# DVB AL-FEC Hybrid FEC Protection

draft-ietf-fecframe-dvb-al-fec-00

IETF 73 – November 2008

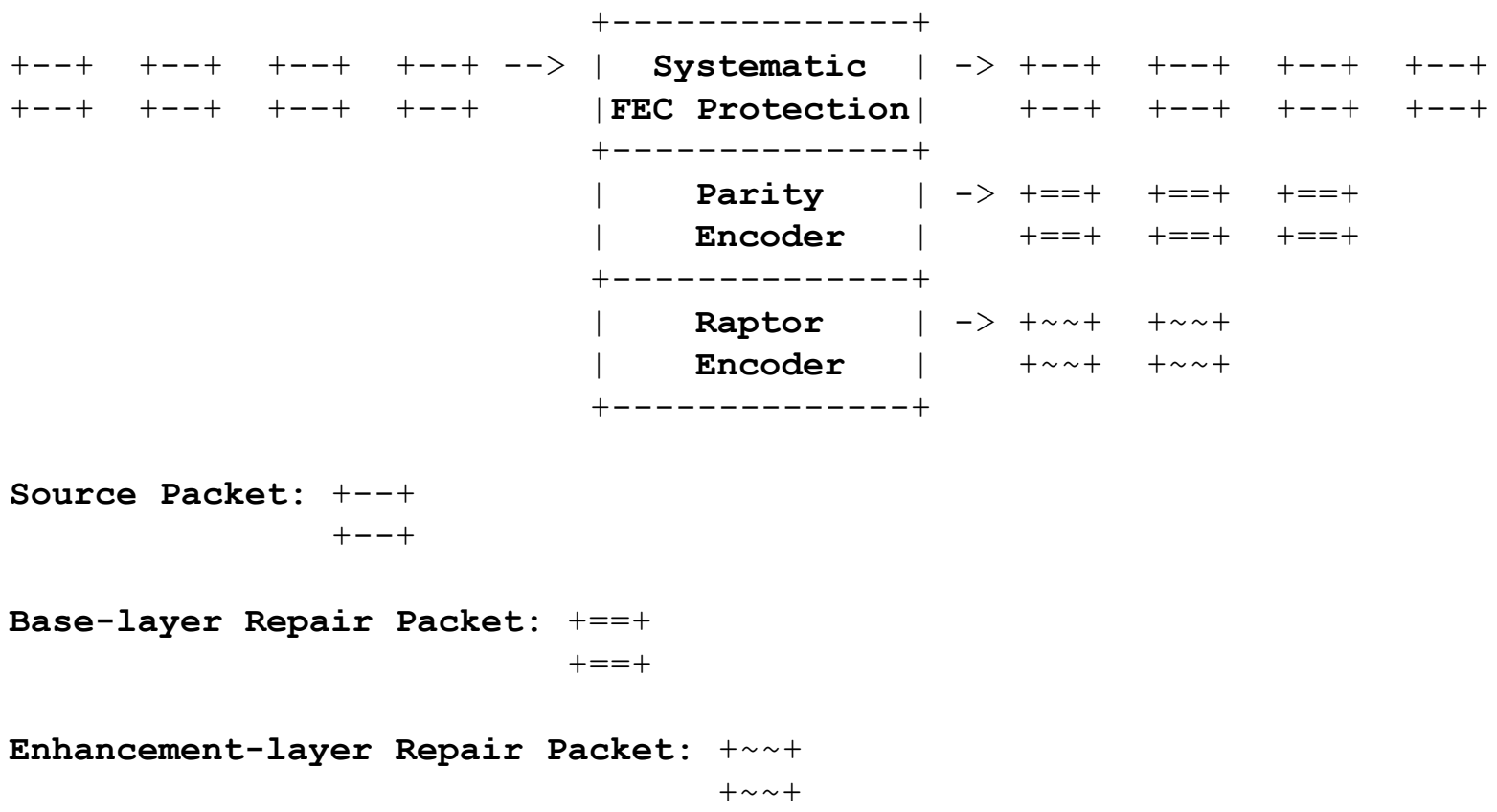
**Ali C. Begen and Thomas Stockhammer**

abegen@cisco.com, stockhammer@digitalfountain.com

# Introduction

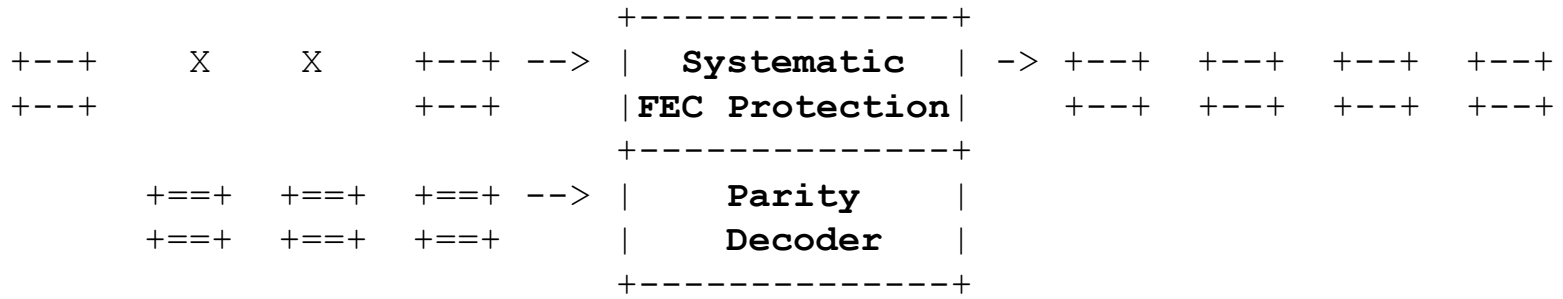
- DVB AL-FEC protocol uses two layers of protection:
  - Base layer: 1-D Interleaved Parity FEC Code
    → SMPTE 2022-1-2007
  - Enhancement layer: Raptor Code
    → draft-ietf-fecframe-raptor
    → draft-watson-fecframe-rtp-raptor
- Both layers are systematic codes
- The specs are
  - ETSI TS 102 034 v1.3.1
  - Draft ETSI TS 102 034 v1.4.1 (Bluebook A086r7)

