The Strengths of Weaker Identities: Opportunistic Personas

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"If you made them and they made you, Who picked up the bill, who?"
Motivation

• Crypto systems are often built with the assumption that keys or certificates are tied to *authenticated identity*

• However, identities are hard...
  ➤ to bootstrap
  ➤ to manage

• Without hard-and-fast *identities* we can still make use of some crypto properties
  ➤ data integrity, on-the-wire privacy
• So we just punt on hard-and-fast identity...

• Consider ssh
  ▶ sshd generates a host key when first run / installed
  ▶ on first connection the client asks user to validate host key
    ■ never done!
  ▶ client caches the key and warns the user when the key changes
General Concept

- Informal crypto
- No firm notion of authenticated identity required
- Generate keys opportunistically == personas
- Use opportunistic persona to form an application-specific track record
- Manage personas by observing user reactions

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• Filtering is the only thing (sort of) saving email

• The false positive is the Achilles heel of email filters
  ▶ Mistakenly filtering off one *crucial* email can be worse than seeing the torrent of virus / spam traffic
Could develop a whitelist of email addresses

But...
1. populating a whitelist is inconvenient
2. email addresses are easy to spoof
3. crypto identities are above most user’s pain threshold

Instead, use the informal opportunistic persona notion
• Sending email ...

  ▶ When a mail client is first run / configured it generates a key-pair on user’s behalf

  ▶ All outgoing messages are signed

  ▶ Public half of the key-pair is included in messages
    - E.g., in a new header
Email Example (cont.)

- Upon reception ...

   ▲ Email that is correctly signed by a key on our keyring (whitelist) is not subjected to filtering.

   ▲ Email that is not correctly signed by a key on our keyring (whitelist) is processed as usual.
Email Example (cont.)

• Managing the whitelist ...

  ▶ Add keys to whitelist based on user reaction to email

  ▶ E.g., if a user replies to a correctly signed email the public key is added to the user’s whitelist
If the machine (key) is compromised ...

► Attacker has limited ability to bypass filtering
  ▪ Only works against people who have whitelisted the key

► Recipient will inevitably "junk" the incoming bogus message
  ▪ Cue to remove the sender from the whitelist
Additional Uses

• Several others:
  ▶ web / phishing
  ▶ SPIM

• Speculatively, *promoting personas*
Persona Promotion

• Cheaply build a web-of-trust

• Bootstrap authenticated identity with personas within highly interactive apps
  ▶ E.g., Skype
  ▶ E.g., calendaring tools

• Leverage the fact that these tools revolve around personal contact to promote the personas to real identities
General Guidelines

• Personas vs. identities is a tradeoff
  ▶ Personas extract strength by giving up strength
    ▪ Greater ease-of-use and hence deployability
    ▪ Lose ties to actual authenticated identities
• Personas open up additional attack vectors

  ▶ Assess the implication of a compromised persona key

  ▶ Increased opportunity for man-in-the-middle attacks?

  ▶ Increased opportunity for social engineering attacks?
General Guidelines (cont.)

• Understand the additional work (if any) for users

• Also, need to soundly vet potential user reactions for persona management (e.g., replying to an email)
Summary

• Informal use of crypto is not ideal, but can provide for better security in real settings

• Often a hard-and-fast *track record* is enough

• We advocate developers think about how opportunistic personas might aid their applications
Questions???