ISO/IEC JTC1/SC29/WG11
MPEG92/
October, 1992

CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

Document AVC-360

SOURCE : Japan
TITLE : Structured packing
PURPOSE : Discussion

1. Introduction

To minimaize the degraded area in a picture at the point of cell loss, structured packing methods have been proposed. Structured packing is based on a concept that some syncronization between the video bitstream and cell enables quick recovery after a cell loss. In this document, the proposed structured packing methods are compared and the impact on the video syntax and on AAL are discussed.

2. Structured packing

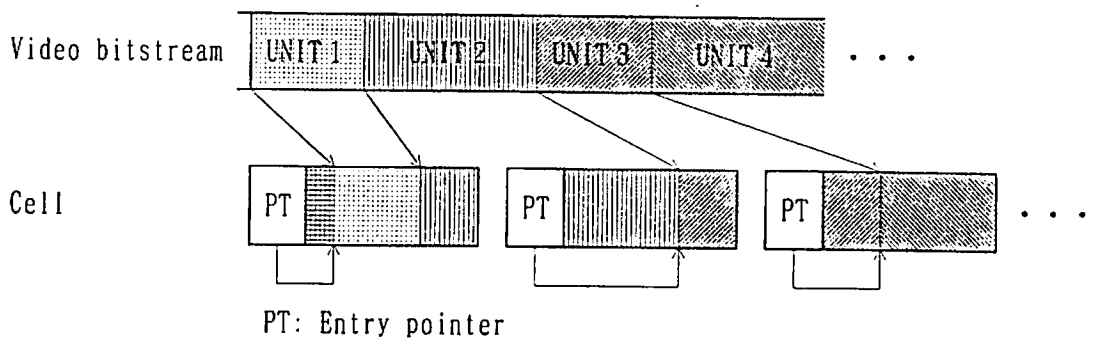
In the current TM2 syntax, resyncronization of the video bitstream is only possible at slice header (or picture header). Therefore, a cell loss leads to degradation of whole the MBs in a slice, in the worst case. It can be improved by shortening the slice size, but it decrease the coding efficiency by inserting slice header (slice start code + quantizer scale = 37 bits at minimum) every small unit of MBs. On the other hand, structured packing methods have been studied as an auxiliary method to realize quick recovery with minimum loss in coding efficiency. The methods utilize the cell syncronization to realize cell based recovery. Proposed methods and their impacts on AAL and on video syntax are described in Table 1. These methods have their own senarios, however, some common requirements can be found as follows.

2.1 Requirements for AAL

Proposed methods are roughly devided into two groups according to the assumed service mode in AAL (i.e. streaming mode and message mode). Requirements for AAL in each case are as folows:

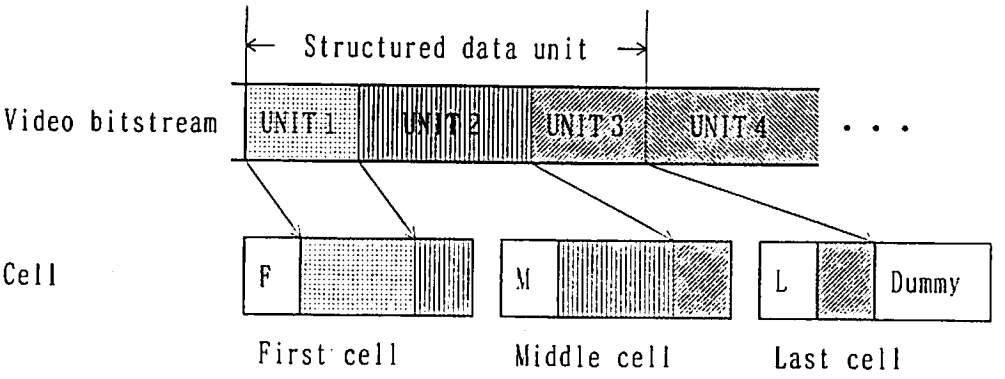
(1)Streaming mode

An entry pointer mecanisz which indicates the first boundary of video data units (possibly MB) in a cell is necessary in AAL. Protocol for notification of the boundary between AAL and user is also needed.



