

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

Document AVC-800R
18 May 1995

Source: RAPPORTEUR (Sakae OKUBO)
Title: REPORT OF THE NINETEENTH EXPERTS GROUP MEETING IN
 HANINGE (15-18 May 1995)
Purpose: Report
Status Confirmed by the participants

1. General

The nineteenth meeting of the Experts Group was held under chairmanship of Rapporteur (Mr. Sakae Okubo) during 15-18 May 1995 in Telia Research, Haninge, Sweden, at the kind invitation of Telia Research AB. At the start of the meeting, Mr. Leif Bengtsson, Manager of Image Technology, gave a welcoming address on behalf of the hosting organization. A list of participants appear at the end of this report.

It is noted that the discussion session for H.222.1, H.245, H.321 & H.310, H.322, H.22Z, H.323 was co-chaired by Rapporteur and each Editor; Mr. Stuart Dunstan, Mr. Mike Nilsson, Mr. Hayder Radha, Mr. Geoff Morrison, Mr. Gary Thom, Mr. Dale Skran.

In addition to the meeting sessions at large, we had three small group discussions regarding network adaptation, communication procedures and LAN matters in the Tuesday evening, and two small group discussions regarding communication procedures and LAN matters in the Wednesday evening.

At the end of the sessions, Rapporteur thanked the hosting organization for providing us excellent facilities and services to support the meeting.

2. Documentation and tape demonstration (TD-2)

For this meeting, 57 AVC-numbered documents and 23 Temporary documents have been made available as listed in Annex 1. On Tuesday, 16 May, the following tape demonstration was given:

Organization	Content	Document
Telia Research	Low-delay simulations for MPEG-2 ML video at 1.5 Mbit/s	-
KPN Research	VADIS hardware processed pictures at 9 and 4.5 Mbit/s using AAL1 and TS	-
AT&T Bell Labs	Concealment of bit errors	AVC-774
AT&T Bell Labs	Error resilience at high packet loss rates	AVC-775

3. Review of the previous meetings

3.1 Experts Group January meeting in Kamifukuoka (AVC-743R)

Rapporteur drew attention of the members to several annexes which contain major achievements at the previous meeting.

3.2 SG15 meeting in February (AVC-749, 750)

Rapporteur drew attention of the members to the items needing action of this Experts Group.

3.3 LBC meeting in March

Rapporteur reported that the harmonization between H.245 and H.246 was agreed at the LBC meeting in March and that we make a single Recommendation H.245 regarding communication procedures for packet based audiovisual communication systems. The meeting appreciated the efforts of Mr. Mike Nilsson and Mr. Keiichi Hibi.

3.4 SG13 Rapporteur meeting in May

Rapporteur summarized the outcome of the SG13 Rapporteur meeting in the preceding week:

- the choice of AAL is left to the user,
- some functions which have been allocated to AAL CS can be in the H.222.1 layer.

3.5 Meetings of related organizations

The outcome of the following meetings were briefly presented by the members of this Experts Group:

- MPEG in March by Mr. Sakae Okubo
- SA&A in February and April by Mr. Jeff Lynch
- DAVIC in March and May by Mr. Olivier Poncin

3.6 List of open issues (AVC-752)

Rapporteur suggested to use AVC-752 as a check list for the discussion at this meeting.

4. Common text Recommendations

4.1 Amendment and corrigendum

The meeting agreed from the ITU-T perspective on the following amendments and corrigendum which were produced at the MPEG meeting in March 1995 :

H.222.0/ISO/IEC 13818-1 Systems

- Amendment for format_identifier (AVC-759)
- Amendment for copyright_identifier (AVC-760)

H.262/ISO/IEC 13818-2 Video

- Amendment for copyright_identifier (AVC-761)
- Amendment for the 4:2:2 Profile (AVC-798)
- Corrigendum (AVC-762)

We submit white contributions after the MPEG meeting in July for the consideration of the SG15 meeting in November.

4.2 Defect report

Members are requested to report their finding for corrections to the publication version of H.222.0 and H.262 texts through the reflector. We will make a list and input to the SG15 meeting in November according to the procedure defined in Section 7.11 of Annex A to WTSC Recommendation A.23 "Guide for ITU-T and ISO/IEC JTC1 Cooperation".

Rapporteur's note: - Chairman of SG15, Mr. Probst, agreed in his letter to Rapporteur dated 12.5.95 that the Experts Group act as Defect Reviewing Group for the two common text Recommendations, pending the approval of SG15 in November 1995.

5. RTI and DSM-CC

5.1 Real Time Interface (AVC-756, 763, 777, 793)

The meeting first discussed whether RTI-LJ with t_jitter=25 microsecond be appropriate for our use in ATM audiovisual communication terminals. We concluded that the current specification is not useful for the applications in ATM environments.

The next question was what t_jitter value is to be specified for our purpose. A proposal of "RTI-NJ" with t_jitter=500 microsecond was presented in AVC-777. The underlying issues are what is the jitter value at the input and how to cope with this input jitter inside the terminal. The meeting concluded that how to absorb the jitter incurred at the input of the receiver should be left to implementation since it is not relevant to interoperability. This conclusion will be reflected in H.222.1 by qualitative description as part of its functionality with a note containing some specific values for information purpose.

The meeting further discussed the usefulness of generic specifications of RTI to conclude that we support the framework standard without specific values of t_jitter as proposed in AVC-793 and this is appropriate for a common text Recommendation (H.222.2).

Based on the above conclusion, the meeting decided to send a correspondence to MPEG as in Annex 2 with an attachment of proposed wording. Review of the attachment is requested by the end of June for submission to MPEG.

5.2 DSM-CC (AVC-754, 755, 779, 783; §6.1.3/AVC-743R)

The meeting briefly discussed the relevance of DSM-CC to H.245 (capability, C&I) whether they are duplicating or compensating. In case of H.310 bi-directional terminals, use of Q.2931 and H.245 is straightforward. In case of H.310 uni-directional terminals or H.310 bi-directional terminals functioning as receive only terminals, the meeting recognized that the two specifications may have some overlap and we need synergy between them.

Mr. Mike Nilsson kindly volunteered to present Draft H.245 at the MPEG DSM-CC Adhoc Group meeting which is held during 22-25 May in Boston. The meeting appreciated this action towards reaching the above mentioned synergy solution.

6. Network adaptation

6.1 H.222.1 functions

6.1.1 FEC (AVC-753, 765, 771, 773, 774; AVC-781)

The meeting discussed how FEC should be handled in the audiovisual communication terminals for ATM environments; whether they should be mandatory or optional for each of AAL1 and AAL5 solutions and where it should be allocated in the protocol reference model. Choice of FEC parameters was also considered.

Based on the network performance scenario (see §6.4.1 of this report) and experimental results, we concluded as follows:

- The error resilience approach using the CRC32 error detection is practical for the AAL5 solution while FEC is required for the AAL1 solution.
- H.310 specifies that the use of FEC is optional.
- As to the FEC specification, RS(128,124) without interleaving is adopted for harmonization with the J.82 solution. The FEC framing is through use of CSI for every 47 FEC frames (128 cells).
- This FEC without interleaving is to be defined as part of AAL1 CS. We will send a correspondence to SG13 requesting definition of this FEC as in Annex 3.

Information on the FEC characteristics is given in Annex 4.

6.1.2 Jitter due to FEC framing (AVC-766, 771)

AVC-766 and 771 discusses jitter due to FEC framing and its relevance to PS/TS packet boundary and AAL-SDU. The meeting appreciated the input and recognized that FEC framing can be a source of jitter.

Some implementation examples for jitter removal inside the receiver are shown in Annex 5 as information. Note that this list is not exhaustive.

6.1.3 Extension to VBR (AVC-771, 794)

The meeting reviewed whether handling of PCBR (Piecewise Constant Bit Rate) should be in H.222.1 at this stage. Since we need more study to clarify the requirements and characteristics of PCBR, we concluded not to include it in the November version of H.222.1. This should be further studied towards a next phase Recommendation or revision of the first phase Recommendation.

6.1.4 Jitter removal (AVC-778)

AVC-778 presented a descriptor method for indicating which parts of the data stream may be used for recovering the Decoder System Clock. During the discussion, it was clarified this descriptor has no relevance to the existing system clock descriptor. The method was refined during the meeting and contained in Annex 6. This proposal was agreed for inclusion in H.222.1.

6.1.5 Conclusion of the network adaptation discussion (TD-9)

The meeting asked Mr. Roel ter Horst to organize a small group to draft the agreements on the network adaptation issue. The approved report is contained in Annex 7.

6.2 AAL (AVC-794, 796)

Considering the two AAL solutions on the table for the CBR coded MPEG stream, the meeting discussed what should be the position of this Experts Group for AAL1 and AAL5. We concluded to maintain the previous decision that H.222.1 define tools and that H.310 specifies the use of AAL1 and/or AAL5 solutions for each of the terminal types.

Rapporteur raised a question that even the same AAL1 is mentioned in SG9 and SG15, choice of CS functions has been different, thus compatibility between the two systems may not be obtained. The meeting agreed to seek a harmonized solution with J.82 in H-series Recommendations.

AVC-796 pointed out necessity to define and describe the selected option for jitter removal in terms of AAL5 convergence sublayer. It was a common understanding of the meeting that the jitter removal is left to implementation (see §5.1 of this report).

The meeting took note of the SG13 advice to study phase (or clock) integrity when a cell loss has taken place. This matter is yet to be considered.

6.3 Communication procedures (AVC-767, 769, 787; AVC-751, 788)

AVC-767 discussed allocation of audiovisual communication procedure functions among H.222.1, H.245 and H.310. The meeting supported to align the three Recommendations according to the function partitioning described in §2 of AVC-767.

All of the listed contributions addressed the choice of channel for the logical channel signalling message. After extensive discussion at the main meeting and small group meetings organized by Mr. Stuart Dunstan, we reached a conclusion to send the logical channel signalling message as part of the H.245 messages. This is with a view to harmonizing with the LBC protocol

stack. Since the current version of H.245 does not include SDLs such as in H.222.1, they will be worked out before the submission of its SG15 white contribution. The meeting agreed to the SDL precedence to description if discrepancy happens inside the Recommendation.

AVC-789 proposed to define default logical channels and their PIDs at the start of communication. The meeting accepted this proposal considering that the propagation delay may not allow quick start of a negotiated mode of communication.

6.4 Network aspects

6.4.1 Network performance (AVC-781)

AVC-781 provided an updated ATM network performance scenario which incorporated SG13 advice and other information obtained after the issue of AVC-635. The meeting confirmed to continue the approach in the lack of definitive network performance information.

During the discussion there was a suggestion that the "Best Case" may mean an error free case, thus it should be reworded as "Above Average Case". The SG13 Rapporteur meeting on Q.6.1 in the previous week also suggested to list performance according to the reference point in the table. The meeting accepted these suggestions.

As to the particular performance values, the meeting decided to send this update to SG13 for comments and seek their advice on error patterns referring to the particular FEC mentioned in §6.1.1 above.

6.4.2 Q.2931 signalling (AVC-780, 783; §10.2/AVC-743R)

AVC-780 and 783 raises a question whether B-HLI or B-LLI be appropriate for the "Correlation ID". Mr. Tomoaki Tanaka informally advised the meeting that SG11 would revisit the issue at its meeting in February 1996. It was recognized that we should review Annex 5 to AVC-743R according to the current H.310 discussion and take necessary actions to SG11.

6.5 H.310 network adaptation protocol reference model (Annex 9 to AVC-743R)

Mr. Stuart Dunstan undertook to update the model according to the achievements obtained at this meeting. This will be submitted as a separate document AVC-801.

7. Draft Recommendations to be decided in November

7.1 Draft H.222.1

7.1.1 Text (AVC-744, 750, 752, 786, 787, 789)

After the meeting at large gave an overview to the available materials, small groups coordinated by Mr. Stuart Dunstan thoroughly discussed the open issues regarding H.222.1 as well as H.245 and produced resolutions to each item. The outcome is contained in Annex 8 with action items for the white contribution. This was approved at the review session which took place on the final day of the meeting. The text will be completed by the end of June through correspondence.

It was clarified that though most of the communications will use the acknowledged procedures, H.310 may specify the use of unacknowledged procedure for some type of uni-directional communications. In any case, H.222.1 defines the two procedures as tools.

7.1.2 Error resilience (AVC-775)

AVC-775 proposes an error resilience method by use of H.262 Data Partitioning syntax in the environments where no priority is provided. It was noted that the proposed correction to H.262 had already been discussed and agreed at the MPEG meeting in March 1995. The

meeting agreed on inclusion of the proposed text in H.222.1 except for the last paragraph in AVC-775.

7.1.3 Timing recovery (AVC-778)

See §6.1.4 above.

7.1.4 Capability descriptor (AVC-788)

AVC-788 proposes to add a descriptor indicating a capability set of the remote terminal to judge the acceptance of the requested logical channel establishment. According to the resolution to the logical signalling message issue (see §6.3 of this report), this addition is no more required.

7.2 Draft H.245

7.2.1 Harmonization with H.246 (AVC-751)

AVC-751 raised the need to harmonize H.245 and H.246 which was agreed by the LBC group in March 1995. The meeting confirmed that this Experts Group also support the harmonization approach integrating the two into a single Recommendation H.245.

7.2.2 Text (AVC-745, 750, 752, 772, 788, 790)

See §7.1.1 for the resolution to the H.245 open issues. The text will be refined through correspondence.

Furthermore, the meeting agreed on the principle to make H.245 generic so that various communication environments such as ATM, GSTN, LAN can be covered by a single Recommendation . It is anticipated that some additions may be needed for H.323 as its work progresses. This addition will be requested from the October Experts Group meeting to the November SG15 meeting. Rapporteur will consult with TSB regarding the acceptance of this procedure.

7.2.3 Jitter control (AVC-764)

AVC-764 proposes additional H.245 messages to assist the encoder to control its coded data generation so that the decoder buffer does not underflow nor overflow. The meeting agreed on the inclusion of additional syntax and semantics in H.245 as contained in Annex 9. During the discussion, some concerns were expressed with potential problems involved in the delayed feedback.

