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

Document AVC-262
May 1992

CCITT
STUDY GROUP XV
Geneva, 4-15 April 1992

Temporary Document (XV/1)

Questions: 3/XV, 4/XV

SOURCE: CHAIRMAN OF THE EXPERTS GROUP FOR ATM VIDEO CODING
TITLE : LIAISON STATEMENTS SUBMITTED BY THE EXPERTS GROUP

The Experts Group sent SGXVIII the following two liaison statements in November 1991 and March 1992;

To SGXVIII

November 1991

- Addendum to liaison statement from SGXV Experts Group to SGXVIII

March 1992

- Liaison to CCITT SGXVIII

They are contained in Annexes 1 and 2 to this document.

To Ad-Hoc Group on Digital Coding

May 1992

- Activities of the group

The cover sheet is contained in Annex 3. The actual liaison document consists of this cover sheet and the third progress report to the Working Party XV/1 submitted as a separate Temporary Document.

END

Annex 1

Questions: 3,4/XV; 2,13,22/XVIII

SOURCE : EXPERTS GROUP FOR ATM VIDEO CODING IN CCITT SGXV
TITLE : ADDENDUM TO LIAISON STATEMENT FROM SGXV EXPERTS GROUP TO SGXVIII
Date : November 1991
Purpose: Action

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1. Introduction

At its fourth meeting in Yokosuka, Japan, November 1991, the following issues were discussed by the CCITT SGXV Experts Group for ATM Video Coding, and recognized as items about which SGXVIII could provide information. This addendum to the liaison statement prepared at the third meeting in Santa Clara, August 1991, seeks response from SGXVIII on the following issues.

2. UPC and NPC

The choice of algorithm used to perform UPC and NPC functions has an impact on the video coding scheme, since compliance will affect the rate control strategy, particularly for VBR video. Standardization of the UPC/NPC algorithm(s) is essential to ensure that terminal equipment can be used on any network and that inter-network (e.g, international) connections can be established.

The Experts Group wishes to advise SGXVIII of the impact that the UPC/NPC algorithm may have on the video coder, and seeks information on the program of standardization efforts in this area.

3. Clock recovery

While simple synchronization strategies such as frame repeat or frame dropping are possible for lower quality video services, such methods are not acceptable if high quality is to be maintained. Therefore, many video services will require a means of synchronizing encoder and decoder video clocks.

While the availability of a universal, synchronous, network based reference clock could provide a solution, the Experts Group has a concern that this may not always be available, particularly if network access is via a LAN and PBX.

In this latter case, an explicit means of providing clock synchronization is required. The Experts Group notes, form the report of the SGXVIII Rapporteurs Meeting on AAL (Ottawa, 1-3 October 1991), that this is an area being studied by CCITT SGXVIII. Both SFET and Time Stamping techniques are discussed in that report. We believe that Time Stamping is more appropriate for VBR services than is SFET, and have previously expressed our strong desire for commonality of AAL for the support of VBR and CBR video. We request that SGXVIII take this into account during its work in this area, and request early advice of progress.

4. Quality of Service guarantees

The Experts Group understands that, as yet, no agreement has been reached within SGXVIII on whether a guaranteed QoS will be offered on Low Priority channels. As the QoS (CLR, delay) has a major impact on the video coding algorithms appropriate for video service support, the Experts Group urges SGXVIII to give urgent attention to this issue and request early advice of progress.

The Experts Group also perceives a risk if no values of QoS are standardized. If the same QoS cannot be provided on different networks or in different regions, this would compromise the viability of large terminal markets and communications spanning different regions.

5. ATM Header availability at receiving terminal

In discussion within the Experts Group and elsewhere, it has been suggested that certain bits within the ATM header (in particular, CLP and PT), if available to a receiving terminal, could provide useful information regarding the cell content and avoid the need for duplicate labeling at a higher layer. The viability of using this technique is dependent on the ATM header being passed up from the network to the receiving terminal device. Can SGXVIII advise whether this will always be possible?

