DTLS Tunnel for PERC

draft-jones-perc-dtls-tunnel-04

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Notable Changes

- Switched tunnel transport from DTLS to TLS
- Changed key field names to align with RFC 5764 (DTLS-SRTP)
- Introduced a conference identifier field
- Switched back to a TLS-style syntax (similar to draft -00)

TLS-Style Syntax

Message primitives are

```
enum {
      unsupported_version(1),
      supported_profiles(2),
      media_keys(3),
      tunneled_dtls(4),
      endpoint_disconnect(5),
      (255)
  } MsgType;
```

Common message structure

```
struct {
    uint8 version;
    MsgType msg_type;
    select (MsgType) {
        case unsupported_version: UnsupportedVersion;
        case supported_profiles:  SupportedProfiles;
        case media_keys:          MediaKeys;
        case tunneled_dtls:       TunneledDtls;
        case endpoint_disconnect: EndpointDisconnect;
  } body;
} TunnelMessage;
```

High-Level Message Sequence

```
Endpoint              media distributor          key distributor
    |                         |                         |
    |                         |<=======================>|
    |                         |    TLS Connection Made  |
    |                         |                         |
    |                         |========================>|
    |                         | SupportedProfiles       |
    |                         |                         |
    |------------------------>|========================>|
    | DTLS handshake message  | TunneledDtls            |
    |                         |                         |
    |                         |<========================|
    |                         |               MediaKeys |
    |                         |                         |
         .... may be multiple handshake messages ...
    |                         |                         |
    |<------------------------|<========================|
    | DTLS handshake message  |            TunneledDtls |
    |                         |                         |
```

SupportedProfiles

- Message sent from the Media Distributor to the Key Distributor to indicate which hop-by-hop SRTP encryption & authentication algorithms are supported

```
uint8 SRTPProtectionProfile[2]; /* from RFC5764 */

  struct {
    SRTPProtectionProfile protection_profiles<0..2^16-1>;
  } SupportedProfiles;
```

TunneledDtls

- This message is used to tunnel DTLS packets between the media distributor and the key distributor

```
struct {
    uint32 association_id;
    opaque conf_id<0..255>;
    opaque dtls_message<0..2^16-1>;
} TunneledDtls;
```

- The conference ID allows the transmitter to indicate the conference to which a tunneled message belongs (more later)

MediaKeys

- Allows the key distributor to provide the media distributor with hop-by-hop keying material and selected cipher

```
struct {
    uint32 association_id;
    SRTPProtectionProfile protection_profile;
    opaque mki<0..255>;
    opaque client_write_SRTP_master_key<1..255>;
    opaque server_write_SRTP_master_key<1..255>;
    opaque client_write_SRTP_master_salt<1..255>;
    opaque server_write_SRTP_master_salt<1..255>;
    opaque conf_id<0..255>;
} MediaKeys;
```

- Note the conference identifier is present here, too (more later)

EndpointDisconnect

- This message is sent from the media distributor to the key distributor to provide a clear indication that the associated endpoint is no longer a conference participant

```
struct {
      uint32 association_id;
  } EndpointDisconnect;
```

