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

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SOURCE : JAPAN
TITLE : Protocol model for H.32X terminal
PURPOSE : Discussion/Proposal

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1. Introduction

The negotiation and communication procedure for H.32X terminals are still under study. There seems to be not enough discussion to define a detailed communication procedure. Therefore, the definition of the protocol configuration and the protocol model are required as the first step for clarifying the concept of the communication protocol for H.32X terminals.

In this document, the consideration points for the definition of AV communication procedure are listed up and discussed. This document proposes a layered protocol model for H.32X terminals and also proposes the application of ASN.1 to the description of control information.

2. Multiplex method of protocol control information

There are some candidates for the multiplex method of protocol control information. The features of each method are discussed as follows. (refer to the discussion on multiple VCs in AVC-697)

2.1 Multiplex in H.222.0 stream

It is enough for H.32X terminals to process only one stream, which consists of audio, video and control information by utilizing the multiplex function of H.222.0.

The distinction between TS and PS should be carried out at the start of communication by some other mean (i.e. outband signaling).

2.2 Separate VC (separate connection, separate network)

This method has the advantage of extendability and flexibility to various kinds of applications. If the major application in B-ISDN environment is user selectable services such as Video on Demand, it would be better to separate the control information from the main body of audiovisual information.

The separate VC solution is recommended in the liaison from SG 8.

The control information is charged in addition to audio and video, that will be unfavorable from user's communication cost point of view.

2.3 User information in call control message

This method uses the user information fields in call control messages, such as HLC/LLC and user-user-information.

It is possible to decide a connectability at the call set-up phase.

However, the contents of HLC/LLC is not completely open to users. It is not clear that use of user-user-information is allowed within communication. Will user-user-information be charged like a separate VC ?

3. Bi-directional and uni-directional communications

The protocol can be executed through a bi-directional channel in symmetrical or asymmetrical communication applications. If user selectable services will be major in B-ISDN, the situation where only uni-directional channel is available for control information is thought to be quite unusual. Bi-directional control channel is a better premise for the communication protocol design which can ensure the coordination and the compatibility between uni-directional and bi-directional communications.

In case of broadcasting, where the communication channel is purely uni-directional, all of the necessary information should be included in the system multiplexed stream without separating the control information into a special channel for protocol handling.

4. Protocol configuration

4.1 Protocol layering

The protocol can be neat by utilizing a layered structure. If all the necessary functions including ACK/NACK procedure or repetitive transmission are involved in only one layer without further layering, the protocol will become complicated far from a simple structure.

The proposed protocol model is shown in Fig.1. Functions are divided into each layer in this model by layering structure. A highly reliable transmission service can be provided by X.224 transport layer. Application layer can concentrate on exchange of application information elements independent of transmission characteristics, because lower layers are responsible for the transmission of user (upper layer's) information. T.125 (T.MCS) is introduced between application layer and X.224 in this model for the purpose of compatibility with existing applications. Whether T.125 is also necessary in H.32X needs further study.