7.2.4 Multipoint video (AVC-776)

AVC-776 proposes additional specifications in H.222.0 and H.245 which allow for simultaneous multiple video displays by merging multiples streams at the MCU or decoder. Members are requested to review this proposal by the next meeting.

7.2.5 Error free transfer protocol (AVC-791, TD-13)

AVC-791 raised a question regarding the possible use of SSCOP in the error free transport of H.245 messages through an H.222.1 logical channel. Mr. Keiichi Hibi clarified the background for the choice of current protocol stack, also referring to the SG8 view. The meeting confirmed to maintain the current protocol stack as in Annex A to H.245, concluding, however, that its content is more appropriately to appear in H.222.1.

7.3 Draft H.321 (AVC-747, 750, 752, 772)

The meeting reviewed modifications which were made after the Kamifukuoka meeting. Except for further editorial improvements, the meeting recognized it necessary to define a communication mode for supporting more than 64 kbit/s communication (typically 2B

communication) in a single VC for the case of "H.321 - B-ISDN - H.321". There are two possibilities that FAS/BAS being contained only in the first timeslot or in every timeslot. Since its resolution needs some more careful thought, it should be worked out through correspondence by the time of white contribution submission.

The text will be completed by the end of June through correspondence.

7.4 Draft H.322 (AVC-748, 750, 752, 772)

Document AVC-748 (version dated May 1995) was presented by the H.322 editor (Mr. Geoff Morrison). The main body of this document was a revised version of the Draft Recommendation H.322. The changes since the version produced at the Kamifukokua Experts group meeting in January 1995 were to address the comments from the SG15 WP1 meeting in February. The first part of AVC-748 listed these comments (also appearing in AVC-750 sourced by the Rapporteur) and summarised the updates made by the editor in response.

Document AVC-772, section 4 contained three comments from AT&T concerning the Kamifukokua draft and two were still relevant to the more recent version. The meeting accepted the intentions behind these two and the editor agreed to formulate and add clarifying text concerning:

- i) the H.322 gateway
- ii) the underlying requirement of H.322 that the ISDN clock is somehow conveyed to the H.322 terminals.

The clock issue prompted further discussion during which doubts were expressed whether the FDDI LANs listed as examples in the Draft Recommendation H.322 really are suitable for use with it. The editor proposed to remove them on the basis that it would be a serious error to include them if they are technically unsuitable whereas it would only be unfortunate if they were not listed in the examples despite being suitable. Any of them could be reinserted if evidence of their suitability was presented before the cut-off date for preparing the version for the next WP1 meeting (see §7.5). The meeting agreed to this.

It was questioned whether further specification was necessary to ensure terminals on the same LAN but from different manufacturers would interwork. The editor remarked that this would depend on the specific LAN. In the case of IEEE 802.9a the specification is quite complete and there is likely little possibility of open choices leading to incompatibility. The meeting expressed no enthusiasm for the ITU-T to examine other LANs and produce further individual specifications where they might be found necessary.

The text will be completed by the end of June through correspondence.

7.5 Refinement through correspondence

The meeting decided the following work schedule for the submission of white contributions towards the "decision" at the SG15 meeting in November 1995:

- | | |
|--|------------|
| • Distribution of an updated draft by Editor | by 7 June |
| • Comments to the draft | by 21 June |
| • Second update by Editor | by 30 June |

The following members volunteered to review the updated draft:

- | | |
|---------|---|
| H.222.1 | Yuichiro Nakaya (Hitachi), Barry Haskell (AT&T), Roel terHorst (KPN Research) |
| H.245 | Keiichi Hibi (Sharp), Jeff Lynch (IBM) |
| H.321 | Tomoaki Tanaka (NTT), Geoff Morrison (BT) |
| H.322 | Toshihisa Nakai (Oki), Dale Skran (AT&T) |

Comments of these members and any other contributors as well as responses should be posted at the AVC reflector (sg15.avc@research.ptt.nl) for open discussion. Comments to Draft H.245 should also be posted at the LBC reflector (sg15.lbc@research.ptt.nl) for review of the LBC members.

8. Draft Recommendations to be determined in November

8.1 Draft H.310

8.1.1 B-ISDN and LAN terminals (AVC-770, 782, 784; TD-4)

The three contributions addressed audiovisual communication terminals in B-ISDN and ATM LAN environments. There was some discussion on difference between the two environments from the terminal perspective. It was felt that they are the same with respect to the user - network interface, but thorough review (e.g. clocking aspect) is required to make a firm conclusion.

The meeting recognized it necessary to make a neat ITU-T framework for various type of conversational terminals, particularly ATM LAN terminals. This framework should be consistent with the approach to the H.320/H.322/H.323. Efforts toward this direction are found in §8.1.3 of this report.

8.1.2 Transfer rate (AVC-768)

AVC-768 discussed the representation of H.310 transfer rate in terms of $n \times 64$ kbit/s and values of n for mandatory support. Mr. Haskell raised a question whether the transfer rate be related to the 27 MHz system time clock instead of the 8 kHz based network clock. This needs further consideration.

8.1.3 Text (AVC-746, 750, 752, 772)

New Editor of H.310, Mr. Hayder Radha, presented the updated draft AVC-746, highlighting the modifications made after the Kamifukuoka meeting, particularly Table 2 indicating mandatory/optional capabilities. These are in response to the WP1/15 and other comments. The Editor also proposed a direction of H.310 based on his analysis of available contributions and the above discussion (§§8.1.1, 8.1.2).

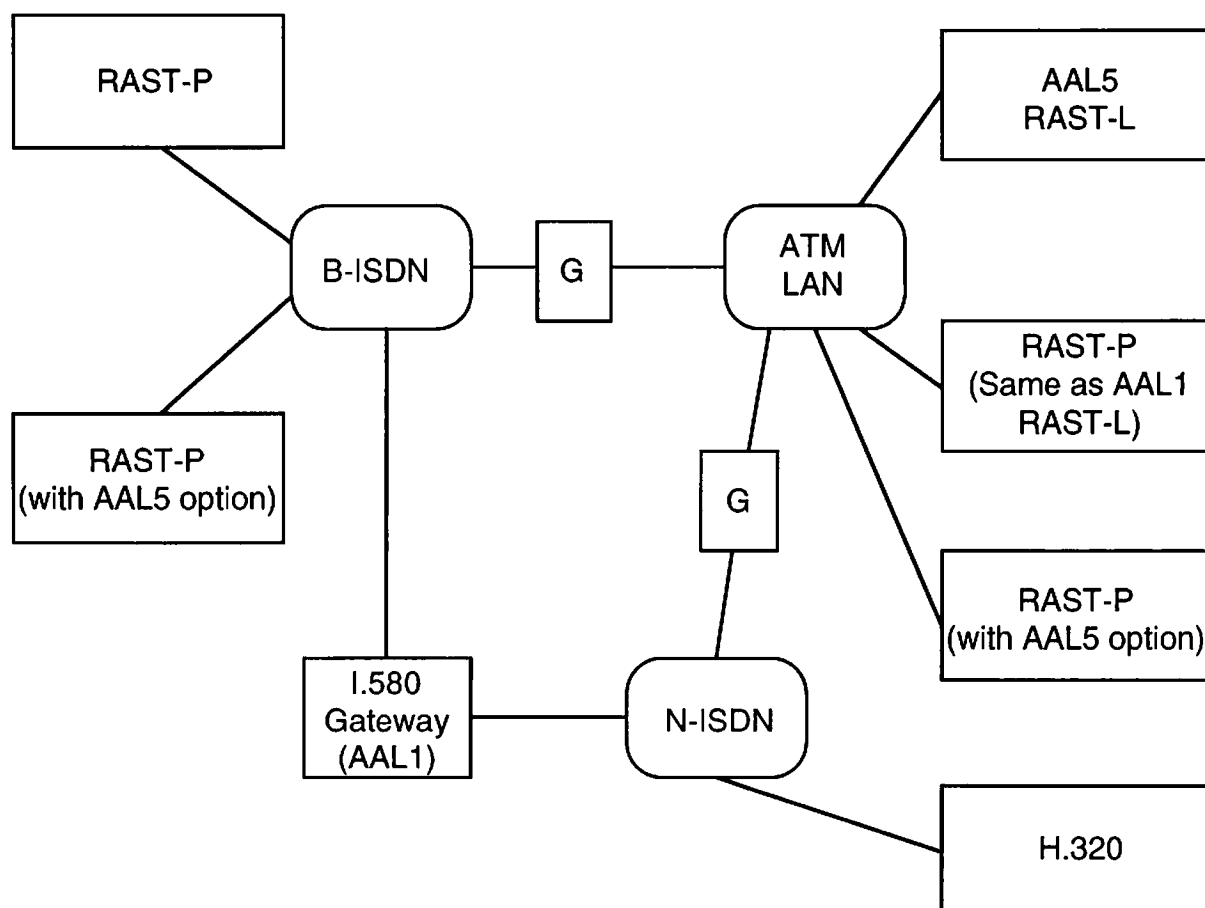
The meeting focused on discussing the scope of Recommendation H.310 and agreed on the following points in defining Receive-and-Send Terminal (RAST) types :

- 1) Interworking between H.310 RAST terminal types and H.320/H.321 terminals is mandatory.
- 2) Interworking among the different H.310 RAST terminal types is mandatory.
- 3) Recommendation H.310 will define two classes (or profiles) of RAST terminal types:
 - (a) H.310 RAST terminal type for (Public) B-ISDN (RAST-P), and
 - (b) H.310 Terminals for ATM LAN (RAST-L).
- 4) For interworking with H.320/H.321 terminals, both H.310 RAST-P and RAST-L terminal types will support the following modes (mandatory):
 - (a) H.261 CIF/QCIF
 - (b) G.711 (G722 and G728 optional)
 - (c) H.221/H.242-H.230
 - (d) 1B, 2B and H0 transfer modes
 - (e) Two ATM VCs (for supporting the 2B communication mode with H.320)

- 5) The support of ALL-1 (for the transfer of H.222.1 and H.221 audiovisual signals over B-ISDN) is mandatory for H.310 RAST-P terminals. The support of audiovisual data over AAL5 by H.310 RAST-P terminals is optional.
- 6) Recommendation H.310 will define an AAL5 based H.310 RAST-L terminal type. The support of AAL1 by H.310 RAST-L is optional.
- 7) A gateway (not inside the network but in the customer premises) between a B-ISDN and an ATM LAN needed to provide interworking functions between:
 - (a) ALL5 only RAST-L and RAST-P (which do not support the optional AAL5 mode) terminals,
 - (b) AAL5 only RAST-L and AAL1 only RAST-L terminals, and
 - (c) AAL5 only RAST-L and H.321 terminals.

Similarly, a gateway between an N-ISDN and an ATM LAN is needed to provide interworking functions between RAST-L and H.320 terminals.

- 8) An H.310 RAST-P terminal, which supports the optional ALL-5 mode, can communicate with an H.310 AAL5 only RAST-L terminal using ALL-5.
- 9) H.310 RAST-P terminals (with and without the optional AAL5 support) can be deployed on (or interface with) both B-ISDN and ATM LANs. However, H.310 RAST-L terminals can only interface with ATM LANs.
- 10) An AAL1 only H.310 RAST-L terminal is the same as a RAST-P terminal (without the ALL-5 option). Therefore, there is no need for Recommendation H.310 to define an AAL1 only H.310 RAST-L terminal.



It was also agreed to complete the action items shown in Annex 10 by the next AVC meeting in October.

8.2 Draft H.22Z (AVC-757, 752)

The meeting at large and small group meetings coordinated by Editor (Mr. Dale Skran) discussed the guiding principles and study items towards determination at the SG15 meeting in November 1995. It was clarified that H.221 is not appropriate for H.22Z purpose because it can not cope with packet losses encountered in the non-guaranteed QoS LANs.

AVC-757, the draft H.22Z for Media Stream Synchronization and Time Base Recovery on Non-guaranteed bandwidth LANs was discussed. A number of decisions were taken:

- 1) FEC is not needed on the LAN, and will thus be terminated at the H.323 gateway, and generated for outgoing (to H.320 WAN) calls. A choice must be made between the following options:
 - (a) Passing the FEC bits onto the LAN to help in video rate matching
 - (b) Not passing the FEC bits onto the LAN, and requiring the gateway to insert FEC bits.
- 2) FEC or CRCs are not needed in the H.22Z layer; these are assumed to be provided on the LAN, with the assumption that the LAN will not pass up errored packets. Thus, errors will be rare, but when they do they will occur at the packet level. Thus, H.22Z should specify a packetization scheme for each media that is robust in the face of packet loss.
- 3) The term "unreliable" protocol will be replaced with "non-guaranteed delivery."
- 4) It was agreed to separate H.22Z into two layers [the location of SAR remains to be determined, but it will most probably be in layer (a)]:
 - (a) An upper layer that is concerned with jitter removal, timing recovery, and media-specific processing. A timestamp on this level will represent the capture time.
 - (b) A lower layer that is concerned with QOS and media stream association. The timestamp for this level is based on when the packet is sent.
- 5) Media capture sequence numbers should increment per media to aid in recovery processing.
- 6) It was agreed to consider whether a shorter sequence number (8 bits?) would be sufficient.
- 7) There is no need for a CRC on the PDU header.
- 8) It was agreed to consider using a smaller time stamp than RTP uses. As two timestamps are being used, this issue can be rethought.
- 9) It was noted that for some LANs the LAN specific layer of the GLI (General Lan Interface) must provide a method of packetization. This will be an issue in the case of passing T.120 or H.245 control over TCP/IP which does not have packet boundaries.
- 10) It was suggested that H.22Z should be an RTP profile and be RTP conformant. This was discussed at length, with the conclusion that:
 - (a) H.22Z would continue to be RTP "inspired" but in PDU structure would not follow RTP/RTCP, nor would there be any attempt to be interoperable with RTP/RTCP.
 - (b) If at all possible, H.22Z would follow the media packetization schemes of RTP, with the intent of both taking advantage of the IETF work, and easing the efforts of implementors who wish to produce systems capable of both RTP and H.323. It was noted that H.323 signaling will be highly incompatible with RTCP.

