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1. Introduction

We have identified the picture format for mx64 as one of the first priority items to be agreed during this study period. There were some discussions in the previous three meetings in Nürnberg (November 1986), San Jose (March 1987) and Stockholm (June 1987). This paper provides a discussion material for further investigation on this topic, by raising questions to sort out the views expressed in contributions and meetings.

2. Guideline

When we initiated the Specialists Group activities in December 1984, we confirmed that 'direct connectivity between 625/50 and 525/60 codecs' is one of the fundamental properties for the new generation sub-primary rate codec and that the burden to include this facility should be equally shared between 625/50 and 525/60 regions (see Section 3.2/Doc. #14R).

This guideline should also be applied to the mx64 kbit/s codecs.

For the picture format of nx384 kbit/s, we agreed on CIF based on the above guideline after extensive discussions. If we need another picture format for the mx64 kbit/s, we should clarify the rationales which differentiate mx64 from nx384.

3. Proposals

We have the following two proposals at hand.

1)   CIF, the same format as defined for nx384

    - Y pels per line   : 360
    - Y lines per picture : 288
    - Interlace   : non-interlace
    - Pictures per second : 29.97

2)   CIF-64 (see Section 7/Doc. #240), reduced format

	Format 1	Format 2
- Y pels per line	270(256)	240
- Y lines per picture	240	192
- Interlace	non-interlace	
- Picture per second	?	?

The number of lines per picture is selected so that only one field need be accessed for coding.

4. Questions

1) What face-to-face resolution is required to display three people seated side by side?

2) What resolution is required to display graphics? Graphics include the following three categories;

    a. Single-shot still picture having CCIR Rec. 601 resolution
    b. Freezed frame still picture having resolution higher than that of face-to-face
    c. Interactive graphics having at least CIF spatial resolution but reduced temporal resolution

The first category is envisaged to be dealt with by a separate algorithm and equipment(?) to be standardized in SGVIII. The second and/or the third categories will be provided by the face-to-face codec with an operational mode dedicated to graphics.

3) How temporal aspect of the picture format is stipulated?

    - Temporal sampling frequency of the source coder input as in the nx384 practice, or
    - Minimum time between two consecutive coded pictures?

The second alternative is assuming a codec architecture which displays new pictures as soon as they are decoded and displays previously decoded pictures before that. This implies that the format could be dual in the temporal aspect.

4) What resolution can we expect from typical cameras and monitors that are commercially available? Are they matched with the picture format at the source coder input?

5) What coding efficiency improvements can be expected for the coming two to three years? How does the coding efficiency depend on the the number of pels at the source coder input?

        Note: Number of pels per picture

        CIF   : 360x288 + 180x144x2 = 155520 (1)
        Reduced-1* : 256x240 + 128x120x2 = 92160 (0.59)
        Reduced-2* : 240x192 + 120x 96x2 = 69120 (0.44)

        * 2 to 1 subsampling (horizontally and vertically) is assumed for chrominance.

The following subsampling related problems should also be considered.

    - Effect of low pass filtering on visual impression and coding efficiency
    - Pel subsampling vs discarding of higher transform coefficients

6) How does the required hardware quantity depend on the number of pels per picture to be coded? What can we expect on;

    - VLSIs to be developed (DCT etc.)
    - DSP processing speed and power?

7) What is the cost burden of conversion to CIF or CIF-64?

- Hardware implementation
- DSP implementation

8) What is the temporal distortion due to the format conversion and how does it affect coding efficiency?

- Jogged motion when using both fields
- Temporal aliasing when using only one field

9) How can the compatibility with nx384 be achieved? Considering

a. Point to point communication between a nx384 codec and a mx64 codec through a mx64 kbit/s channel, and
b. Multipoint communication among nx384 and mx64 codecs via MCU,

the picture format for mx64 should be either

- identical to,
- compatible with, or
- easily convertible to

that for nx384, CIF.

10) Are there any flexible approaches to cope with the situation that neither users requirements nor coding possibilities are well understood?

End