(2)Message mode

Handling of structured data unit (variable length ?) is necessary to be supported by AAL.



2.2 Requirements for video syntax

The following syntax is necessary to be included to realize MB based recovery.

-Additional code table(s)

A new code table which allow absolute addressing for any MBs and /or a new MB type to realize equivalent mechanism (see Annex for example).

-Additional mechanism

A new mechanism which enables to reset prediction among MBs in a slice (DPCM coding of intra DC component and Motion vector).

3. Conclusion

Proposed structured packing methods are discussed from a view point of their impacts on AAL and on video syntax. It was clarified that an entry pointer and handling of structured data unit are required to be supported in AAL and an absolute addressing mechanism is a common requirement for video syntax. The final decision should be made after more mature consideration on the best balance among cell loss resilence, AAL/bitstream generality and coding efficiency. Furthermore, taking multimedia environments into account (multimedia/VC case etc.), structured packing may be performed in the multiplex layer (MPEG2 system), which also needs further study.

Table 1: Comparison among proposed structured packing methods

Organization	AAL		Required items for video syntax		Comments
	Service mode	Required items			
Fujitsu [1]	Streaming mode	- Entry pointer - Protocol for cell timming indication between AAL/user	- Horizontal MB address - Vertical MB address	- Absolute MBA*	- Resyncronaization can be done cell by cell, even slice header is lost
Matsushita [2]		- Entry pointer	- Horizontal MB address	- Absolute MBA*	- Segmentation within a cell is used for efficient realization of entry pointer mechanism - Vertical MB address is detected by using vertical slice address
DSRC [3] TCE		- CLP support - Entry pointer - Protocol for cell timming indication between AAL/user	High priority: - Slice No. - Header information - Layering information Standard priority: - Horizontal MB address - Header information		- Use of priority transport - Each cell includes all the necessary header information for perfect cell-by-cell recovery
KDD [4]	Message mode	- Handling of structured data with variable interval	- Horizontal MB address - Vertical MB address	- Absolute MBA*	- Length of the structured unit is under the freedom of encoder

* : Not necessary, if horizontal MB address is supported in the other layer than in video syntax.

References

(1)AVC-235(MPEG92/184) , AVC-279(MPEG92/342)
(2)AVC-333(MPEG92/473)
(3)MPEG92/353, AVC-308(MPEG92/344)
(4)Annex2 to AVC-190, AVC-269

Annex to AVC-360

An example of Macroblock Address extention to support absolute addressing

Table B.1.a Variable length codes for macroblock-address-increment.

macroblock-address-increment VLC code	increment value	macroblock-address-increment VLC code	increment value
1	1	0000 0101 10	17
011	2	0000 0101 01	18
010	3	0000 0101 00	19
0011	4	0000 0100 11	20
0010	5	0000 0100 10	21
0001 1	6	0000 0100 011	22
0001 0	7	0000 0100 010	23
0000 111	8	0000 0100 001	24
0000 110	9	0000 0100 000	25
0000 1011	10	0000 0011 111	26
0000 1010	11	0000 0011 110	27
0000 1001	12	0000 0011 101	28
0000 1000	13	0000 0011 100	29
0000 0111	14	0000 0011 011	30
0000 0110	15	0000 0011 010	31
0000 0101 11	16	0000 0011 001	32
		0000 0011 000	33
		0000 0001 111	macroblock-stuffing
		0000 0001 000	macroblock-escape
		0000 0000 1	macroblock-reset

Table B.1.b Encoding of absolute macroblock-address following macroblock-reset code as a 6-bit fixed length code. length code.

absolute macroblock-address FLC code	absolute value
1111 11	escape
0000 01	1
0000 10	2
0000 11	3
...	...
...	...
...	...
...	...
...	...
1111 10	62
0000 00	63