- 11) It was suggested in AVC-799 that a "real-world" profile be added to illustrate the use of a particular LAN, with TCP/IP being suggested. This was agreed to in the spirit of T.123, which provides such an example. Whether this is informative or normative is for further consideration, but it was noted that T.123 is making the LAN stack normative, although it was initially informative.
- 12) AVC-799 suggests that H.22Z specify an accuracy requirement on the capture timestamp. This was tentatively accepted, and input on the proper value is solicited.
- 13) AVC-799 suggests that H.22Z specify how much difference in audio/video capture timestamps may be tolerated before recovery procedures are started. This was tentatively accepted, and input on the proper value is solicited. It was also agreed to consider how to handle the situation where video arrives ahead of audio, and not to simply prohibit this, as this cannot be assured.
- 14) It was tentatively agreed to follow the H.261 packetization direction of RTP. The 512 bit frame approach was rejected. Per frame packetization allows error recovery only on the level of the entire frame, and was rejected for this reason. An H.263 packetization for the LAN must be developed.
- 15) As discussed under the H.323 topic, the scope of H.22Z will include broadcast/multicast video on the LAN in the context of the gateway operating as an MCU, and also the case of the gateway operating as a simple video broadcasting element. Thus, H.22Z must consider the possible error recovery implications of the broadcast scenario. The tentative direction is that even if video and audio are unidirectional, the H.245 control link will always connect the H.323 endpoint to the gateway/gatekeeper, and thus the same error recovery procedures for the duplex case will apply to the broadcast case.
- 16) Audio silence packets will be supported/allowed as an option.

The following issues related to H.22Z were raised:

- 1) It was suggested that T.125 should run over the T.123 LAN stack as specified in T.123. The issue of whether and how T.120 should be coordinated with the audio/video requires further work. Two directions are:
 - (a) Run T.120 without any coordination with audio/video. This has the problem that some features(e.g. associating video with a cursor) may be impossible.
 - (b) Add a program id to the T.120 PDUs in some fashion, as well as to the audio/video PDUs to support this association.
- 2) Some important messages (e.g. freeze picture release) are in the media stream on a non-guaranteed delivery PDU. It is necessary to have some strategy (duplicated sending, etc.) to assure delivery.
- 3) The issue of whether mixed audio/video packets would be allowed was discussed. Two views were expressed:
 - (a) Audio and video should be kept in separate packets to take advantage of QOS services offered by different LANs.
 - (b) If audio is put into packets by itself, this results in too many packets for some LANs. Specific implementations were mentioned where mixing of audio and video in a single packet was needed. It may be desirable to make mixing of audio and video an option, with its own capability.
- 4) Program or source identifiers may be important in the context of video broadcast/multicast on the LAN since point-to-point signaling may not be present. This requires further consideration.

The editor requests that material intended for the July edition be received by June 19, 1995 by posting to the H.323 reflector at h32z2-list@mtgbcs.att.com.

8.3 Draft H.323

The meeting at large and small group meetings coordinated by Editor (Mr. Gary Thom) discussed the guiding principles and study items towards determination at the SG15 meeting in November 1995.

H.323 session began in the afternoon of Monday May 15. Five documents were presented and discussed. In addition, a small work group met during lunch breaks and on Tuesday and Wednesday evening to further discuss the issues relating to H.323. This report summarizes the result of these discussions.

TD-5, an overview of AVC-758 was presented and there was some discussion. In particular, the following points were raised:

- 1) H.263 SQCIF is optional but H.263 also specifies CIF and QCIF picture formats. Are these not supported?

Resolution: These were not intentionally excluded and will be added to the text.

- 2) FEC may not be required on the video since errored packets will probably not be output from the network interface for error correction to be performed.

Resolution: This will be handled in the H.22Z video packing description. The current thinking is that FEC will not be used with the video on the LAN.

- 3) A Gatekeeper entity will be required.

Resolution: The following description will be added.

1.x Gatekeeper

The Gatekeeper is a centralized conference manager that provides access to the network for H.323 terminals and gateway units. The gatekeeper is always required, even when all terminals are on the same LAN. It is logically separate from the terminal and the gateway, however, its physical implementation may coexist with a terminal, gateway, server, or other network entity. The Gatekeeper may be a single entity or may be multiple entities that co-operate to provide the gatekeeper services. The gatekeeper shall provide the following services to H.323 terminals and Gateway units on the LAN:

- Conference Authentication. Is a terminal on the WAN permitted access to the LAN? Is a terminal permitted access to a conference?

- Bandwidth Management. Static control of the number of H.323 terminals permitted simultaneous access to the LAN.

- Connection Management. Management of ongoing connections.

- Conference Management. Management of ongoing conferences.

- Terminal to gatekeeper "Q.931 like" call signalling.

- Network management information data structure.

- Directory services. E.164 to LAN address translation list. Static mandatory, dynamic optional.

- Multicast address allocation.

- 4) H.323 intends to use H.245 for communications control. This may require some changes to H.245. These changes include:

- Addition of G.DSVD audio code point.

- Other changes

Resolution: Need contributions describing necessary changes to H.245. Open

5) A procedure for limiting video bitrates is needed.

Resolution: Video, audio, and data bitrate will be negotiated during the capability exchange. This will use the H.245 Flow Control message.

6) A more detailed description of the Gatekeeper and the gateway are required.

Resolution: New sections will be added to describe the procedures involving the gatekeeper and the gateway.

AVC-792 was presented which described an implementation example of video teleconferencing on non-guaranteed quality of service LANs. This contribution was very useful in presenting actual implementation issues. Some discussion followed. It was confirmed that H.323 is not only targeted to software implementation. Furthermore, questions were raised regarding :

7) The effect of not having network timing at the end-points. Can rate adaption be performed acceptably in the gateway between the end-point on the LAN and an H.320 terminal on the WAN?

Resolution: It is thought that this will not be a problem.

AVC-799 was presented which raised many issues. This contribution was very helpful in summarizing many issues relating to Non-Guaranteed QoS LAN video telephone systems. Some discussion followed. These issues are addressed below:

8) Scope

- Limit scope to LAN end-point to gateway and LAN endpoint to LAN endpoint.
- Remove MCU-less multipoint.

Resolution: Scope of H.323 includes

- Point to point
 - H.323 terminal to H.323 terminal
 - H.323 terminal to gateway to H.320/H.321/H.322 terminal
 - H.323 terminal to gateway to H.324 terminal
 - H.323 terminal to gateway to gateway to H.323 terminal
- Multipoint
 - H.231/H.243 MCU in gateway
 - H.321/H.243 MCU on WAN
 - without MCU (for future study)
- Broadcast/multicast
 - Simplex Audio/video Broadcast/multicast, duplex control
 - Single source on LAN
 - Single source on WAN
 - Video Broadcast/multicast
 - Single simultaneous source
 - Source selected by MCU
 - Audio mixing in MCU
 - Video Broadcast/multicast
 - Multiple simultaneous sources
 - Sources controlled by MCU
 - Audio mixing in MCU

9) Terminology

- packet network vs LAN

Resolution: Terminology will remain LAN because of possible further confusion with X.25 packet networks, etc.

10) Speech Coder

- Make provision for G.DSVD.

Resolution: Provision has been made for the low complexity G.DSVD audio algorithm.

11) Control Channel

Resolution: The following control/signalling paths need to be described:

- H.323 terminal to H.323 terminal (end-to-end intra LAN)
- H.323 terminal to H.323 Gateway (end-to-gate intra LAN)
- H.323 terminal to H.323 Gatekeeper (end-to-manager intra LAN)
- H.323 Gateway to H.323 Gatekeeper (gate-to-manager intra LAN)
- H.323 Gatekeeper to H.323 Gatekeeper (manager-to-manager intra LAN)
- H.323 terminal to WAN/GSTN terminal (end-to-end inter LAN)
- H.323 terminal to H.231/H.242 MCU (multipoint intra/inter LAN)
- H.323 MCU-less multipoint (multipoint intra LAN) (for future study)

12) Call Control

Resolution: Use IEEE 802.9a tailored Q.931 carried in PDU for signalling. H.323 perform call signalling with the gatekeeper. The gatekeeper will also perform E.164 number to LAN address translation.

13) Capability Negotiation

Resolution: Allow for intelligent gateways that perform cap set conversion. This is particularly useful for audio conversion. Allow gateway to pass-through non-standard cap and com to endpoints. [[What about NS-Cap/Com destined for gateway?]]

14) Audio/Video Synchronization

Resolution: Handled in H.22Z

15) Audio Quality

- Specify audio sample rate accuracy
- Specify echo return loss
- Specify nominal audio levels.

Resolution: Audio levels will be specified. Sample rate accuracy may be specified. No decision on specifying echo return.

16) Network Management

- Provide support for network management entities.

Resolution: Volunteers have agreed to provide text. Possibly for an informative annex.

17) In-bound Call Routing

- How are inbound calls routed to an endpoint on the LAN?
- H.242 extensions?

Resolution: Inbound E.164 address to LAN address translation will be performed in the Gatekeeper. We may need to define extensions to H.242 to support transmission of secondary addresses.

18) Authentication

- How do we provide LAN access authorization?
- H.242 extensions?

Resolution: Authentication will be performed in the Gatekeeper. We may need to define extensions to H.242 to support authentication.

19) Support for T.120 Data

- Use T.123.
- Association with audio and video.
- H.320 call is placed first.
- Inside/outside of H.22Z PDU?

Resolution: Handled in H.22Z.

20) Multiplexing Audio and Video

- Send audio and video in different packets.

Resolution: Handled in H.22Z.

21) Packetizing Video

- Use picture packets
- Fragmentation and reassembly

Resolution: Handled in H.22Z.

22) Echo on GSTN voice calls

- Echo issue for audio only terminal interoperability.

Resolution: Open

23) Specification using Real World Protocols

- Add profiles for TCP/IP and SPX/IPX

Resolution: Handled by H.22Z. Volunteers will provide text for an informative annex.

AVC-797 suggests making an allowance for adopting future multicast services for T.120 data.

24) Multicast for T.120

Resolution: Handled by H.22Z.

Other issues

25) Encryption

- H.223/H.224

Resolution: Use procedure described in H.324.

26) Mux/Demux terminology

- Change to Data formatter?
- Change to Packer/Depacker?

Resolution: Open.

27) Call establishment

- How is the terminal to terminal call established?
- Terminal procedures?

Resolution: Volunteers have agreed to write text for H.323 on these issues.

Members are requested to submit all comments, suggested text, and recommendations by June 15, 1995 by correspondence using the H.32Z e-mail reflector.

8.4 Refinement through correspondence

The texts of Draft H.310, H.22Z and H.323 are refined through correspondence. The next edition will be issued early July and at least one more edition will be issued by mid September before the October meeting of the Experts Group. For Drafts H.22Z and H.322, Mr. Joerg Ott provided a list of discussion items as in Annex 11 for consideration of the members.

9. Work plan and work method

9.1 H.310 hardware trials

It is expected that the trials will be demonstrated at the next meeting.

9.2 Second phase work and SG15 tasks during and beyond the next study period (1997-2000)

Though we did not have time to discuss this topic at this meeting, contributions are solicited toward the next meeting.

9.3 Interaction with other groups

In addition to the correspondence to SG13 (§6.1.1) and MPEG (§5.1), the meeting decided to send the following correspondence:

Destination	Topic	Cover sheet	Attachment
The ATM Forum	Status report	Annex 12	AVC-800R
ETSI NA5	Network adaptation	Annex 13	Annexes 7 and 3 to AVC-800R

Furthermore we identified that the following work items of SA&A/The ATM Forum are relevant to the work of this Experts Group and we appreciate to be informed of the outcome:

- Network performance, CDV in particular,
- Definition of uni-directional communication terminals, and
- DSM-CC mapping to Q.2931.

9.4 Use of ftp server

The following ftp site has been installed for distributing the AVC Experts Group documents, Draft Recommendations in particular.

FTP site	ftp.gctech.co.jp
Login name	itu-t
Password	sg15!avc

This ftp site can be accessed by anyone who is interested in the AVC Experts Group activities.

