CCITT SGXV
Working Party XV/1
Specialists Group on Coding
for Visual Telephony

Document #292
January 1988

Title: A Potential Problem with Reduced Picture Rate Coders

Source: UK, France, FRG, Netherlands, Italy, Sweden, Norway

This contribution is intended to highlight a problem which may occur if coders are designed in a certain way. It is applicable to n*384kbit/s and m*64kbits.

The picture rate of 29.97 Hz in CIF is the highest rate at which a decoder must be able to receive encoded pictures. Because picture dropping is permitted in an unspecified way as part of the coding control, it is currently permissible to design an encoder which regularly drops pictures and therefore has a coded picture rate less than 29.97Hz. Such an encoder with reduced maximum picture rate would have more time to process each coded picture and this might be utilised in the hardware design of it.

As was pointed out in Document #100 such an approach constitutes a pre-coding buffer. Therefore if such a coder also has a post-coding buffer, then the effective buffer-size is greater than the size of the transmission (post-coding) buffer which is subject to recommendation.

The difficulty arises when a such a coder with a pre-coding buffer is connected to a decoder which decodes pictures at the full 29.97Hz rate. The states of the buffers at encoder and decoder will no longer move in sympathy with each other. Consider a coder operating at 15Hz. It will be filling its transmission buffer with one coded picture in 2 CIF picture periods. The decoder however will be emptying its buffer twice as quickly for one CIF picture period and then doing nothing for the next picture period. Obviously the sum of the two buffer states is not constant and this causes a problem for any decoder which is using the transmitted buffer state information.

Much more significant however is the fact that it is possible for the decoder to underflow its receive buffer during the first of the two picture periods mentioned above.

Lower maximum picture rates, for example 10Hz, exacerbate the effect. The problem is not confined to n*384kbit/s, being applicable also to m*64kbit/s and interworking between them. Indeed it is at m*64kbit/s that the lower possible coded picture rates and DSP architectures may encourage the design of coders with this effective pre-coding buffer.

Proposal

Members of the Specialists Group are requested to study this problem so that one or more solutions may be found, subsequently debated and any necessary specifications included in the recommendations.

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