PERC: Double + EKT

IETF 99, July 2017, Prague

- Cullen & Sergio

V3

Agenda

One broad open issue on how to deal with repair like packets

Specifically, RTX, FlexFEC, and RED

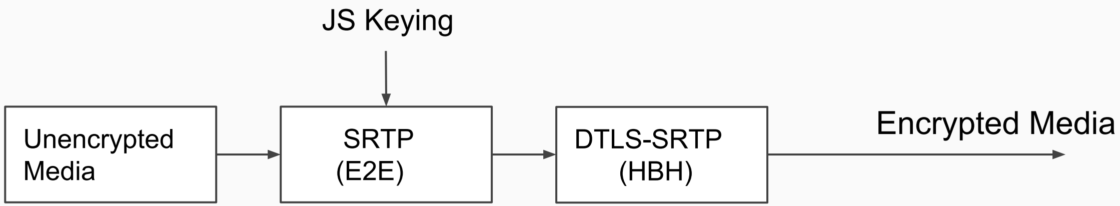
Presentation will look at range of options for each

Options looked at includes proposal from the lite draft

Exciting and awesome joint proposal from Sergio, Cullen, Emil, & Alex that none of us like and all of us can live with (ietf bumpy consensus)

But first … talk about the facts everyone agrees on about what these proposal are ..

What is “lite” ?



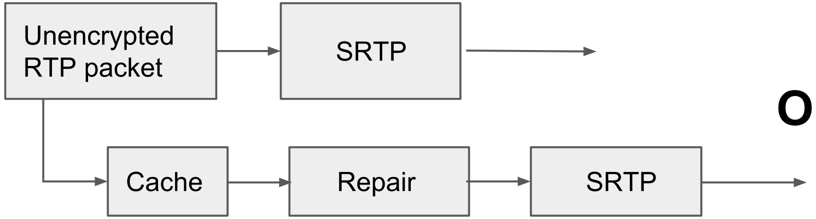
- Lite is an approach where SRTP is tunneled inside SRTP
- The E2E SRTP is keyed by the JavaScript in the same way SRTP with SDES would be keyed
- The HBH DTLS-SRTP is keyed by normal DTLS without use of DTLS EKT

Repair operations are done before HBH DTLS-SRTP but after the E2E SRTP (details on later slides)

FlexFEC

FlexFEC Outside of PERC

Endpoint (RTP Sender)