6. Burstiness characteristics of cell loss

The length of a cell loss burst has a significant impact on the means of error protection/correction in a video coding system, and could even influence the basic coding architecture. While we appreciate the SGXVIII's information on this matter provided by WPXVIII/6 in November 1990, a quantitative description of the expected cell loss burst behavior is desired at the earliest opportunity.

The Experts Group notes, from the SGXVIII Rapporteurs Meeting on AAL (Ottawa, 1-3 October 1991), that a modulo 8 sequence number is considered adequate to detect error in a CBR, AAL Type 1 application, would this also be appropriate for a VBR video transmission using AAL Type 2? Any information that would give a quantitative description of cell loss burst behavior would be welcome. Are any measures of cell loss burst length likely to be included in the QoS parameters agreed between user and network?

7. Multimedia multiplexing

Some advantages of multiplexing the components of a multimedia call on different VCs (i.e. cell-based multiplexing) have been recognized by the Experts Group. To use this approach, however, requires determination of the media type by the receiving terminal at the time the connection/call is established. What is the mechanism by which this media identification is envisioned to occur?

8. Conclusion

In this addendum to the liaison statement to SGXVIII prepared at the August meeting in Santa Clara, the SGXV Experts Group for ATM Video Coding has provided information on the items it sees as important in progressing its video coding standardization activity. Consideration of, and response to the issues raised above are requested.

Annex 2

Questions XVIII/2, 13, 22

SOURCE : CCITT SGXV EXPERTS GROUP ON VIDEO CODING FOR ATM NETWROKS
TITLE : LIAISON TO CCITT SGXVIII FROM SGXV VIDEO CODING EXPERTS GROUP
Date : March 1992
Purpose: Action

Abstract

This liaison represents a brief report of aspects of the Experts Group work at the Stockholm meeting that is considered relevant to SGXVIII. Comments on the issues raised and answers to specific questions are requested.

1. Introduction

The SGXV Experts Group on Video Coding for ATM Networks held its sole sessions of the 6th meeting in Stockholm 18-20 March 1992. The comprehensive liaisons from SGXVIII were welcomed and provided important input to our continuing work.

The following Sections provide an update of the work of the Experts Group that may be of interest to SGXVIII, as well as additional network related queries on which we request guidance.

2. Timing Requirements

The need for end-to-end timing recovery has been recognised by the Experts Group. Precise requirements are under consideration. The availability of a network reference clock will be essential to ensure timing recovery necessary for high quality video applications.

8 kHz structured data reference will be required for circuit emulation support of existing audiovisual systems based on Rec. H.221.

The SRTS timing recovery approach, adopted by SGXVIII at its Melbourne meeting, has been investigated. It appears to be appropriate for timing recovery for CBR video services. Some extension may be necessary for VBR, and this is currently a topic for study. Whether timing recovery is achieved using AAL functionality or as part of the video codec function is also under consideration.

3. Access Networks

The Experts Group recognises that access to the B-ISDN may, at least for a considerable interim period, be via other networks such as LANs and MANs. Video services must also be supported over these access networks. The implications of the differing network characteristics, in terms of resource allocation, timing requirements, protocol conversions, UPC control, etc., require study. Comments are requested from SGXVIII on this subject.

4. AAL

The Experts Group is studying requirements for support of video services by both AAL Type 1 and Type 2. While we believe that the details of AAL Type 2 are likely to differ from those of Type 1, we recognise the value of maintaining common types of function, and will identify this in future recommendations concerning AAL requirements.

Possible AAL functions identified by the Experts Group are:

- Multiplexing capabilities;
- Sequence number;
- Cell payload length indication;
- Requests for priority level;
- Alignment of packet data to cell boundary.

Work is ongoing to define precise requirements, and other functions may be added to this list. It is possible to avoid the use of a cell payload length indicator by using embedded end-of-data code words, and both options are under study.

Detailed requirements for sequence number cannot be determined without more knowledge of anticipated cell burst lengths. The differing cell loss tolerance of video data from that of other data types suggests that a 3-bit sequence number may not be sufficient.

