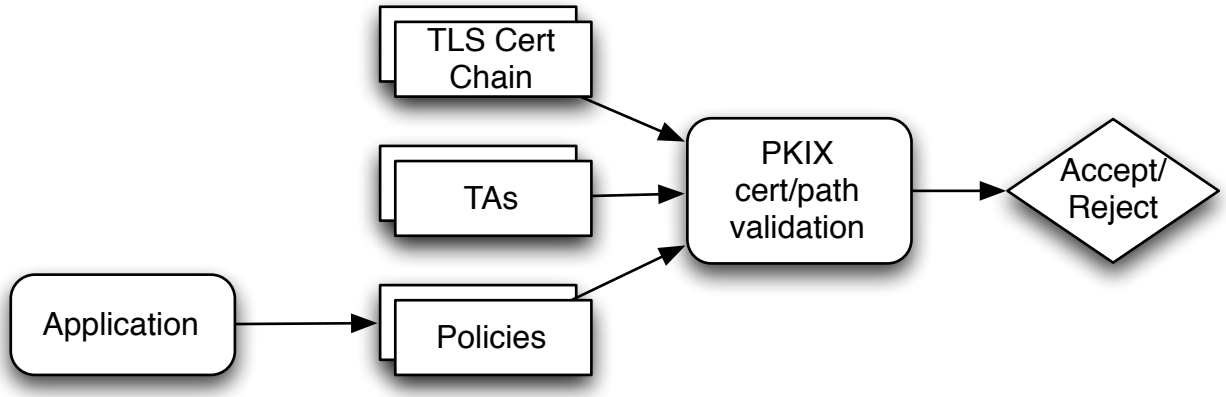
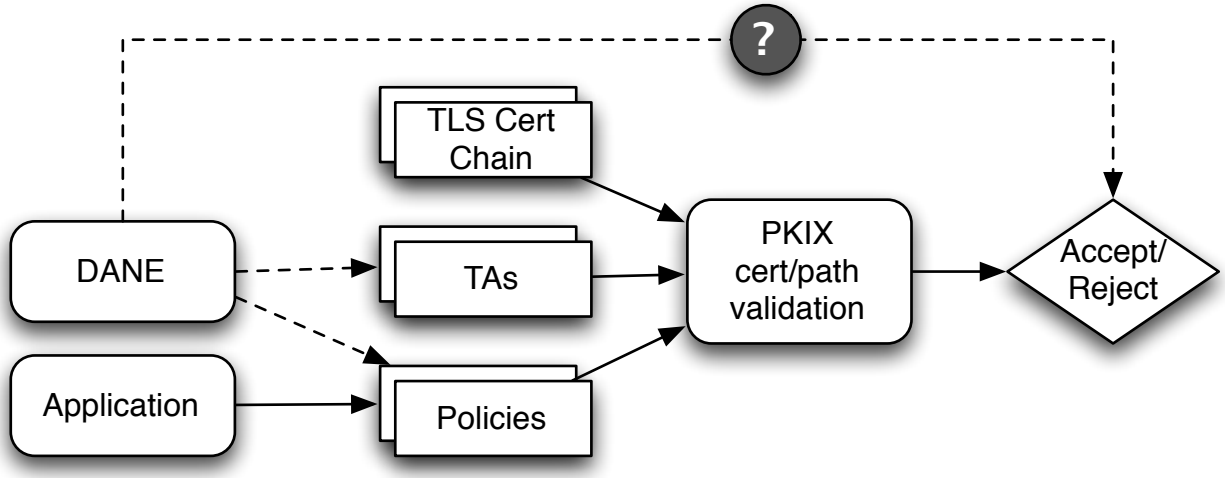
Harmonizing PKIX and DANE

Richard Barnes
BBN
DANE @ IETF80

How TLS works today



The question for DANE



Goals

- Define how DANE affects TLS certificate chain validation
- Modify PKIX inputs, not PKIX process
- Enable the use cases the WG has agreed on

Definitions

- "**CA-issued**" certificate:
  A certificate issued by an entity other than the domain owner (e.g., a commercial CA)

- "**Domain-issued**" certificate:
  A certificate issued by the owner of a TLS server and its domain name
  - Example: self-signed certs and their children

