Telecommunication Standardisation Sector
Study Group 15
Experts Group for Video Coding and Systems in
ATM and Other Network Environments

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TITLE : Some H.32X audiovisual terminal issues

PURPOSE : Discussion

1. INTRODUCTION

In this document the following points are considered:

- requirement for a generic Video and Audio Convergence Sublayer
- H.22X/AAL type 1 issues
- requirement for a terminal reference point for time stamping of data
- location of the rate control buffer in H.32X

2. PROTOCOL CONFIGURATION

Annex 5 to AVC-598R [1] illustrates protocol configuration in the H.32X audiovisual communications terminal. It is proposed that some refinements be made to this figure as shown in Figure 1.

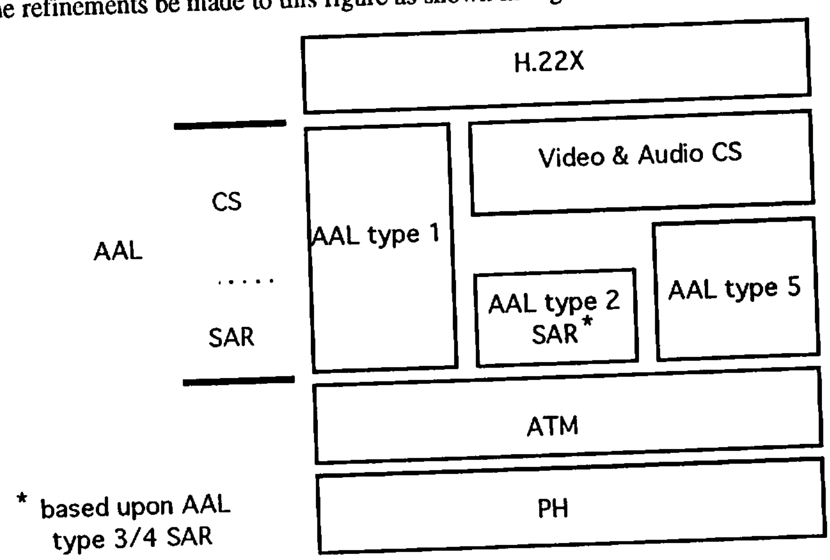

Figure 1. Proposed architecture for consideration in H.22X and ATM Adaptation Layers.

A modified AAL type 3/4 SAR mechanism, should be considered as the basis for an AAL type 2 SAR. This AAL type 2 SAR and AAL type 5 appear to be suitable mechanisms for video and audio. Each have their own qualities. An AAL type 2 based on the AAL type 3/4 SAR offers segment based multiplexing, and is able to pass macroblocks preceding the first error to the decoder, while AAL type 5 offers higher efficiency.

The feature of Figure 1 is a Video and Audio Convergence Sublayer (CS) for the transport of high quality audio and video, which may be used with either AAL type SAR structure. This CS is generic in that it can support MPEG-2 coded audio and video, or other types of audio and video data. Given that it is generic this CS may include some of the functions contained in H.22X e.g. multiplexing.

3. AAL TYPE 1 ISSUES

In Figure 1 it is assumed that H.22X will be required to work with AAL type 1. This clearly specifies what functionality is required of H.22X. For example H.22X is required to perform multiplexing and packet delineation.

With respect to H.22X and AAL type 1 the following questions are raised:

- what multiplexing capacity is required for H.22X? The MPEG-2 Systems PES packet only allows for 16 video streams and 32 audio streams. This is a consequence of the dual functionality of the stream_id field, being that of packet delineation (start code) and multiplex identification.
- what degree of delay jitter can AAL type 1 deal with, and does this match the requirements of the MPEG-2 Systems timing model?

4. TIMING MODEL

The MPEG-2 Systems timing model is appropriate for use in H.22X and the AAL. In this model, time stamping of access units (Presentation Time Stamps) provides synchronisation between multiple streams, while time stamping of the data stream (System Clock Reference) provides transmitter and receiver clock synchronisation.

It may be necessary to identify a H.32X terminal reference point at which time stamping of data streams is performed.

Time stamping of access units should be performed above the AAL since knowledge of the coding structure is required. Time stamping of the coded date stream is a Video and Audio CS function, since it must be performed after multiplexing and buffering. Given that the Video and Audio CS is generic, it may be convenient to think of the system clock as residing in the Video and Audio CS rather than H.22X.

5. LOCATION OF BUFFER IN H.32X

Consideration should given as to whether Recommendation H.32X should say anything explicit about the location of the buffer for rate control in the terminal. Some notion of where the buffer is located may be necessary. For example traffic control for B-ISDN, as outlined in Recommendation I.371 [2], suggests that the cell buffer should be at the point where the traffic contract is defined. This is shown in Figure 2 for the case of terminal multiplexing, and use of one virtual channel. In Figure 2 the buffer output rate algorithm in the terminal is matched to the UPC algorithm at the network edge, so as avoid the latter operating upon the terminal traffic.

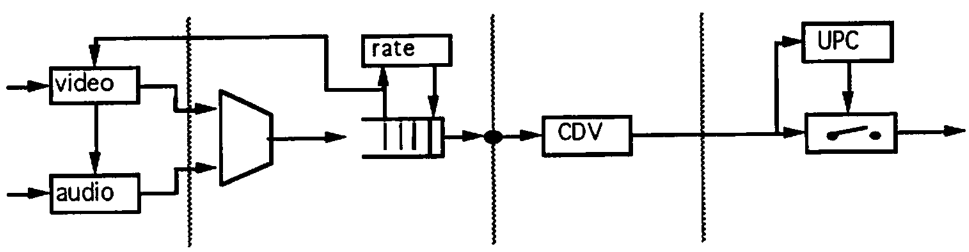

Figure 2. Rate control on aggregate terminal traffic.

Figure 3 illustrates the case of rate control being local to the video coder. Such a configuration can violate the traffic contract, since rate control is done locally and not on the aggregate terminal traffic. For example an audio cell may immediately follow a video cell, which could violate the peak cell rate parameter. Here additional rules and buffering are required in the AAL multiplexer. Also AAL procedures may add delay variation to the rate controlled video traffic. The traffic contract at the reference point may require reinterpretation to be meaningful at the coder/AAL interface.

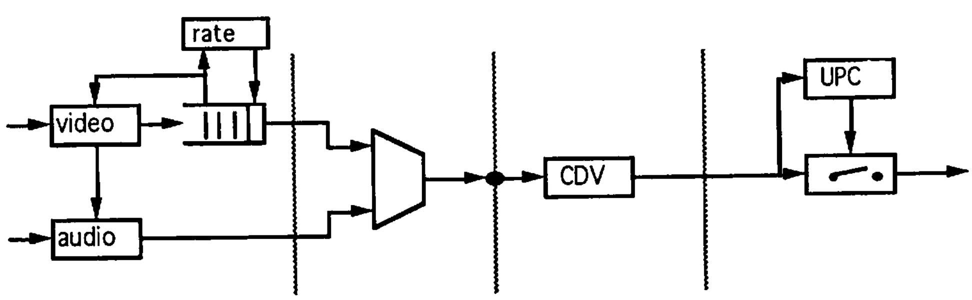

Figure 3. Rate control on individual streams

Rate control is further complicated when one considers multiple priorities in one virtual channel.

REFERENCES

[1] ITU-T Study Group 15 Experts Group for Video Coding and Systems in ATM and Other Network Environments, "Report of the fourteenth Experts Group meeting in Daejeon and Seoul", Document AVC-598R, November 5, 1993.

[2] ITU-T Recommendation I.371, "Traffic Control and Congestion Control in B-ISDN", June 1992.