It is also recognised that functions of AAL Type 1 for video signal transport require further consideration. Use of AAL Type 1 or 2 may depend on decisions regarding video coding in VBR or CBR for H.26X.

5. Multiplexing

The Experts Group is considering audiovisual and other multimedia services support on the B-ISDN, and therefore the possible multimedia multiplexing alternatives. VC-based multiplexing has been identified as a long-term target, but early service implementation may have to use other means of multiplexing, since

- interworking with audiovisual equipment on other networks (64 kbit/s ISDN) will require a user multiplex mode of operation;

- we understand that the network will not be able to support VC-based multimedia multiplexing at the early stages of standardisation.

For your information and comment, we have included Table 1, which summarises our current perceptions regarding multiplexing approaches.

We have also developed a reference terminal configuration (Figure 1) which shows where the alternative multiplexing operations are performed, and we hope this will be useful to identify the division of responsibilities. The Experts Group has some concern about the measurement of Traffic Descriptors by the user at the AAL-SAP and by the network at the T reference point, and of the effect on CDV from multiplexing and the NT2.

In supporting multiple media and different streams representing the one medium (e.g. different layers of a layered video signal representation), the Experts Group recognises the value of matching the channel QoS to the characteristics of the signal being carried.

Though there appears to be some ambiguity, our understanding is that all VCs in a given VP will have the same QoS, though two different CLRs will be available according to the selected value of the CLP bit. It would therefore seem that there is no advantage to support of the different bit streams in different VCs of the one VP. Furthermore, for efficient delivery of layered video signals in configurations that provide for interworking between terminals of different capabilities, the different signal streams may need to be routed over different parts of the network.

These considerations imply that optimum service support will require the establishment of multiple VPs, each carrying a subset of the total number of multiplexed signal streams. Is this scenario attractive, or even possible, from the network point of view? Are there plans to develop a signalling system to allow a single end-to-end call to be allocated multiple VPs? Or are there any other methods suitable for supporting audiovisual/multimedia multiplexing?

6. UPC/NPC Algorithm Standardisation

The Experts Group remains concerned about the issue of UPC/NPC algorithm standardisation. The network Parameter Control technique must be mirrored in the terminal to ensure that no violation of the network agreement (which could lead to discarded cells) occurs. It is therefore essential that, for anything other than peak rate monitoring, the UPC/NPC algorithm must be standardised; it cannot be left to individual operators to choose.

The Experts Group seeks comment on this issue from SGXVIII, and wishes to express its interest in receiving information on the details of UPC/NPC algorithm development as they emerge. These algorithms have a significant impact on video service provision and efficient utilisation of network resources from the service point of view. It would be impractical to consider that terminals could adapt to different Parameter Control algorithms depending on which network, or combination of networks, is used.

The Experts Group continues to study UPC mechanisms from the video services viewpoint. Current indications are that leaky bucket techniques have some advantages in terms of efficient implementation.

7. Conclusion

An update of some of the activities within the Experts Group that are relevant to the activities of SGXVIII has been provided in this liaison. Comments on any of this material are welcome, and answers to specific queries requested. The Experts Group continues to benefit from close liaison with SGXVIII, and in particular welcomed the presence of Mr. Yamazaki (SGXVIII SWP 8-3 chairman), who provided valuable tutorial information and other advice at the Stockholm meeting. Future reciprocal representations are seen as beneficial to both groups.

