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

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July 1, 1994

SOURCE : JAPAN
TITLE : COMMUNICATION PROCEDURE FOR H.222.1
PURPOSE : Proposal/Discussion
Relevant sub-group : System

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1. Introduction

In general communication applications, a mechanism should be prepared to initiate data transmission after a connection setup and selection of communication mode. For AV terminals in B-ISDN, it is desirable to specify the procedure utilizing a peculiarity of bidirectional communication application. This is suitable not only for real time conversational service, but also extendable to mailing and retrieval type services, and seems to be promising to apply to VC multiplex or networks which has few restrictions, such as ATM-LAN. Therefore, it is necessary to specify the procedures for negotiation at the beginning of communication, mode switching during the communication, and the communication control.

In this document, the procedure and channel for communication control which are under study in H.222.1 is discussed based on bidirectional communication. We propose that the special PID in TS should be assigned to identify the communication control channel.

2. Channel available for negotiation

The following list indicates possible means to provide a communication control channel in the ATM environments;

- Multiplex by another AAL connection such as AAL 3/4 or another VC
- Change all VC contents from TS/PS to the control information
- Prepare a logical channel in TS/PS

The upper two methods are outside the specification of H.222.0. This document discusses the third method to fully utilize the characteristics of bidirectional communication; bidirectional channel is required for audiovisual signal transport.

In the current draft of H.222.0|ISO/IEC 13818-1, there are no specifications of bidirectional control channels for communication applications. If a new channel is needed, use of Private Data or addition of new specifications for that purpose is considered to be a solution.

2.1 Using Private Data

This method uses private_stream or private_section. Because it is out of scope of standardization, a contention with other applications which also use Private Data would become serious problem in the environment where a number of different type of terminals are interconnected through the network.

2.2 Definition of a channel for a bidirectional communication

2.2.1 In case of PS

When PS is used, there is no other means to distinguish the communication control channel from different media than using stream_id in PES packet. Therefore, it is necessary to allocate a new stream_id for the communication control in H.222.0 (refer to AVC-656). Whether the PSM is necessary (Fig.1 or Fig.3) needs further study.

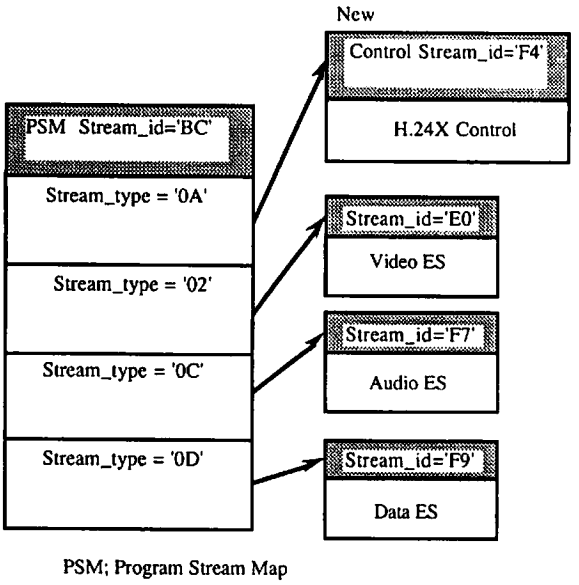

Fig.1 Program Stream Map (Program Stream)

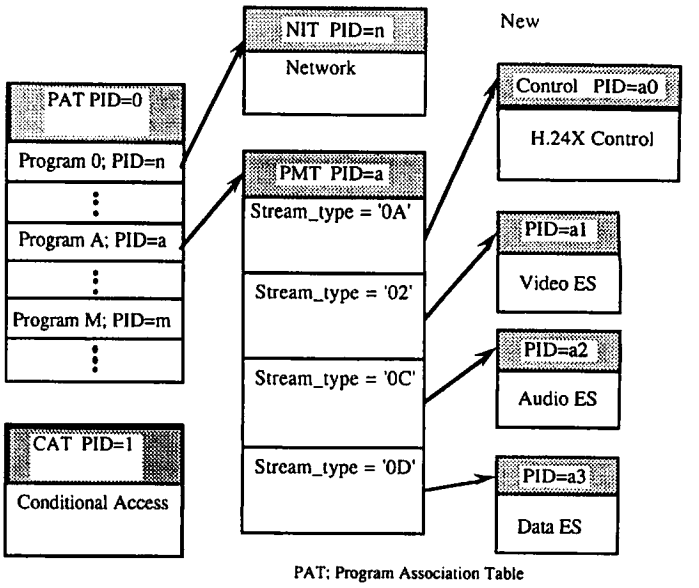

Fig.2 Program Map Table (Transport Stream)

