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SOURCE : JAPAN
TITLE   : Multimedia multiplexing method for audiovisual communication
Purpose : Discussion

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1. Introduction

When differential delay between two VCs is not acceptable for lipsync and/or when there are some demerits to use multiple VCs instead of one VC, especially network tariffing, multimedia multiplexing method H.22X should be standardized. Besides, it is preferable that one integrated audiovisual terminal can be used for not only communication services but also retrieval service and broadcasting services via ATM networks.

In this document, three cases for integrated audiovisual terminal configuration are compared. For simplicity of integrated terminal, it is preferable that different services use a common multiplexing method if possible. This document clarifies what items should be studied, having MPEG2-SYSTEM as a possible H.22X.

2. Integrated audiovisual terminal for multiple services

Three cases for integrated audiovisual terminal configuration are described in Table 1 and illustrated in Figure 1, where "elementary bitstream" is the generic part independent of application or transport / storage media. If different multiplexing methods are used service by service, case (a) or

Table 1 Three cases for integrated audiovisual terminal configuration

	Case (a)	Case (b)	Case (c)
Method to accommodate multiple services	Multiple demultiplexer at integrated audiovisual terminal	Remultiplexing at sending center	Common multiplexing method for different services
Relation between H.22X and other multiplexing methods	No relation but commonality is preferable for implementation or easy remultiplexing		Subset or superset
Merit	If H.32X is designed only for communication purpose, H.32X becomes simple.	Integrated audiovisual terminal is simple.	Both sending center and integrated audiovisual terminal are simple.
Demerit	Integrated audiovisual terminal should be complicated.	Sending center is complicated. (Sometimes it may be sending terminal)	H.22X may be a little complicated, and lose similarity with H.221.

Note: "Center" is for remote database or program distribution.

(a) An integrated audiovisual terminal have multiple demultiplexers.

(b) Remultiplexing at a sending center

(c) Common multiplexing methods are used for different services

Example of Error Recovery
(A) BCH, Reed-Solomon
(B) ?
(C) BCH, Reed-Solomon,
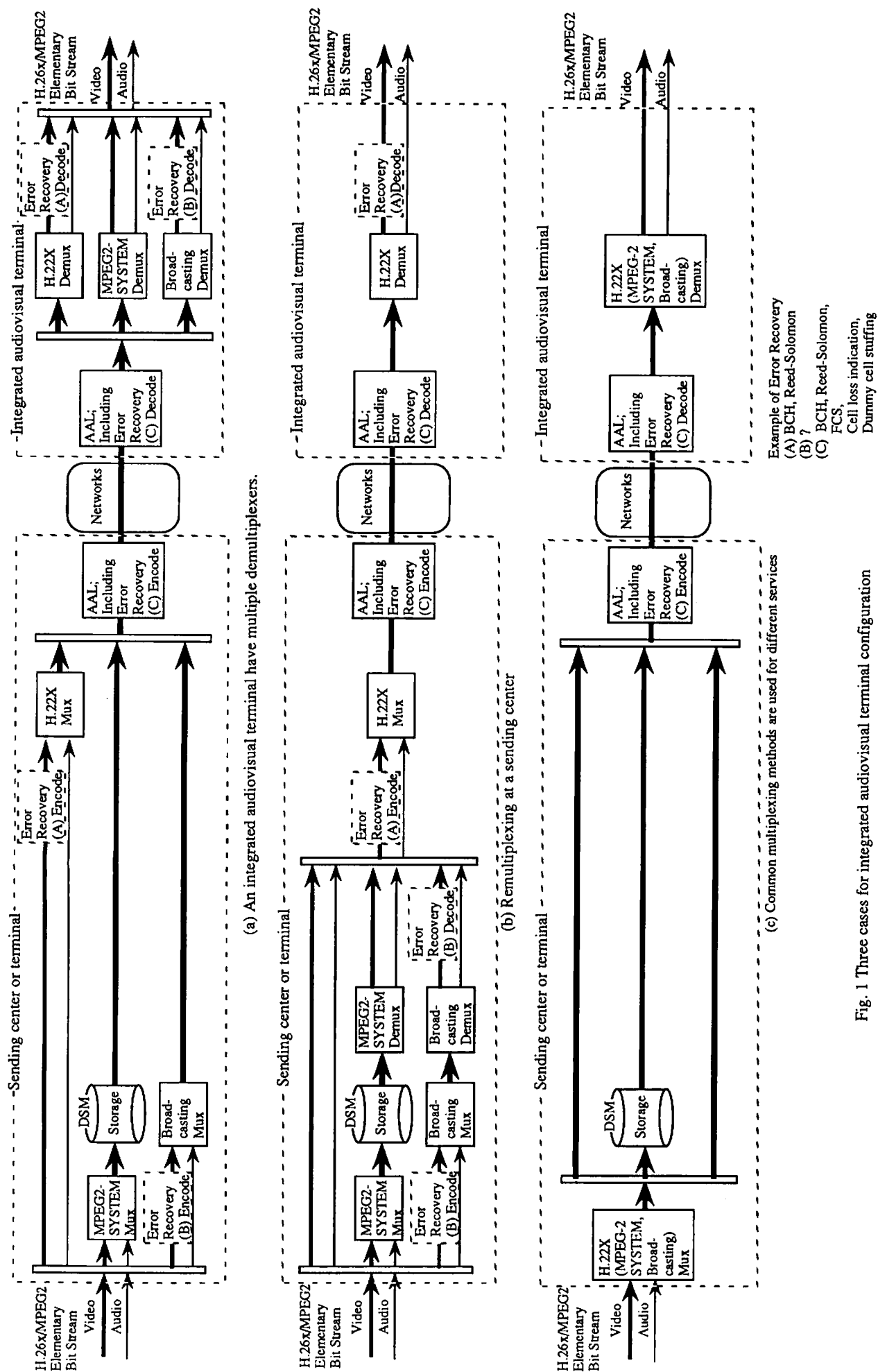   FCS,
    Cell loss indication,
    Dummy cell stuffing