Unencrypted RTP packet

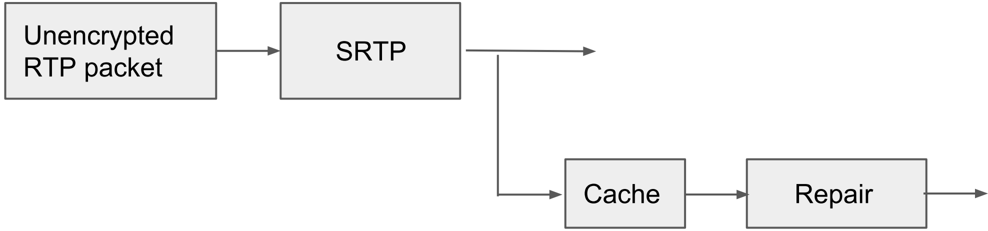
SRTP

Cache

Repair

SRTP

OR

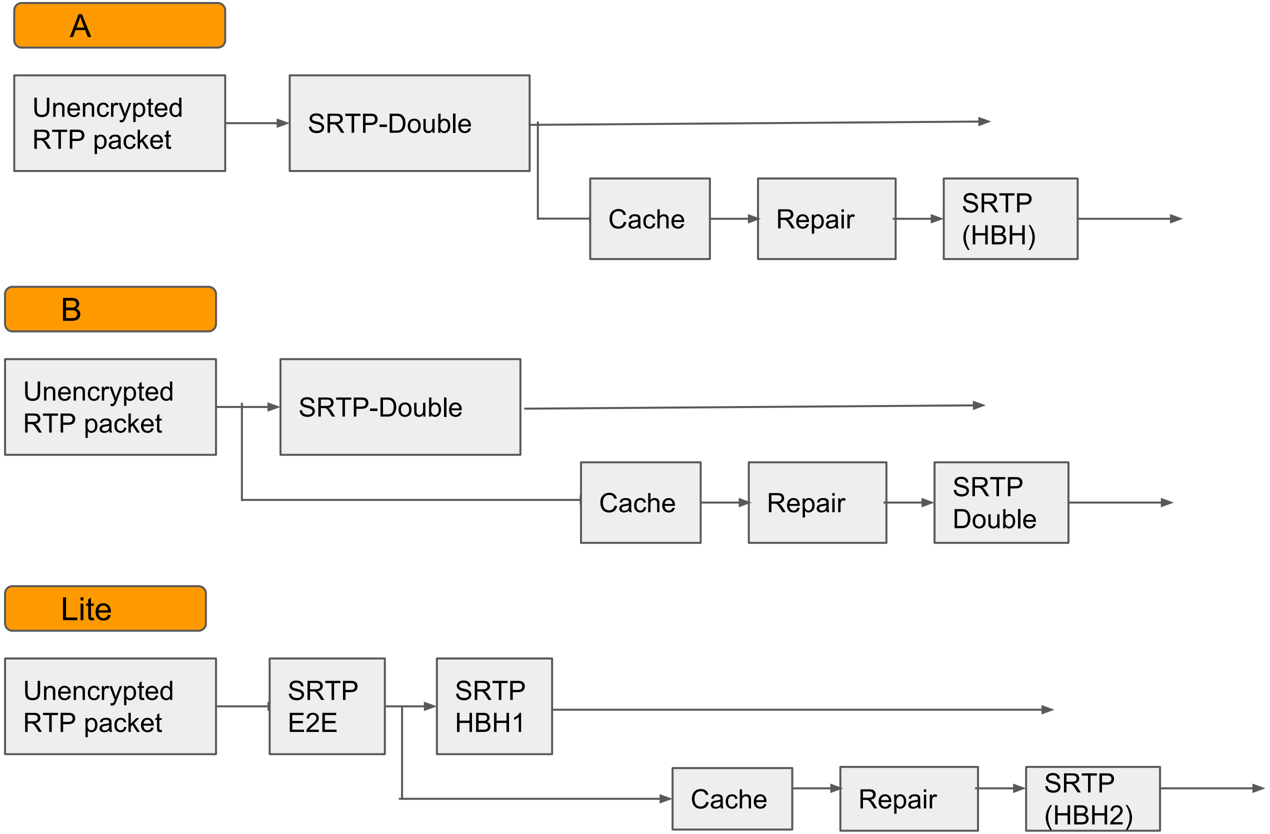

Unencrypted RTP packet

SRTP

Cache

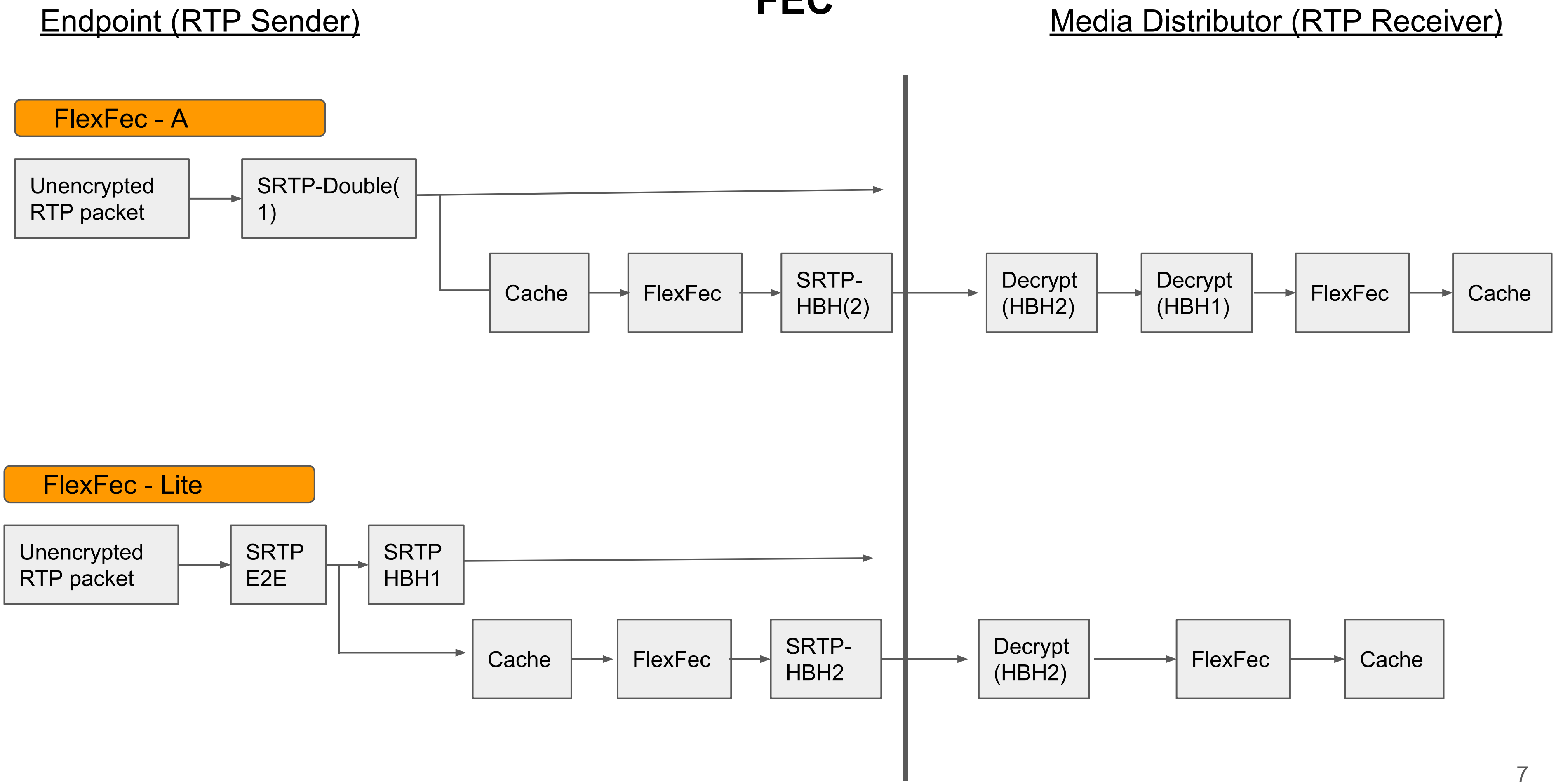
Repair

FlexFEC Proposals for PERC



Media Distributor can not do repair

FEC

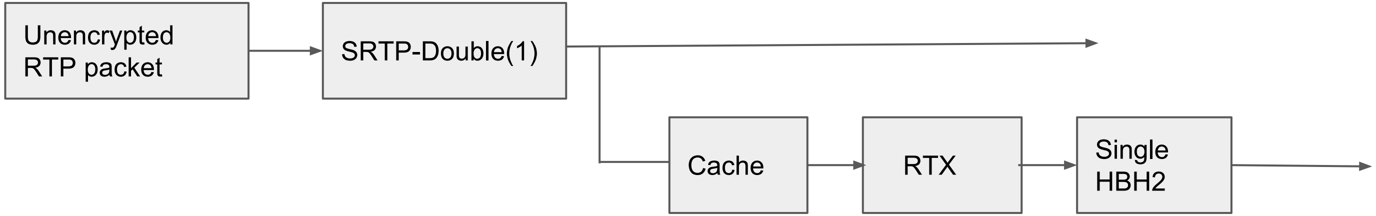

Endpoint (RTP Sender)
Media Distributor (RTP Receiver)
FlexFec - A
Unencrypted RTP packet
SRTP-Double(1)
Cache
FlexFec
SRTP-HBH(2)
Decrypt (HBH2)
Decrypt (HBH1)
FlexFec
Cache
FlexFec - Lite
Unencrypted RTP packet
SRTP E2E
SRTP HBH1
Cache
FlexFec
SRTP-HBH2
Decrypt (HBH2)
FlexFec
Cache

RTX

RTX

Endpoint (RTP Sender)

RTX A (Same as FEC A)