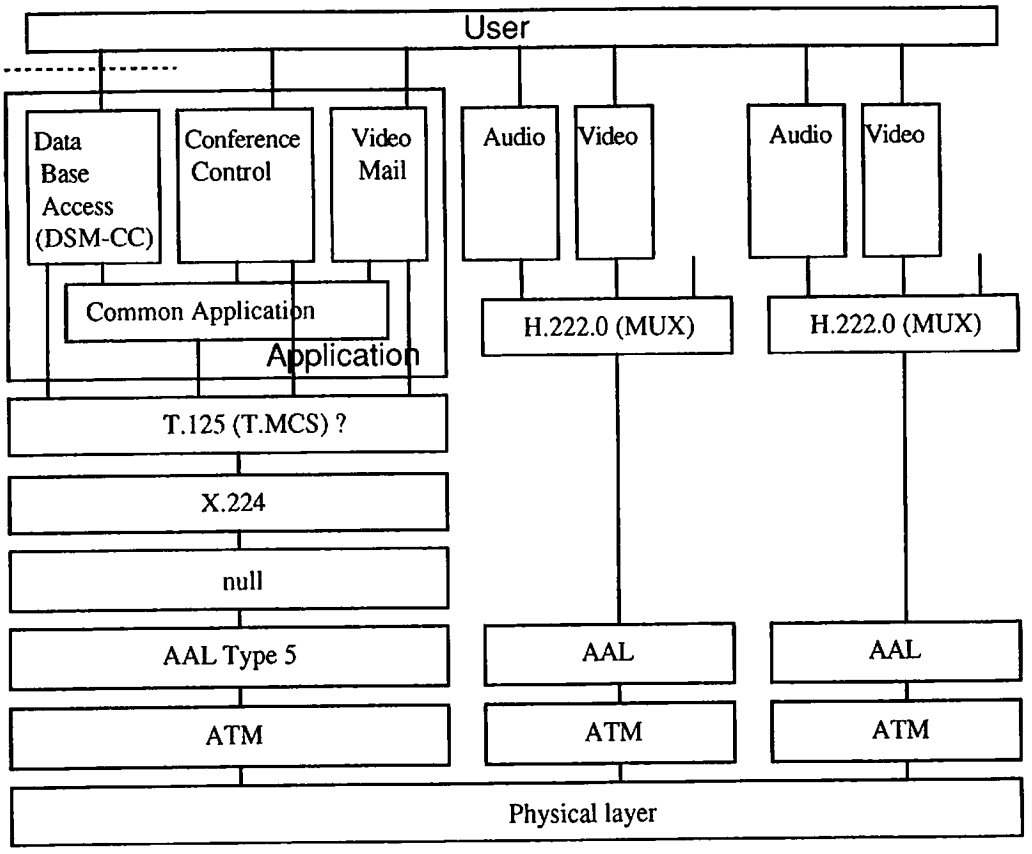

Fig.1 Protocol stack.

4.2 Application protocol

For example, video conferencing needs chair control and token control functions in its protocol. It is desirable to support these application control protocols by unique protocol configuration. Service specific parts are separated as "common application" in Fig.1, which includes minimum common service elements to all applications such as the capability negotiation and a setup of audiovisual information channel. Simple terminals can be designed to support only the common application part, because it is not necessary for them to use the application control protocol.

4.3 Description method of application control information

An approach like H.221 BAS which assigns necessary capability/command codes seems to have a limitation, considering many requirements from various kinds of applications.

The structured description method of information elements is better in future extendability like a layered protocol structure. ASN.1 (ITU-T Rec. X.680, X.690) is suitable for this purpose. The alternative capsets pointed out in AVC-677 is easily realized by structured description. The example of ASN.1 description of capability set is shown in Fig.2. This ASN.1 method can also be applied to the description of other application information elements such as DSM-CC.

```
DeclaredCapabilitySets   ::= SEQUENCE
{
   receiveCapabilitySet          ReceiveCapabilitySet,
   transmitCapabilitySet         CapabilitySet
}

ReceiveCapabilitySet             ::= SEQUENCE
{
   primaryCapabilitySet          CapabilitySet,
   alternativeCapabilitySet      SEQUENCE OF CapabilitySet  OPTIONAL
}

CapabilitySet                    ::= SET
{
   audioCapability               SET OF AudioCapability,
   videoCapability               SET OF VideoCapability,
   dataCapability                SET OF DataCapability  OPTIONAL
}

VideoCapability          ::= [1] IMPLICIT SEQUENCE
{
   codingAlgirithm               VideoCodingAlgorithm,
   profileAndLevel               ProfileAndLevel,
   videoBitRate                  INTEGER
}

VideoCodingAlgorithm     ::= ENUMERATED
{
         H.261          (0),
         H.262          (1)
}

ProfileAndLevel          ::= ENUMERATED
{
         SP@ML          (0),
         MP@ML          (1)
}
```

Fig.2 An example of ASN.1 description.

The codeword assignment proposed in AVC-677 can be incorporated into our proposed method as primitive contents. The basic coding form of ASN.1 is the same ILC message as that of AVC-677. The difference is that our proposal has a nested ILC structure, which enables more flexible and generic definition of control information.

5. Conclusions

This document has discussed the multiplex methods of protocol information and the applicability of communication procedure to both bi-directional and uni-directional services. We have pointed out that the bi-directional channel should be our main target of protocol design.

The layered protocol model for H.32X terminals and an usage of ASN.1 description for application protocol information have been proposed considering a flexibility and extendability to various kinds of services.

Reference

[1] AVC-697 "A study on use of multiple VCs", JAPAN, November 1994.
[2]AVC-675 "Liaison statement to SG15 (Q2/15) on B-ISDN audio graphic and audiovisual conferencing on ATM", SG8 (Q10/8), June 1994.
[3]AVC-677 "Multimedia System Control: a proposal for H.24P and H.24X", BT Labs, November 1994.

END