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

Doc #143
October 1986

Source: UK

Title : The Requirement for Clipping in the Coding Loop

The quantizer will introduce distortion of the transform coefficient amplitudes. Under some circumstances this may cause arithmetic overflow to occur in any of three places in the loops at the coder and the decoder.

1. The ouput of the first 1-D inverse transform may exceed the nominal range of -721 to +721. As the sizing of the transform architecture caters for values in the range -1024 to +32767/32 (almost +1024), clipping should be introduced to constrain values to the this latter range.

2. The output of the second 1-D inverse transform may fall outside the range -256 to +256. As only 9 bits are allocated, clipping should be applied to keep all values within the range of -256 to +255.

3. The sum of the prediction and the decoded prediction error may fall outside the nominal video ranges of 16 to 235 for luminance and 16 to 240 for chrominance. A two part solution is proposed. Firstly, the values inside the loop should be clipped to stay within the range 0 to 255. Secondly, further clipping to narrower ranges may be introduced outside the loop. This second clipping operation, being outside the coding loop, does not affect compatibility and can be implemented unilaterally so that the final video from the decoder to external equipment conforms to any desired restrictions on amplitude excursions.

END