END

Table 1 : The comparison of three multi-media multiplex methods

REQUIREMENTS \ SCHEMES		Cell multiplex (VC multiplex : VCI approach) merit : Variety of services	SAR multiplex (SAR-PDU multiplex : Packet approach) merit : Easiness for VBR?	User multiplex (Bit multiplex : H.221 approach) merit : Compatibility with H.320
1.Efficient channel utilization	Over head	0	192/(packet size+192) + 4/384 - (UW) (dummy bits) (IT bits) (Unique Words) *1)	16/p*640
	Sharing with other media	Impossible	Possible	
2.Multiplexing delay		No delay due to multiplexing.		
3.Compatibility	with H.320	H.221 is necessary (switchable)		Easy (Embedded)
	with MPEG	MPEG bit stream should be transmitted as data. MPEG demultiplexer is necessary.		
4.Multi-media	Media identification	HLC or user information at call setup	Indicated by IT?	BAS
	Bit rate identification	Call signaling	User protocol?	BAS
	Cross media synchronization	Not guaranteed now	Guaranteed	
5.Media selectability in Multi-point conference		Easy but copy function for each medium in network or MCU is required. Otherwise mesh type connection is required.	Difficult but possible by MCU with some transmission efficiency loss.	
6.Real time transmission for the low bit rate (eg. 2400bps) data		Delay and transmission efficiency is a trade off. delay = 384bits/bit rate*efficiency		300/1200/4800 bits etc.
7.The influence of one cell loss		One medium Recover at the next packet?		Several media Recover at the next packet? (The probability of FAS,BAS errors due to cell losses is assumed significantly low.)
8.Easy to implement		Easy by using media-VCI's table	Easy by using media-IT table	Already implemented in H.221 using LSI chip
9.QOS(Quality of Service)		Any QOS for each medium	QOS must be that of the most demanding medium	
10.Transmission cost		Multiple VCs may be expensive because of OAM for each VC	-	

*1) If GOB is aligned with cell, UW is GOB start code. If such alignment is not used, first term and third term can be deleted.

