

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

Document AVC-660

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SOURCE : Stuart Dunstan, Siemens Ltd

TITLE : Draft skeleton text for H.22X

PURPOSE : Discussion

Draft Recommendation H.22X

MULTIMEDIA MULTIPLEX AND SYNCHRONIZATION FOR AUDIOVISUAL COMMUNICATION IN ATM ENVIRONMENTS

1. Scope

This Recommendation describes the multiplexing and synchronization of multimedia information, for audiovisual communication in ATM environments. This Recommendation specifies the peer-to-peer protocol, and the interactions with the AAL.

2. References

- [1] ITU-T Recommendation H.22W - Coding of Moving Pictures and Associated Audio - ISO/IEC 13818-1.
- [2] ITU-T Recommendation I.362 - BISDN Adaptation Layer (AAL) Functional Description
- [3] ITU-T Recommendation I.363 - BISDN ATM Adaptation Layer (AAL) Specification
- [4] CCITT Recommendation X.200 - Reference model of open systems interconnection for CCITT applications.
- [5] CCITT Recommendation X.210 - OSI layer service conventions.

3. Definitions

ATM	Asynchronous Transfer Mode
AAL	ATM Adaptation Layer
HPS	H.22X Program Stream
HTS	H.22X Transport Stream
PDU	Protocol Data Unit

4. General

This Recommendation deals with the multiplexing and synchronisation of multiple multimedia signals, for use in audiovisual communications in ATM environments. The multimedia signals may be coded audio or video, or other data signals.

This Recommendation is suitable for various applications such as conversational services, distributive services, retrieval services, and messaging services.

Separate procedures are specified for the case of interactive services where the physical connection is bi directional, and for the case of broadcast services, where the connection is unidirectional.

{Ed: It is assumed that for interactive services, that there are distinct call phases, just as in H.320. H.22X will need to maintain a map of active connections within a Virtual Channel. As connections are changed, acknowledgment, from the far H.22X layer and hence a return channel, will be

required, to ensure that the maps at each end agree. In the broadcast case the connection information would be broadcast continuously, and no return channel is required.}

This Recommendation may also be suitable for use in environments other than ATM.

This Recommendation specifies two separate and independent protocols. They are:

- H.22X Program Stream (HPS)
- H.22X Transport Stream (HTS)

These two protocols are based upon the Program Stream and Transport Stream respectively, defined in Recommendation H.22W [1].

{Ed: the acronyms above are used to distinguish the H.22X protocol from the MPEG-2 Systems Program and Transport Stream. At this stage it is assumed that the H.22X protocol may be different (perhaps a subset) from MPEG-2 Systems. There may be better words or acronyms than those used here.}

{Ed: Must H.22X implement both protocols or only one? Where should such a statement be written? Here, or in H.32X?}

This Recommendation uses the services provided by the AAL. It is intended that this Recommendation be used in conjunction with AALs that support services requiring an end to end timing relationship, i.e. Service Classes A and B, as defined in ITU-T Recommendation I.363 [2].

This Recommendation specifies the protocols using OSI modelling principles [4, 5]. The coding of peer-to-peer PDUs, and their procedures, are specified, as are the interactions with the AAL Service Access Point. Figure 1/H.22X illustrates these principles at the send side.

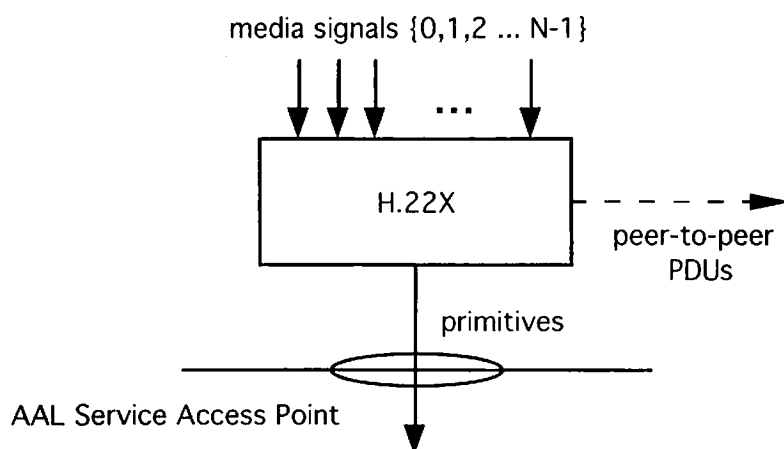


Figure 1/H.22X. H.22X protocol model - send side.

{Ed: A similar figure should be included for the receive side.}

Signals relating to error conditions at the receive side are also specified.

A Service Access Point is not defined at the media/H.22X service boundary.

