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TITLE: Graphics for n x 384 Kbit/s Codec

This contribution discusses a number of factors involved in the approach to graphics transmission and concludes by proposing a dual approach to the topic.

DISCUSSION

First let us consider the resolution requirements. We agreed in Turin that any graphics mode should be a simple super-set of the intermediate format agreed for moving pictures. Using the philosophy of a common intermediate format for graphics as well as face to face this would imply that any graphics mode should have a 576 line, 29.97 Hz format. We should however consider whether this is the only approach to graphics that could be adopted:-

1 The majority of "graphics" pictures will be generated by a conventional television camera. The picture material in most cases would be diagrammatical or physical objects rather than the more testing, and somewhat hypothetical, half page of A4 typescript. It is therefore pertinent to ask how many situations there are which require a fuller resolution than that offered by the common intermediate format.

2 A separate graphics mode needs to be sufficiently different in performance, as perceived by the user, from the common intermediate format to make its inclusion worthwhile.

3 Any graphics format should take account of the capabilities of camera and display equipment available today and any improvements that are likely within the next ten years.

4 A separate format should bear in mind the capabilities of the television scanning formats currently in use and the developments that are likely within the next ten years, for example, the adoption of scanning at higher line or frame rates or both, in the camera or the display or both, combined with conversion to and from the existing transmission formats.

5 The graphics format should take account of the limitations of existing NTSC, PAL and SECAM systems: a large proportion of pictures will still pass through one of these systems between origination and display. The use of a sampling frequency appreciably higher than 6.75 MHz for the luminance signal separated from a composite NTSC colour waveform is therefore difficult to justify.

6 The design and ergonomics of video-conferencing terminals could effect the requirements. For example, it may be desirable to arrange for the viewer - monitor distance to be of a sufficiently large value to hide some distortions in the moving picture mode. At such a distance the better resolution of a separate graphics mode might be wasted.

7 The common intermediate format was defined for the moving picture mode Opinions have been expressed that for 384 kbit/s moving picture transmission, a degree of spatial sub-sampling will need to be a permanent feature. Such a philosophy would prevent the use of the common intermediate format for detailed still pictures. This would be a pity for the format agreed for the luminance signal together with the proposed chrominance definition in document 57 provides very adequate still picture resolution. It would therefore seem reasonable to ensure that the highest "mode" in the moving picture algorithm should allow the update of the picture at the receiver to the full spatial resolution available from the common intermediate format.

8 Figure 1 shows the temporal and vertical capabilities of several formats, the three interlaced formats have triangular baseband spectra and the sequential one has a rectangular shape. Notice that the 288 line, 30 Hz sequential and 576 line, 30 Hz interlaced formats have 75% of their areas in common. In addition the effect of interlace is to further reduce the vertical definition by a factor of 0.7.

There are also some system aspects to bear in mind:-

1 A strong argument for single-mode over dual-mode was the avoidance of great complexity in multipoint arrangements. Any graphics mode proposal should not reverse this situation.

2 Any graphics mode that occupies the full n x 384 Kbit/s per second channel should not require a return path in order to operate, ie no handshake should be required to determine far end graphics capability otherwise a broadcast mode would be impossible and multipoint extremely difficult. This could imply that if an 'optional' graphics mode is invoked, then the same picture must be sent simultaneously in moving picture format.

3 It should be possible to align developments in videoconferencing with similar systems in other services, in particular audioconferencing and photovideotex. Audioconference and videoconference terminals either in point to point or multipoint configurations should be capable of direct interconnection. Audioconference terminals are likely to have a still picture facility. It has already been proposed that the videoconference codec use the same audio arrangements as audioconference, it would therefore seem logical to adopt the same philosophy for still picture systems. In audioconference the still picture transmission rate is likely to be 64 kbit/s or less.

PROPOSAL

The discussions above lead us to propose the following:-

1 The moving picture algorithm should, for all bit rates, inherently permit the full spatial resolution (luminance and chrominance) of the common intermediate format to be realised when the incoming video comprises pictures having little movement.

2 An optional full definition mode should be defined that does not restrict the full vertical and horizontal resolution of the incoming TV signal. This "graphics" mode should be transmitted at 64 Kbit/s in parallel with any moving picture information. The graphics mode should be compatible with similar systems being developed for audioconferencing and photovideotex.

FIG. 1