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SOURCE : NTR (Norway)
TITLE : **Quality considerations on video coding algorithm for short term PSTN video telephone standardisation**
PURPOSE : **Information**

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1 Background

With background in the market introduction of video telephones on PSTN, the question of standardisation of such equipment/service has been raised. Terminal have already been presented. The issues of standardisation have been raised in CCITT, ISO and ETSI. The simulation subgroup of COST 211ter has had an activity oriented against video coding algorithms suitable for such terminals the last year.

NTR supports developing a standard to:

- have a good service interworking between PSTN terminals made by different companies
- have a larger market base for hardware development, resulting in lower terminal prices

2 Properties of new video coding algorithm

An important element in the discussion has been what video coding algorithm should be used. Several properties of such an algorithm have been highlighted during the discussion:

- should be similar to existing standard algorithm to:
  1. lower price by possible reuse of existing components
  2. ease interworking between existing and new equipment
  3. not use long time on algorithm development
- should give reasonable quality

3 Image quality considerations

The last year COST 211ter simulation subgroup has been working actively on both short and long term solutions for bitrates in the PSTN video telephone area. The work towards a short term solution has been done on a DPCM/DCT platform. The group will have a first reference

model ready in December '92, and we already know most of the elements in the reference model.

One main result of the work towards a reference model is that we have identified improving *prediction* as a key element when working from the basis of H.261. We have found a significant gain by dropping the loop filter and instead use half pixel accuracy motion estimation. Some gain, but not that dominant, is also achieved reducing the amount of overhead and optimising the VLCs. Table 1 gives SNR figures (inter, luminance) for some coded sequences using a scheme very close to what will be the COST reference model in December. This scheme uses half pixel motion estimation. SNR figures (inter, luminance) are also given for scheme resulting from using integer pixel motion estimation and loop filtering instead. A tape demo shows results for both schemes on 8 and 16 kbit/s.

Sequence	Claire		Miss America	
Bitrate	8 kbit/s	16 kbit/s	8 kbit/s	16 kbit/s
1/2 pixel motion estimation	35.37 6.69 fps	37.27 10.32 fps	36.87 6.82 fps	38.39 10.40 fps
1 pixel motion est. + loop filter	34.13 6.60 fps	35.74 9.92 fps	35.50 6.78 fps	36.95 9.92 fps

Table 1: Inter frames luminance SNR figures for different motion estimation

3.1 Similarities to existing standards

By switching to half pixel motion estimation we do no longer have the same coding kernel as in H.261. On the other side it is a tendency that the same chips may be used for both H.261 and MPEG1.

The elements outside the coding kernel (VLCs, choice of modes, etc.) are not that processing intensive, and changes here are usually easier to handle.

3.2 Differences between the COST 211ter reference model and RM8

The COST 211ter reference model is, just as H.261, DPCM/DCT based. The following features are the main differences from RM8:

- Half pixel accuracy motion estimation (no loop filter)
- Motion estimation on 16x16 or 8x8 blocks
- Reduced overhead
- Few coding modes

4 Conclusion

Results from the work in COST 211ter shows that significant gain in image quality can be made changing the prediction of H.261. At the same time NTR agrees with that a new standard coding algorithm should be close to H.261. When deciding how close a new algorithm should be to the old one, the effect on image quality should be carefully considered.