

1-D Interleaved Parity FEC

draft-begen-fecframe-interleaved-fec-scheme-00

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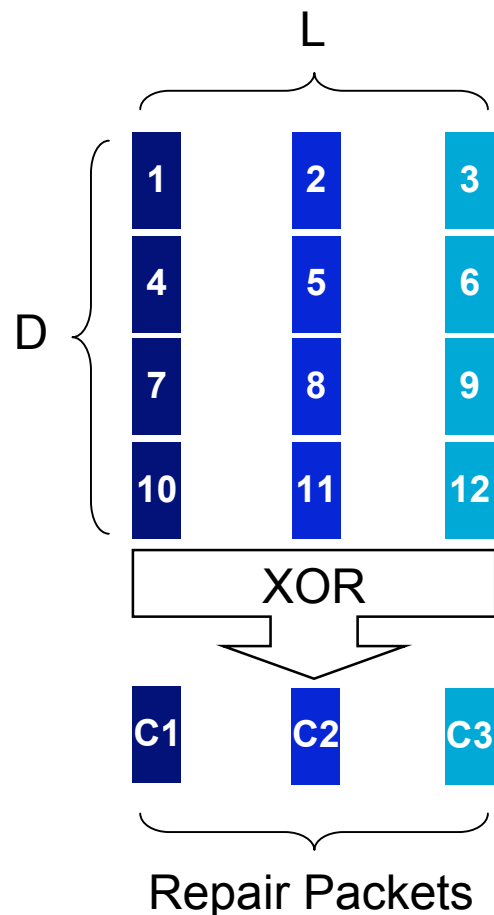
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Introduction

- 1-D interleaved parity code
 - Is a systematic FEC code of decent complexity
 - Provides protection against bursty losses
- This document describes
 - A Fully-Specified FEC Scheme for the 1-D interleaved parity code
 - An RTP payload format for the FEC that is generated by this code
- The FEC defined in this document
 - Adopts the RTP payload format defined in SMPTE 2022-1
 - We fix the parts of SMPTE 2022-1 that are not RTP compliant
 - Forms the base layer in the DVB AL-FEC protocol

1-D Parity FEC



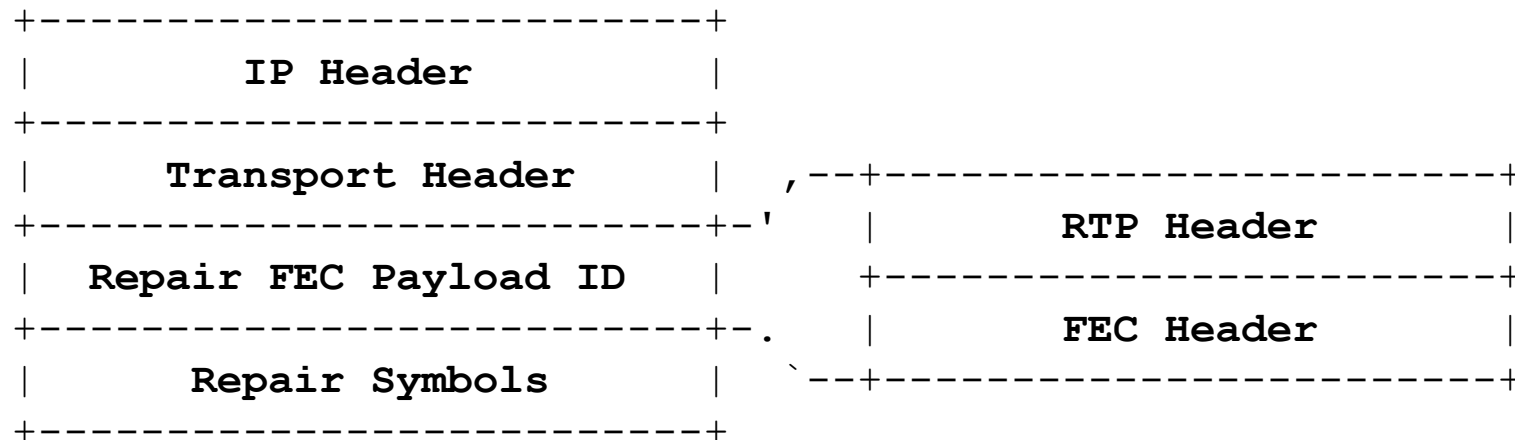
- Source block size: $D \times L$
- Each column produces a single packet
→ Overhead = $1 / D$
- L-packet duration should be larger than the (target) burst duration
- Full recovery is possible if
 - Only at most one source packet is missing in a column, and
 - The repair packet in that column is available

