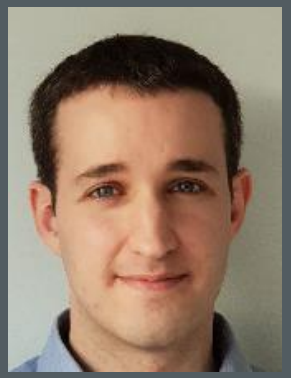
Layered Exported Authenticators



Jonathan Hoyland
Royal Holloway, University of London

Securely binding Exported Authenticators

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Exported Authenticators

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- Exported Authenticators provide proof that a peer independently controls multiple certificates
- We propose to an extension to extend that proof to prove that a peer jointly controls multiple certificates
- Joint authentication means that all of the EAs were generated by the same actor

EA Authorship

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- Potentially more than one party can create EAs for a TLS channel
- Potential Scenarios:
  - A server using a static-RSA key-exchange with TLS 1.2 might be being monitored and modified
  - An attacker who has compromised a server's certificate, can masquerade as that server
  - A CDN coalescing multiple keyless SSL certificates
  - A server shared a resumption master secret with a different server, with potentially different certificates

Layered Exported Authenticators

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- We propose an extension that links an Exported Authenticator to a previous one, forming a chain

```
struct {
    opaque prev_certificate_request_context<0..2^8-1>;
    opaque prev_Finished[Hash.length];
} LayeredEA;
```

- If an actor receives a layered EA with an uncompromised certificate then the sender believes all certificates in the chain up to that point are valid.

Use Cases

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1. Updating pinned certificates (even after compromise)
   - A server signs the pinned certificate with the new certificate
   - An attacker needs to compromise the old certificate and obtain a mis-issued certificate
2. Proof of acceptance
   - If a peer binds to a certificate the actor, then the actor knows the bound certificate was accepted
3. Authentication on static-RSA TLS 1.2 connections
   - A middlebox cannot make either the client or server accept an inserted certificate into a chain