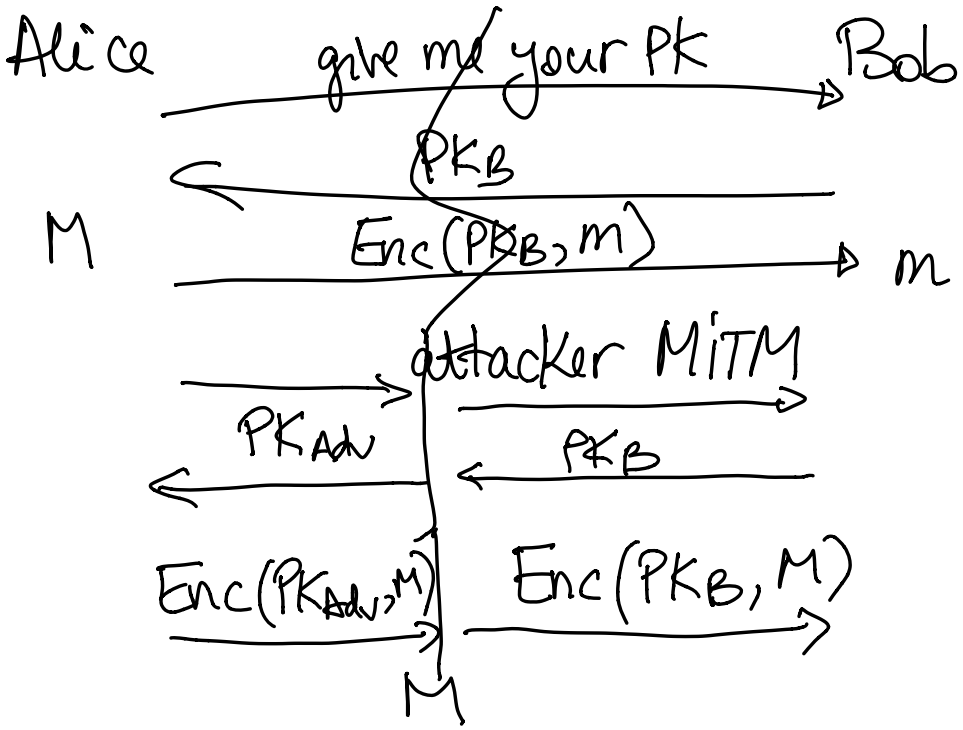
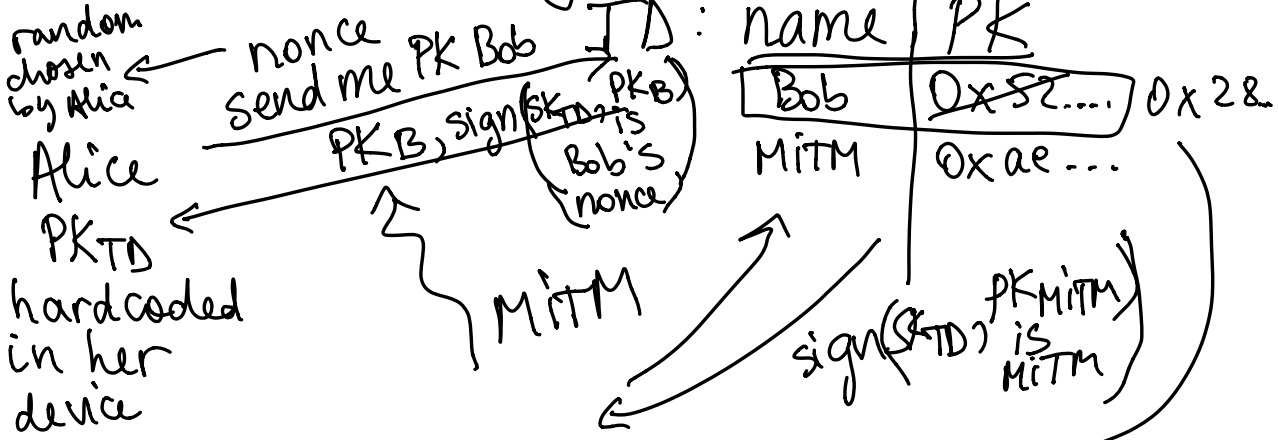


Trusted directory



Updating a Key

Assume update happens securely

Replay attack:

Attacker replays old information (old sig with old PK)

Alice embeds nonce in her request
Checks sig from TD to contain
nonce & to verify with PK_{TD}
& contains Bob's name
⇒ knows PK of Bob is latest

Drawbacks of TD

- scalability (store & serve all PKs)
- TD is a central point of attack/trust
- difficult to recover from TD compromise
- updating key requires trust
- TD has to be always available
  - central point of failure

Approach 2: Digital certificates

↳ association between name & PK
by a CA (certificate authority)
eg. Verisign

certificate: $\text{sign}(SK_{CA}, \text{Bob's PK is } 0x5f\ldots, \text{expiry date}) = cert_{Bob}$

assume browsers have PK_{CA} hardcoded

+ anyone can serve $PK_{Bob}, cert_{Bob}$

Alice checks:

- $cert_{Bob}$ verifies with PK_{CA}, is not expired, is for Bob

Alice no longer contacts TD to fetch PK_{Bob}, but can contact local server, e.g. Bob's server