

ITU Telecommunication Standardization Sector
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Experts Group for Video Coding and Systems in
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TITLE: Modification to VBV for VBR in WD is incorrect

PURPOSE: Proposal

It is impossible for an encoder to generate a bitstream that obeys the requirements in the modification to the VBV for variable bit rate operation in [1] (MPEG93/842, "Delta to video WD produced on 93/09/09"). Therefore, the modification should be rescinded.

The new requirement in [1] states that "In the case of variable bitrate operation, the value (of vbv_delay) represents the time to fill the VBV buffer to the point B_n^* if the bits were supplied at the maximum average rate R_{max} ", instead of the value FFFF. The modified appendix C states that the vbv_delay in the i th picture header should take the value of $T_i = N_i/R_{max}$, where N_i is the VBV buffer status before decoding picture i .

Therefore, for the encoder to generate a bitstream that obeys the requirements in [1], it must be able to correctly compute the value of N_i . The appropriate recursion equation is

$$N_i = N_{i-1} - P_i + R_i * T_p$$

where P_i is the number of bits in picture i , T_p is the picture period, and R_i is the average channel rate used to transmit while picture i is being decoded. However, since the encoder is encoding picture i some time before it will be decoded, and because in many VBR applications the encoder cannot know the channel rate that will be used in the future, it will be impossible for the encoder to give a consistently correct value of N_i to the decoder, in a VBR situation.

Correct operation of a video decoder in the case of VBR can be ensured at the systems layer.

Furthermore, the modification that requires that "In the case of variable bitrate operation the value represents the maximum average bitrate over a picture period, R_{max} ". If this is true, it is impossible for the decoder to identify whether a bitstream is VBR or CBR. Since the VBV cannot be verified in the case of VBR (as shown above), but must be verified for CBR, this ability is essential. Therefore, VBR and CBR bitstreams must be clearly distinguishable.

To conclude, the modification cannot be satisfied by the encoder. Therefore, it should be removed from the WD. The value of vbv_delay in a VBR bitstream should be "FFFF" in hexadecimal, and the value of the VBV bitrate should be "3FFFFFFF".