SOURCE : Japan

TITLE   : Investigation of multimedia multiplex on ATM networks

PURPOSE : Discussion

----

1. Introduction

Some considerations of the multimedia multiplex method for audiovisual services on ATM networks were discussed at the Hague meeting (AVC-11). In oder to make discussion points clear and to solve problems ,we think it should be studied along the following two steps.

    step 1) Clarification of requirements to ATM networks from audiovisual
             terminal

    step 2) Concrete multimedia multiplex method to realize the requirements

This document mainly addresses the first step. Some preliminary study results on the second step are also presented.

2. Requirements of ATM networks from audiovisual terminal

From the terminal point of view, the basic requirement to ATM networks with regard to multiplexing the components of multimedia is that the network just provides a logical path for each medium and that the terminal does not need to recognize the physical multiplexing method.

Therefore we assume an intermediate virtual layer (called here MUX layer) for multiplexing the components of multimedia between Convergence Sublayer (CS) and higher layer (See Fig.1). This MUX layer can be null if all the necessary multimedia multiplexing functions are provided by the AAL and ATM layer.

By listing up the required functions of MUX layer, the requirements to ATM networks for multimedia multiplex could be clarified. Those functions which are not supported by the network should be provided by the terminal.

Required functions of MUX layer
    1)End-to-end data transmission for each medium

2)Establishment and release of logical path for each medium

3)Synchronization between different media signals

4)Realization of sufficiently small delay caused by multiplexing

5)Mapping of MUX layer Service Data Unit (MUX-SDU) into CS Service Data Unit (CS-SDU)

- MUX-SDU should be of variable size to packetize variable length coding data from terminals (eg. MB, GOB data).

6)Reconstruction of MUX-SDU from CS-SDU

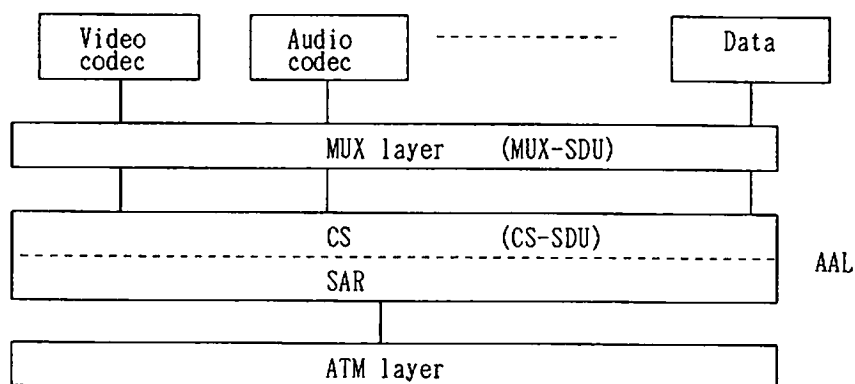In case of cell loss, MUX layer informs the lost cell number and makes up the lost data (eg. all "1").

Fig. 1 Mux layer

3. Consideration of multimedia multiplex method

Four methods were described in AVC-11.

1) Cell multiplex (Multiplexing in ATM-layer)

2) Message multiplex (Multiplexing in SAR)

3) Media multiplex (Multiplexing in CS)

4) User multiplex (Multiplexing in higher layer than CS)

We studied the delay of multiplexing in CS method. In this method, while a CS Protocol Data Unit (CS-PDU) of medium #1 (CS-PDU#1) is being sent it is impossible to send a CS-PDU of medium #2 (CS-PDU#2). So the following two cases are considered to send CS-PDU.

case 1) Cells of CS-PDU is sent during its construction.

case 2) Cells of CS-PDU is sent after its construction has been finished.

The delay of each case is depicted in Fig. 2. And the relation between bit rate and assembly time is shown in Fig. 3.