# DVB AL-FEC Encoder

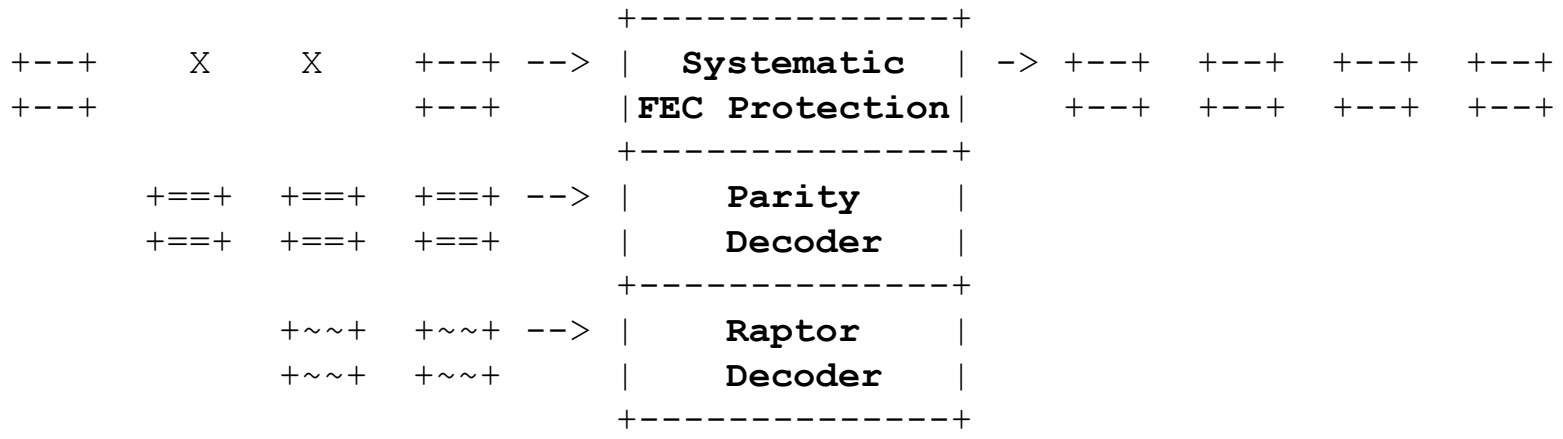


# DVB AL-FEC Decoders

## Minimum Performance Decoder:




## Enhanced Decoder:




**Lost Packet:** X

# Hybrid Decoding

1. Perform parity decoding
   - Are all missing packets recovered?
     - Yes → Done
     - No → Go to step 2
2. Perform Raptor decoding
   - Are all missing packets recovered?
     - Yes → Done
     - No → Go to step 3
3. Convert the unprocessed parity repair packets to a form in which they can be added to the Raptor decoding process and continue decoding

# ETSI TS 102 034 v1.3.1 vs. v1.4.1

- Base-layer FEC
  - v1.3.1: RTP only
  - v1.4.1: RTP only
- Enhancement-layer FEC
  - v1.3.1: UDP only
  - v1.4.1: RTP only

# ETSI TS 102 034 v1.3.1

- Base-layer FEC is based on SMPTE 2022-1-2007
- Incompatibilities of SMPTE 2022-1 with RFC 3550
  - SSRC is set to zero in the FEC stream
  - No CSRC fields are allowed in the source packets
  - Timestamp in the FEC stream is ignored by the receivers
    - It is probably set to zero
  - Initial seqnum of the FEC stream is not chosen randomly
  - PT field is set to 96 in the FEC stream

# Resolution Attempts

- draft-ietf-fecframe-interleaved-fec-scheme fixed these issues
  - Changes are not backward compatible
  - The draft has not been adopted by DVB (yet)
    - v1.4.1 only allowed to choose the initial seqnum randomly for the FEC stream
- AVT WG sent a liaison to DVB-IPI on Oct 22nd
  - AVT suggested DVB to define a new RTP profile for the AL-FEC protocol
    - This profile prohibits the use of RTP mixers

      → Solves the CSRC issue
    - This profile assigns 96 as the payload type

      → Solves the PT issue
  - AVT suggested DVB to use explicit SSRC signaling via draft-ietf-mmusic-sdp-source-attributes

    → Solves the SSRC issue
  - If the new profile will be defined, only the timestamp issue will remain

# IANA Issues

- DVB registered the following for ETSI TS 102 034 v1.3.1
  - vnd.dvb.iptv.alfec-base
    - RTP format parameters are NOT defined for this registration
    - It is not clear how FEC parameters will be defined/set in SDP

- draft-ietf-fecframe-interleaved-fec-scheme registers the following
  - 1d-interleaved-parityfec
    - All RTP format parameters are defined

- DVB has not registered anything for ETSI TS 102 034 v1.4.1
  - Use of vnd.dvb.iptv.alfec-base may cause implementation issues

# Next Steps

- draft-ietf-fecframe-interleaved-fec-scheme explains a fully RTP-compliant implementation
- draft-ietf-fecframe-dvb-al-fec explains the exceptions to be compliant with v1.3.1 and v1.4.1
- Unless DVB is willing to resolve the remaining issues in v1.5, we should update the draft based on v1.4.1 and WGLC