National Institute of Advanced Industrial Science and Technology
AIST

Research Center for Information Security

HTTP Mutual authentication protocol proposal

Yutaka OIWA

RCIS, AIST

National Institute of Advanced Industrial Science and Technology
AIST

HTTP “Mutual” auth.

Research Center for Information Security

- New access authentication method for HTTP
  - Secure (⇔ HTTP Basic/Digest, HTML Form)
    - No offline password dictionary attack possible from received/eavesdropped traffic
  - Easy to use (⇔ TLS client certificates)
  - Provides *Mutual authentication*: clients can check server’s validity
    - Authentication will ONLY succeed with servers possessing valid authentication secrets
    - Rogue servers can’t make authentication to succeed

National Institute of Advanced Industrial Science and Technology
AIST

Basic design

Research Center for Information Security

- Implemented on top of RFC2617
  - Standard WWW-auth/Auth-info headers used
- Password-based Mutual authentication
  - Using PAKE as underlying crypto primitive
- Authentication only
  - Can be used both with HTTP and HTTPS
  - Encryption/integrity provided by HTTPS
- No long-term storage required

National Institute of Advanced Industrial Science and Technology
AIST

More features

Research Center for Information Security

- Support for recent Web application design
  - Optional authentication
    - Single URI can serve both auth/unauth contents
    - Support for sites like Slashdot, Google or Yahoo
  - Timed/server-initiated logout

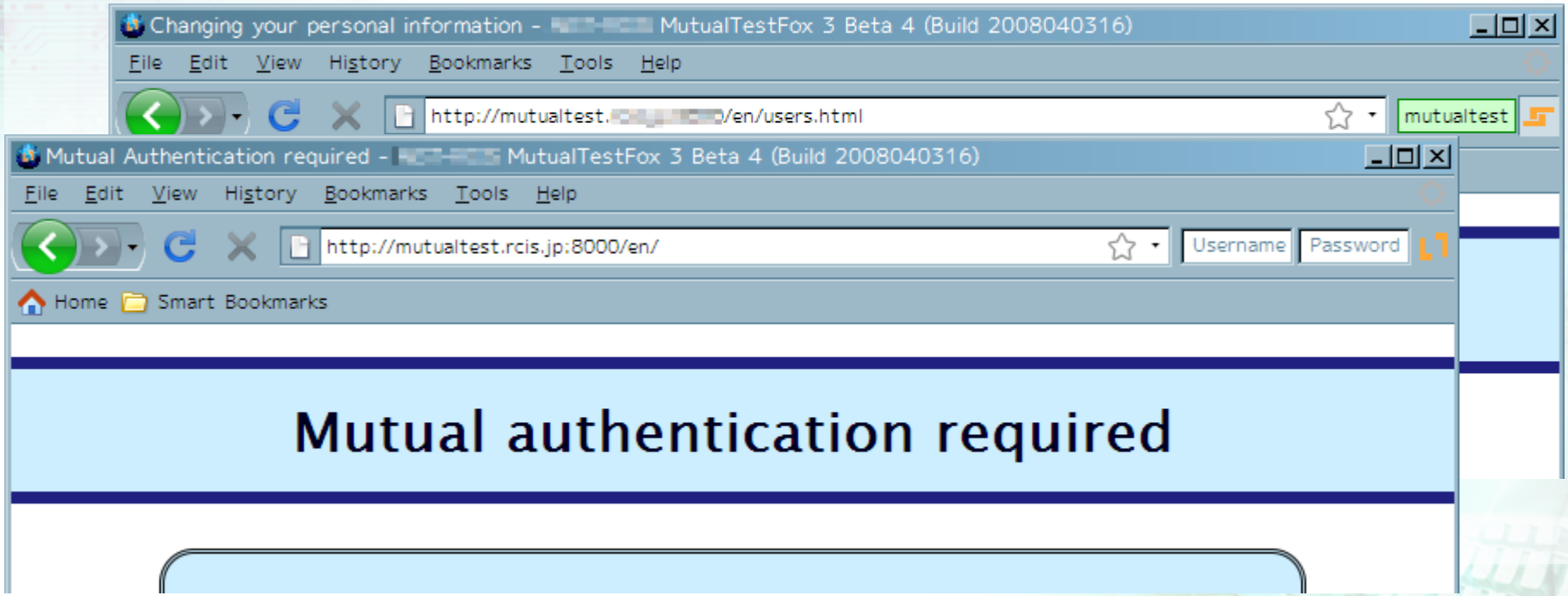
    - To solve several current issues with HTTP auth: covers reasons to use Form-based auth.
    - More features currently under testing: will appear in draft-05 (or 06)

National Institute of Advanced Industrial Science and Technology
AIST

UI consideration

Research Center for Information Security

- Trusted display for mutual authentication result will be needed
  - We propose new UI for this auth scheme
    - Uses browser chrome area



National Institute of Advanced Industrial Science and Technology
AIST

Current status

Research Center for Information Security

- Spec draft: draft-oiwa-http-mutualauth-04
  - -04 draft has solved an IPR issue requested
    - “once becomes Internet Standard” clause removed
- Draft Implementations
  - Server-side: an Apache module
  - Client-side:
    - Mozilla-based implementation (Open-source)
    - IE-based implementation (closed-source)
  - Available from project homepage: https://www.rcis.aist.go.jp/special/MutualAuth/
    - Trial website there!

National Institute of Advanced Industrial Science and Technology
AIST

Draft documentation

Research Center for Information Security

- Included in the current draft:
  - Overview
  - Detailed protocol description
  - Security considerations
- NOT included in the current draft:
  - UI design description and guidelines
  - Design background, decisions & considerations
  - Comparisons (Related work)
    - Things which is not suitable for protocol standards
    - We're preparing a paper for describing those

National Institute of Advanced Industrial Science and Technology
AIST

FAQ: why on HTTP? (or: why not TLS-SRP?)

Research Center for Information Security

- Answer: Web authentications requires finer controls from Web applications
  - Only part of pages in server require auth/authz.
  - Two or more “realms” on the same server
    - The above possible with RFC2617 / not by TLS
  - Application-initiated logout
  - Authed/unauthed contents on single URI
    - Possible with our proposal (or form/cookie)
    - How to implement those on TLS/SRP elegantly?

National Institute of Advanced Industrial Science and Technology AIST

FAQ: why on HTTP? (or: why not TLS-SRP?)

Research Center for Information Security

- More answer:
  - For some apps, transport auth is OK.
    - If transport's duration is equal to app's duration
      - One user per connection, one connection per user
    - Examples: IMAP, POP3, FTP, VPN, SVN etc.
  - However, Web auth. is not so simple
    - An "authenticated session" involves several requests
    - Multiple independent requests on one connection
    - Multiple authentication realms on one server
      - Including "unauthenticated" realm
    - So, authentication should be tied to each request, not to each transport

National Institute of Advanced Industrial Science and Technology
AIST

Thank you

Research Center for Information Security

- More resources
  - Our project homepage: https://www.rcis.aist.go.jp/special/MutualAuth/
  - Draft:
    - Official: https://datatracker.ietf.org/drafts/draft-oiwa-http-mutualauth/
    - Some preliminary drafts (before submition) may be on our homepage