10. Future meetings till November 1995

Meeting	Date	Place	Note
20th Experts Group	24-27 October 1995	Yokosuka, Japan	
Study Group 15	13 - 24 November 1995	Geneva	

END

Annexes

- Annex 1 Documents for the Haninge meeting
- Annex 2 Correspondence to MPEG regarding RTI
- Annex 3 Correspondence to Rapporteur for Q.6.1/13 in ITU-T SG13
- Annex 4 FEC characteristics
- Annex 5 Possible implementations of FEC and system clock recovery
- Annex 6 Proposed timing descriptor
- Annex 7 Report on network adaptation issues (AAL, FEC, CDV compensation)
- Annex 8 Resolutions on Draft H.222.1 and Draft H.245
- Annex 9 Proposed addition to H.245 for jitter control (in ATM Networks)
- Annex 10 H.310 Action Items
- Annex 11 Issues to be considered for H.22Z and H.323
- Annex 12 Cover sheet for the correspondence to The ATM Forum
- Annex 13 Cover sheet for the correspondence to ETSI NA5

**Participants of the nineteenth meeting of the Experts Group
for Video Coding and Systems in ATM and Other Network Environments
held in Haninge, Sweden**

<i>Country</i>	<i>Name</i>	<i>Organization</i>
Germany	Mr. Joerg Ott	Technische Universitaet Berlin
Australia	Mr. Stuart Dunstan	Siemens
Belgium	Mr. Olivier Poncin	BELGACOM
Korea	Mr. Dong-Bum Jung	ETRI
	Mr. Jin-Soo Kim	KAIST
USA	Mr. Narjala Bhasker	Intel
	Mr. Chuck Bostrom	CLI
	Mr. Jay Gadre	TELE-TV
	Mr. Tom Geary	Rockwell Telecommunications
	Mr. Barry Haskell	AT&T
	Mr. George Kajos	VideoServer
	Mr. Jeffrey J. Lynch	IBM
	Mr. Hayder Radha	AT&T
	Mr. Mark Reid	PictureTel
	Mr. Lee Rogers	IBM
	Mr. Dale Skran	AT&T
	Mr. Gary A. Thom	DIS
	Mr. Qin-Fan Zhu	Motorola
Finland	Mr. Mika Grundstroem	Tampere University of Technology
France	Mr. Eric Gonfia	CNET
	Mr. Bruno Lozach	LEP/Philips
Israel	Mr. Aharon Segev	ECI Telecom
Italy	Mr. Maurizio Corasiniti	Olivetti Ricerca
Japan	Mr. Keiichi Hibi	Sharp
	Mr. Yuichiro Nakaya	Hitachi
	Mr. Sakae Okubo	GCL
	Mr. Tomoaki Tanaka	NTT
Netherlands	Mr. Roel ter Horst	KPN Research
UK	Mr. David Beaumont	BT
	Mr. Geoff Morrison	BT
	Mr. Mike Nilsson	BT
	Ms. Georgina Waide	Cable & Wireless
Sweden	Mr. Ola Andersson	Telia Research
	Mr. Gosta Leijonhufvud	Ericsson
	Mr. Per Tholin	Telia Research
	Ms. Christel Verreth	Telia Research

**Documents for the Haninge meeting
(15-18 May 1995)**

Normal Documents

AVC number	Purpose	Title (Source)
AVC-743R	R	Report of the eighteenth Experts Group meeting in Kamifukuoka (24-27 January 1995) (Rapporteur)
AVC-744	P	Draft H.222.1 (Editor, Stuart Dunstan)
AVC-745	P	Draft H.245 (Editor, Mike Nilsson)
AVC-746	P	Draft H.310 (Editor, Hayder Radha)
AVC-747	P	Draft H.321 (Editor, Hayder Radha)
AVC-748	P	Draft H.322 (Editor, Geoff Morrison)
AVC-749	R	Seventh progress report of the Experts Group for Video Coding ad Systems in ATM and Other Network environments (Rapporteur)
AVC-750	R	Report of the Study Group 15 meeting held during 6-17 February 1995 (Rapporteur)
AVC-751	P	Harmonization of H.245/H.246 (M. Nilsson)
AVC-752	A	Open issues toward the Stockholm meeting (Rapporteur)
AVC-753	A	Liaison regarding need for FEC in H.222.1 (SA&A/The ATM Forum)
AVC-754	A	Liaison regarding DSM-CC (SA&A/The ATM Forum)
AVC-755	R	MPEG DSM-CC Meeting at Lausanne, Switzerland, March 20-24, 1995 (C-C. Li)
AVC-756	R	The MPEG Systems committee met in Lausanne, Switzerland on March 20-24 (B. Haskell)
AVC-757	P	Draft H.22Z (Editor, D. Skran)
AVC-758	P	Draft H.323 (Editor, G. Thom)
AVC-759	P	Draft Amendment 1 to ISO/IEC 13818-1 (MPEG Systems)
AVC-760	P	Draft Amendment 2 to ISO/IEC 13818-1 (MPEG systems)
AVC-761	P	Draft Amendment 1 to ISO/IEC 13818-2 (MPEG Video)
AVC-762	P	Proposed corrigendum for ISO/IEC 13818-2 (MPEG Video)
AVC-763	P	Real-Time Interface specification for Low Jitter Applications (MPEG Systems)
AVC-764	P	Proposed Addition to H.245 for Jitter Control (in ATM Networks) (AT&T)
AVC-765	I	Binary primitive polynomial and generator polynomial of Reed-Solomon code (Japan)
AVC-766	I	Information on the TS packet jitter accompanied by the FEC framing (Japan)
AVC-767	P	Logical channel set-up procedure (Japan)
AVC-768	D	Transfer rate for H.310 terminals (Japan)
AVC-769	D&P	A case study for H.310 communication procedures (Japan)
AVC-770	D	Terminal specification for H.310 terminals (Japan)
AVC-771	P&D	Protocol data unit in H.222.1 layer (Japan)
AVC-772	P	Comments on H.310, H.321, H.245, and H.322 (AT&T)
AVC-773	P	Proposal to remove FEC from H.222.1 (AT&T, CableLabs, COMSAT, IBM, Telesis, Technologies Laboratory)
AVC-774	I&P	Concealment of Bit Errors in MPEG2 Video Decoder (AT&T)
AVC-775	I&P	Proposals for Error Resilience (AT&T)
AVC-776	I&P	Proposals for Multipoint Video (AT&T)
AVC-777	I&P	Real-Time Interface Specification for Normal Jitter (AT&T)
AVC-778	D&I	Descriptor Information to Aid Timing Recovery (AT&T)
AVC-779	A	Liaison regarding DSM-CC #2 (SA&A/The ATM Forum)
AVC-780	A	Liaison regarding B-HLI (SA&A/The ATM Forum)
AVC-781	P	Update of ATM performance assumptions (Experts Group)
AVC-782	I	Liaison regarding H.320 over AAL and AMS Phase 1 Work Scope (SA&A/The ATM Forum)
AVC-783	I	A Summary of the April 1995 ATM Forum AMS Meeting (IBM)
AVC-784	P	An AAL5 only profile for H.32X (IBM)
AVC-785		Vacant
AVC-786	D&P	List of open issues in H.222.1 (Siemens)

AVC-787	D&P	Explanation of current H.222.1 acknowledged signalling procedures (Siemens)
AVC-788	D&P	Codepoint and parameter duplication in H.245 and H.222.1 (Siemens)
AVC-789	D&P	Proposed additions to H.222.1 acknowledged signalling procedures (Siemens)
AVC-790	D&P	Comments on Draft Rec. H.245 (Siemens)
AVC-791	D&P	Protocols to support H.245 (Siemens)
AVC-792	I	H.322/3 and an example software based multimedia conferencing system (Siemens, Monash University)
AVC-793	P	US National Body Position on MPEG-2 Real-Time Interface (USA)
AVC-794	I&D	Further clarification on an AAL model for real-time VBR services (BT and KPN)
AVC-795	D&P	Outstanding H.245 issues for ATM-based systems (BT)
AVC-796	D	AAL for MPEG-2 Transport Streams (France)
AVC-797	D&P	Transmission of T.120 information in a LAN environment (TU Berlin)
AVC-798	P	Proposed Draft Amendment to ISO/IEC 13818-2 "4:2:2 Profile" (MPEG Requirements and Video Subgroups)
AVC-799	D	Comments on Draft H.323 and H.22Z (Intel)

Abstract

AVC-743R Report of the eighteenth Experts Group meeting in Kamifukuoka (24-27 January 1995) (Rapporteur)

This document records the outcome of the Kamifukuoka meeting held in January 1995, summarizing the discussion and identifying action items.

AVC-744 Draft H.222.1 (Editor, Stuart Dunstan)
AVC-745 Draft H.245 (Editor, Mike Nilsson)
AVC-746 Draft H.310 (Editor, Hayder Radha)
AVC-747 Draft H.321 (Editor, Hayder Radha)
AVC-748 Draft H.322 (Editor, Geoff Morrison)

These documents contain updated drafts which reflect discussion at the Kamifukuoka meeting, SG15 meeting in February and subsequent correspondence. Open issues are indicated in form of editor's comments.

AVC-749 Seventh progress report of the Experts Group for Video Coding and Systems in ATM and Other Network environments (Rapporteur)

This document reports major achievements obtained at the three meetings (Grimstad, Singapore, Kamifukuoka) towards defining the following Recommendations of which we are in charge; H.262, H.222.0, H.222.1, H.24X, H.32X, H.32Y, H.32Z.1. It also lists particular items which need consideration of Working Party 1/15.

AVC-750 Report of the Study Group 15 meeting held during 6-17 February 1995 (Rapporteur)

This document reports the outcome of Working Party 1/15 meeting (7-15 February) and Study Group 15 meeting (6, 16, 17 February), highlighting the issues of our concern; comments on draft Recommendations, new Editors for H.22Z and H.32Z.2, Recommendation numbers, alignment between H.24X and H.24P, cooperation with MPEG, and other liaison statements.

AVC-751 Harmonisation of H.245/H.246 (M. Nilsson)

This contribution describes some of the differences in Drafts H.245 and H.246 and suggests how they can be harmonised. The following items are discussed; use of ASN.1, lower layer protocols, mode indication, indication of capability, control and indication, messages, document structure. It is concluded that despite their different appearances, H.245 and H.246 are very similar, thus it should be quite easy to remove the minor differences procedures and messages and it would be beneficial to do so, particularly compatibility at the bit level can be achieved.

AVC-752 Open issues toward the Stockholm meeting (Rapporteur)

This document lists open issues which were identified after the Kamifukuoka meeting. They are classified into categories of "H.222.0", "Video coding and VBR", "Network adaptation", "C&I and DSM-CC", "Draft H.222.1", "Draft H.24X (H.245)", "Draft H.32X (H.310)", "Draft H.32Y (H.321)", "Draft H.32Z.1 (H.322)", "Draft H.32Z.2 (H.323)", "H.22Z" and "Second phase work"

AVC-753 Liaison regarding need for FEC in H.222.1 (SA&A/The ATM Forum)

This document requests that the Expert Group should reconsider their decision to include FEC at the H.222.1 layer. Its ground is that since it appears impossible to characterize the error behavior, especially with a single model that is applicable to all transmission systems, the best approach would be to detect for the presence of errors, and then attempt to conceal their effects rather than directly correct the bit errors.

AVC-754 Liaison regarding DSM-CC (SA&A/The ATM Forum)

This document describes the status of DSM-CC study in the SA&A and lists several work items being considered for the Phase 1 AMS Implementation Agreement or for future work efforts. Interest is shown to the use of DSM-CC U-N messages for the end-to-end session control and management.

AVC-755 MPEG DSM-CC Meeting at Lausanne, Switzerland, March 20-24, 1995 (C-C. Li)

This document summarizes the outcome of the DSM-CC Subgroup meeting held on March 20-24, 1995, in Lausanne, addressing those items which are either directly related to or may potentially impact the work in ITU-T SG15. The group produced the second Working Draft of ISO/IEC 13818-6 at the end of the meeting. This document covers User-to-Network operations, User-to-User operations, transport of DSM-CC messages, Normal Play Time (NPT) and downloads.

AVC-756 The MPEG Systems committee met in Lausanne, Switzerland on March 20-24 (B. Haskell)

This document reports the outcome of the MPEG Systems meeting in Lausanne which produced the RTI-LJ specification allowing up to 25 microseconds of jitter (50 us peak-to-peak), regardless of bit rate. It is raised whether the ITU-T should specify a Real Time Interface for "Normal Jitter" (RTI-NJ), perhaps as part of H.222.1, to cater for the ATM environments.

AVC-757 Draft H.22Z (Editor, D. Skran)

AVC-758 Draft H.323 (Editor, G. Thom)

These two documents provide initial drafts for the multimedia multiplex & synchronization and the terminal on non-guaranteed QoS LANS.

AVC-759 Draft Amendment 1 to ISO/IEC 13818-1 (MPEG Systems)

This document is for amending the procedures to register format_identifier for the private data in H.222.0/ISO/IEC 1388-1 through Registration Authority.

AVC-760 Draft Amendment 2 to ISO/IEC 13818-1 (MPEG systems)

This document is for amending the procedures to register copyright_identifier for the Systems stream of H.222.0/ISO/IEC 1388-1 through Registration Authority.

AVC-761 Draft Amendment 1 to ISO/IEC 13818-2 (MPEG Video)

This document is for amending the procedures to register copyright_identifier for the Video stream of H.262/ISO/IEC 1388-2 through Registration Authority.

AVC-762 Proposed corrigendum for ISO/IEC 13818-2 (MPEG Video)

This document lists several corrections to the final text of H.262/ISO/IEC 13818-2: 1) dual-prime vertical vector range, 2) semantics for chromaticity parameters, 3) reservation for signed_level == -2048, 4) first frame after any sequence_header (), 5) frame_pred_frame_dct in progressive frames, 6) VBV, 7) description for profile_and_level_indication, 8) typos, 9) definition of slice_picture_id, 10) semantics for copyright_identifier.

AVC-763 Real-Time Interface specification for Low Jitter Applications (MPEG Systems)

This document is Committee Draft produced at the Lausanne meeting which specifies t-jitter as 25 microsecond (jitter shall be +/- 25 microsecond or less at the input of an RTI-LJ decoder).

AVC-764 Proposed Addition to H.245 for Jitter Control (in ATM Networks) (AT&T)

This document proposes additional H.245 messages for transmitting the following information from the decoder; 1) decoder buffer size available for jitter removal, 2) an estimate of the received jitter at the decoder, and 3) indication of frame skipping by the decoder. This is to assist the encoder to control its coded data generation so that the decoder buffer does not underflow nor overflow.

AVC-765 Binary primitive polynomial and generator polynomial of Reed-Solomon code (Japan)

This document summarizes the binary primitive polynomial and the generator polynomials of RS codes which are used in existing standards or applications. It is suggested that either primitive polynomial of $X^8+X^4+X^3+X^2+1$ or $X^8+X^7+X^2+X+1$ is appropriate for H.222.1 and the choice of generator polynomial affects hardware complexity.

AVC-766 Information on the TS packet jitter accompanied by the FEC framing (Japan)

This document analyzes the TS packet jitter due to TS packet mapping on FEC frame and FEC frame mapping on AAL-SDU. The former is one TS packet period time (250 us at 6 Mbit/s) without alignment while the latter is one cell period time (70 us at 6 Mbit/s) without alignment. If the alignment is made between FEC frame with AAL-SDU, efficiency decreases due to padding.

AVC-767 Logical channel set-up procedure (Japan)

This document first discusses allocation of functions to higher layer modules (H.222.1, H.245 and H.310) to clarify the protocol configuration for logical channel set-up. Then it proposes to use both H.222.1 SE and H.245 procedures, because they are considered to have different functionalities, and application dependent control should be managed by the Call Management (H.310) module.

AVC-768 Transfer rate for H.310 terminals (Japan)

This document reviews some methods to reproduce multiple rate clocks in a step of 64 kHz in the receiving terminal and concludes that though the current representation of the transfer rate is appropriate, further study is needed for whether any value of n be mandatorily supported by the H.310 terminal. It is also suggested to study the upper bound of the transfer rate (maximum value of n) for each type of the H.310 terminal.

