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

Document AVC-129
November 6, 1991

SOURCE : JAPAN
TITLE : Comparison of multimedia multiplex methods
PURPOSE : Discussion

---

1. Introduction

Several multimedia multiplex methods in the B-ISDN environment have been discussed. We provisionally adopted cell multiplex as a reference method for multimedia multiplex (VCI approach). A virtual layer approach to consider logical multimedia multiplex functions was also discussed in AVC-92 at the last Santa Clara meeting.

This contribution describes the comparison of three multimedia multiplex methods to clarify what is the merit and demerit of VCI approach. Necessary functions of the virtual layer (MUX layer in AVC-92, called media control layer here), when each multimedia multiplex method is applied, are also discussed.

2. Comparison of three methods

Table 1 shows the comparison of three multimedia multiplex methods; cell multiplex (VCI approach), SAR multiplex (packet approach) and user multiplex (H.221 approach).

VCI approach requires further studies concerning the following items.

(a) Sharing with other media is impossible. Is this demerit from a stand point of network tariffing ?
(b) How to achive compatibility with H.221?
(c) How to negotiate media identification at call setup?
(d) Is cross media synchronization guaranteed by network?
(e) Is the delay for low bit data negligible?

3. Functions of media control layer

The logical interface between media control layer and upper layer (e.g. video codec, etc.) can be defined optimum for each medium.

One objective of media control layer is to absorb the difference of the multimedia multiplex method. The same logical interface, where data is transfered by proper unit for the medium such as MB or GOB of video, can be provided irrespective of multiplex method. The required functions of media control layer for each multimedia multiplex method are described below.

3.1 Cell multiplex (VCI approach) (Fig.1)

(1) Transmission data unit is received from each codec.
(2) Data unit is packetized as AAL-SDU.
(3) AAL-SDU is sent to AAL.

3.2 SAR multiplex (packet approach) (Fig.2)

(1) Transmission data unit is received from each codec.
(2) Data unit is packetized to cell.
(3) Each medium is multiplexed cell by cell.
Media indication (e.g. IT) is also inserted to the header.
(4) Cell (AAL-SDU) is sent to AAL.

3.3 User multiplex (H.221 approach) (Fig.3)

(1) Transmission data unit is received from each codec.
(2) Each medium is multiplexed.
(3) Multiplexed data frame is constructed like H.221.
(4) Data frame is packetized as AAL-SDU.
(5) AAL-SDU is sent to AAL.

4. Conclusions

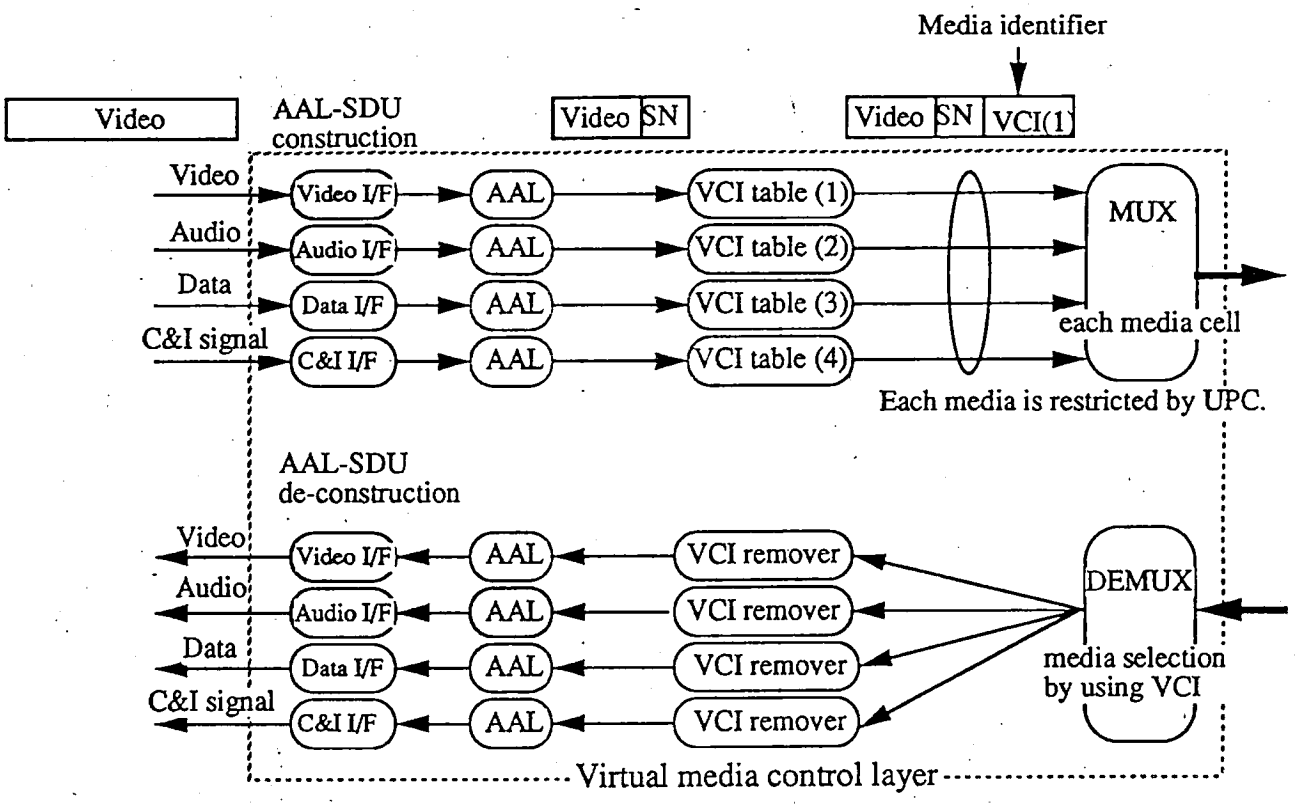
This contribution has discussed comparison of three multimedia multiplex methods and functions of virtual media control layer for each multimedia multiplex method. We have pointed out that further studies are required before adopting the VCI approach, because VCI approach have some demerits. We have also pointed out that media control layer is able to provide the same logical interface to the upper layer independently of multiplex method.

