GDOI Key Establishment for SRTP

<http://tools.ietf.org/wg/msec/draft-baugher-msec-gdoi-srtp-00.txt>

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Overview

• What is SRTP?
  – It is Secure RTP (RFC 3711).
  – What is RTP (RFC 3550, 3551) and how does SRTP secure it?

• What is GDOI?
  – It’s RFC 3547, the ISAKMP Group “domain of interpretation”
  – What is ISAKMP (RFC 2408) and GDOI group key management?

• Why do GDOI-SRTP?
  – It is useful for multicast SRTP sessions, SRTP translators, etc.
  – What are the payloads and operational framework of GDOI-SRTP?

This work extends GDOI to establish an SRTP cryptographic context (GDOI “data security association”) that is suitable for Secure RTP multicast sessions, translators, and other group-key applications.
What is SRTP?

- SRTP provides confidentiality & integrity to RTP sessions
  - An RTP session carries RTP packets of media payloads from an SSRC
  - There should be a management back-channel of RTCP packets
  - RFC 3711 appends HMAC tag to packet for integrity service (not shown in Figure)
- Defaults to AES Counter Mode for confidentiality
  - REQUIRES: Unique SRTP master key per SSRC or a non-colliding SSRC

Figure: Packet flows between SSRCs of an RTP session
SRTP Key Management

- SRTP keys are derived from SRTP master key
  - Default lifetime is $2^{48}$ packets for SRTP ($2^{31}$ for SRTCP)
  - Most secure configuration is one master key per sender (SSRC)
  - SSRCs to a session can share a key but SSRC collision is a risk
- At least a dozen SRTP parameters in session “crypto context”
  - Master key bound to CC by GDOI or EKT (see below)
  - SSRC can be bound by GDOI or first SRTP/SRTCP packet
  - RTP/SRTP SSRC & ROC also used in key management
- GDOI-SRTP establishes an SRTP crypto context using GDOI
What is GDOI?

- Establishes “group” keys
  - Uses IKE SA between member and GCKS
  - Has authenticated exchange for application keying
    - IPsec ESP done today
    - SRTP proposed here
- GDOI is a framework
  - Based on ISAKMP (RFC 2408)
  - Supports multiple “data security” protocols, e.g. IPsec, SRTP
- GDOI-SRTP extends GDOI for the SRTP data security protocol
  - Adds new payloads
  - Supports SRTP “Encrypted Key Transport” (EKT) protocol
GDOI-SRTP Payloads

- SA-TEK shown at left
  - RFC 3711 parameters
  - SRTP options & attributes
- Options field of SA-TEK
  - Unencrypted RTP
  - Unencrypted SRTCP
  - Unauthenticated SRTP
  - Encrypted key transport (EKT) is used
- If EKT is used
  - EKT SA-TEK follows
    - Not shown
  - EKT key is downloaded
- Else, an SRTP master key download payload follows
GDOI Signaling of EKT

- draft-mcgrew-srtp-ekt-01.txt
- Passes ROC and SRTP master key
  - Useful when GCKS is remote to SRTP sender
  - EKT is useful if firewalls block GDOI push operations
  - EKT fixes some problems in SIP forking and early media, but GDOI does not use and is not used by SIP at present
- ROC & SRTP master key encrypted with an EKT key
- GDOI-SRTP signals the EKT key
  - When EKT signaled, GDOI doesn’t download SRTP master key as the TEK
  - EKT is signaled by an EKT SA-TEK and a key-download payload carrying EKT key
Summary

• By design, GDOI (RFC 3547) supports new “data security protocols” such as SRTP

• We propose to do 3 things
  – Complete the GDOI-SRTP specification
  – Add it to Brian Weis’s GDOI reference code
  – Add it to David McGrew’s libSRTP

• Should this work be an msec WG item?
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Thank You