AVC-769 A case study for H.310 communication procedures (Japan)

This document presents a case study to clarify the whole communication procedures from a call setup to the intended audiovisual communication by listing all the relevant events for an example case of audiovisual communication. It focuses on the mode switching for which two proposals have been made, describing their information flow in the control and audiovisual channels. Various questions and observations are provided and some specific proposals are made with respect to the default mode and mode request. It also points out that the relationship between H.222.1/H.245 messages and DSM-CC messages be clarified.

AVC-770 Terminal specification for H.310 terminals (Japan)

This document discusses first the basic specifications of high quality audiovisual terminal in ATM environments consisting of AAL5 and TS and then presents available technologies for inter connectivity with H.320 and compares their features, highlighting the configuration based on AAL5 and TS. It suggests to make a proper framework of ITU-T Recommendations for different type of audiovisual terminals in ATM environments, taking into account not only B-ISDN but also ATM LANs.

AVC-771 Protocol data unit in H.222.1 layer (Japan)

This document investigates the H.222.1 PDU in terms of FEC handling in Recommendations, its usefulness for Piecewise Constant Bit Rate (PCBR) applications, and jitter due to FEC framing. It concludes that; 1) FEC should be optional for H.310 A1, B1, A2, and B2 terminals, 2) the specifications of the H.222.1 PDU for PCBR data should be left as "for further study" until the implementation of the PCBR terminals is clarified, and 3) the length of the FEC frames and the packetization method of TS and PS into FEC frames and AAL PDUs need further discussion.

AVC-772 Comments on H.310, H.321, H.245, and H.322 (AT&T)

This document lists some comments to the draft texts of the four Recommendations in the title. It points out that clarification is needed for where ATM LANs should be handled (H.322, H.321, H.323).

AVC-773 Proposal to remove FEC from H.222.1 (AT&T, CableLabs, COMSAT, IBM, Telesis, Technologies Laboratory)

This contribution proposes that the SG 15 Video and Systems Experts Group reconsider their decision to include FEC in the H.222.1 layer. The reasons are; additional hardware, non-support of I.363 for forwarding corrupted data, additional protocol overhead, FEC location being appropriately in physical layers.

AVC-774 Concealment of Bit Errors in MPEG2 Video Decoder (AT&T)

This documents gives experimental results on the impacts of 10^{-7} random errors on reproduced pictures for the two cases; one is to forward bitstream with errors to the decoder, the other is to detect errors with AAL5's CRC, discard the information with errors and inform the decoder as to the location of missing information for concealment. The results show that pretty good pictures can be reproduced with the error detection and concealment strategy. As a conclusion, the document proposes to exclude FEC from AAL5 based H.310 terminals, to include FEC only in AAL1 based H.310 terminals with its optimization for AAL1 and without alignment between FEC framing and ATM cells.

AVC-775 Proposals for Error Resilience (AT&T)

This document addresses error resilience by use of H.262 Data Partitioning syntax in the environments where no priority is provided. It uses pre-transmission of High Priority information so that the decoder can use it when recovering from the packet/cell loss. The document proposes additional text in H.222.1 to enable the above error resilience method.

AVC-776 Proposals for Multipoint Video (AT&T)

This document proposes additional specifications in H.222.0 and H.245 which allow for simultaneous multiple video displays by coding every frame as a P frame and use I macroblocks within these streams when needed. This technique enables a decoder or MCU to merge multiples of such streams by simple header manipulations.

AVC-777 Real-Time Interface Specification for Normal Jitter (AT&T)

This document proposes RTI for Normal jitter, considering ATM and other environments where higher jitter is involved than those for RTI-LJ. The specification for t_jitter is 500 microsecond.

AVC-778 Descriptor Information to Aid Timing Recovery (AT&T)

This document addresses a method to indicate from the encoder to the decoder which parts of the data stream may be used for recovering the Decoder System Clock. An example of ITU_video_timing_descriptor () is given for discussion.

AVC-779 Liaison regarding DSM-CC #2 (SA&A/The ATM Forum)

This document reports that the Implementation Agreement includes among other things: 1) the DSM-CC definition of "session", 2) the support of DSM-CC User-Network session messages for session control mapped over ATM connection control, 3) the definition of an end-to-end ATM parameter -- the "correlation id" -- to identify and associate all the ATM-related connections within a session, 4) the definition of ATM signalling parameters needed to support ATM connections under DSM-CC session control.

AVC-780 Liaison regarding B-HLI (SA&A/The ATM Forum)

This document states the SA&A consideration for the use of B-HLI for the Correlation ID and asks SG11 whether B-HLI be transported end-to-end.

AVC-781 Update of ATM performance assumptions (Experts Group)

This document provides an update of the Experts Group assumption for the ATM network performance, which is based on the cocommunication with SG13 and broadband network performance experts since July 1994.

AVC-782 Liaison regarding H.320 over AAL and AMS Phase 1 Work Scope (SA&A/The ATM Forum)

This document contains two liaison statements addressed to ITU-T SG15; 1) H.320 over AAL5 study initiation by ATM Forum, 2) informational correspondence of AMS Phase 1 Work Scope and Schedule. The second one includes scope and time schedule for Implementation Agreement as well as MPEG2/AAL5 packing efficiency and MPEG2 PCR awareness.

AVC-783 A Summary of the April 1995 ATM Forum AMS Meeting (IBM)

This document reports the outcome of the April Audiovisual and Multimedia Services (AMS) Activities (Service Aspects and Applications(SAA) SWG) meeting which focused on: 1) reviewing the VOD over ATM Implementation Agreement (IA), 2) agreeing on changes and updates to the VOD IA Baseline text, 3) begin planning for phase 2 work items. Use of DSM-CC for VOD out-of-band service selection/control and user-network signalling parameters are highlighted among other things.

AVC-784 An AAL5 only profile for H.32X (IBM)

This document proposes that the H.32X Draft Recommendation should specify an AAL5 only profile for Terminal Types A1, A2, B1, and B2 considering the large number of workstation and PC AAL5 ATM adapters projected to be in use in the future,

AVC-785 Vacant

AVC-786 List of open issues in H.222.1 (Siemens)

This document lists a number of open issues with respect to or surrounding H.222.1.

AVC-787 Explanation of current H.222.1 acknowledged signalling procedures (Siemens)

This document gives explanation of the H.222.1 acknowledged procedures in form of illustration and examples. It is proposed that the example procedures be included as an appendix to H.222.1

AVC-788 Codepoint and parameter duplication in H.245 and H.222.1 (Siemens)

This document discusses the consequence of overlapped information in different channel and concludes that it may not be undesirable. It proposes a rule that H.245 should contain only those parameters which are necessary to completely describe the capabilities of a terminal, such that without this parameter the call could not proceed. Furthermore it proposes to add a descriptor indicating a capability set of the remote terminal to judge the acceptance of the requested logical channel establishment.

AVC-789 Proposed additions to H.222.1 acknowledged signalling procedures (Siemens)

This document proposes the following additions to the H.222.1 acknowledged signalling procedures contained in Annex A of Draft Rec. H.222.1:

- END PDU and RELEASE indication signal parameter to indicate source of release
- N(CAUSE) values in the BGREJ PDU indicating reason for logical channel establishment refusal
- a signal indicating clock synchronisation of the system clock in the remote terminal
- M-ERROR indication signal and ERRCODE values
- H.222.1 user plane error codes
- PDU coding in the Transport Stream. Two phases of signalling are required.
- N(REQUEST) parameter for the STATREQ PDU to determine format of information to be returned
- Keep alive function in the ESTABLISHED state

AVC-790 Comments on Draft Rec. H.245 (Siemens)

This document provides technical comments and editorial comments to the draft H.245. The former address 1) alternative wording for "connection/connectionless", 2) arrangement of acknowledgment messages, 3) relationship between logical channel number and PID/stream_id.

AVC-791 Protocols to support H.245 (Siemens)

This document raises a question to the statement in Annexes 3 and 4 to AVC-743R that "the SSCOP is tightly coupled to AAL type 5 and therefore unsuitable for use in MPEG Systems" and shows a possible way of using SSCOP PDU in the H.222.1 multiplex.

AVC-792 H.322/3 and an example software based multimedia conferencing system (Siemens, Monash University)

This document describes an example LAN based multimedia conferencing system, with interworking to standard H.320 terminals in the public network via an ISDN gateway. All video and audio codec functions are software based. Common PC platforms and audio and

video capture cards are used. This document is provided as an illustration as to what is possible in multimedia conferencing using commonly available PC based hardware.

AVC-793 US National Body Position on MPEG-2 Real-Time Interface (USA)

This document describes the position of US National Body for JTC1/SC29/WG11 that the RTI should be modified to suit a larger range of applications, that the RTI should not contain a specified value for maximum allowed timing jitter in a bitstream's real-time delivery, and that the RTI only should define a framework that helps MPEG users specify their interoperability requirements between equipment such as video servers, delivery networks, storage devices, and decoders.

AVC-794 Further clarification on an AAL model for real-time VBR services (BT and KPN)

This document reports the current progress on an AAL definition for variable bit rate services which has been made in SAM/ETSI NA5. It gives modeling of AALs according to I.363 which shows that the functions allocated to H.222.1 in the Experts Group liaison should be in the CS. It also shows the effectiveness of the AAL1-model by means of practical examples including the support of CBR MPEG-2 and a model for AAL2 based on AAL1 as well as possible format for the CS-PDU in AAL2.

AVC-795 Outstanding H.245 issues for ATM-based systems (BT)

This contribution lists the outstanding issues related to H.245 for ATM-base systems, considers issues raised using e-mail and proposes some solutions. Commonality with solutions for PSTN systems is proposed wherever this is possible. The most outstanding issue is to fix where the logical channel acknowledged procedures be defined; in H.222.1 or H.245 or both.

AVC-796 AAL for MPEG-2 Transport Streams (France)

This document discusses that although AAL type 1 is seen as appropriate for the transport of MPEG-2 signals, the use of AAL type 5 needs further investigations and that before the use of AAL type 5 is considered as a serious candidate, it is necessary to define and describe the selected option for jitter removal in terms of convergence sublayer so that a clear comparison between both AALs can be made.

AVC-797 Transmission of T.120 information in a LAN environment (TU Berlin)

This document aims at describing ways of distributing T.120 data information in a mixed multicast and point-to-point environment. It proposes a way to make use of LAN (and WAN?) multicast facilities where possible for more efficient information distribution. The protocol XYZ layer which fills the gap between the services and the QoS offered by the LAN and the needs of the MCS is discussed and a solution is proposed which separates it into two parts: 1) a (set of) generic multicast transport protocols that offers reliable, at least single source ordered, and flow-controllable service, and 2) an adaptation layer that provides the additional T.120/H.222 specific functionality, where necessary this layer may also make use of reliable point-to-point protocols e.g. for peer negotiations and "connection" setup.

AVC-798 Proposed Draft Amendment to ISO/IEC 13818-2 "4:2:2 Profile" (MPEG Requirements and Video Subgroups)

This document proposes addition of the "4:2:2" profile based on the experiments which had been carried out by the time of MPEG Lausanne meeting. This profile is a 4:2:2 version of the Main Profile and intended for professional use where multiple generations of encoding and decoding are required.

AVC-799 Comments on Draft H.323 and H.22Z (Intel)

This document provides various comments toward setting appropriate goals for Draft H.323 and H.22Z addressing scope, terminology, speech coders, control channel, call control, capability negotiation, audio/video synchronization, audio quality assurance, network management, inbound call routing, authentication, support of T.120 data, multiplexing audio and video, packetizing video, echo on PSTN voice calls, specification using real world transport protocols.

Temporary Documents

#	Source	Title
TD-1	Rapporteur	Agenda for the Haninge meeting
TD-2	Rapporteur	Available documents for the Haninge meeting
TD-3	Rapporteur	FTP site for Draft Recommendations and other documents
TD-4	Rapporteur	H-series audiovisual communication terminals
TD-5	Editor (G. Thom)	Overview of H.323
TD-6	DAVIC	Press release
TD-7	B. Haskell	Various rates in the encoder
TD-8	ATM Forum	Audiovisual multimedia services: Implementation Agreement 1.0
TD-9	R. ter Horst	Report on network adaptation issues (AAL, FEC, CDV compensation)
TD-10	Y. Nakaya	Possible implementations of FEC and system clock recovery
TD-11	Editor (G. Thom)	H.323 report
TD-12	Editor (D. Skran)	H.22Z report
TD-13	SG8 (Q.10/8)	Harmonizing T.120 and H.24X protocol stacks for ATM
TD-14	Telenor, BT, GPT, CSELT	Audio level setting in H.320 revision
TD-15	J. Ott	Issues to be considered for H.22Z and H.323
TD-16	T. Tanaka	FEC performance in AAL type 1
TD-17	Rapporteur	Draft list of agreements
TD-18	B. Haskell	Liaison to ISO ISO SC29/WG11 MPEG regarding RTI
TD-19	R. ter Horst	Liaison to ITU-T SG13/2 Q6 (Mr. Yamazaki) regarding request for FEC without interleaver in AAL type 1
TD-20	B. Haskell	Proposed Addition to H.245 for Jitter Control (in ATM Networks)
TD-21	B. Haskell	Proposed Timing Descriptor
TD-22	Editor (S. Dunstan)	Resolutions on Draft Rec. H.222.1 and H.245
TD-23	Editor (H. Radha)	H.310 Scope for Bi-directional Terminals

END

Liaison to ISO ISO SC29/WG11 MPEG regarding RTI

18 July 94

Source ITU-T SG15 Experts Group for Video Coding and Systems in ATM

Title: Liaison to ISO ISO SC29/WG11 MPEG

Purpose: Generic Real Time Interface Specification

At its May meeting in Stockholm the ITU-T SG15 Experts Group on Video Coding for ATM agreed that the recently proposed Real Time Interface for Low Jitter was not useful for our applications. In fact, changing the jitter number to a larger value would not help our situation either since, as yet, we are not sure if network providers will specify upper bounds on jitter for all their ATM services.