END

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

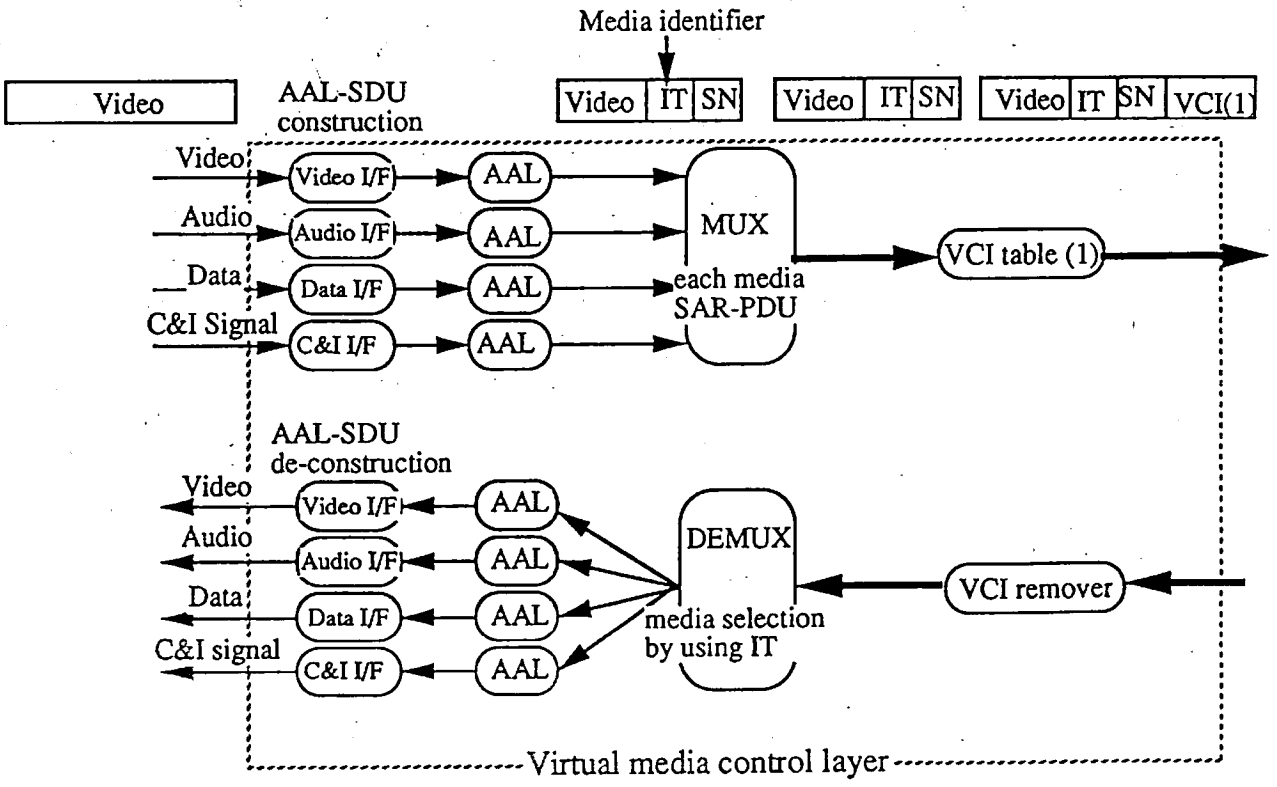
REQUIREMENTS \ SCHEMES		Cell multiplex (VC multiplex : VCI approach) merit : Variety of services	SAR multiplex (SAR-PDU multiplex : Packet approach) merit : Easiness for VBR?	User multiplex (Bit multiplex : H.221 approach) merit : Compatibility with H.320
1.Efficient channel utilization	Over head	0	192/(packet 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 neccesary (switchable)		Easy (Embeded)
	with MPEG	MPEG bit stream should be transimitted 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

*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.