Fig. 1 Three cases for integrated audiovisual terminal configuration

case (b) should be adopted. In this case, configuration of integrated audiovisual terminal or sending center becomes complicated, especially if there is no commonality between H.22X and other multiplexing method. Besides, if a common multiplexing method is used for different services, case(c) can be adopted. In this case, H.22X is subset or superset of other multimedia multiplexing method and integrated audiovisual terminal becomes simple.

Therefore a common multimedia multiplexing method for different services is preferable if possible (note). If not possible, at least commonality between different multiplexing methods is desirable.

Note; The following is common understanding in Japan.
· Broadcasting may not allow the flexibility for multiplexing. Therefore, common multiplexing method for both communication and broadcasting service may not be realistic.

3. Study items to use MPEG2-SYSTEM as H.22X

The following items should be studied to use MPEG2-SYSTEM as H.22X.

a.Negotiation channel (Note 1)
· Where is negotiation channel reserved? (Pack layer-System header, Packet layer)
· Is special stream_id necessary for negotiation channel?
· How long does it take before renegotiation?

b.Multiplexing other media
· Should we define stream_ids for other media?
· How to are these ids managed (registered and maintained) ?

c.Synchronization
· How long does it take before synchronization? Is it reasonable for communication purpose?

d. Overhead
· Is overhead reasonable under acceptable delay? (Note 2)

e. Video clock recovery
· MPEG2-SYSTEM is based on 90kHz SCR (System Clock Reference). How to transfer SCR via ATM networks is a problem. What is the relationship between ATM network clock and SCR?

f.Cell loss resilience, CLP bit
· Is special function necessary for multiplex layer for cell loss resilience?
(BCH, Reed-Solomon, FCS, Cell loss indication, Dummy cell stuffing, Indication of video structure)
· In case (a) and case (b), special technique for error recovery (indicated (A) in Fig. 1) can be used for video elementary bit stream before multiplexing. On the other hand, in case (c) such kind of technique can not be used. Does it cause any problem? (Note 3)
· How video codec can use CLP bit via multiplexing layer? (Note 3)

g.Encryption
· Where is the best point for encryption? (Before or after H.22X)

Note 1; Bit stream which is stored in DSM may have no negotiation information. If negotiation information is necessary not only at the start of communication but also during communication, case (b) in Fig. 1 is the realistic solution.

Note 2; In MPEG2-SYSTEM, minimum length of Packet header is 4 Byte. Therefore, if interval between consecutive packet is 1 msec, the overhead of Packet layer is 4000Byte/sec or more.

Note 3; If special error recovery techniques, such as structured packing, is mandatory for video elementary bit stream and these performance is not achievable by error recovery in AAL, case (b) in Fig. 1 is the realistic solution.

4. Summary

If a common multimedia multiplexing method is used for different services, integrated audiovisual terminal may become simple. This document clarifies what items should be studied to define a generic multimedia multiplexing scheme.

Study item to use different VCs for video and audio

If separate VCs are used for video and speech, it would be profitable for low quality terminal as indicated 'terminal C' in Fig. 1. However, some mechanism should be studied to synchronize multiple VCs because at that time it is not clear whether differential delay between two VCs is acceptable or not acceptable for lipsync.

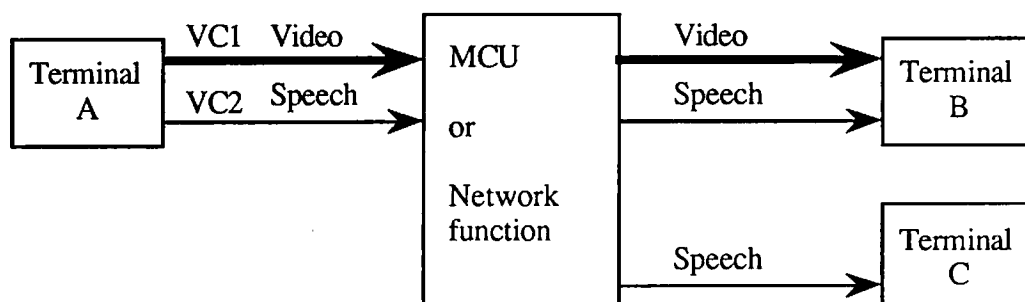Note; Some mechanism should be included in not only VC1 but also VC2. This fact indicates that terminal C should understand this mechanism.

Fig. 2 Video and speech transmission using two VCs

AVC-370