Unencrypted RTP packet

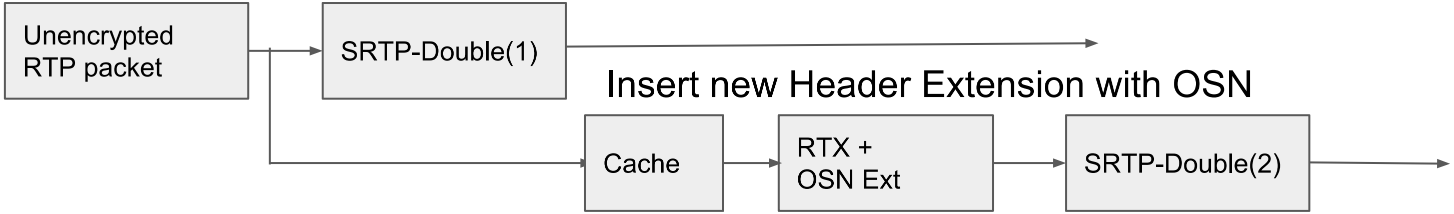
SRTP-Double(1)

Cache

RTX

Single HBH2

RTX B



Unencrypted RTP packet

SRTP-Double(1)

Insert new Header Extension with OSN

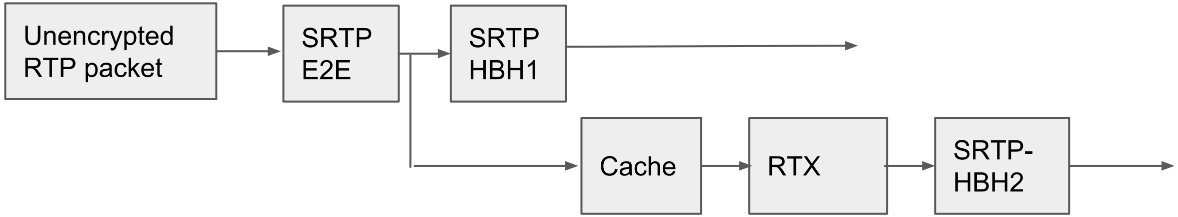
Cache

RTX + OSN Ext

SRTP-Double(2)