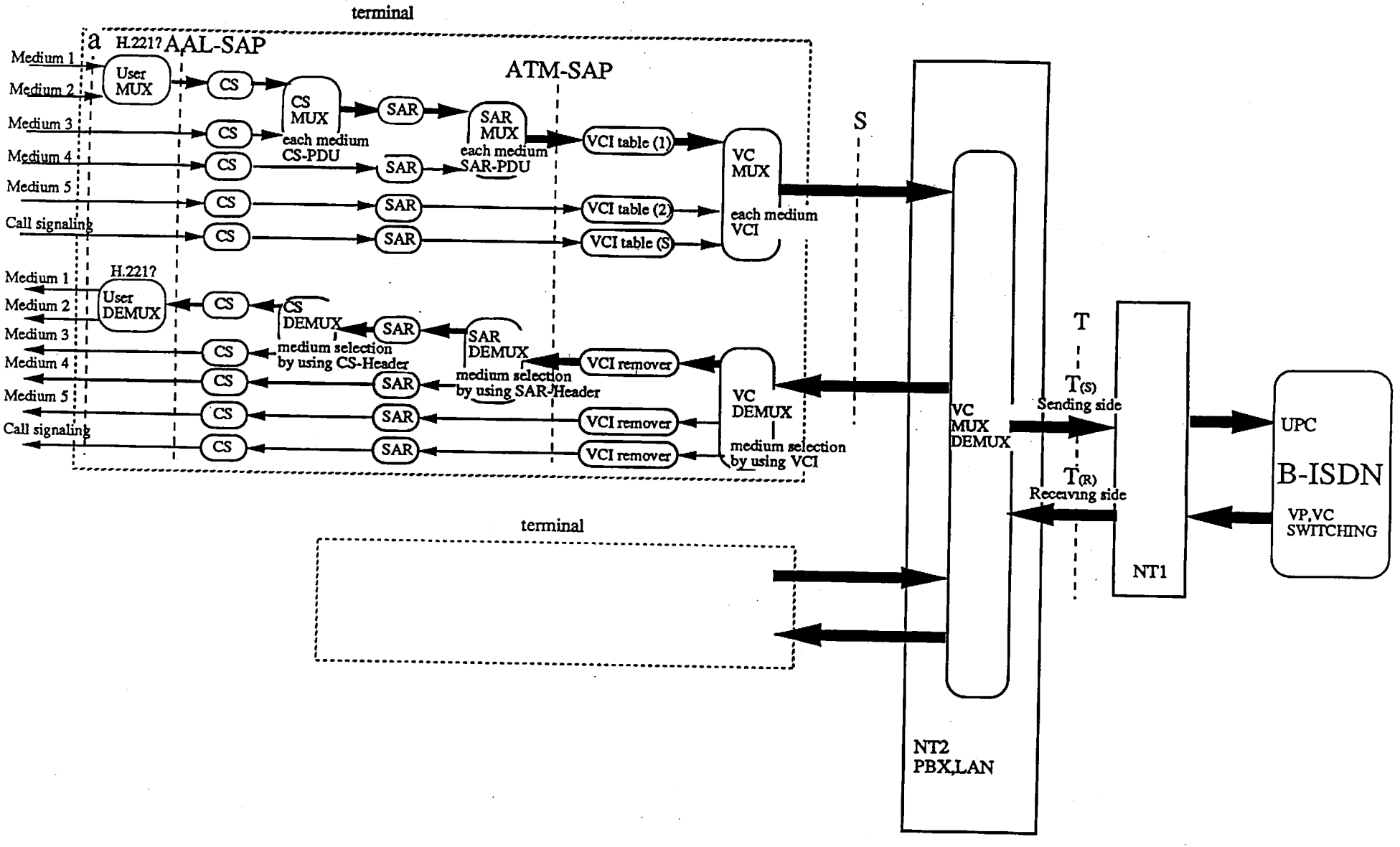

Fig. 1 Terminal configuration

Documents
CCIR Study Groups
Period 1990-1994

Doc. 11/AHG-DC -
8 May 1992
Original: English

SOURCE: EXPERTS GROUP FOR ATM VIDEO CODING IN CCITT SGXV
TITLE : ACTIVITIES OF THE GROUP

The Experts Group for ATM Video Coding was established at the July 1990 meeting of Study Group XV to develop video coding standards (Recommendation H.26X) appropriate for B-ISDN providing ATM transport. The group consists of members from FRG, Australia, Belgium, Canada, Denmark, USA, France, Italy, Japan, Norway, The Netherlands, UK, Sweden and Switzerland under chairmanship of Mr. S. Okubo (NTT, Japan).

The terms of reference for the group are as follows;

1) to study video coding algorithm appropriate to the ATM environment for conversational services, particularly to study whether modifications are necessary to make the present AV Recommendations applicable to the ATM network;

2) to study the relationships between video coding algorithm and network parameters such as average and peak rates, burstiness, and peak duration to achieve good picture quality and traffic characteristics;

3) to study feasibility of a unified coding standard for various applications in all service classes using the ATM network for which different hardware versions (codecs) can be realized;

4) to investigate potential applications for ATM coding systems (conversational, distributive, retrieval of stored information, etc.) and network-related constraints on potential system performance, and to develop a set of requirements and constraints to guide the work of the Group;

5) to study compatibility of the new algorithms with audiovisual systems covered by Recommendation H.200;

6) to coordinate directly with the experts of other CCITT Groups, CMTT and ISO/IEC on video coding;

7) to draft Recommendation(s) for video coding under the ATM environment.

Since one of the objectives of B-ISDN is service integration, the Experts Group is very keen to develop a unified (or generic) video coding which allows interworking among various applications. In order to achieve this objective, we are now collaborating with ISO/IEC JTC1/SC29/WG11 (MPEG) by having joint meeting sessions and with TG CMTT/2 Special Rapporteur's Group by exchanging liaison statements toward establishing a standard in 1994.

A diverse range of video services will be carried over the B-ISDN, and television program broadcasting and distribution could be among the most important in the longer term. The CCITT Experts Group (and MPEG) therefore seeks closer collaboration with CCIR to ensure that the video coding systems that are developed by all groups can achieve maximum commonality (thus scale merit in necessary devices), service integration and ease of interchange.

Progress report of the Experts Group is attached for consideration of the Ad-Hoc Group on Digital Coding.