However, we would find it helpful to define a generic Real Time Interface specification that terminal manufacturers and network providers could refer to when they indicate their jitter handling capabilities. In that way, customers would know very specifically what a provider means when specifying a jitter number that characteri their equipment or service.

We suggest that part 9 of MPEG2 would be very convenient as a generic RTI specification if the jitter number were removed and wording to the effect that it is a generic specification were added. Attached is a suggested version of a generic RTI.

END

Real-Time Interface Specification (RTI)

Recommendation H.222.2

1. Introduction

Conformance for ITU-T Rec H.222.0 | ISO/IEC 13818-1 Transport Streams is specified in terms of the normative specifications in part 0 of this Recommendation. These specifications include, among other requirements, a Transport Stream System Target Decoder (T-STD) that specifies the behavior of an idealized decoder when the stream is input to such a decoder. The T-STD model, and the associated verification, do not include information concerning the stream in real time.

This part of the standard specifies the timing of the real-time delivery of the bytes of Transport Stream packets at a Real Time Interface for Jittered applications (RTI). This specification does not change or supersede any of the requirements in Part 0 of this Recommendation. All Transport Streams, whether or not they are delivered in accordance with the RTI, shall comply with the T-STD model. In particular, the accuracy requirement in Part 0 for PCRs in Transport Streams is not changed by the requirements of this section. Compliance with this Recommendation is optional.

Equipment that includes some type of interface for Transport Stream data, the timing characteristics of which are said to comply with the RTI specification, must be able to operate normally with any input that complies with the RTI specification. In no case, however, is a piece of equipment required to implement an RTI interface.

Figure 1-0 provides a simplified view of the scope of H.222.2. This figure shows a Data Link Interface Adaptor, a Real-Time Interface Decoder (RTD), and the location of the Transport stream that complies with the RTI Specification. It should be noted that the Data Link Interface Adaptor is responsible for removing any data link protocol/data structures, as well as any timing variations (i.e.) in order to produce a compliant RTI Transport Stream. This RTI Specification has been developed specifically for applications in which the input to the Data Link Interface Adaptor contains jitter.

- insert figure here

2. Real-Time Interface Requirements for Jittered Applications

2.1 The Real-Time Interface Decoder Model for Jittered Applications

The Real-Time Interface Decoder Model for Jittered applications, called the RTD, is a conceptual model used to define the RTI normative requirements. The RTD is used only for this purpose. Neither its architecture nor the timing described precludes uninterrupted, synchronized playback by a variety of decoders with different architectures or timing schedules.

The RTD is exactly the same as the T-STD model defined in part 0 of this Recommendation, except that

- the byte delivery schedule defined in the T-STD is replaced by the actual byte arrival time in the RTD;
- real-time constraints are imposed on the values of PCR in relation to their arrival time in the RTD;
- the buffer sizes defined in the T-STD are different in the RTD; and
- an extra requirement on the Transport Buffer occupancy, see below.

2.2 Clock Frequency Requirements

The requirements on the System time clock w.r.t. frequency and frequency slew given in part 0 of this Recommendation are also mandatory for the Real-Time Interface for Jittered applications..

2.3 PCR Accuracy Requirements

This section defines a single constraint on the relationship of the arrival time of all the bytes containing the last bit of a `program_clock_reference_base` field for a single program of a Transport Stream, and the value carried in the corresponding program clock reference.

Specifically,

- let `system_clock_counter` be a counter that counts cycles of a system clock that satisfies the frequency requirements specified in clause 2.2 above, where `t` represents time;
- let `i` be the index of a byte containing the last bit of a `program_clock_reference_base` field;
- let `t(i)` be the time at which byte `i` arrives in the RTD_NJ; and
- let `PCR(i)` be the value of the program clock reference associated with byte `i`;

then there shall exist such a `system_clock_counter(t)` and a sequence of times `e(i)` that satisfy

$$PCR(i) = system_clock_counter((t(i) + e(i)) \% (300 * 2^{33}))$$

and

$$| e(i) | \leq t_jitter.$$

2.4 Buffer Requirements

The buffers in the RTD have the same names as those in the T-STD, indexed with `r`. Their sizes are:

$$\begin{aligned} TB_{s_n} &= TB_{s_n} + (2 * t_jitter * R_x) + 188 \text{ bytes} \\ TB_{s_{sys}} &= TB_{s_{sys}} + (2 * t_jitter * R_x) + 188 \text{ bytes} \\ sb_size(r) &= sb_size + (2 * t_jitter * sb_leak_rate) + 188 \end{aligned}$$

It should be noted that the use of the smoothing buffer (`sb`) is optional for the RTD, as it is in ISO/IEC 13818-4.

The multiplex buffer (for video) and the decoder buffer (for audio and systems data) in the RTD have the sizes:

$$\begin{aligned} MBS_{n_r} &= MBS_n + (4 * t_jitter * R_x), \\ BS_{n_r} &= MBS_n + (4 * t_jitter * R_x), \text{ and} \\ BS_{s_{sys}} &= BS_{s_{sys}} + (4 * t_jitter * R_x), \end{aligned}$$

respectively.

Note 1: in all these equations, `Rx`, which is identical in definition to the same variable in the T-STD, is expressed in bytes/second for convenience.

Given the RTD buffers as defined above, and a system clock that fulfills the above requirements, the RTD requires that all the buffer constraints imposed by the T-STD in part 0 of this Recommendation be complied with. In addition, the buffer state of the buffer `TBn` in the RTD at the arrival of the first byte of any Transport Stream packet shall be no more than the size of that buffer minus 188.

2.5 The value of `t_jitter`

The value of the constant `t_jitter` (Note this is a zero-to-peak jitter) is a characteristic to be specified by equipment and service providers.

3.0 Compliance Testing for RTI

3.1 Assumptions

This text assumes an RTI specification that is developed according to the three parameters *clock accuracy*, *slew rate*, and *PCR jitter*. These parameters are referred to in the text below by variable names, D_f , R_{slew} , and t_{jitter} , respectively. The formulas that tie these parameters to certain buffer sizes, however, are supposed to remain fundamentally unchanged.

3.2 Objectives

The objectives of a testing procedure for the RTI specification are the following:

1. Test for compliance with the frequency accuracy spec.
2. Test for compliance with the slew rate spec.
3. Test for compliance with the PCR jitter spec.
4. Test for compliance with the buffer requirements.

For some streams, all of these requirements cannot be reached in the sense that it's not possible to measure them accurately enough or to separate them from each other. In principle, it can be said that streams need to have a certain length for the concept of compliance with all four points to have any meaning. The procedures for the different objectives are outlined briefly below.

3.3 Procedure

Frequency Accuracy, Slew Rate, and PCR jitter

- . The compliance test is carried out for one program at a time. The rest of the procedure is described for one program called P.
- . For each byte that carries the last bit of a PCR field for P, the arrival time of that byte and the value of the corresponding PCR itself are noted. These values are called $t(i)$ and $PCR(i)$, respectively.
- . When all PCR values in the segment of stream to be tested have been noted, these are plotted against their arrival values.
- . The stream is now compliant if a graph can be drawn such that its slope in each point is compliant with the requirement for STC frequency accuracy; its curvature in each point is compliant with the requirement for maximum STC frequency slew; and its vertical distance to any of the points $(t(i), PCR(i))$ is not greater than t_{jitter} in any case.

Finding a graph such as in d. will sometimes be difficult. A stream is compliant whenever such a graph can be found, and a stream is not proven non-compliant until it can be proven that no such graph exists. This can be proven in some cases by for example taking a suspect point $(t(i), PCR(i))$ and draw a region that includes all other permissible points in the bitstream. If another point falls outside that region, the stream is non-compliant. A stream shall be assumed to be compliant unless it can be proven to be non-compliant.

3.4 Buffer Compliance

The buffer compliance test shall be performed exactly as the corresponding test for the T-STD, except for obvious changes due to different arrival times and buffer sizes, as well as the extra requirement for TB_r occupancy at the start of Transport Stream Packets.

END

Correspondence to Rapporteur for Q.6.1/13 in ITU-T SG13

Source : Q.2/15
Title : Correspondence to Rapporteur for Q.6.1/13 (Mr. Yamazaki) in ITU-T SG13
Purpose : Request for FEC without interleaver in AAL type 1

The experts group for video coding and systems in ATM and other environments discussed the ATM network adaptation for broadband audiovisual communication systems and terminals. We currently focus on CBR only, with scenarios for both AAL1 and AAL5. We concluded that:

- There is currently no identified need for FEC in the AAL5 scenarios.
- For the AAL1 scenarios, the existing RS (128,124) FEC in AAL1 was identified to meet our needs. For low delay including FEC, we propose a non-interleaved version of this FEC. In this case there is no correction for cell losses, but this is acceptable in our network and service scenarios, since cell losses will be detected. FEC framing is supported by the CSI bit every 47 FEC frames, similar to the interleaved version.
- The AAL1 FEC options we propose for the broadband audiovisual terminals therefore are:
 1. RS (128,124) with interleaving
 2. RS (128,124) without interleaving
 3. No FEC
- The AAL1 option of FEC without interleaver should be supported by the capabilities exchange in both Q.2931 for channel set-up and H.245 for multimedia system control.
- It was emphasized that at the AAL1 CS service access points a CBR service is defined, independent of the optional use of the FEC inside of the CS. As an example: in case of the adaptive clock method in AAL1, this method should incorporate the buffering delays introduced in the FEC decoder.

Some concern was expressed in the meeting on the effectiveness of the RS (128,124) code without interleaving. It is capable to correct 2 byte symbols that have errors in a block of 128 bytes, with unknown location of these bytes.

The probability of two random bit errors in a 128 byte frame is very low, but the capabilities for burst errors with a burst length of more than 8 bits gave us some concern. Also the effect of the scrambler in the physical layer was mentioned: a bit error in the physical layer will cause a second error 43 bits apart in the ATM layer.

It was however mentioned that even if the RS (128,124) error correction capabilities may be limited, its use for error detection may be appropriate for the broadband audiovisual terminal. This is subject to further study.

Conclusions

1. We propose the inclusion of the non-interleaved RS(128,124) code as an additional FEC option in the AAL type 1 CS.
2. We invite comments on the effectiveness of this FEC option, with a view on the error characteristics (single bit vs. burst errors) that can be expected from the networks.
3. We invite comments on the effectiveness of this RS code for error detection.

END

FEC performance in AAL type 1

Source: Tomoaki TANAKA, NTT
 Title: FEC performance in AAL type 1
 Purpose: Information

FEC method	Delay (*1)	at 6 Mbps (msec)	Probability of uncorrectable bit errors (*2)
no FEC	$47 \times 8 / R$	0.06	1
FEC without interleave ; RS(128,124)	$(47 \times 3 - 4) \times 8 / R$	0.18	For 2 single bit errors ; 10^{*-n} (*3,*4) For 2 bits burst error ; $1 - (6/8) = 0.25$ (*5)
FEC long interleave ; 128 cells that include 4 RS cells	$47 \times 124 \times 2 \times 8 / R$	15.5	extremely low * 4 cell losses or * 2 cell losses and 1 errored octet in each row * 2 errored octet in each row

*1 R = Information bitrate at AAL SAP. (see Fig. 1)

2 If this value is X and bit error ratio at ATM layer SAP is 10^{-9} , the error ratio at AAL SAP is $X \times (10^{*-9})$.

*3 In SDH, one bit error in physical layer causes two bit errors in ATM layer, 43 bits apart because of scrambler for cell payload. (see Fig. 2)

4 10^{-n} is probability in which more than two bit errors in physical layer are included in one FEC frame. If bit errors occur in random and bit error ratio is 10^{*-9} , this value is approximately 10^{*-7} .

*5 $6/8$ is probability in which two bits burst error does not occur beyond octet boundary. (see Fig. 3)

Conclusions

- FEC without interleave is not tolerable for burst errors.
- Probability for uncorrectable error is 25% for 2 bits burst error.
- We should be careful whether usual error is single bit error or burst error. (see Liaison to SG 13 as in Annex 3)

Note: - FEC without interleave may be used for bit error detection. The performance of error detection is for further study.

