MoQ Secure Objects

End to End Symmetric Encryption and Authentication Scheme

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V1

Goals

This is not a replacement for Common Encryption (cenc) in CMAF, it is an alternative for use with things such as LOC or where “cenc” schemes cannot be used.

Minimize Bandwidth for MoQ Objects (such as audio)

Not new crypto, simply uses HKDF and AEAD Schemes

- RFC 5116 defines an API for symmetric encryption such at AES-GCM

Easy integration with Key Establishment schemes (MLS and others)

Easy Integration with container formats (such as LOC)

Transparent to MoQT and Relays

AEAD Crypto

Prerequisites: A set of keys per track identified by a key ID, and the cipher suite that key uses (could come from MLS)

Object_key and object_salt are derived from the FullTrackName, Key, KeyID, cipher suite using HKDF. If the key is changed, it gets a new keyID.

Nonce is formed from concatenation of GroupID and ObjectID xor'd with salt. Nonce is unique for this object_key as GroupID/ObjectID is unique for Track.

The extra authenticated data includes Key ID, Group ID, and Object ID. Relay can not change these.

Why focus on low bandwidth

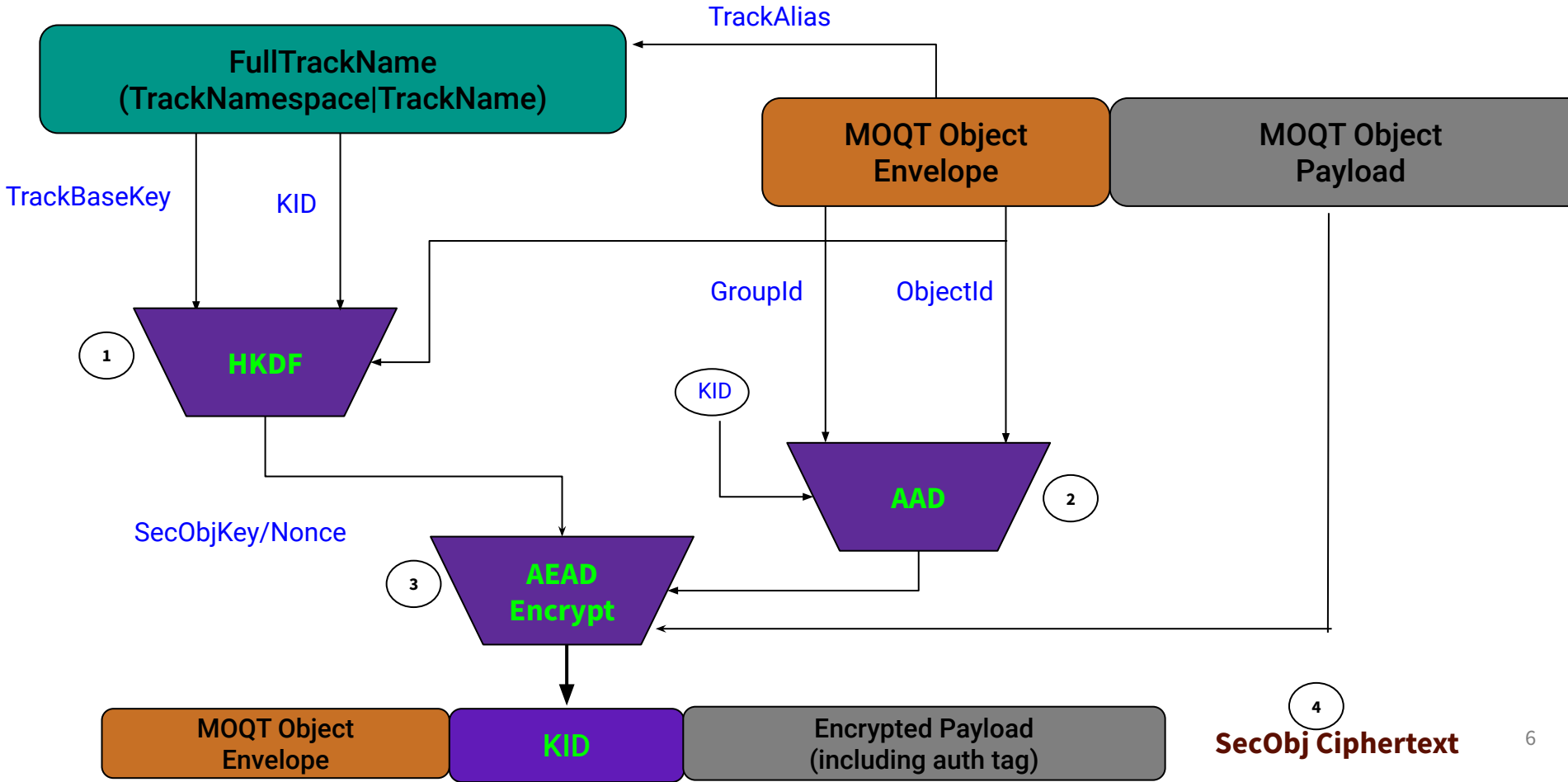
Lyria is a 3kbps audio codec. Newer ML codecs are use even less bandwidth.

A 1.9 kbps codec with 50 ms packets would use 12 bytes per packet.

With a 1 byte key ID and 80 bit auth tag, crypto will add 11 bytes.

Backup Slides

Encryption


TrackAlias
FullTrackName
(TrackNamespace|TrackName)
MOQT Object
Envelope
MOQT Object
Payload
TrackBaseKey
KID
GroupId
ObjectId
1
HKDF
KID
AAD
2
SecObjKey/Nonce
3
AEAD
Encrypt
MOQT Object
Envelope
KID
Encrypted Payload
(including auth tag)
4
SecObj Ciphertext