FLEXFEC SDP

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draft-singh-payload-rtp-1d2d-parity-scheme-00
Motivation

- Current FEC standards lack sufficient flexibility to be usable for many use cases, including RTCWEB

- RFC 2733 XOR with 24-bit mask: obsoleted by 5109
- RFC 5109 XOR with 48-bit mask and ULP:
  - SSRC multiplexing not supported
    - draft-lennox-payload-ulp-ssrc-mux proposes a=ssrc-group:FEC
  - 48-bit mask insufficient for interleaved FEC to recover from burst loss, and requires >2% FEC
- RFC 6015 XOR with fixed 1D interleaved FEC:
  - Non-standard RTP header prevents general use
  - Fixed parameters not suited for adaptive real-time cases
- RFC 6682 Raptor FEC: IPR declarations exist
- RFC 6865 Reed-Solomon FEC: no RTP format
Proposed Solution

- New flexible FEC payload format ‘FLEXFEC’

- **Flexibility to use different multiplexing:**
  - SSRC multiplexing (e.g. BUNDLE, Unified Plan)
  - RTP session multiplexing (e.g. multicast, legacy SIP)
  - PT multiplexing within the same RTP stream
  - RED multiplexing within the same RTP packet

- Flexibility for sender to adapt FEC scheme based on dynamic network conditions (e.g. RTCP)

- 16, 48 or 112-bit mask for irregular FEC patterns
  - 112-bit mask allows larger source blocks and <1% FEC

- Virtual bit mask for larger, regular FEC patterns up to:
  - 255 non-interleaved (1D row) source packets, or
  - 255x255 interleaved (2D column*row) source packets
SDP using PT association

a=rtpmap:96 VP8/90000
a=rtpmap:97 H264/90000
a=rtpmap:98 FLEXFEC/90000
a=fmtp:98 apt=96,97; code=xor; repair-window=200ms

- apt associates the Redundant Stream packets with the source Encoded Stream packets. (Similar to RTX)
- repair-window specifies how long the receiver can wait for repair packets, in units of ms or us.
- code is an optional parameter for future extensibility to more FEC codes.
  - default is xor if omitted
SDP using SSRC association

a=rtpmap:96 VP8/90000
a=rtpmap:97 H264/90000
a=rtpmap:98 FLEXFEC/90000
a=fmtp:98 code=xor; repair-window=200ms
a=ssrc:1234
a=ssrc:5678
a=ssrc-group:FEC-FR 1234 5678

• **ssrc-group** associates the Redundant Stream (SSRC 5678) with the source Encoded Stream (SSRC 1234).
Next steps

• Agree in MMUSIC on multiplexing and binding source and repair streams in SDP

• Adoption as PAYLOAD WG-item