Source FEC Payload ID

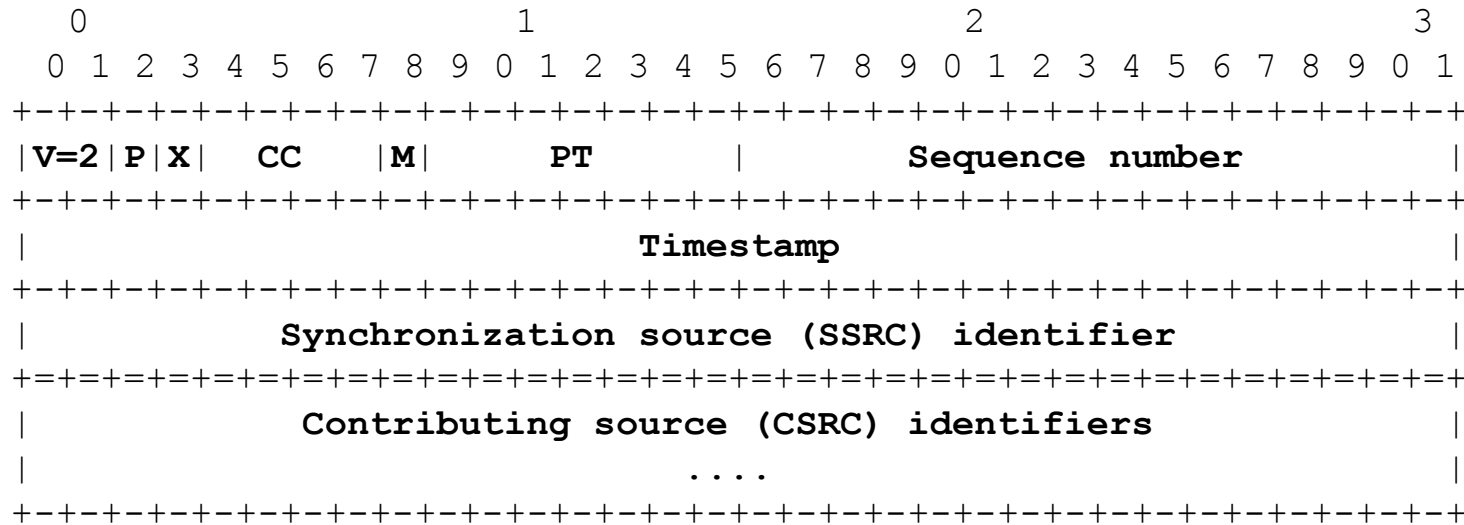
- Each source packet **MUST** contain the information that identifies
 - Source block
 - Packet's relative position within the source block
- We use RTP streams as the source flows
 - Unique sequence numbers in the RTP headers
 - No need to use the Explicit Source FEC Payload ID field
- Source packets are not modified
 - Compatibility with non-FEC-capable receivers
 - Usability of the same multicast group for all receivers

Repair FEC Payload ID

- Repair packets **MUST** contain information that identifies
 - Source block they pertain to
 - Relationship between the repair symbols and original source block