Media Distributor can not do repair

RTX - Lite



Unencrypted RTP packet

SRTP E2E

SRTP HBH1

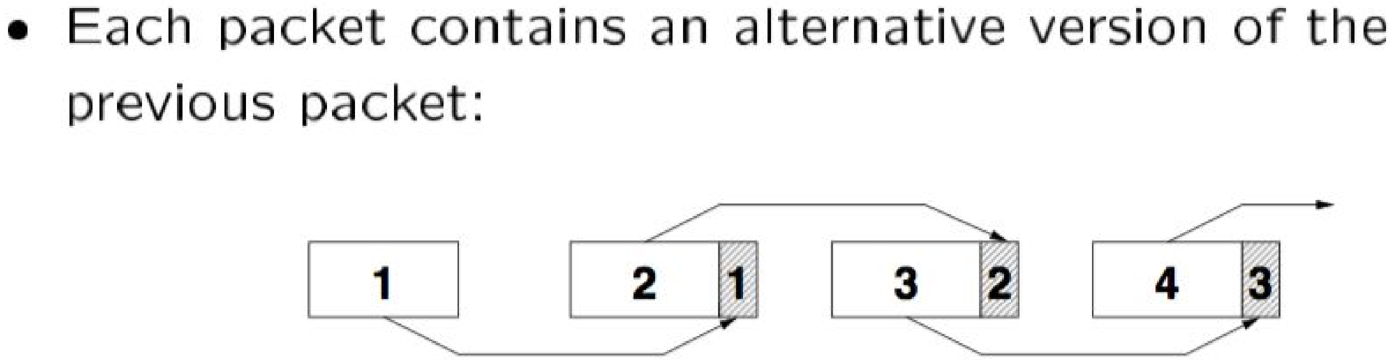
Cache

RTX

SRTP-HBH2

RED

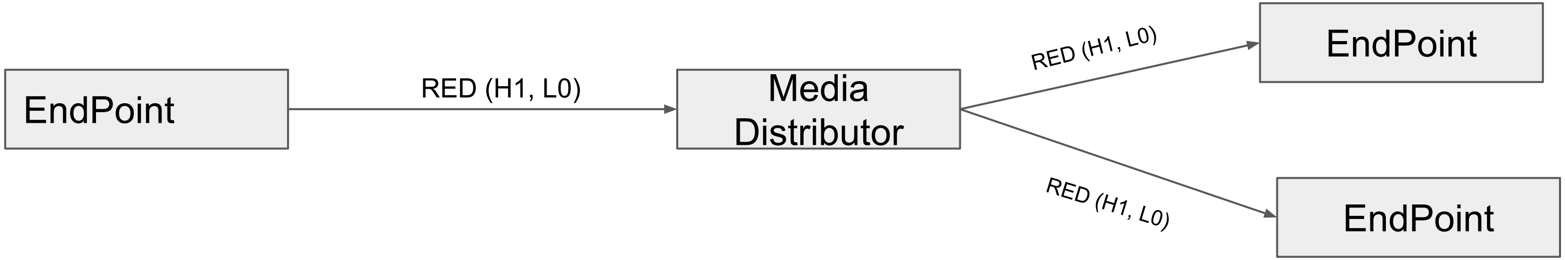
RED - Overview

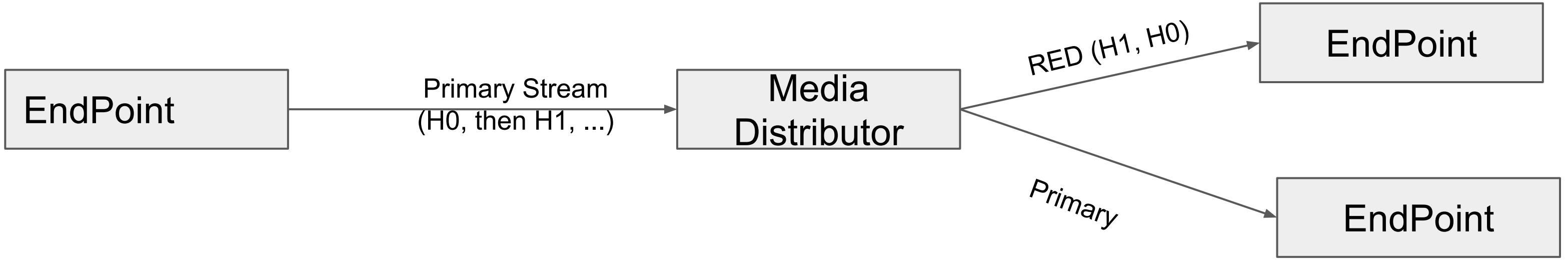


- Each packet contains an alternative version of the previous packet:

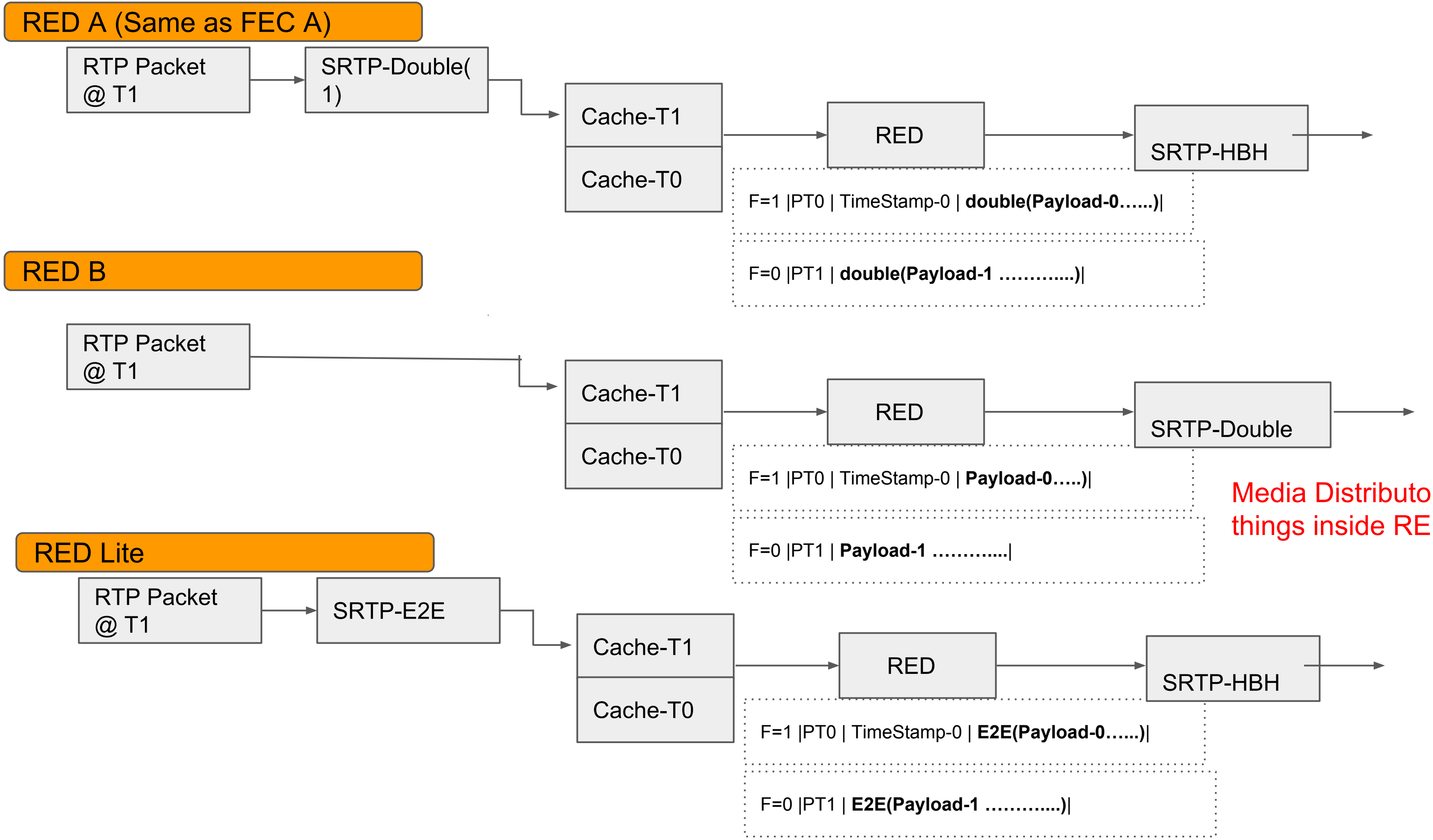
Above from IETF 37 in 1996, Thank you Colin

