DTLS over SCTP RFC 6083 Update

draft-westerlund-tsvwg-dtls-over-sctp-bis-01

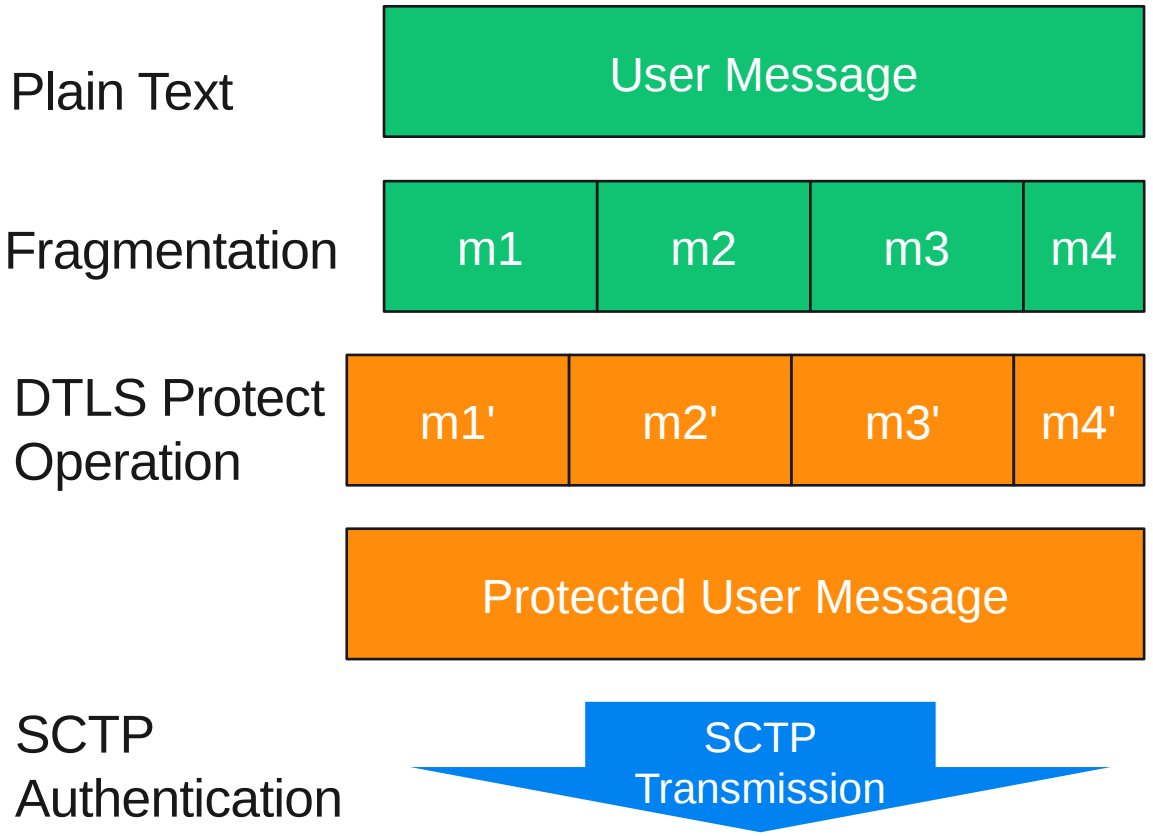
Magnus Westerlund, Ericsson
Claudio Porfiri, Ericsson
John Mattsson, Ericsson
Michael Tüxen, Münster University of Applied Sciences

Introduction

- 3GPP in 5G Networks uses DTLS over SCTP (RFC 6083) for securing several radio network application protocols.
  - It has been realized that the F1, E1, Xn, NG-C interface protocols may send messages of sizes that exceed RFC 6083's limitation of a single DTLS record (16383 bytes)
  - 3GPP RAN2 has sent an LS asking TSVWG to address the issue https://datatracker.ietf.org/liaison/1723/
  - 3GPP would prefer a general solution to not having to address the issue in each protocol individually
- RFC 6083 maps a user message to single DTLS record
  - User message sizes a limited by DTLS record sizes, which is too small
- RFC 6083 security requirements are also outdated
  - DTLS 1.0 (TLS 1.1 based)
  - SHA-1 in SCTP-AUTH (RFC 4895)

Proposal

- Replace RFC 6083 with an updated specification
  - Define a secure fragmentation mechanism
  - Updated Security Requirements
    - DTLS 1.2 or DTLS 1.3
    - Require SHA-256 support for SCTP-AUTH
  - Signaling of supported message sizes
  - Defined as SCTP Adaptation Layer
    - Handshake indication
  - Recommend support of I-DATA (RFC 8260)
  - Clarify DTLS 1.2 Renegotiation to minimize impact from rekeying



SCTP Authentication Reliance

- Like RFC 6083 this is dependent on SCTP-AUTH to achieve security properties:
  - Combined with SCTP's reordering provide Replay Protection
    - Replaying an SCTP packet will not impact protected user messages
  - SCTP ensuring DTLS record order in each protected user message
    - SCTP AUTH ensures that third party can not impact the order of the DTLS records being received, thus integrity of user message is preserved

Open Issues

- DTLS 1.3 and rekeying for long lived flows
  - DTLS 1.3 do not support renegotiation
  - No post-handshake server authentication, Diffie-Hellman, and exporter_secret update possible
  - Negative impact on security for long lived flows
  - Started discussion in TLS WG
- With SCTP Adaptation Layer signaling we can require DTLS to be used for all User Messages
  - StartTLS will not work under these restrictions
- Specify handling of partially delivered protected user messages
  - Relevant when partial reliability is used
- How to deal with socket API changes related to RFC 4895 to allow usage of SCTP AUTH as required by this specification?

Going Forward

- Request adoption as WG Item
  - RFC 6083 needs update
  - Resolve message length restriction
  - Update security algorithm requirements
  - 3GPP needs a solution, preferably in Rel-17 timeframe (March 2022)

- Discussion of open issues on mailing list
- Resolve some editorial
- Source, Pull Requests and Tracking issues at:
  https://github.com/gloinul/draft-westerlund-tsvwg-dtls-over-sctp-bis