(1) CASE 1   (2) CASE 2

T1 = CS-PDU#1 size/Bit rate   T1

Medium #1 | CS-PDU#1 | | CS-PDU#1 |

CS

Medium #2 | CS-PDU#2 | | CS-PDU#2 |

SAR

Delay of CS-PDU#1   Delay1   Delay3
Delay of CS-PDU#2   Delay2   Delay4

                    Time   Time

Cell of   Cell of   Cell of   Cell of
CS-PDU#1   CS-PDU#2   CS-PDU#2   CS-PDU#1

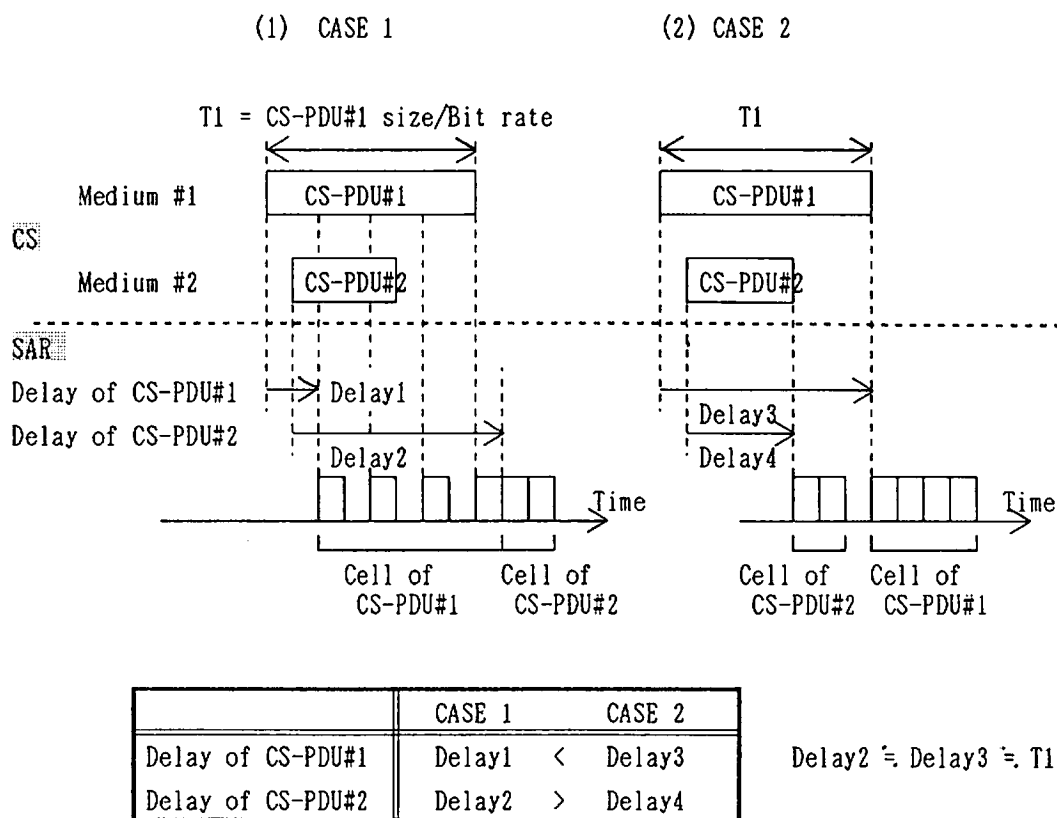|	CASE 1	CASE 2
Delay of CS-PDU#1	Delay1 <	Delay3
Delay of CS-PDU#2	Delay2 >	Delay4

Delay2 ≒ Delay3 ≒ T1

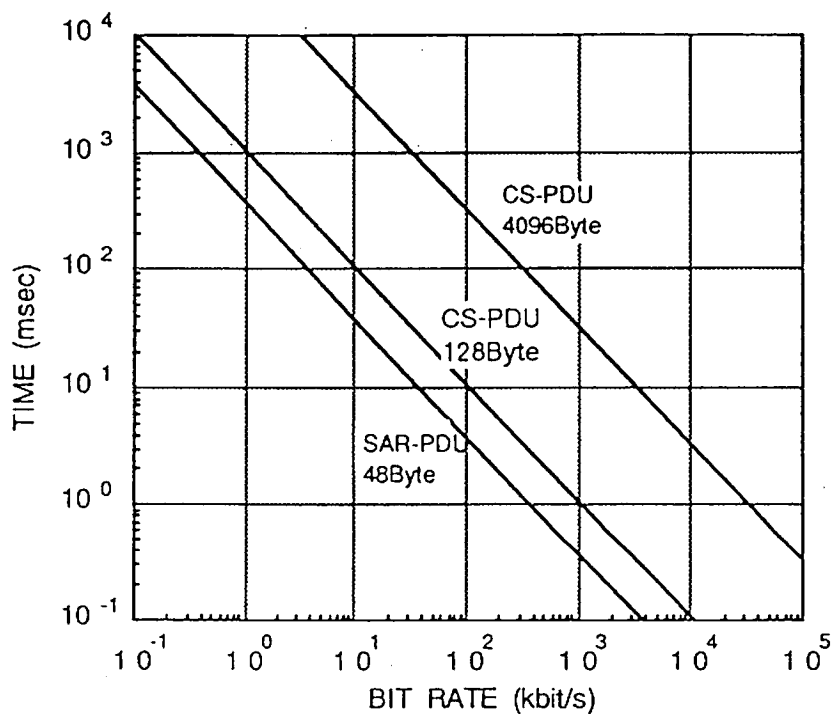Fig. 2   Delay of multiplexing in CS

Fig. 3 Bit Rate vs. Assembly Time

In both cases, the delay caused by multiplexing in CS depends on the size of CS-PDU and signal bit rate. So we have to pay attention to the size of CS-PDU and signal bit rate in this method.

4. Conclusion

We have presented for discussion a method to list up all the multimedia multiplex functions and assign some of them to the network and the others to the terminal. Delay due to multimedia multiplexing in CS is also discussed.

END