TLS Working Group
Tuesday, November 15, 2016

Exported Authenticators

Nick Sullivan

Exported Authenticators

- New concept along the lines of TLS exporters (RFC 5705)
- Allows binding of new certificates to existing TLS connections
- Inspired by HTTP/2 secondary authentication

HTTP/2 Reactive Client Authentication

- draft-bishop-httpbis-http2-additional-certs-02
- HTTP 1.1 reactive client authentication
  - TLS 1.2 uses renegotiation
  - TLS 1.3 uses post-handshake authentication
- HTTP/2 does not interact well with renegotiation due to multiplexing
- Add certificate authentication into HTTP/2 using special frames
  - Need a way to do certificate proof and link certificate proof to TLS connection

HTTP/2 Connection Coalescing

- TLS sessions are reused if both the following are fulfilled
  - IP address of both domains match
  - Certificate covers both Subject Alternative Names
- ORIGIN frame allows bypass of IP restriction
- HTTP/2 Secondary Authentication allows bypass of certificate restriction

Initial attempt

- draft-sullivan-tls-post-handshake-auth-00
- Generalization of existing TLS post-handshake authentication
  - Allowing both spontaneous and elicited post-handshake client and server authentication

*CertificateRequest →

← Certificate, CertificateVerify, Finished

← *CertificateRequest

Certificate, CertificateVerify, Finished →

CLOUDFLARE

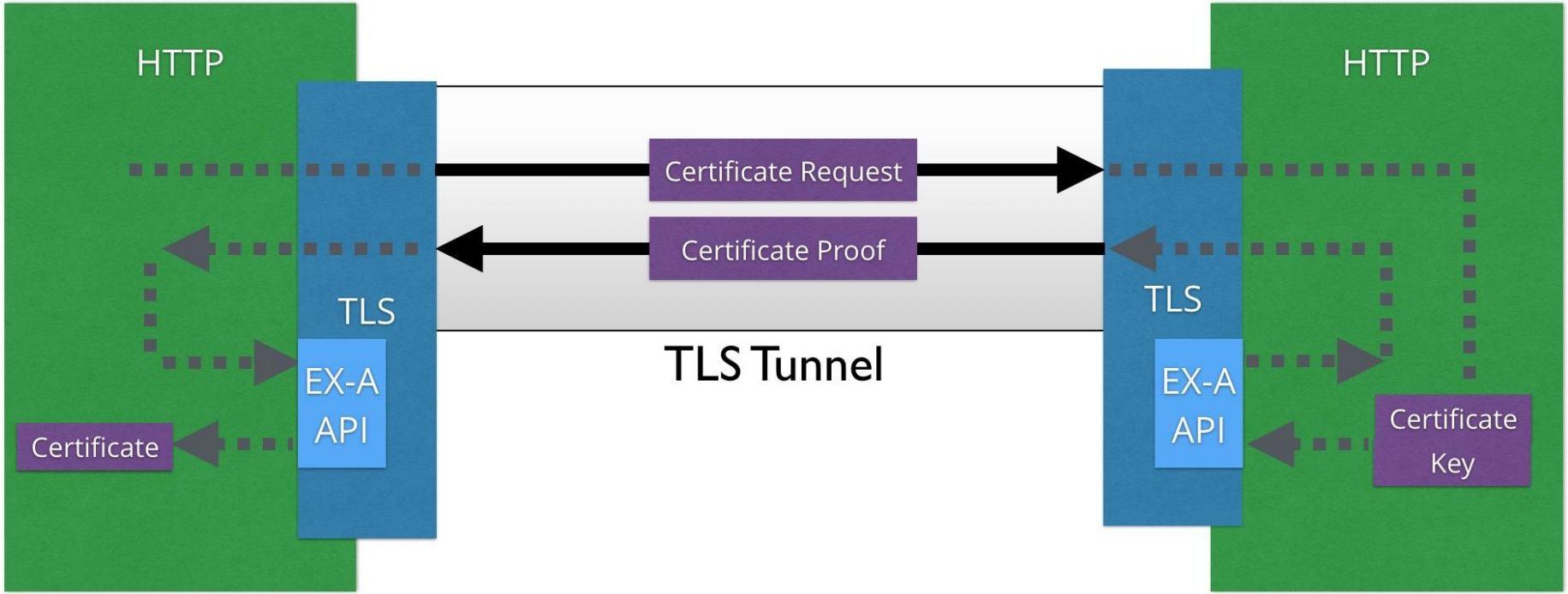
Initial attempt

- Criticisms
  - Additional complexity during initial negotiation
  - Acknowledging CertificateRequest creates buffering, additional work to calculate finished
    - NOTE: This criticism also applies to post-handshake client authentication

Exported Authenticators

- Like the post-handshake auth, but messages are exported instead of sent as TLS messages
- No state kept in TLS handshake, only exported messages
- Message structure

Certificate, CertificateVerify, Finished


HTTP
HTTP
Certificate Request
Certificate Proof
TLS
TLS
TLS Tunnel
EX-A API
EX-A API
Certificate
Certificate Key

Open Questions

- Formal security proof needed along lines of Krawczyk's SIGMAC
- Is it an issue that this does not get updated when there is a key update?

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