Telecommunication Standardization Sector
Study Group 15
Experts Group for ATM Video Coding
(Rapporteur's Group on Part of Q.2/15)

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**Source :** BELGACOM - UCL
**Title :** Error resilience based on Data Partitioning
**Purpose :** Information / Discussion

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## 1. Introduction

Delivering video signals over an ATM network implies that an encoder has the opportunity to split its bit-stream into two *sub bitstreams*; each of them being transmitted with a different quality of service (QOS). This is not a mandatory mechanism; it is only a way of reducing the transmission cost by sending information in *lower price* cells.

Two main approaches have been studied so far to define such a two-layer scheme:

A. two-loop solution (e.g. Spatial Scalability)
B. one-loop solution (e.g. Data Partitioning)

Spatial Scalability is in the NP. Data Partitioning is going to be included in the MPEG-2 CD but not in SP, MP nor NP.

The SNR scalability scheme is somewhere between those two.

## 2. Data Partitioning

The use of Data Partitioning implies to indicate to the decoder the place where the bitstream has been split (PBP : Priority Break Point). This can be done at the beginning of any transmission by external means; in this case this PBP is fixed during all the transmission and the amount of bits obtained in each of the two partitions may vary. This can be done also at the slice level as described in TM5 Appendix L, to allow the encoder to maintain constant the bitrate in each layer. However, this syntax does not take into account the case of progressive refresh (at the slice level). To solve this problem, the transmisson of the PBP at the slice level should be done as follow :

| | |
|---|---|
| slice (P or B pictures) : | PBP Intra (expressed on 7 bits) |
| | PBP Inter (expressed on 7 bits) |
| slice (I pictures) : | PBP Intra (expressed on 7 bits) |

## 3. Results

Tests have been carried out on *Flower Garden*, *Mobile & Calendar* and *Suzie* :

| | |
|---|---|
| Number of pictures : | 100 |
| Value of M : | 3 |
| Value of N : | 12 |
| Bit Rate : | 6 Mbit/s (except for *Suzie* : 4 Mbit/s) |
| Number of lines : | 576 |
| Field rate : | 50 Hz |

**Table 1**

Two different sets of PBP have been tried :

Configuration 1 : PBP Intra = 8 PBP Inter = 5
Configuration 2 : PBP Intra = 4 PBP Inter = 2

This leads to the following results :

| PBP | Sequence | Part 0 | Part 1 |
|---|---|---|---|
| (8,5) | Mobile & Calendar | 54 % | 46 % |
| | Flower Garden | 60 % | 40 % |
| | Suzie | 76 % | 24 % |
| (4,2) | Mobile & Calendar | 46 % | 54 % |
| | Flower Garden | 50 % | 50 % |
| | Suzie | 67 % | 33 % |

**Table 2**

Subjective quality can be assessed on a *D1-tape*. The *cell loss rate* is $10^{-3}$ and the *mean burst length* is 2 (as defined in TM5).

## 4. Conclusions

Data partitioning is the cheapest way to provide a two layer scheme for taking advantage of a network with two QOS while assuring a very acceptable picture quality.

The current Working Draft implies that the only way to indicate the use of Data Partitioning is by external means. Do we want the PBP information included in the H.26X bitstream at the slice level to allow constant bit rate mode in each of the two layers or are we satisfied with the current situation ?

## References


**AVC-490** H.26X error resiliency based on Data Partitioning and concealment *Tektronix*
**AVC-504** MPEG-2 / H.26X error resilience based on Data Partitioning *Belgacom, UCL*