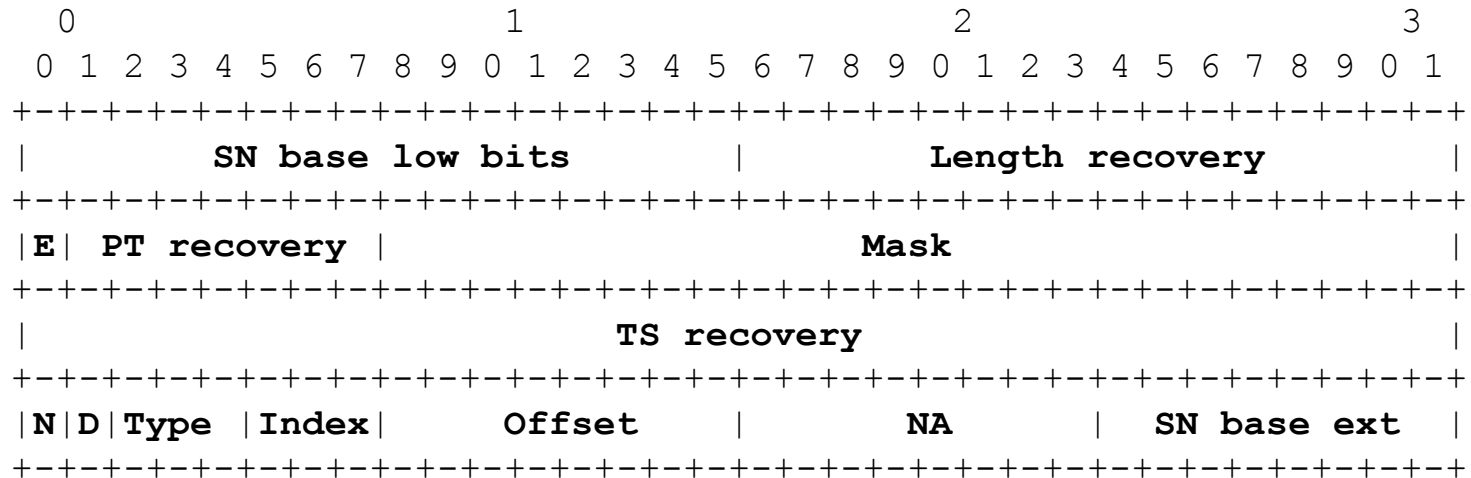


RTP Header for Repair Packets



- P, X, CC and M are obtained by applying protection to the corresponding fields in the source packets
- Payload Type: Introduced in this document (Requires IANA registration)
 - Unrecognized payload types are discarded per RFC 3550
- Sequence Number (SN): One higher for each subsequent packet
- Timestamp (TS): Set to the timestamp of the source packet whose seqnum is indicated in SN base
- SSRC: Randomly assigned per RFC 3550
 - Sender can multiplex the source and repair flows on the same port, or multiple repair flows on a single port
 - RTCP CNAME field is used to associate the repair flows with the source flow

FEC Header



- SN base low bits: Set to the lowest sequence number of those source packets protected by FEC
- E bit: Set to 1 to extend RFC 2733 FEC header
- Mask: Set to 0 and ignored
- N bit: Extension flag, set to 0. Reserved for future use
- D bit: Set to 0 and ignored
- Type: Set to 0 (Error-correcting code type)
- Index: Set to 0 and ignored
- Offset: Set to L
- NA: Set to D
- SN base ext bits: Set to 0 and ignored

Configuration Information

- FEC Encoding ID: Requires IANA registration → 0 or 1?
- FEC-Scheme-Specific Information (FSSI)
 - L: Number of columns of the source block
 - D: Number of rows of the source block

FEC Encoding / Decoding

- FEC Encoding – Repair Packet Construction
 - RTP Header: Regular RTP header for the repair packet
 - FEC Header: Provides protection for the RTP headers of the source packets
 - Repair Symbols: Provides protection for the “RTP payloads” of the source packets
 - Variable-length packets are OK
- FEC Decoding – Source Packet Reconstruction
 - Step 1: Associating the source and repair packets
 - Step 2: Recover the RTP header and the payload

Comments/Questions