Redundant Encoding (RED) - Use-cases





Redundant Encoding (RED)



RED A (Same as FEC A)

RTP Packet @ T1 → SRTP-Double(1) → Cache-T1 / Cache-T0 → RED → SRTP-HBH →

F=1 |PT0 | TimeStamp-0 | **double(Payload-0……)**|

F=0 |PT1 | **double(Payload-1 ………...)**|

RED B

RTP Packet @ T1 → Cache-T1 / Cache-T0 → RED → SRTP-Double →

F=1 |PT0 | TimeStamp-0 | **Payload-0…..)**|

F=0 |PT1 | **Payload-1 ………...**|

RED Lite

RTP Packet @ T1 → SRTP-E2E → Cache-T1 / Cache-T0 → RED → SRTP-HBH →

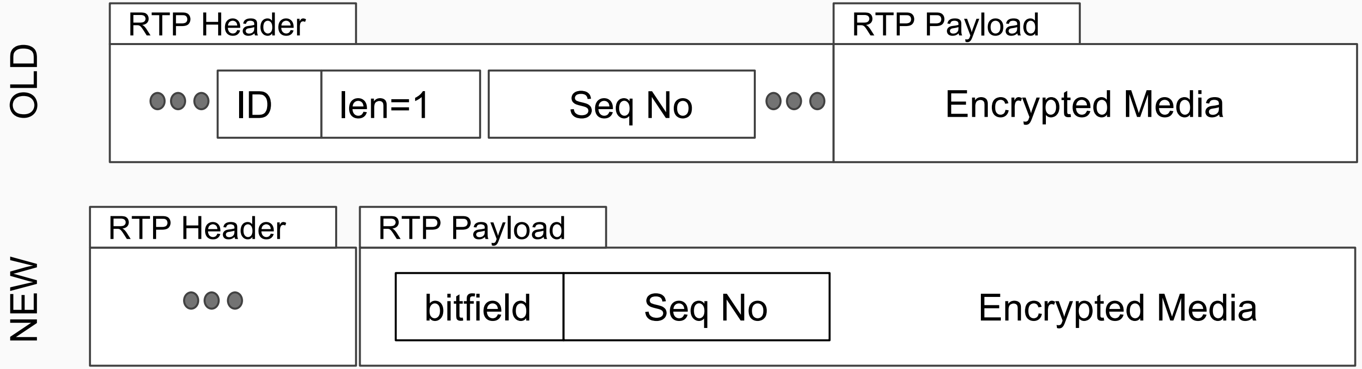
F=1 |PT0 | TimeStamp-0 | **E2E(Payload-0……)**|

