Research Center for Information Security (RCIS)
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PAKE-based mutual HTTP authentication for preventing phishing attacks

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Our proposal

new mutual authentication protocol for Web systems which is

- Secure
  - detecting phishing websites reliably
    - Both *users* and *servers* are authenticated
  - no password information leaks for false websites
    - offline dictionary attack impossible
    (↔DIGEST auth, PwdHash:
    >20 chars required for password secrecy)
- Easy to use
  - using human-memorable passwords only
  - no need for personal secret storage
    (↔TLS client auth., password reminders)
- Generic
  - no whitelist (↔EV SSL)
  - no blacklist (↔IE/Firefox phishing warnings)
  - not site-specific

★ *Aiming for long-term solution:*

- *future replacement for form-based auth.*

Four possible phishing attacks:

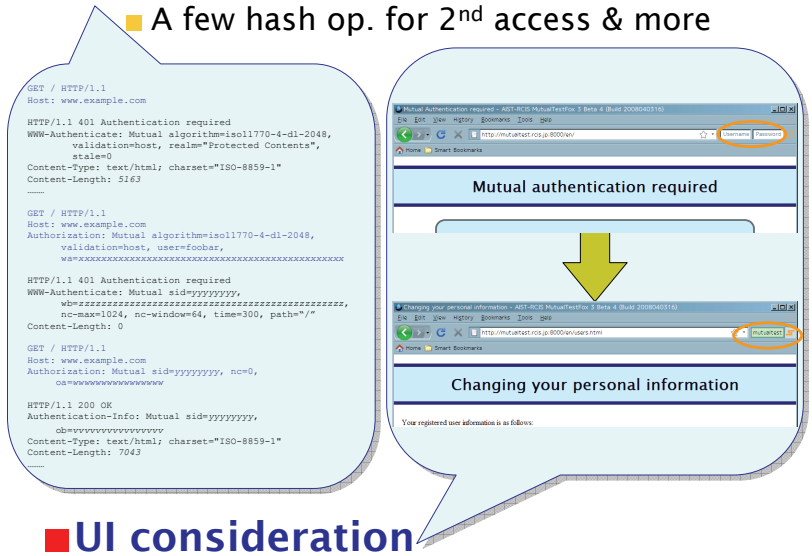
1. steal user's password sent
2. imitate successful login
   - to steal user's privacy data afterwards
3. check password's validity by forwarding it to the genuine site (man-in-the-middle attack)
4. hijack user's sessions

Technology

- Adopting PAKE for Web authentication
  - Mutual auth. with weak secret (password)
  - Password information is not leaked at all
    - Offline dictionary attack impossible
- Naturally extending RFC2617
  - Drop-in replacement for BASIC/DIGEST
  - Replacement for form-based authentication in web applications
  - Relying on TLS for secrecy of payload
    - Assume transport/DNS security
- Host-name based detection of phishing
  - avoiding man-in-the-middle phishing

Protocol details

- Based on ISO-defined variant of PAKE protocol (ISO 11770-4 KAM3)
  - Password is combined with hostname as "weak secret" to prevent MITM attack.
    π = H (password, host, …)
- Computational cost similar to TLS
  - Single public-key op. for 1st access
  - A few hash op. for 2nd access & more



UI consideration

- Entry field must be protected from image-based forgeries
  - no popup dialog (↔ BASIC/DIGEST auth.)
  - e.g. use the chrome area (see above)
- Auth. status must be indicated
  - to prevent imitated auth. success

Current status

- Plugin for Apache server implemented
- Firefox-based browser implemented
  - *Both available as open-source software*
- Internet-Draft submitted to IETF
  - "draft-oiwa-http-mutualauth-04.txt"
- Field trials
  - Our project website (see below)
  - Yahoo! Japan Auction Trial site (in 2008)
- Distribution of open-source modules

Future Work

- Standardization of the protocol
- Propose an integration to Mozilla etc.

Project URL: https://www.rcis.aist.go.jp/special/MutualAuth/