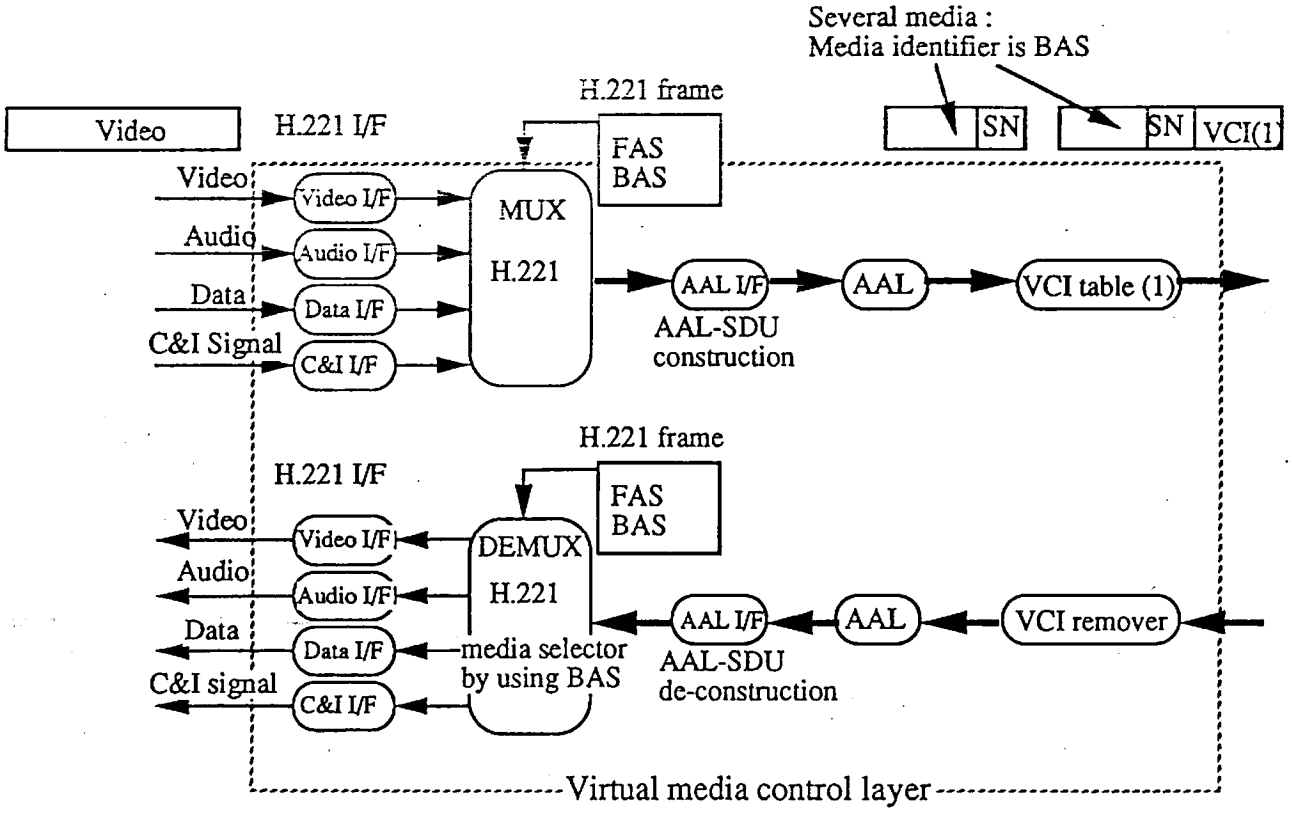
VCI table at the sender and DEMUX at the receiver should negotiate each other at call setup.

Fig.1 Cell multiplex (VC multiplex : VCI approach)



AAL at the sender and DEMUX at the receiver should negotiate each other the meaning of IT. One VC is shared by several media. Therefore, bit rate allocation control is required at MUX to restrict the total amount of user information.

Fig. 2 SAR multiplex (SAR-PDU multiplex : Packet approach)



The sender and the receiver negotiate each other by using BAS.
One VC is shared by several media. Bit allocation control is done by using BAS.

Fig. 3 User multiplex (Bit multiplex : H.221 approach)