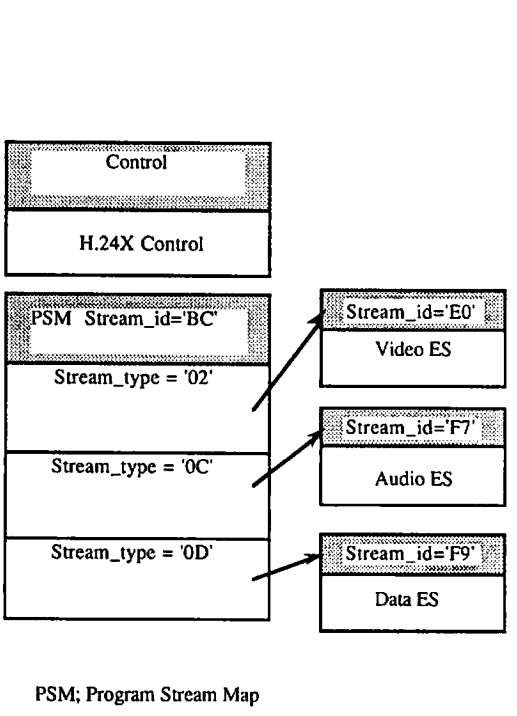

Fig.3 Program Stream Map (Program Stream)

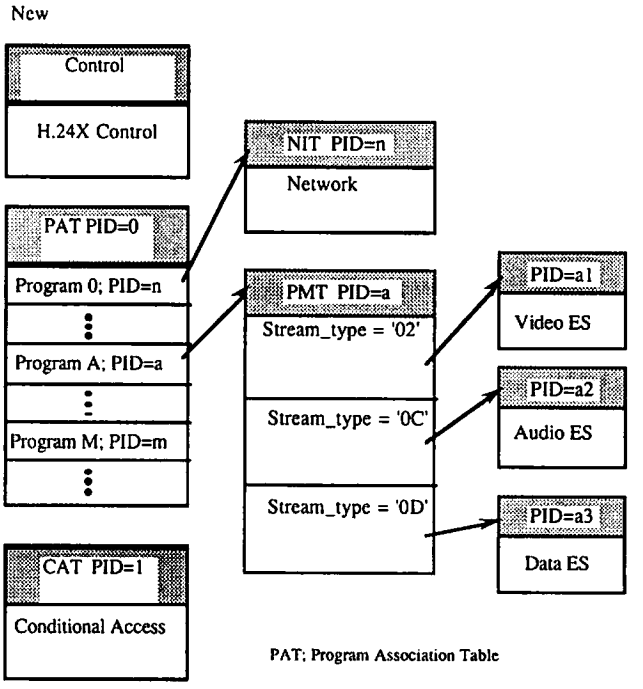

Fig.4 Program Map Table (Transport Stream)

2.2.2 In case of TS

When using TS, both stream_id and PID are applicable to distinction of the media stream.

(1) Using sream_id

Same as the case of PS described above, this is a method to identify by PES packet basis, and additional specifications for TS is not necessary. It is required to identify corresponding PID by receiving and decoding map table in advance for distinction of channels (Fig.2). It is redundant to send map table at the beginning of the communication because re-transmission of the table after the decision of usable media will be necessary. However, the control channel can be processed the same manner as other media (receiving PID=0 -> decoding map -> demultiplexing media).

(2) Using PID

The control information can be recognized immediately by introducing special PID like the case of Program Association Table (PID=0). This method does not need transmission and decoding of the map table at the beginning of the communication (Fig.4). It is a merit that this method can clearly distinguish initialization phase from data transmission phase by sending the information with only one PID. When the negotiation is completed and the usable media is determined, PID=0 information and the map table will be transmitted.

