CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

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Subject: Picture Format for High Quality Interactive Video Services

Source: Bellcore

Purpose: Discussion

1. Introduction

Some fundamental requirements that should lead us toward a selection of appropriate picture format(s) for high quality video applications are:

1. The format should be applicable to a variety of telecommunication services in the range of 64 kbps to 10 Mbps, including videophone, videoconferencing and high quality videoconferencing.
2. Consistent with the flexibility of BISDN, it should provide flexibility to accommodate future advanced digital TV services as well as non-standard image/video services such as those used in medical imaging and computer graphics.
3. It should facilitate connectivity between 525/59.94 and 625/50 regions.
4. It should minimize possible hardware complexity.

Clearly it is not easy to provide a single solution satisfying all and often conflicting requirements listed above. Requirements 1 and 2, with the exception of non-standard services, essentially point to a hierarchical set of picture format whereas commonality within a wide range of applications is maintained (e.g., videophone, videoconferecing, digital TV etc.). To satisfy requirement 3 and for ease in bridging and multi-point operations it is desirable to have a common picture format.

2. Compatibility with Workstations Having Fixed Pel Geometry

One important consideration in the future will be the pel aspect ratio. In the past, the pel aspect ratio was not too significant, because it only related to the sampling rate for A/D and D/A conversion. However, in the future display devices, such as LCDs and plasma displays, will have fixed pel geometries, which are likely to be square so that dual application to workstations and television are possible. As workstation and personal computer multi-media applications grow, square pel CCD imagers are also likely to become common. To permit direct connectivity with computer workstations, and to encourage desktop videoteleconferencing, we prefer that a square pel format with 528 lines and 704 pels/line be adopted. The new square pel format fits into existing formats as shown.

Application	Format	Picture Rate	Pel Aspect Ratio
Videophone	176x144	29.97	625-line CCIR 601
Videoteleconferencing	352x288	29.97	625-line CCIR 601
Video Graphic Adaptor	640x480	60	Square
525-line CCIR	720x480	59.94(int)	
ATM teleconferencing	704x528	59.94(prog)	Square
625-line CCIR	720x576	50(int)	
8514 display adaptor	1024x768	60(int)	Square
Workstations	1280x1024 typical	various	Square

Vertical filtering is still needed for conversion between the square and non-square formats, but it is done in a balanced way. Displays within larger square pel displays may be done by windowing or by interpolation to the larger size.

3. Conclusions

To facilitate inter-region connections, and for ease of multi-point and bridging operations it is desirable to have a common picture format. In addition, by adopting a square pel geometry the realization of a "truly integrated" multi-media terminal becomes a reality. The final choice should however rely on careful study of cost and market demand for various video and data services.