{Ed: This should be for further study. It would not be difficult to formalise the service boundary for H.24X data for example.}

5. Functions provided by H.22X

5.1. H.22X Program Stream functions

The HPS protocol provides the following functions.

a) multiplexing

Multiplexing is based on a sequence of PDUs (containing data from a media source) which may be of variable length and of relatively large size. Each of these PDUs carries consecutive data from only one media source type i.e audio, video, or other data signal.

b) timebase recovery

The HPS protocol supports one and only one program. A program is a collection of associated media, all of which refer to a common time base.

The send side and receive side each have their own time bases. Time stamps attached to specific PDUs identify the intended time of arrival of the PDU at the receive side. Synchronisation of the receive side time base with the send side time base is achieved using these time stamps.

c) media timing synchronization

Additional time stamps identify times at which entities in each media are to be presented to the end user.

d) jitter removal

The HPS protocol specifies procedures for removal of timing jitter on received PDUs.

{Ed: It is not clear that H.22X should say anything at all about jitter removal. This is surely an implementation issue.}

e) buffer management

Rules are specified so as to avoid underflow and overflow of receive side buffers. This is achieved by a hypothetical receive side timing model, which specifies timing relationships between outgoing PDUs at the send side.

f) security and access control

Security and access control functions are provided by media encryption.

g) inband signalling

The multiplexing function provides multiple connection end points at the user/H.22X service boundary. Protocol is provided that signals to the receive side the association between a PDU and a connection end point. The nature of the information carried by the connection is also described.

h) error reporting

Protocol at the receive side reports error conditions to the H.22X user.

5.2. H.22X Transport Stream functions

The HTS protocol supports the following functions.

a) multiplexing

Multiplexing is based on a sequence of PDUs which are of fixed length and of relatively small size. The HTS protocol has a large multiplex capacity.

b) timebase recovery

The HTS protocol supports multiple programs. A program is a collection of associated media, all of which refer to a common time base.

The send side and receive side each have a time base, for each program. Time stamps attached to specific PDUs identify the intended time of arrival of the PDU at the receive side. For each program synchronisation of the receive side time base with the send side time base is achieved using these time stamps.

c) media timing synchronization

Additional time stamps identify times at which entities in each media are to be presented to the end user.

d) jitter removal

The HTS protocol specifies procedures for removal of timing jitter on received PDUs.

{Ed: It is not clear that H.22X should say anything at all about jitter removal. This is surely an implementation issue.}

e) buffer management

Rules are specified so as to avoid underflow and overflow of receive side buffers. This is achieved by a hypothetical receive side timing model, which specifies timing relationships between outgoing PDUs at the send side.

f) security and access control

Security and access control functions are provided by media encryption.

g) inband signalling

The multiplexing function provides multiple connection end points at the user/H.22X service boundary. Protocol is provided that signals to the receive side the association between a PDU and a connection end point. The nature of the information carried by the connection is also described.

h) error reporting

Protocol at the receive side reports error conditions to the H.22X user.

6. Interaction with the AAL

{Ed: The intent of this section is to specify how the primitives at the AAL-SAP will be used.}

6.1. AAL type 1

For further study

6.2. AAL type 2

For further study

6.3. AAL type 5

For further study

7. Timing model

For further study.

{Ed: This section should point to the respective sections in H.22W.}

8. HPS protocol for peer-to-peer communications

8.1. HPS PDUs

For further study.

{Ed: This section would list and identify as a PDU, each section of MPEG-2 Systems syntax, that had a unique start code.}

8.2. HPS PDU formats

For further study.

{Ed: For each PDU this section would point to the appropriate syntax and semantics section of H.22W (MPEG-2 Systems).}

8.3. HPS PDU sequence

For further study.

{Ed: This section details the allowed sequence of PDUs. This gives a high level description of allowed syntax.}

8.4. HPS states

For further study.

{Ed: This and the following section, detail connection set up and release, and what happens in the case of errors at the receiver e.g. arrival of a PDU with an unassigned multiplex identifier (stream_id value). In addition error events reported from the AAL are dealt with here.}

8.5. HPS state diagram

For further study.

{Ed: See above.}

9. HTS protocol for peer-to-peer communications

9.1. HTS PDUs

For further study.

{Ed: This section would list and identify as a PDU, each section of MPEG-2 Systems syntax, that had a unique start code.}.

9.2. HTS PDU formats

For further study.

{Ed: For each PDU this section would point to the appropriate syntax and semantics section of H.22W (MPEG-2 Systems)}..

9.3. HTS PDU sequence

For further study.

{Ed: This section details the allowed sequence of PDUs. This gives a high level description of allowed syntax}.

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9.5. HTS state diagram

For further study.

{Ed: See above}.

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