At this time, to preserve uniformity with PS, it is better to use same information structure as PES which the control information is also distinguished by stream_id, however it becomes redundant.

The assignment of special PID (PID=2?) for the communication application in TS is proposed as a candidate for control channel definition.

3. Negotiations, C&I

3.1 Items for negotiation

Items which need negotiation can be divided into two categories; one is decision of the service at the beginning of the communication, which depends on the terminal capability and environments, another is depending on each media characteristics.

3.1.1 Application level negotiation which affects whole media

- Identification of application
- Kinds and number of media
  - Number of video sources
  - Combinations of multi-channel audio and video
- Coding method of each medium information
- Transmission rate of a whole channel (out-band?)
- Multiplexing method (VC multiplex, TS multiplex, PS multiplex)

3.1.2 Negotiation within medium

Audio

- Monaural, stereo, surround
- Signal bandwidth, sampling rate

Video

- Profile, level
- Low delay mode
- Kind of scalability
- Video format

Data

- Protocol
- Kind of the application (still picture, FAX)
- Used channel (another VC, same VC)

It is noted that even if the decoder can accept any mode of operation, sometimes it is required for the receiving side to indicate its preferred mode of operation. For example, any MP@ML decoder can accept "Low delay mode" but the sending side may choose high quality / high delay mode against the receiving side wish.

3.2 C&I signal

In addition to the above items, terminal-to-terminal signaling such as that provided in H.230 is necessary.

- Freeze / release picture
- Split screen
- Document camera
- Fast update request
- Maintenance commands
- Multi-point related commands

For indication of these signals synchronized with the video signal, see the companion document AVC-656.

3.3 Mode switching in communication

3.3.1 Dynamic switching of bitrate allocation

When a whole transmission rate is restricted as CBR, the function which dynamically changes the rate allocation to each medium is necessary. In case of circuit multiplexing such as H.320 terminals (H.221), if the bit position where the medium is multiplexed is not indicated, the receiver cannot demultiplex it properly. On the other hand, in case of packet multiplexing, such strictness is not needed, because it is possible to distinguish the kind of the information per packet. However, for example, if still picture data are transmitted in the middle of a communication, it is necessary to reduce the rate of video (or audio) to keep the total rate constant. This function is possible by PS/TS-MUX of transmission side, which can control a whole output bitrate of PS/TS-MUX by a feedback function to encoder output information quantity control. Therefore, it is considered that the control procedure between the sender and the receiver is not necessary for dynamic switching of bitrate allocation.

3.3.2 Change of the communication mode (ex. kind of using media)

The function which changes the mode negotiated at the beginning of the communication, such as kinds and number of media, is considered to be necessary. Features of a packet multiplex method also makes it easy to insert and drop some media during communication. If the channel for the communication control and the negotiation is multiplexed with other information channels, starting the re-negotiation procedure similar to the one at the beginning of the communication is easy. And it is not necessary to stop audiovisual information transmission. For this purpose, a procedure of starting re-negotiation, timing of change to new mode, procedure and timing of terminating disused media should be provided.

4. Communication procedure

4.1 Distinction between TS and PS

When both TS and PS are available as the multimedia multiplex method, a distinction function is necessary. Here are listed two alternatives.

(1) Outband signaling at the call setup

LLC or HLC in the call setup message is used. So as to include the necessary elements in B-ISDN call setup procedure Rec. Q.2931, a liaison statement needs to be forwarded to SG11/SG13.

(2) To define TS as mandatory for control functions

TS becomes mandatory for communication control channel; only TS is used at the beginning of the communication. When PS multiplex is applied to audiovisual information transfer, the mode is switched to PS after the negotiation.

The load of terminal processing may be increase, but TS is only used for the communication control purpose, so the implementation of full-set of TS is not needed.

4.2 The outline of communication procedure

An example of communication procedure is given at Fig.5. Corresponding protocol model is shown in Fig.6. This example is based on bidirectional communication service. The range of the scope of H.222.1 in the protocol model is shown by dashed line in Fig.6.

4.3 Asymmetrical channel

In center-to-end services such as video data base access, where audiovisual information is transmitted unidirectional, asymmetrical channel will be prepared for the control and the same consideration can be applied. How to transmit the control information through the low bitrate return channel needs further study.