F=0 |PT1 | **E2E(Payload-1 ………...)**|

Media Distributor can not read things inside RED packet

Proposal

Sergio Proposal to move OHB to Payload



- Take the content of OHB and move it to a block at the start of the payload
- Replace length with single byte bitfield indicating which “original” fields follow in payload.
    - Bit 0: PT
    - Bit 1: Seq No
    - Bit 2: M flag
    - Bit 3..6: future extensions
    - Bit 7: reserved for getting more bits
- Add a bit that is set for a field with counter of number of E2E protected header fields
- Have the EKT Message in the DTLS from the Key Distributor tell the client the value of the bitfield (as conveyed by the Media Distributor)

Proposal (part 2 of 2)

- Move the OHB information from header extension to payload (see previous slide)

- RTX, RED, and FlexFEC ordering: use the ordering described as “A” in this draft

- DTMF: Do not support the Media Distributor being able to receive DTMF (No change to current drafts)

EKT

EKT Issues

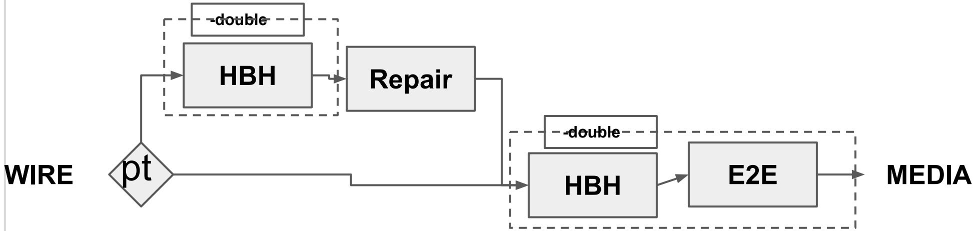
No open issues.

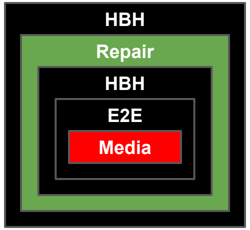
Add in to DTLS EKT message, the value of the bitfield value for the new Double Payload if we make the OHB -> Payload change

Backup

	Receiver Processing	Recovery Pkt.	Notes

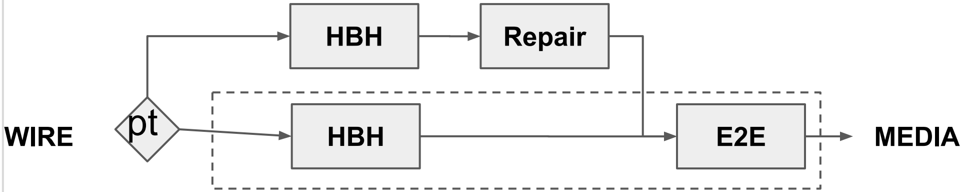
After Enc

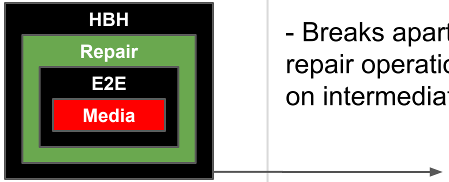




- State of the art [Jennings]
- s-flag for E2E vs. HBH
- Keeps unitary transform, with different output depending on s-flag
- “Triple” encryption

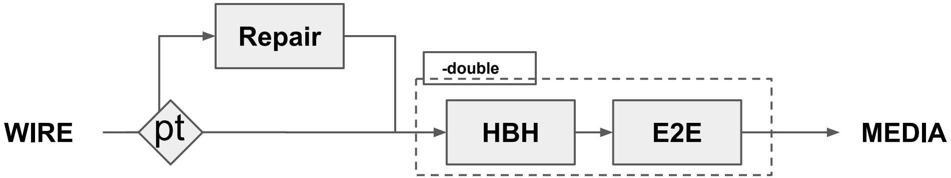
Lite

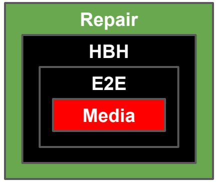




- Breaks apart transform, since repair operation has to operate on intermediate product

Before Enc





- State of the art [FlexFEC?]
- Keeps unitary transform, no need for s-flag

🟥 Plaintext ⬛ SRTP Transform 🟩 Repair transform (RTX / FEC)