END

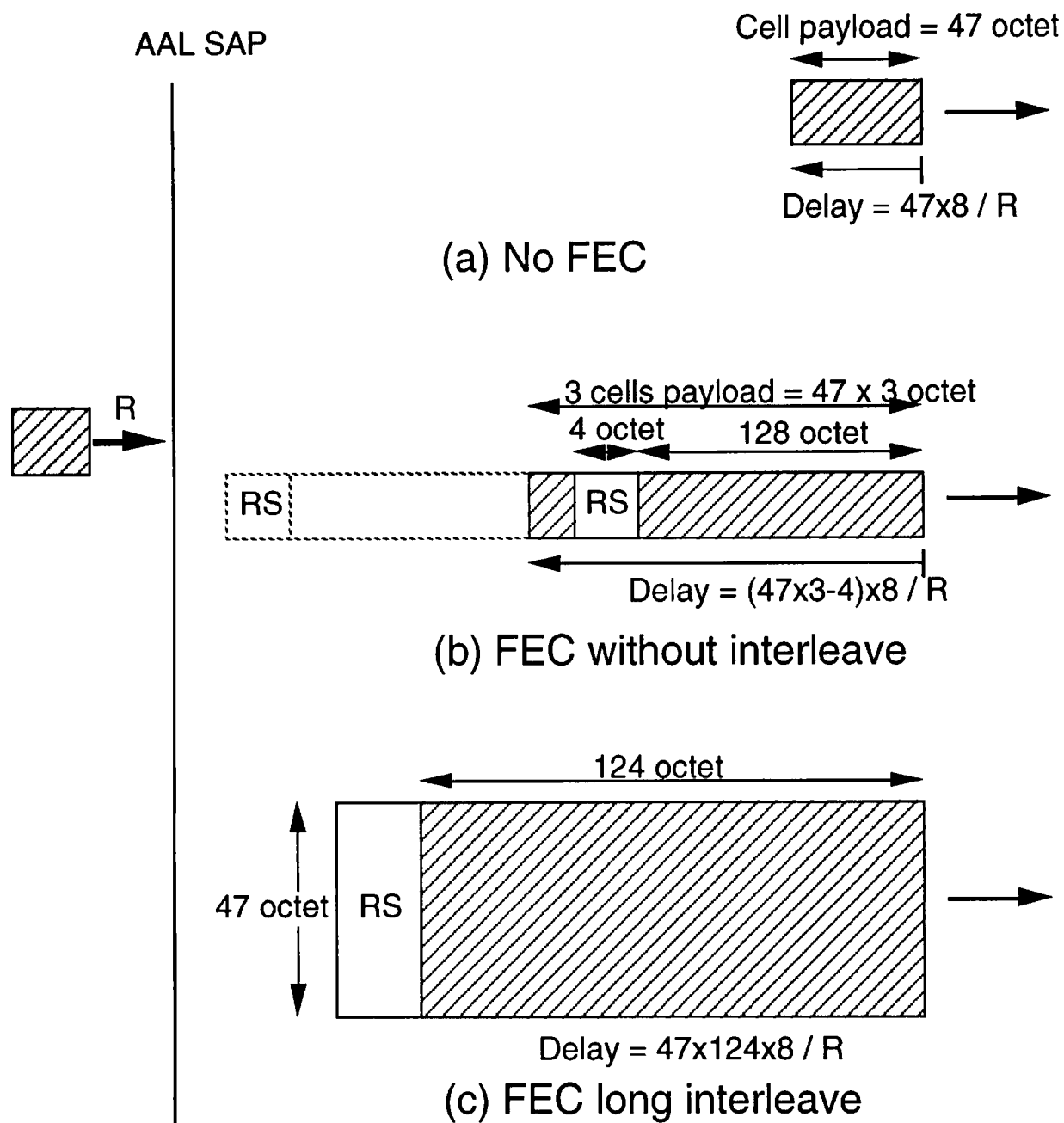


Fig. 1 Delay caused by FEC

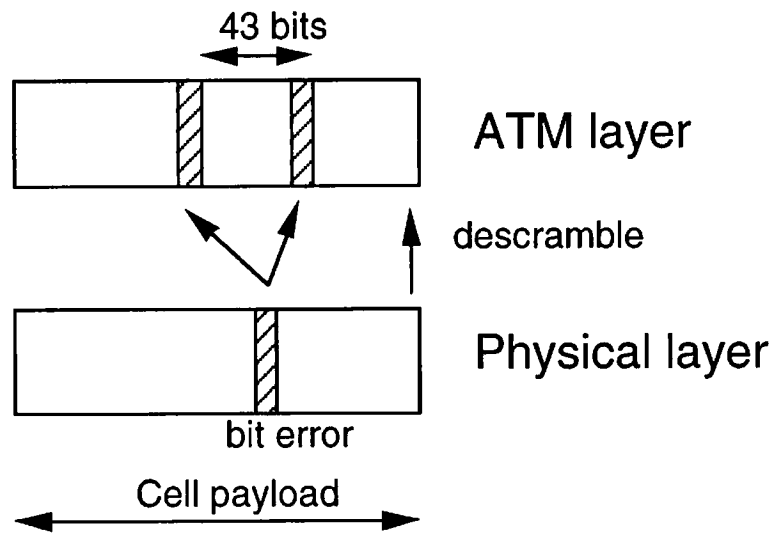
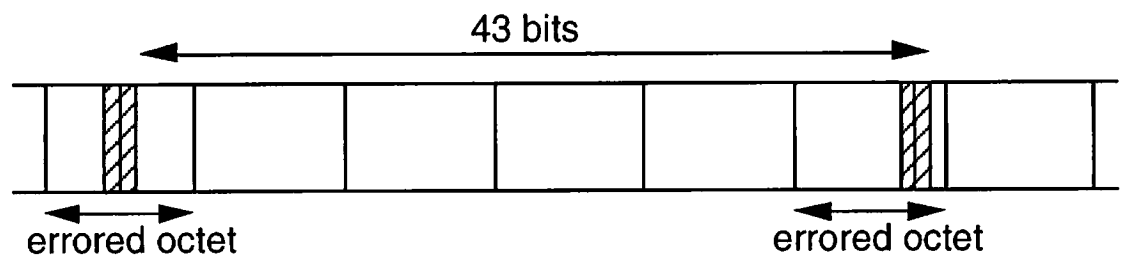
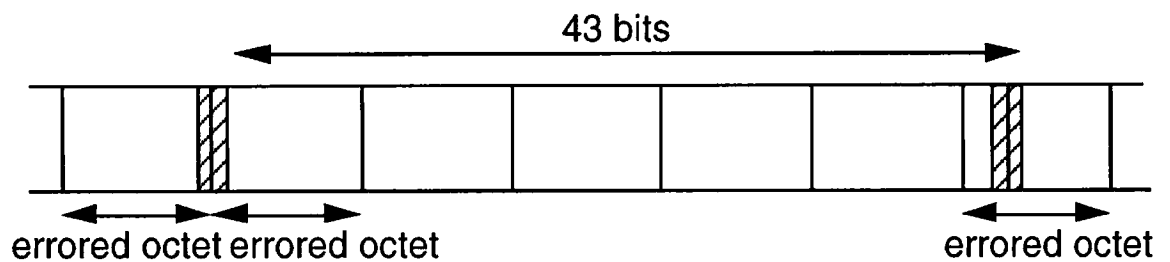


Fig. 2 Two bit errors caused by payload scrambler



(a) correctable error ; two errored octets



(b) uncorrectable error ; three errored octets

Fig. 3 FEC tolerance for 2 bits burst error

Possible implementations of FEC and system clock recovery

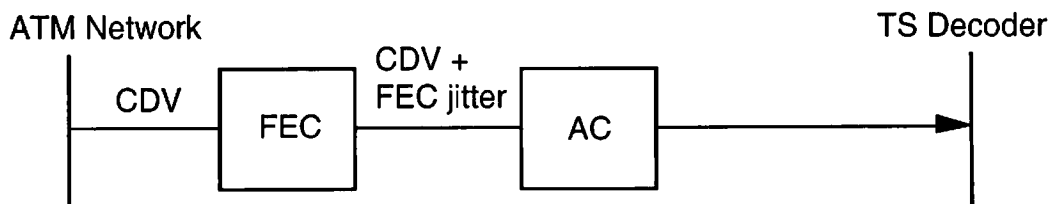
SOURCE : Japan

TITLE : Possible implementations of FEC and system clock recovery

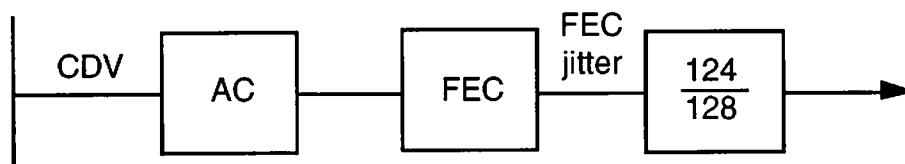
Purpose : for clarification

1. AAL1

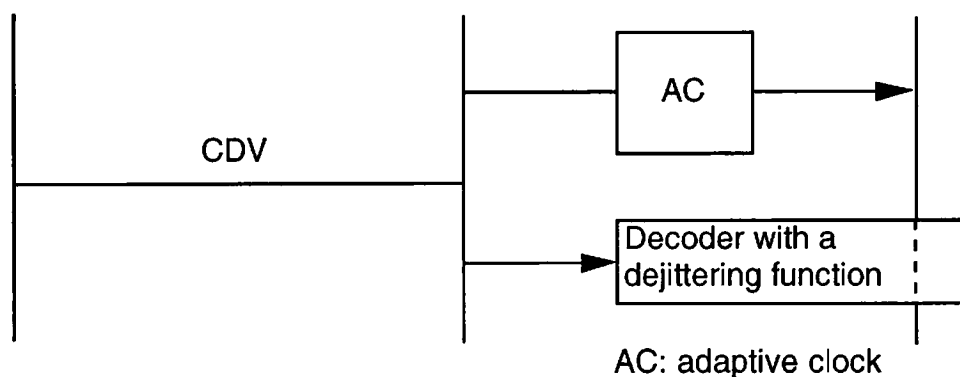
- Long interleave FEC / Non interleave FEC



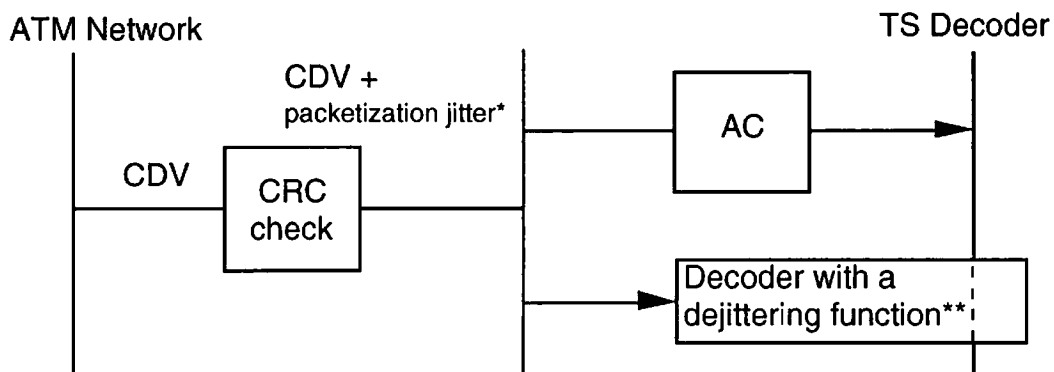
- Non interleave FEC



- Non FEC



2. AAL5



*: Only in the case without PCR awareness

**: Without the PCR awareness, the size of the buffer or the time until the PLL locks increases

END

Proposed Timing Descriptor

Source: AT&T (Barry Haskell)
 Title: Proposed Timing Descriptor
 Purpose: Review

```
ITU_timing_descriptor(){
    descriptor_tag (=70)          8      uimsbf
    descriptor_length             8      uimsbf
    SC_PESPktR                   24      bslbf
    SC_TESPktR                   24      bslbf
    SC_TSPktR                    24      bslbf
    SC_byte_rate                 30      bslbf
    vbv_delay_flag               1       bslbf
    reserved                    1       bslbf
    reserved                    32      bslbf
}
```

SC_PESPktR-- If $\neq 0\text{xffffff}$, this parameter indicates that PES packets are passed from the encoder buffer to the multiplexer buffer at a constant rate. Integer value is the ratio of 27e6 Hz to the PES packet rate. It specifies the interpacket durations for the next PES packet and all following packets up to and including the PES packet following a new valid **SC_PESPktR**. This parameter is valid only in an elementary stream descriptor.

SC_TESPktR-- If $\neq 0\text{xffffff}$, this parameter indicates that TS packets for the specified elementary stream (hereinafter called TES packets) are passed from the encoder buffer to the multiplexer buffer at a constant rate. Integer value is the ratio of 27e6 Hz to the TES packet rate. It specifies the interpacket durations for the next TES packet and all following packets up to and including the TES packet following a new valid **SC_TESPktR**. This parameter is valid only in an elementary stream descriptor.

SC_TSPktR-- If $\text{not} = 0\text{xffffff}$, this parameter indicates that TS packets for the specified program are passed from the multiplexer to the network at a constant rate. Integer value is the ratio of 27e6 Hz to the program TS packet rate. It specifies the interpacket durations for the current TS packet and all following packets from the specified program up to and including the TS packet containing a new valid **SC_TSPktR**. The **program_number** indicates to which STC the TS packet rate is locked. Only PSI packets containing sections describing this program are considered part of this program. Null TS packets belong to no program. This parameter is valid only in a program descriptor.

SC_byterate-- If $\neq 0\text{x3ffffff}$, this parameter indicates that PES bytes are passed from the encoder buffer to the multiplexer buffer at a constant rate. Integer value is the ratio of 27e6 Hz to (byte_rate/50), ie, $\text{SC_byterate} = 135\text{e7}/\text{byte_rate}$. It specifies the interbyte durations for the next PES packet and all following packets up to and including the PES packet following a new valid **SC_byterate**. This parameter is valid only in an elementary stream descriptor.

vbv_delay_flag-- This is a 1 bit flag which when set to '1' indicates that the video parameter vbv_delay may be used for timing recovery. The last byte of PSC arrives nominally at time DTS - vbv_delay. This flag is valid only in a video elementary stream descriptor.

All rates mentioned above are locked to the Systems Time Clock, whose frequency is nominally 27e6Hz.

Informative Annex

In severely jittered or highly lossy networks, timing recovery may be problematic in inexpensive implementations that cannot afford highly stable crystal clocks. Often the encoders can provide information as to which parts of the data stream may be useful for recovering the Decoder System Time Clock (D-STC) frequency and phase.

Generally this means that one or more data rates are locked to the Encoder System Time Clock (E-STC) and can be used in an *Adaptive Clock Recovery* (ACR) scheme at the decoder. The size of the assumed buffer in the ACR is implementation dependent and will depend on how much jitter is encountered during transmission. The jitter may or may not include multiplexing jitter. If it does, then the assumed ACR buffer will be larger.

END

Report on network adaptation issues (AAL, FEC, CDV compensation)

SOURCE: ITU-T SG15 Experts group for video coding and systems in ATM and other environments
TITLE: Report on network adaptation issues (AAL, FEC, CDV compensation)
PURPOSE: Information

Several inputs to the meeting discussed the network adaptation protocol reference model that had been drafted in the group's January meeting (Annex 7 to AVC-743).