5. Conclusions

This document has discussed the channel to be used for the communication control. We have pointed out that a new stream_id is necessary and proposed that new special PID should be assigned in case of TS. This document has also discussed items to be negotiated, signaling synchronized with media and the distinction between PS multiplex and TS multiplex. An example of communication procedure has been shown.

Reference

[1] Draft Recommendation H.22X, May 1994.

[2] AVC-656 "Necessary provision for applying H.222.0 to the H.32X terminals"(JAPAN), July 1994.

END

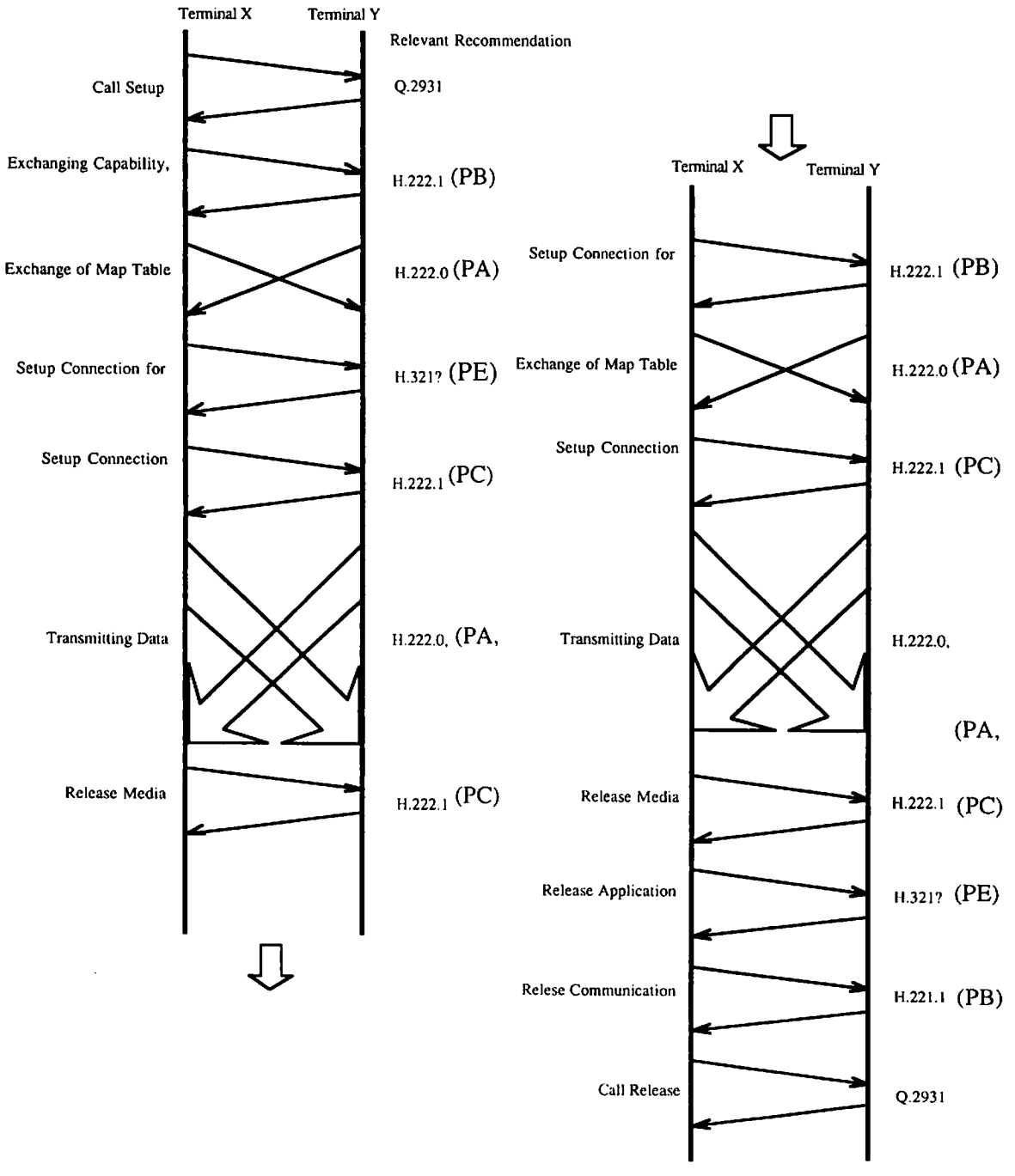

Fig.5 Communication procedure

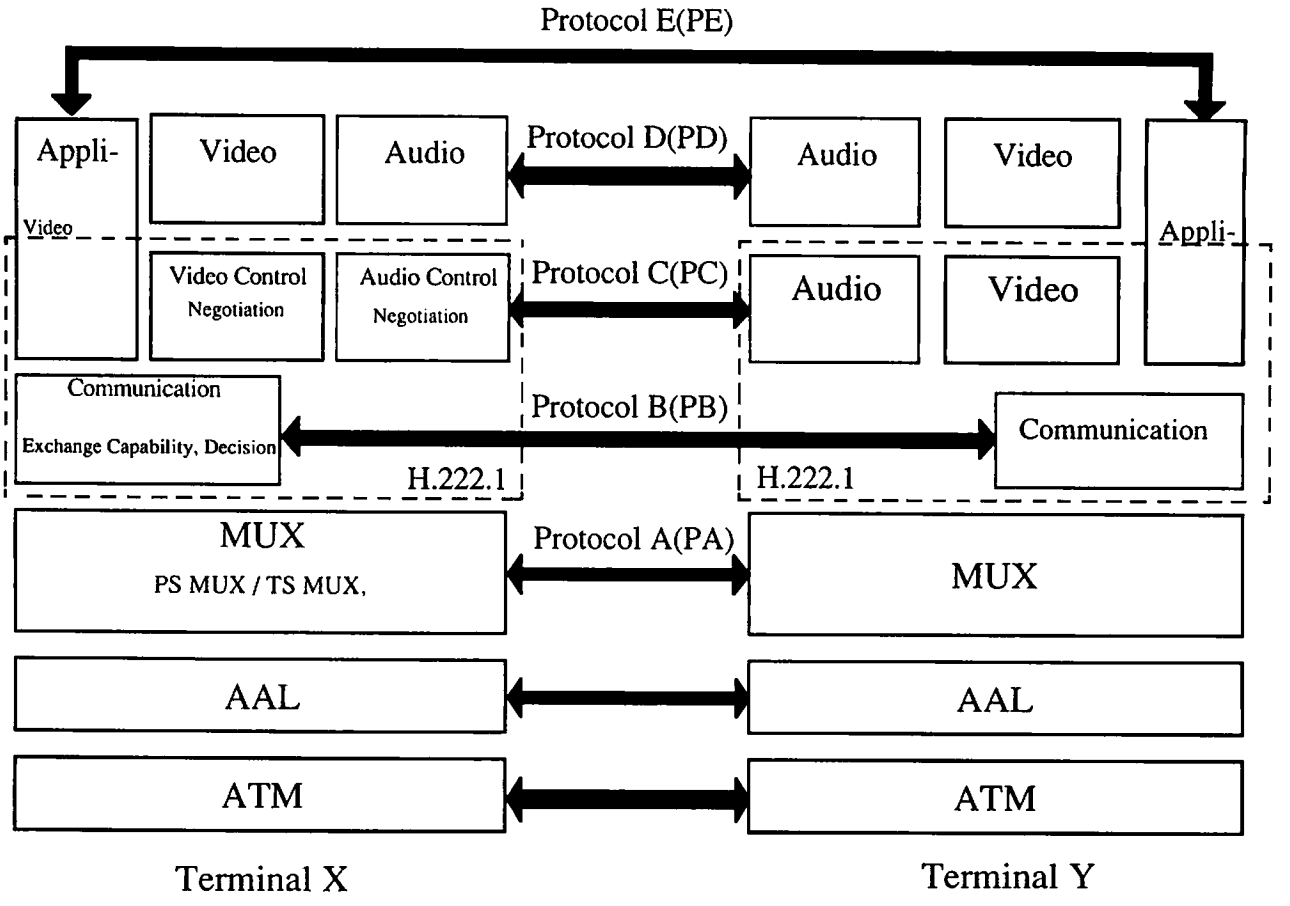

Fig.6 Protocol Model