TLS 1.3 Extension for Certificate-based Authentication with an External Pre-Shared Key

draft-ietf-tls-tls13-cert-with-extern-psk
(Experimental)

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TLS WG at IETF 104

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Reminder: This Extension Adds Another Choice for the Initial Handshake

Initial Handshake:

Authentication:	Key Schedule Secret Inputs:
Signature and Certificate	(EC)DHE
Signature and Certificate	External PSK + (EC)DHE

Subsequent Handshake:

Authentication:	Key Schedule Secret Inputs:
Resumption PSK	Resumption PSK + (EC)DHE
Resumption PSK	(EC)DHE

Reminder: External PSK in Initial Handshake

Extension Syntax

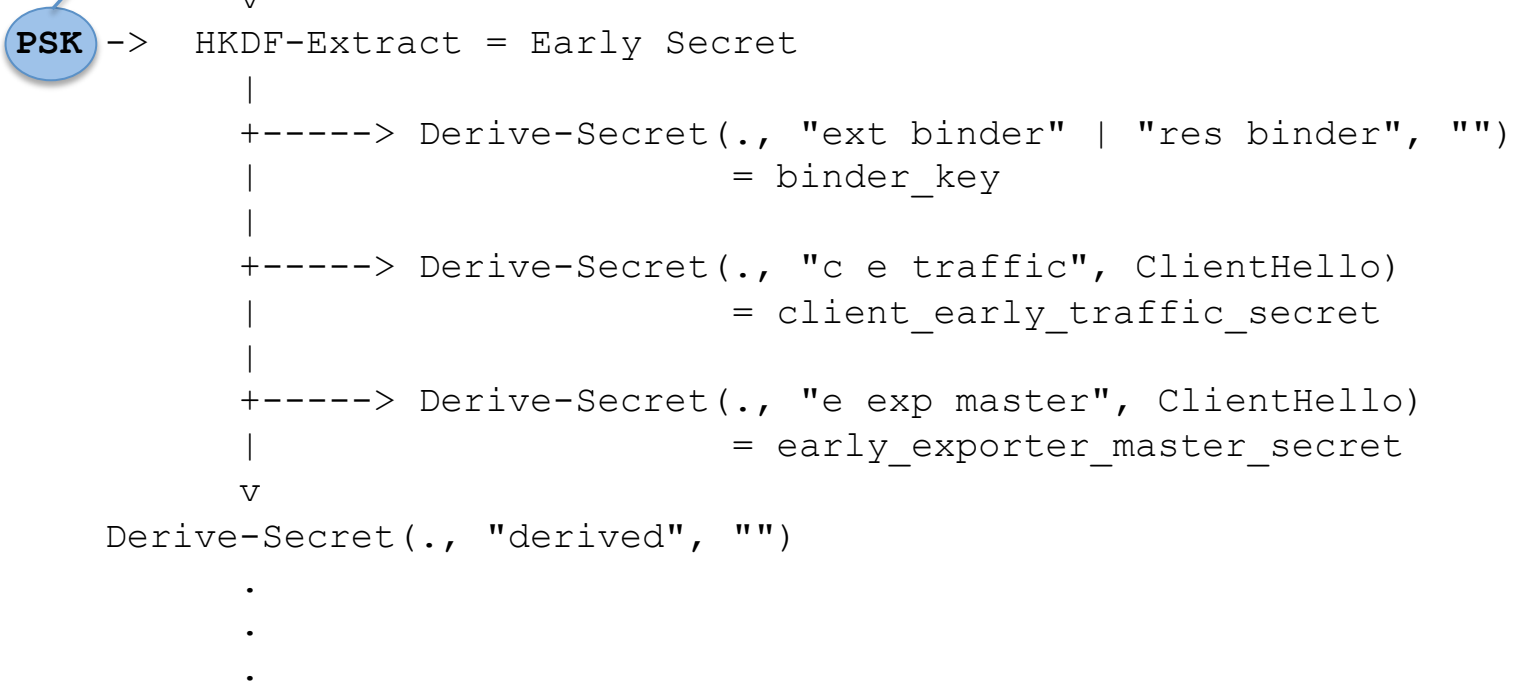
- The successful negotiation of the "tls_cert_with_extern_psk" extension requires the TLS 1.3 key schedule processing to include *both* the selected external PSK and the (EC)DHE shared secret value; it also requires the server to send the Certificate and CertificateVerify messages in the handshake
- The "tls_cert_with_extern_psk" extension is always be used along with the already defined "key_share", "psk_key_exchange_modes", and "pre_shared_key" extensions
- The "psk_key_exchange_modes" extension will always offer psk_dhe_ke
- The "pre_shared_key" extension used with obfuscated_ticket_age of zero, and only offer external PSKs

- Inclusion of the extension is willingness to authenticate the server with a certificate and include an external PSK in the key schedule processing:

```
struct {
    select (Handshake.msg_type) {
        case client_hello: Empty;
        case server_hello: Empty;
    };
} CertWithExternPSK;
```

Key Schedule

The external PSK is placed in the usual place in the key schedule. In the initial handshake, the PSK input value is otherwise set to 0.



Informal Reasoning About TLS 1.3 Security

Authentication

The certificate processing is exactly the same. It is not better or worse. No changes.

Key Schedule computation of Early Secret

– Initial Handshake

Without extension: HKDF-Extract(0, 0)

With extension: HKDF-Extract(ExternalPSK, 0)

– Subsequent Handshake

No changes.

Conclusion: Any entropy contributed by the External PSK can only make the Early Secret better; the External PSK cannot make it worse.

Next Steps

- We have been talking about this topic since IETF 101
- Along the way, a bunch of stuff was added, and then it was removed again
- We are essentially back to the original -00 document
- I think the document is ready for WG Last Call for progression as an Experimental document

- PLEASE REVIEW!