SFrame
RTP Encapsulation
WebRTC P2P encryption

**Secure but Not Scalable**

Using Peer-to-Peer

WebRTC encryption is hop-by-hop by design, and only end-to-end encrypted in p2p connections.

**Scalable but Not Secure**

Using Media Server

As soon as you use a server, e.g. for scalability or recording, the server could expose your content to a third party.
SFrame goals

- Provide a secure E2EE mechanism for audio and video in conference calls.
- Decouple media encryption from key management to allow SFrame to be used with an arbitrary KMS.
- Minimize overhead.
- Independence from the underlying transport.
- When used with RTP, require no special handling for RTX and FEC.
- Minimize the changes needed in SFU servers and in endpoints.
- Work with the most popular audio and video codecs used in conferencing scenarios.
Per packet vs per frame encryption

- Implemented in web browsers via Insertable Streams API which allows not only e2ee but any transformation of the media frames in JS. This allows other use cases like inserting app-defined metadata in the video frame.
Video Payloads usage within SFrame

- Not all video codecs support SFrame easily.
- Each video codec requires different processing by SFrame if used with their standard RTP packetization.
- Having a different solution per video codec will require extra specification effort, will make implementation harder and will create huge problems in interoperability.
- SFUs require access to frame metadata for detecting frame type and performing layer selection.
- If RTP, frame metadata is better carried on an header extension than inside the payload.
- It would be preferably to have a transport protocol agnostic solution, as SFrame.

Next steps

- Video packetization which is codec agnostic and allows to transport a raw binary blob.
- Metadata RTP header extension for SFU operations.
  - Framemarking.
  - AV1 Dependency Descriptor.
- SDP negotiation.
  - Define negotiation of encrypted and non-encrypted formats and how are they related.
  - RTP Payload Format Restrictions (draft-ietf-mmusic-rid).