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CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

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SOURCE : Takeshi Yukitake, Matsushita Comm.
TITLE : Clarification of Appendix H (Low delay mode) in TM2
PURPOSE : proposal (MPEG), information (CCITT)
Ad-hoc Group: Low delay mode

I think there are some ambiguities in the Appendix H of TM2 Draft Revision 1. I have written my proposal for these ambiguities.

1. Handling of first picture

I believe that section H.1.3 "How to handle the first picture" describes only the case of using forced intra slice NOT of using intra picture.

In case of using intra picture, the first picture of the test sequence is coded as NORMAL Intra Picture, and its rate control follows normal rate control described in TM.

In case of using forced intra slice, the first picture of the test sequence is coded with QP=16 (for 4 Mb/s), as described in H.3.1. For rate control, this first picture should be treated as P-picture, whose number of bits is set to the average number of bits for the sequence. So after coding the first picture, Xi, Xp and Xb will be renewed for rate control.

PROPOSAL

1) Change the title of H.1.3 as:
H.1.3 How to handle the first picture using forced intra slice.

2) Change the third hyphened sentence in H.1.3 as:
- The number of bits for the first picture - used for buffer regulation - is set to the average number of bits for the sequence, and this picture is treated as P-picture in term of rate control.

3) Add the following note at the last of H.1.3;
Note) In case of using intra picture, the first picture of the test sequence is coded as NORMAL Intra Picture, and its rate control follows NORMAL rate control described in TM.

2. Handing of skipped picture

I think the number of skipped picture and rate control should be described more precisely. Following is my tentative idea on this term.

1) Coding the first picture after a scene change
QP is fixed to 16 (for 4Mb/s) as described in H.1.5.

2) Calculation of the number of skipped picture
The number of skipped picture is calculated by following equation.
Ns = max{ (Bf//(bit_rate/picture_rate) - 1) , 0 }
where Ns: number of skipped picture
Bf: number of bits generated in the first picture after scene change
Pictures are skipped in the display order.

3) Rate control
The number of bits generated in the skipped picture is forced to set to zero. Step 1 of rate control in TM is active even in the skipped pictures, while Step 2 and Step 3 in TM are not. This means that three kinds of target bits of picture (Ti, Tp, Tb) are renewed in EVERY picture. And calculation of QP is active only in the coded pictures.

4) Prediction of pictures followed skipped picture.
To keep the GOP structure, the re-constructed image of the skipped picture is forced to set to the re-constructed image of the "large" picture.

PROPOSAL

1) Add the followings at the end of first paragraph in H.1.2 "Handling of scene change to maintain low delay."
The number of skipped picture is calculated by following equation.
Ns = max{ (Bf//(bit_rate/picture_rate) - 1) , 0 }
where Ns: number of skipped picture
Bf: number of bits generated in the first picture after scene change
Pictures are skipped in the display order.

For the prediction of pictures followed skipped one, the re-constructed image of the skipped picture is forced to set to the re-constructed image of the "large" picture.

2) Delete the second hyphened sentence in the "SKIPPED PICTURES" of H.1.5 "Rate control" and add the following sentences.

- The number of bits generated in the skipped picture is forced to set to zero.
- The Step 1 of rate control in TM is active even in the skipped pictures.
- The Step2 and Step3 of rate control are active only in the coded pictures.