UnsupportedVersion

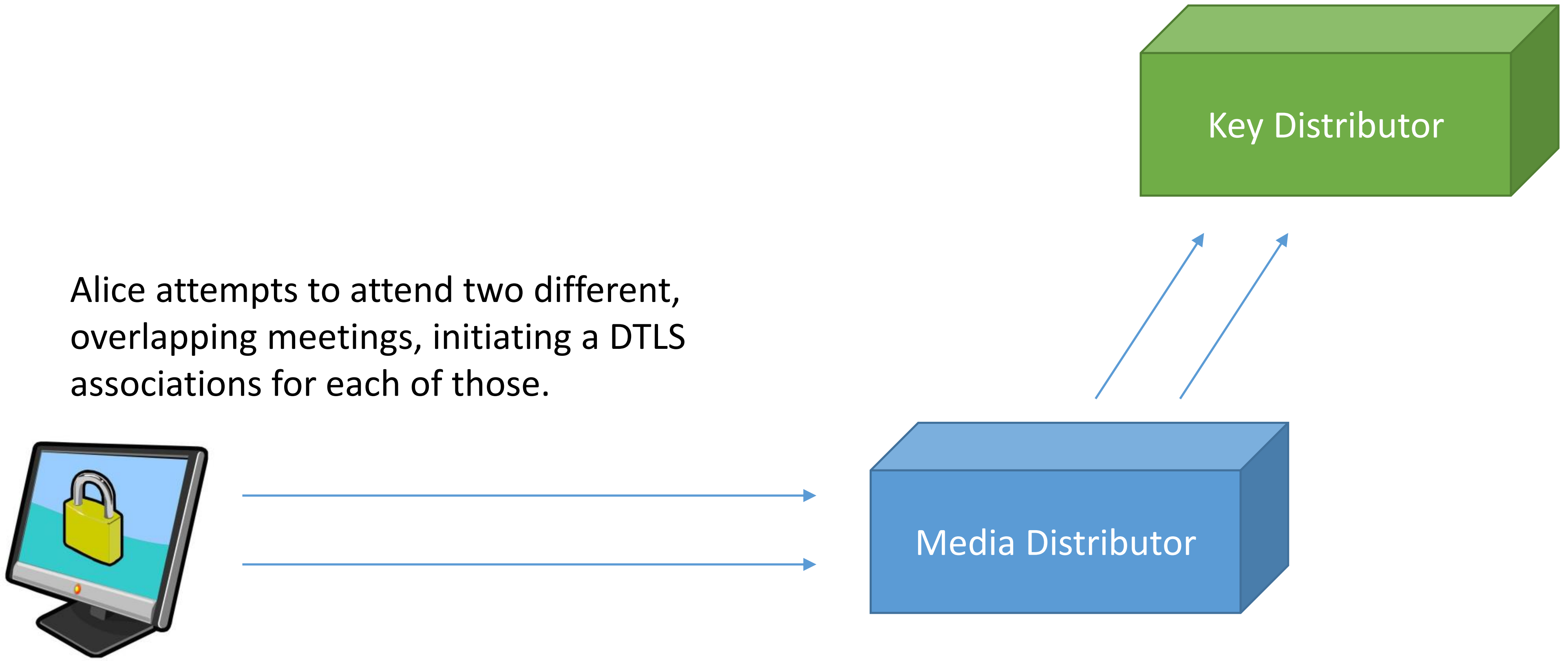
- Sent by the key distributor to indicate to the media distributor that the version of the protocol advertised is not supported
- Media distributor is responsible for moving to the version supported by the key distributor

```
struct { } UnsupportedVersion;
```

Conference Identification Issue

Which DTLS association belongs to conference “A” and conference “B”? This determines which “EKT Key” to return.

Alice attempts to attend two different, overlapping meetings, initiating a DTLS associations for each of those.



Conference Identification

- Assumption: the key distributor knows which users (including the user's certificate fingerprint) are allowed to be given a given conference key
- If an endpoint uses the same certificate, we have a problem to solve
  - Solution: put the conference identifier into the TunneledDtls message sent by the media distributor, allowing the key distributor to be able to associate a DTLS association with a particular conference
  - Preference: the media distributor not have to know a conference identifier *a priori* and require that each simultaneous call use a different certificate, thus allowing the key distributor to determine which key to use based on the certificate fingerprint
  - Alternative: advertise a conference identifier in the DTLS handshake (discovery external to PERC)
- How does the media distributor know how to put a user's media flows into a given conference?
  - Solution: put a conference identifier into the MediaKeys message, effectively allowing the key distributor to tell the media distributor how to group user flows into a conference
  - Preference: not have this field and accept that some higher-level call control function instructs the media distributor on how to associate flows into a conference (outside the scope of this protocol or PERC entirely)