CertType 2 is fine

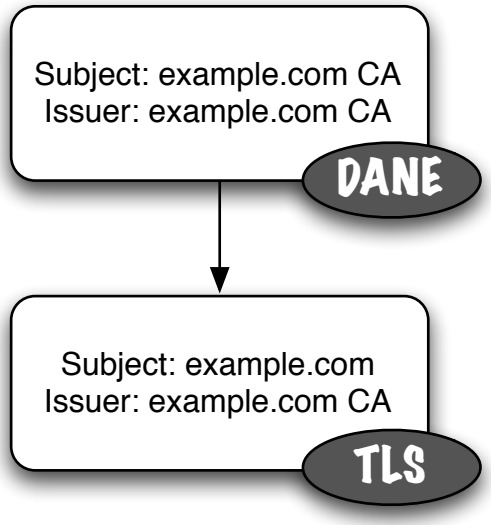
- With CertType 2 (CA certificate), there is no ambiguity in how to apply PKIX
- The certificate in the DANE record is used as a trust anchor in PKIX
- One subtlety:
  - PKIX TA = name, key, key params
  - No other checks required by PKIX
    - But several are common; signature validity, expiry
    - DANE could require some of these additional checks

What about CertType 1 ?

- The intended semantic is that the server cert MUST be the same as the DANE cert
  - Is this necessary or necessary+sufficient ?
- Spectrum of options here:
  - One end: Full PKIX validation
  - Other end: Bare keys
  - Middle: Bare keys + some PKIX-like checks
    - Omitted for simplicity

Option A: PKIX Validation

- TLS cert MUST match DANE and pass PKIX validation (including chaining to a TA)
- For CA-issued certs, this pins the cert
  - Guards against re-issue by the same CA
- For domain-issued certs, also need a CA to chain to
  - Self-signed certs are CA certs
    - Not legal for TLS
  - Domain-issued CA cert in a CertType=2 DANE record



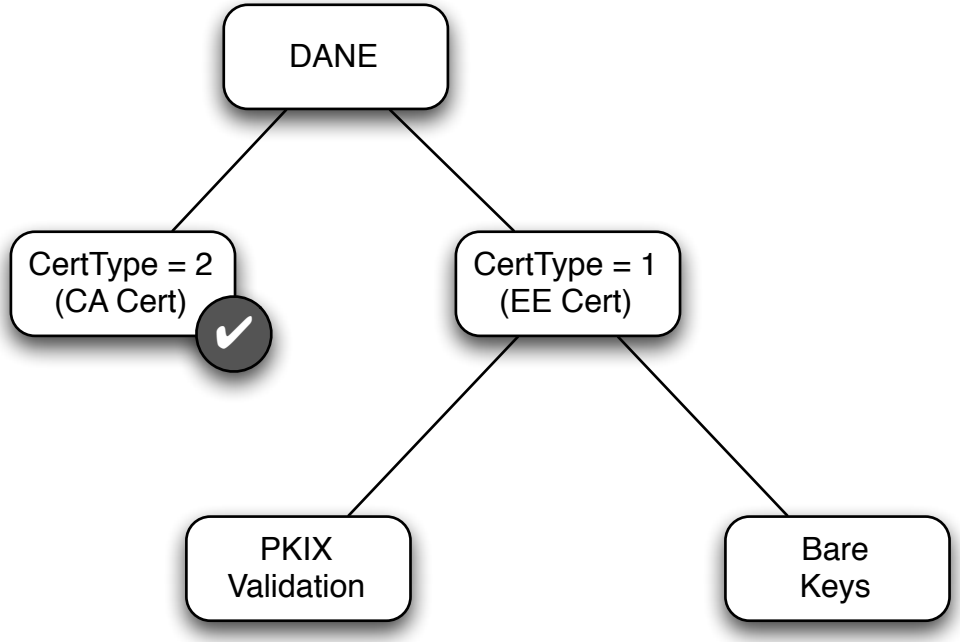
Option B: Bare Keys

- Current document uses cert that are never validated by a relying party
  - A cert that's not validated is invalid
  - Unfriendly to PKIX
- Instead, just encode what you care about
  - Public key
  - (Anything else?)
- For CA-issued, useful for DANE with backward compatibility
- For domain-issued, still need to generate and keep a cert for TLS

Comparing the options

	A. PKIX	B. Bare Keys
Domain-issued	Requires second certificate (CA) in a Type 2 record	Still need to generate and store cert for TLS
CA-issued	Useful for deploying DANE while preserving backward compatibility	Guards against CA issuing a second certificate to someone else

Summary


DANE
CertType = 2
(CA Cert)
CertType = 1
(EE Cert)
PKIX
Validation
Bare
Keys

Gedankenexperiment

- Should you accept …
  1. An expired certificate?
  2. A certificate with incorrect CA bits?
  3. A CertType-1 certificate with a different domain name