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SOURCE: Japan
TITLE: Re-synchronization by slice size reduction
PURPOSE: Information

1. Introduction

At this moment, two types of spatial error spread prevention methods are on study for cell loss error recovery. One is structured packing and the other is slice size reduction. In this document, degradation owing to slice size reduction was examined by simulation, and merit and demerit of structured packing were pointed out comparing to the slice size reduction.

2. Simulation condition

The simulation conditions were as follows.

TM2 M=1, N=150, 4 Mbps
Fr structure, Fr/Fi prediction
Fi structure, Fi/Dual
sequences; Flower Garden, Mobil & Calendar, Football
slice size; 1 slice = 44 MB (= TM2), 22 MB, 11 MB, 4 MB, 2 MB

3. Simulation result

Table 1 shows the result for Fr structure and Table 2 shows the result for Fi structure. The results show that the degradation by slice size reduction from 44 to 4 was about 0.6 dB and by slice size reduction to 11 was about 0.2 dB. As for picture quality, difference between 44MB and 4 MB was distinguishable but difference between 44 MB and 11 MB was very small.

4. Merit and demerit of structured packing

Comparison between transmission efficiency of structured packing described in AVC-279 and slice size reduction is shown in the annex. Slice header spends about 24 excessive bits than structured packing for this example case. On the other hand, if structured packing is applied, H.26X decoder must work with subsidiary information prepared outside the syntax. In this case, it becomes difficult to use common hardware for H.26X and MPEG2.

5. Conclusion

Degradation owing to slice size reduction was examined by simulation. When slice size was reduced to 4 MB/slice, degradation in picture quality was distinguishable. Although, comparison of both methods should be based not only on transmission efficiency but also on other points such as imprementability of H.26X.

Further, if the performance of concealment is good enough to allow slice size reduction only to 11 MB/slice, it doesn't seem that degradation has to be cared much.

END

Table 1 Simulation result for Fr structure

	Flower Garden	Mobil & Calendar	Football
44 MB/slice	28.26 dB	26.26 dB	33.85 dB
22 MB/slice	28.19 dB	26.21 dB	33.78 dB
11 MB/slice	28.08 dB	26.13 dB	33.67 dB
4 MB/slice	27.60 dB	25.78 dB	33.21 dB
2 MB/slice	26.77 dB	25.22 dB	32.39 dB

Table 2 Simulation result for Fi structure

	Flower Garden	Mobil & Calendar	Football
44 MB/slice	27.82 dB	25.48 dB	34.09 dB
22 MB/slice	27.75 dB	25.43 dB	34.03 dB
11 MB/slice	27.62 dB	25.35 dB	33.92 dB
4 MB/slice	27.11 dB	24.98 dB	33.49 dB
2 MB/slice	26.24 dB	26.38 dB	32.73 dB

Annex Structured packing vs. synchronization by slice header

1. Amount of bits for synchronization unit

structured packing (ex. AVC -279)

pointer	9 bits
macroblock_address	11 bits (including both horizontal and vertical)
macroblock_type (with macroblock_quant)	5-6 bits (ave. 5.5 bits)
quantizer_scale	5 bits
total	30.5 bits

synchronization by slice header (4 MB/slice)

slice_start_code	32 bits (including vertical address)
quantizer_scale	5 bits
extra_bit_slice	1 bit
macroblock_address	4-18 bits -1 bit (horizontal only ave. 9.5 bits) (-1 bit means that the value shows a difference between absolute address and relative address)
macroblock_type (without macroblock_quant)	1-5 bits (ave. 3 bits)
zero_bits (stuffing)	0-7 bits (ave. 3.5 bits)
total	54 bits

2. Correspondence between codes for both methods

Slice header	Structured packing
Slice_start_code	pointer macroblock_address (vertical)
quantizer_scale	macroblock_type (macroblock_quant) quantizer_scale
extra_bit_slice	
macroblock_address	macroblock_address (horizontal)
macroblock_type	macroblock_type
zero_bits_stuffing	