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Experts Group for Video Coding and Systems
in ATM and Other Network Environments

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SOURCE: NTR
TITLE: Increase of frame rate from 30 to 60 Hz in Main Level (ML)
PURPOSE: Proposal
Relevant group: Video

1. Background.

1.1. Relation between SIF and maximum format in ML.

The Main Level (ML) of MPEG2 is considered to be used for many applications. One merit of MP@ML is that it contains MPEG1 - including the SIF format of (360x288/240x25/30). The "practical" upper bounds for picture format at ML are (720x576/480x25/30). This means that ML contains a natural extension of SIF in horizontal and vertical directions. However in the temporal direction the possible increased resolution is connected to using interlaced format. If progressive picture formats are used, the temporal resolution is limited to 30 updates/sec according to the present DIS.

1.2. Coding performance with proscan.

We have performed simulations on proscan versions of some of the MPEG test sequences and compared them with "normal" coded interlace test sequences. The proscan versions of some of the test sequences comes out very favourably and will be demonstrated.

1.2.1. Conversion from interlace to proscan.

We have converted 720x576 picture into two 720x288 pictures. Each field in the original picture is converted into a 720x288 picture. Let the vertical luma lines fields 1 and 2 of the original picture be named: F1(i),F2(i), i=0..287. Correspondingly let the vertical lines in the resulting proscan pictures 1 and 2 be named: P1(i),P2(i), i=0..287.

The filters used to produce P1() and P2() are defined as:

P1(i) = (-F1(i-2) + 8xF1(i-1) + 27xF1(i) - 2xF1(i+1))/32
P2(i) = (-2xF1(i-2) + 27xF1(i-1) + 8xF1(i) - F1(i+1))/32

Conversion of chroma was performed with similar filters. The down conversion represents a vertical filtering in addition to producing proscan format. The resulting format is (720x288x50). In "real life" this proscan format could be produced either by filtering as described here or by adjusting the camera to produce proscan directly.

1.2.2. Coding structure.

The simulations were performed with M=3 for both interlace and proscan sequences. For interlace we used N=12 and for proscan N=24. This means that the time between intra update for the two cases are the same. The time between P-pictures is 60 ms for the proscan sequences and 120 ms for the interlace sequences. Coding bitrate of 3 Mb/s was used for all simulations.

1.3. Coding delay.

Field coding with M=3 has been identified as a coding structure satisfying the "low delay requirement". Using proscan format with 50/60 Hz results in the same delay. This would therefore give an option for low delay combined with good coding performance at low bitrates.

1.4. Possible applications.

We do not have any particular application in mind for the 50/60 Hz proscan formats. In some environments there is a requirement of having interlace. However, it is believed that proscan formats will become more common in the future. Possible application areas could be:

- Applications requiring low bitrates and high temporal resolution - (as VOD together with ADSL?)
- Low delay applications requiring high temporal resolution.

2. Limitations of picture formats at ML in the video DIS.

There are two types of upper bounds to picture format at ML in the video DIS:

1:
Table 8-10 sets upper bounds of luma resolution to (720, 576, 30).

2:
Table 8-11 sets upper bound of luma samples/sec to 10368000.

The last number allows the combinations: (720x576x25) and (720x480x30) but not (720x576x30). The present proposal is to change the upper bounds of luma resolution to (720, 576, 60). The upper bound of luma samples/sec should of course still be 10368000. This will allow picture formats such as: (720x288x50), (360x288x50),(480x240x60),(544x288x50) etc.

3. Proposal.

In Table 8-10 of the video DIS: Change the upper bound for frames/sec at main level from 30 to 60.