Subject : ATM cell loss experiments with TM1

Source : PTT Research, The Netherlands

Purpose : Information, discussion

1 Introduction

At this moment, much attention is paid to the source coding for MPEG2. As the future MPEG2 standard is likely to be used for H.26x, in an early state attention has to be paid to the error sensitivity of the new scheme (bit errors, ATM cell loss). In this document, ATM cell loss experiments with a TM1 pure field based codec are described. A comparison is made between one-layered and two layered coding (compatible with MPEG1). An accompanying tape is provided to subjectively verify the results.

2 Coding structure

The encoder is a pure field based codec as described in appendix E of CCITT document AVC-260 (Description of Test Model 1) with the following addition:

- The error signal of all odd macroblocks can be predicted by the upsampled error signal of the MPEG1 encoder.

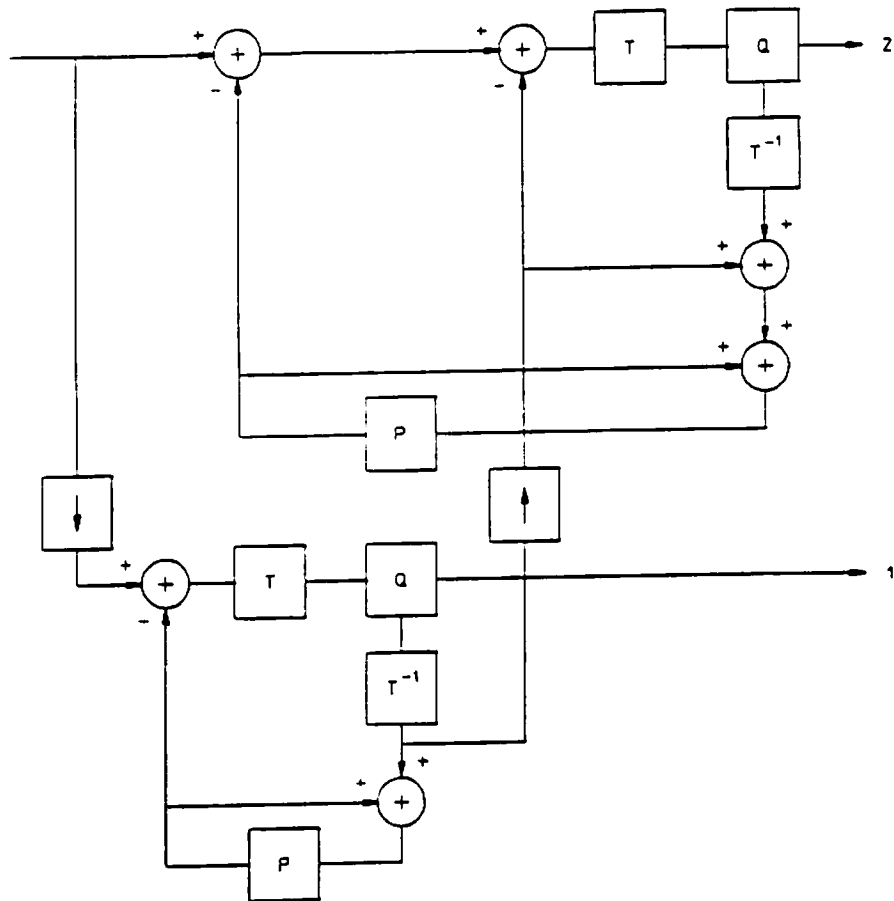This is according to CCITT document AVC-260 appendix G, chapter one.
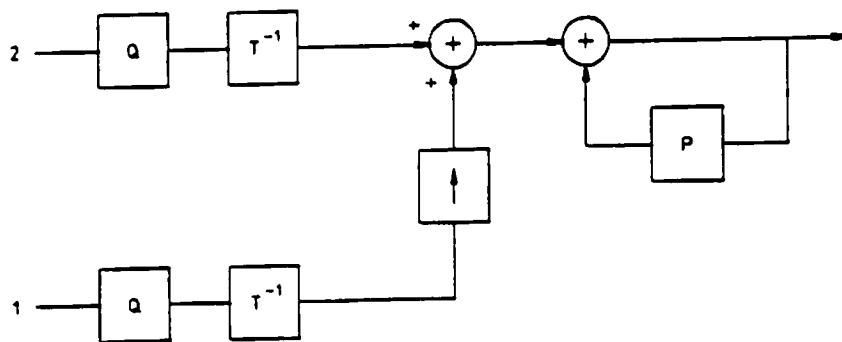
Figure 1: Compatible encoder structure

Figure 2: Compatible decoder structure

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3 Simulations and Results

The first 50 frames of CALENDAR and FLOWER GARDEN are coded
(M = 3, N = 12). Then, the bitstreams are decoded:

1. without cell loss;

2. with a mean overall cell loss rate of 1 in 1000 and a mean burst length of
   2.

Cell loss is simulated according to appendix F of CCITT document AVC-260.
The bitrates used for high resp. low priority are given in table 1. Only low

	High priority bitrate	Low priority bitrate
1-layer	0	4
2-layer	1.5	0
	0	2.5

priority cells are lost; to reach a mean overall cell loss rate of 1 in 1000, for the
2-layered coding a mean cell loss rate of 1 in 625 is used for the low priority cells.

For the low priority bitstreams, resynchronization is adapted by searching for
the next startcode. In case of one-layered coding, the frame memory is fixed for
the remaining macroblocks of the current slice. In case of two-layered coding,
these macroblocks are reconstructed by using the MPEG1-information (coeffi-
cients AND motion vectors).

An accompanying tape is provided to subjectively verify the results.

4 Conclusion

The influence of ATM cell loss on one- and two-layered TM1 coding was investi-
gated. Layered coding can be very useful for transmission over ATM-networks
when the base layer bitstream can be sent over a guaranteed channel. Further
study and more information on how multi-layered coding will be supported by
ATM-networks is needed to make firm conclusions possible.

5 Acknowledgement