**ITU Telecommunication Standardization Sector**
**Study Group 15**
**Experts Group for Video Coding and System**
**in ATM and Other Network Environments**

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SOURCE : JAPAN
TITLE : Consideration on the Forward Error Correction support for H.32X terminals
PURPOSE : Discussion

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## 1. Introduction

At the Grimstad meeting, we agreed to the preference of seeking the generic AAL solution(s) for bit error / cell loss correction. From the H.32X specification point of view, we have to consider the level of support ( Mandatory or Optional ) of the forward error correction for H.32X terminals.

In this document, we consider the support level of FEC and compare the optional FEC methods in AAL type 1.

## 2. Consideration on the support level of FEC for H.32X terminals

There are three alternatives whether H.32X encoder and decoder support FEC or not.

**Case 1:** FEC is mandatory at both encoder and decoder

Based on the network QOS scenarios[AVC-635], bit error correction is necessary even if network QOS is of the best case and cell loss correction is necessary for the worst case.[AVC-657]

**Case 2:** FEC is mandatory at encoder and FEC is optional at decoder

This case is the same as H.261. User can select the use of FEC function depending on the network QOS.

**Case 3:** FEC is optional at both encoder and decoder

At the time of call set-up encoder and decoder need to negotiate their capabilities of FEC by using out-channel. It would be complicate at multipoint or broadcasting type service.

The necessity of FEC function for H.32X terminals should be considered from system aspects point of view. In order to leave the flexibility for implementation, case 2 may be a good solution for support level of FEC.

## 3. Comparison of FEC Methods in AAL type 1

Even if the FEC in AAL 1 is optional for H.32X decoder, every H.32X decoder has to support the synchronization of FEC frames and has to discard the Reed-Solomon codes.

Moreover, according to the FEC methods, decoding process and impact of a cell loss are different as follows.

(a) Diagonal Interleaving (Short Interleave Method in I.363 [ Figure 1/Annex 1] )

- Need of deinterleave mechanism (Deinterleaver size is 94 x 8 bytes.)
- Due to the deinterleaving, one cell loss ( i.e. 47 bytes burst error ) results in 47 bytes single errors. In case of Transport Stream, 4 or 5 TS packets are damaged. In case of Program Stream, almost interleaver data (650 bytes) are damaged.

(b) Orthogonal Interleaving (Long Interleave Method in I.363 [ Figure 2/Annex 1] )

- Need of deinterleave mechanism (Deinterleaver size is 124 x 47 bytes.)
- Due to the deinterleaving, one cell loss results in 47 bytes single errors. In case of TS, 31 or 32 TS packets are damaged. In case of PS, almost interleaver data (5705 bytes) are damaged.

(c) Parallel writing & reading (AVC-617 [ Figure 3/Annex 1] )

- No need of deinterleave mechanism
- In case of TS, one cell loss will cause 47 bytes burst error for one TS packet. If the TS header exists within the lost bytes, it is impossible to identify the media type by using PID, therefore the associated TS packet will be discarded. In case of PS, 47 bytes data are damaged.

For the diagonal and the orthogonal interleaving methods, the deinterleave function is also mandatory for every decoder and the errors due to cell loss are widely spread. Further discussion for the hardware impact of deinterleaver is necessary.

On the other hand, the error correction method described in AVC-617 ( i.e. parallel writing and reading ) is suitable for the optional use of FEC for the H.32X decoder.

## 4. Conclusion

In this document, we considered the support level of FEC for H.32X terminals and the optional use of FEC methods in AAL type 1. As a result, it may be desirable that FEC is mandatory at the encoder and optional at decoder. From the comparison of FEC methods, the error correction method described in AVC-617 ( i.e. parallel writing and reading ) is suitable for the optional use of FEC for the H.32X decoder. This implies definition of a new option in AAL 1. In order to get the firm conclusion, further discussion for the hardware impact of deinterleaver is necessary.

END.

**[References]**


[1] AVC-617 Cell loss correction method in AAL for transmission of MPEG-2 Transport packets (Japan), March 1994, Paris.

[2] AVC-635 ATM performance assumptions (Experts Group), March 1994, Paris.

[3] AVC-657 Consideration on error correction functionality in H.222.1/AAL (Japan), July 1994, Grimstad.

