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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 : Japan
TITLE : Modification to the current VBV specification
PURPOSE : Proposal/Discussion
Relevant sub-group: Video

1.Introduction

In N.Y., the VBV specification has been defined taking 3:2 pulldown into account. (Refer to MPEG93/573.) However, we can find a problem concerning the specification. This contribution proposes a modification to the current VBV specification taking into account of the 3:2 pulldown.

2.A problem on the current VBV specification

We can find a problem in clause C.1.11 and C.1.13 of ANNEX.C. These clauses define the time interval $t_{n+1} - t_n$ between two successive examinations of the VBV buffer taking 3:2 pulldown into account.

C.1.11 If the n'th picture is a frame-structure P-frame or I-frame, then $t_{n+1} - t_n$ is equal to the total display duration of previous P-frame or I-frame (2 or 3 field-periods).

C.1.13 If the n'th picture is the second field of a field-structure P-frame or I-frame, then $t_{n+1} - t_n$ is equal to (m-1) field-periods, where m is the total display duration of the previous P-frame or I-frame (m equals 2 or 3 field-periods)

For these definition, the problem is...;

[Problem]

Just after the 1st picture has been removed from the buffer, we can not decide the time interval $t_{n+1} - t_n$ (n=1) because previous P-frame or I-frame does not exist.

3.Proposal

To solve this problem, we propose to modify the VBV specification as follows.

C.1.11 If the n'th picture is a frame-structure P-frame or I-frame, then $t_{n+1} - t_n$ is defined as follows.

a)If previous P-frame or I-frame exists, then $t_{n+1} - t_n$ is equal to the total display duration of the previous P-frame or I-frame (2 or 3 field-periods).

b)If previous P-frame or I-frame does not exist, then $t_{n+1} - t_n$ shall be calculated as

$$t_{n+1} - t_n = (vbv\_delay_{n+1})/90000 - B_n/R$$

C.1.13 If the n'th picture is the second field of a field-structure P-frame or I-frame, then $t_{n+1} - t_n$ is defined as follows.

a)If previous P-frame or I-frame exists, then $t_{n+1} - t_n$ is equal to (m-1) field-periods, where m is the total display duration of the previous P-frame or I-frame (m equals 2 or 3 field-periods)

b)If previous P-frame or I-frame does not exist, then $t_{n+1} - t_n$ shall be calculated as

$$t_{n+1} - t_n = (vbv\_delay_{n+1})/90000 - B_n/R$$

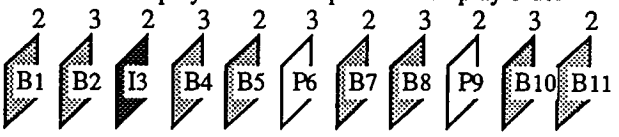
Where vbv_delay_{n+1} = vbv_delay value of n+1'th picture.
B_n = VBV buffer occupancy just after removing n'th picture.
R = Bit rate

4.Note on 3:2 pulldown encoding at M>1

An encoder can set **number_of_field_displayed_code** to give display duration for a picture. In case of 3:2 pulldown at M>1, note that the encoder must take the re-ordering into account when it gives display duration for each picture.

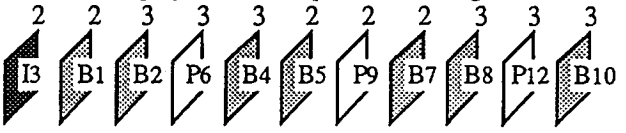
[Example]

Intended display duration sequence in display order



When display duration sequence is intended in display order as depicted above, the encoder should give display duration in coding order as follows.

Given display duration sequence in coding order



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