CCITT SG XV
Specialists Group on Coding
for Visual Telephony

Document #417
December 1988

Source: SWEDEN, NORWAY, ITALY, UK, FRG, FRANCE, THE NETHERLANDS

Title: PREDICTION OF DC COMPONENT IN INTRA MODE

It has previously been pointed out that bit savings can be made by using spatial prediction of the DC component in intra mode. In this document it will be shown that the technique is complex and not worth while.

The intra mode has three aims:

A. Refresh after IDCT mismatch.

B. Refresh after transmission errors.

C. Coding at scene cut.

D. Improved coding of single blocks.

To save bits at intra transmission one can utilize the value of the DC components in previously transmitted blocks for prediction. Studies have shown that if a whole picture is transmitted intra at scene cut, approximately 3000 bits are saved, corresponding to 50 ms improved recovery time. As intra mode is used relatively seldom, the overall bit saving is small. To use DC prediction, previous DC values must be available also in the decoder.
There are two possibilities to achieve that:

1. If previous blocks were transmitted intra, the DC values are automatically available in the decoder.

2. If previous blocks were transmitted inter, the DC values have to be calculated in the decoder.

In method 1 there is an obvious disadvantage that DC prediction can only be used in the special cases when previous blocks were transmitted intra. This would complicate both encoder and decoder. First, it must be tested if DC values are available for prediction. Second, different VLCs must be used for each case, otherwise the bit saving is lost.

Method 2 requires that the DC component actually can be calculated in the decoder. Calculation from the reconstructed picture is not possible due to IDCT mismatch. Calculation before IDCT by summing up previously transmitted inter DC values is not possible because motion compensation may have been used. Even if this would have been possible, it is not recommendable as there may have been transmission errors in the past.

CONCLUSION

DC prediction in intra mode can only be used if previous DC values were also transmitted intra. The technique is complex compared to the relatively small bit saving.

PROPOSAL: Forget about DC prediction.