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Specialists Group on Coding
for Visual Telephony

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Source: SWEDEN, FRG

Title: NON RM4-BASED SIMULATIONS AT 64 KBIT/S

Simulations have been done with a coding algorithm which is different from so called "RM4-based" algorithms in four respects. The differences are...

... buffer control at scene cut.

... transmission of low-pass picture.

... estimation and transmission of motion field.

... post processing.

The following parameters are used:

Picture format:	CIF, 10 Hz
Transform block size:	16·16
Buffer size:	6400 bits

Buffer control at scene cut.

A special mode is introduced after scene cuts, in which fine quantization is allowed in one GOB of each picture. This gives a "curtain effect" with the duration of nine pictures. Still parts of the picture will thus have very good quality within one second after the scene cut.

Transmission of low-pass picture.

A low-pass part of the prediction error is subtracted before transformation, and transmitted separately. The transmission is done in the pel domain, using an averaged pixel value from the corners of the 16·16 blocks. The pixel values are coded with the same 2D-VLC as the transform components.
The advantage of this technique is not yet fully understood, although, blocking effects are decreased in some critical situations, such as scene cuts and moving shadows in the background.

Estimation and transmission of motion field.

Hierarchical motion estimation is used, with block sizes 16·16, 8·8 and 4·4. In the last step fractional displacement down to ¼ pel accuracy is allowed. The technique is an improvement of "Predictive Motion Estimation" as described in document no 265.
The motion field is transmitted on a 4·4 block size basis. Horisontal and vertical components are coded separately with 8·8 DCT and 2D-VLC. The quantization of the transform components is chosen such that the bit rate is approximately 25% of the total bit rate.

Post processing.

A temporal recursive low-pass filter is used on the decoded pictures. The filter is compensated according to the transmitted motion field. (In case the motion vector is non-integer, also a spatial filter effect occurs.)

Comparison with RM4 based scheme.

The above scheme has been compared with simulations performed in FRG, using minimum modifications from RM4 (16·16 blocks) to achieve 64 kbit/s. The comparison shows similar results in terms of SNR, but notably better quality for the non-RM4-based scheme.

CONCLUSIONS.

A coding sceme with several new concepts has been simulated at 64 kbit/s.
The system is not optimized, but shows picture quality better than RM4 based.
Further improvements can be foreseen