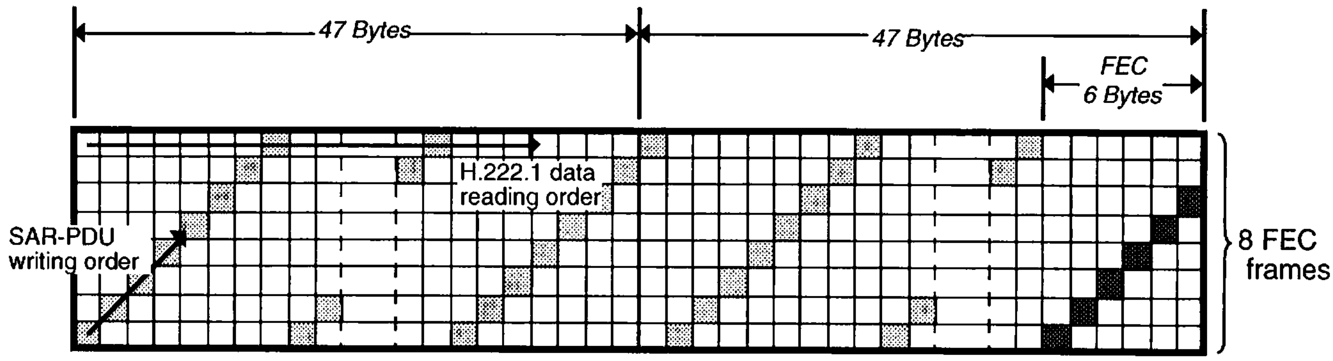


Figure 1 / Annex 1 Short interleave method in I.363

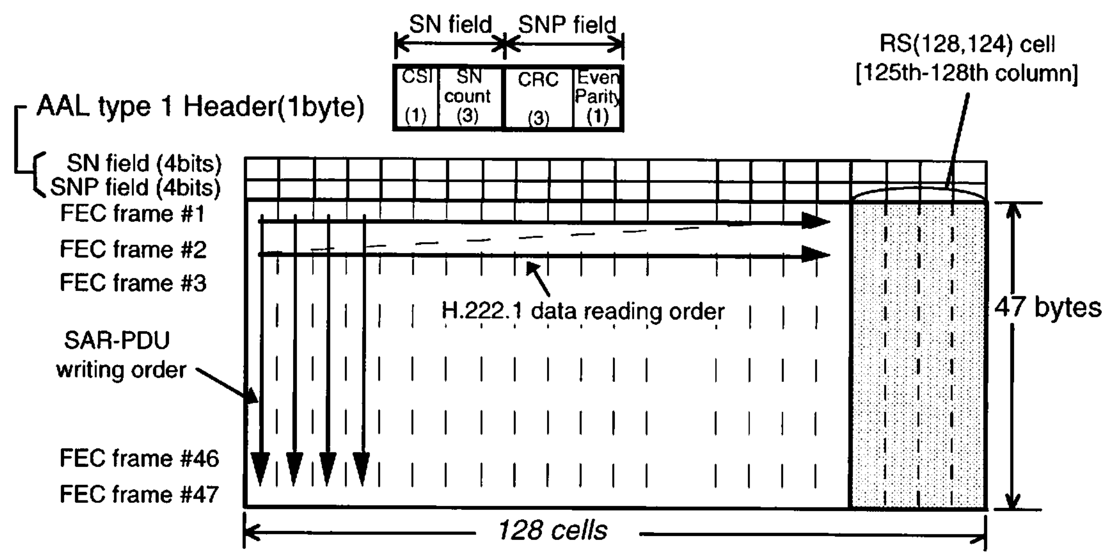


Figure 2 / Annex 1 Long interleave method in I.363

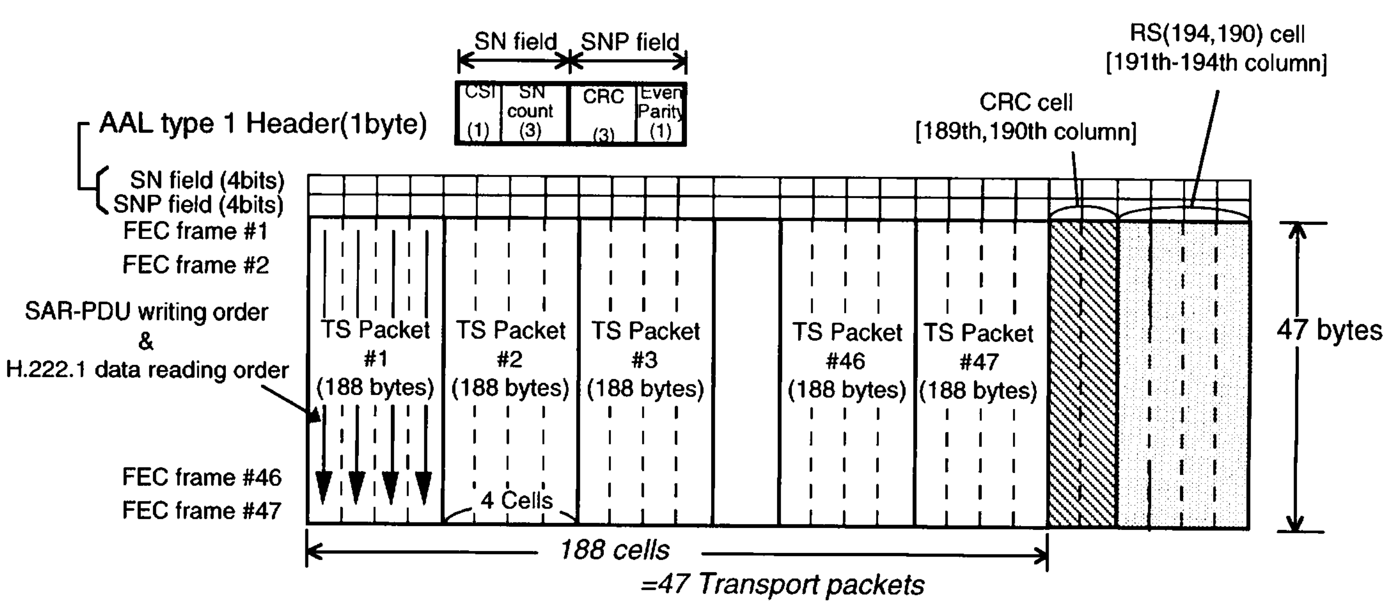


Figure 3 / Annex 1 Error correction method from AVC-617