The approach of a common FEC and FEC framing in the H.222.1 specific sub-layer has been abandoned, since jitter problems have been identified and since the inclusion of FEC in this sub-layer was considered to be inconsistent with the AAL CS model approach. Methods for piecewise CBR (PCBR) or VBR in H.222.1 will not yet be included in the November 1995 version of H.222.1. We therefore restricted the H.222.1 scenarios to CBR over AAL1 and AAL5:

- There is currently no identified need for FEC in the AAL5 scenarios. The error detection in the AAL5 CPCS layer would be sufficient, in combination with simple error concealment in the video layer. It was mentioned that detection of TS-packet loss can be included in the System layer and may support the concealment in the video decoder.
- For the AAL1 scenarios, the existing RS (128,124) FEC in AAL1 was identified to meet our needs. For low delay including FEC, we agreed on a non-interleaved version of this FEC. In this case there is no correction for cell losses, but this is acceptable in our network and service scenarios, since cell losses will be detected. FEC framing is supported by the CSI bit every 47 FEC frames, similar to the interleaved version.
- The AAL1 FEC options for H.222.1 therefore are:
 1. RS (128,124) with interleaving
 2. RS (128,124) without interleaving
 3. No FEC
- The AAL1 option of FEC without interleaver should be supported by the capabilities exchange in both Q.2931 for channel set-up and H.245 for multimedia system control
- It was emphasized that at the AAL1 CS service access points a CBR service is defined, independent of the optional use of the FEC inside of the CS. As an example: in case of the adaptive clock method in AAL1, this method should incorporate the buffering delays introduced in the FEC decoder.

The group concluded that the RTI as an internal point between H.222.0 and H.222.1 is not an essential conformance point, since implementers may integrate the functions of the different layers, without implementation of an internal RTI compliant interface. However, RTI as a definition was considered to be useful for specification of jitter handling capabilities of separate H.222.0 equipment. We concluded that no particular jitter value need be mentioned in the RTI specification.

The essential interface is the user network interface as shown in figure 1. Definition of expected values for CDV, as well as BER and CLR, at this interface is needed for the design of the ATM audio-visual terminal. The ATM performance assumptions as in document AVC-781 have been discussed with SG13 experts on these issues. We decided that these performance assumptions will be an informative note to H.222.1, giving some guidance to implementers.

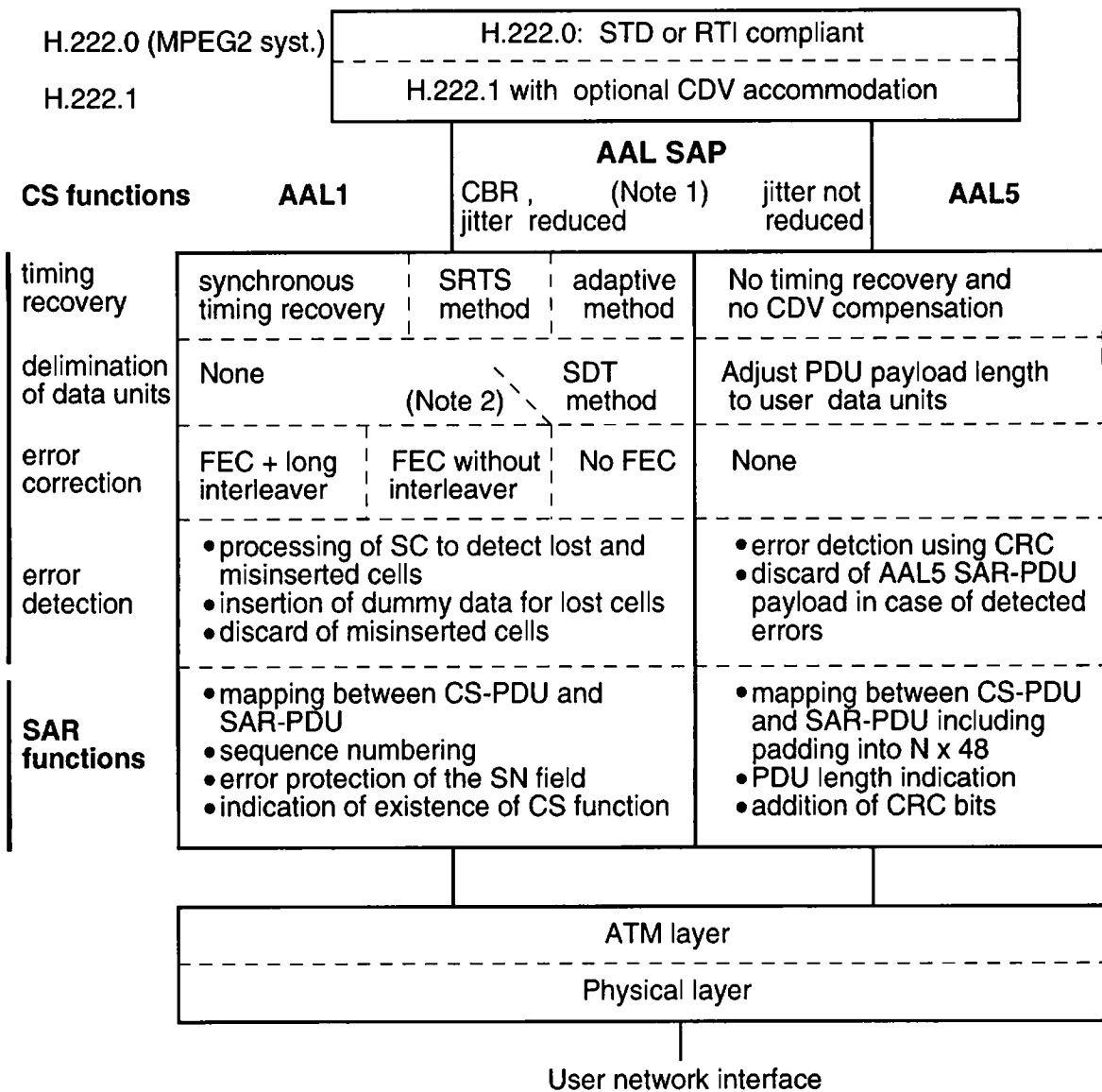


Figure 1: Overview of the AAL1 and AAL5 functions for H.222.1

Note 1:: AAL SAP is a definition point in the model. Implementers may choose to integrate the AAL CS and H.222.1 functions for CDV accommodation, also for AAL1.

Note 2: The AAL1 structured data transfer (SDT) method is only applicable if no FEC is used. However, all other combinations of error correction, delimitation and timing recovery are allowed. Use of the SDT method has not been identified for H.222.1.

END

Resolutions on Draft Rec. H.222.1 and Draft Rec. H.245

SOURCE: Stuart Dunstan, Siemens Ltd
 TITLE: Resolutions on Draft Rec. H.222.1 and Draft Rec. H.245
 PURPOSE: Report

No.	item	description	action
1	Logical channel signalling	In support of harmonisation with LBC, logical channel signalling procedures have been moved from H.222.1 to H.245. In H.310 H.245 logical channel signalling is <i>always</i> done for <i>all</i> terminal types. PSI/PSM tables (repeated signalling) in the TS/PS are redundant. Their coding is not mandatory.	H.222.1 SD H.245 SDLs SD H.245 MN H.310 HR
2	H.245 functions	H.245 has the following distinct and independent functions: <ul style="list-style-type: none"> • capability exchange • logical channel signalling • C&I There may be other distinct functions. Attachment 1 shows H.245 in relation to the H.310 terminal. Attachment 2 shows H.245 PDUs.	H.245 MN
3	Mode switching	Mode switching is performed by opening multiple logical channels which share a common decoder resource. See Sharing is indicated by inclusion of a resource_id in the BGN message. H.245 C&I attaches the decoder resource to one and only one of the open logical channels. See Attachment 3. These procedures implement the dependency capabilities indicated during the capability exchange. The term "fast mode switching" is to be changed to "mode switching". Reference to "slow mode switching" is to be dropped.	H.245 MN
4	logical channel reference	Moving the logical channel signalling to H.245 i.e out of band with respect to H.222.1, requires that a logical channel be referenced by reference to both: <ul style="list-style-type: none"> • an ATM VC (or TS/PS) • a PID/stream_id Options for identifying an ATM VC end-to-end include use of: <ol style="list-style-type: none"> Q.2931 and correlation_id Progressive; H.245 followed by Q.2931 signalling. H.245 attaches an end-to-end reference to the next VC to be opened. Inband H.222.1 signalling a) is the preferred solution. Use of the correlation_id is to be confirmed. . b) is a satisfactory alternative. c) is undesirable and not allowed.	H.245 MN MN.: confirm use of correlation_id with DSM_CC

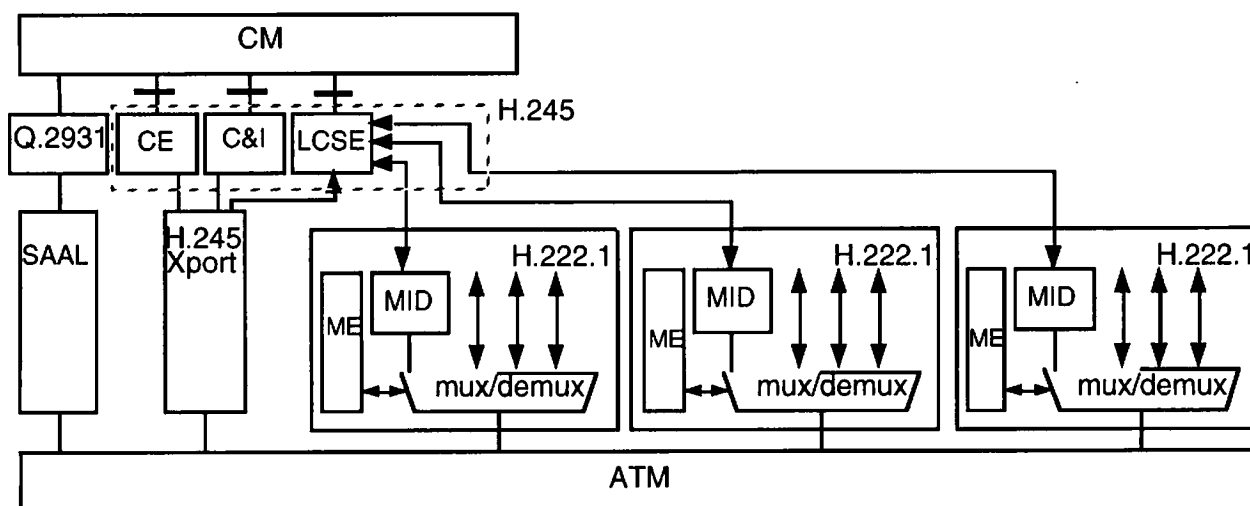
5	Additions to H.245 acknowledged signalling procedures	<ul style="list-style-type: none"> the STAT and STATREQ PDUs, and related signals are to be removed. CAUSE values to be added to BGREJ SOURCE parameter to be added to END PDU signal to indicate receive terminal clock synchronisation table of error codes for M-ERROR signal. H.222.1 user plane errors addition of H.245 keep alive function in which H.245 sends a signal to its peer, and expects an acknowledgment signal in a fixed period. N retries are attempted before the remote terminal is declared to be not alive. 	H.245 SDLs SD H.222.1 SD
6	ITU-T stream_ids	The arrangement as shown in Attachment 4 was adopted.	H.222.1 SD
7	ITU-T stream types and PTS/DTS	ITU-T audio stream types may be used with MPEG video. A definition of an access unit is required for ITU-T audio. There is never an MPEG Systems system time clock associated with H.261. (<i>why not??</i>)	SO
8	frame synchronous signalling	Two options were considered a) signal in video layer picture header b) signal in PES packet. Use ITU-T data stream_id, and use PTS in the PES packet to time the event. The former has good packing efficiency but is less flexible. The latter was chosen as the desired method. H.222.1 requires video frame synchronous stream type and stream_id_extension codepoints, and a description of the method. The video frame synchronous signals are to be described in H.310.	H.310 HR H.222.1 SD
9	H.222.1 and jitter removal	H.222.1 may offer the service of jitter removal/reduction. The method is left to implementations. H.222.1 provides no specific coding for removal of jitter, but contains qualitative description of jitter removal as part of its functionality with a note containing some specific values for information purpose.	H.222.1. SD.
10	Number of programs	In the H.310 terminal there shall be only one MPEG System System Time Clock i.e. only one program, in one communication direction. This is true even in the case of multiple VCs i.e. multiple TS/PSs, in which case one STC is shared amongst many TS/PSs. This impacts H245 logical channel signalling (amongst other things).	H.222.1 SD H.310 HR
11	Multiple TS/PS	When multiple VCs are used i.e. multiple TS/PSs, it is mandatory to code PCR/SCRs in at least one TS/PSs. It is not mandatory to code PCR/SCRs in all TS/PSs. <i>PSI required in each case?</i>	H.222.1 SD
12	Figure 1 Annex 9 AVC-743R	Figure 1 will be moved to an informative Annex in H.222.1. It will be updated as follows; <ul style="list-style-type: none"> the T.120 protocol stack will be left unspecified. If the protocol stack is decided in the near term it will be described in H.222.1 (or H.310?). If not in the near term it will be described in H.310. the diagram will be updated to reflect changes in signalling 	H.222.1 SD (H.310 HR ?)

13	Encryption	H.222.1 will say that PES packets and TS packets may be encrypted using H.233. H.222.1 will say nothing about exchange of keys etc. H.310 will say something about this. <i>Requires confirmation</i>	H.310 HR H.222.1 SD MN to investigate
14	Use of AALs	AAL type 1 use of primitives will be stated. H.310 to specify use of CS tools. AAL type 5 text from ATM Forum IA 1.0 will be used	H.222.1 SD H.310 HR
15	Default coding modes and logical channels	Shown in Attachment 5. <i>Where is this to be specified?</i>	H.222.1 SD H.310 HR
16	H.222.0 optional functions	Some fields in MPEG-2 Systems relate to Network Elements e.g remultiplexers. A H.310 send terminal is not required to code these fields, but may. A H.310 receive terminal by definition ignores these fields.	H.222.1 SD
17	H.222.1	<ul style="list-style-type: none"> in section 6 change "functions" to "services". in clause 5 include a statement that H.222.1 currently only supports constant bit rate coded video. correct editorial errors in clause 13 on descriptor rules remove reference to mode changing. This is now described in H.245 	H.222.1 SD H.245 MN
18	Error resilience, AVC-775	Include the improved 2nd and 3rd last paragraph of AVC-775 in H.222.1. See Attachment 6.	H.222.1 SD
19	Jitter descriptor, AVC 764	Include Annex 9 to this report in H.245.	H.245 MN
20	Timing recovery descriptor AVC-778	Include Annex 6 to this report in H.222.1.	H.222.1 SD
21	H.245 codepoints	The following codepoints are required to be inserted in H.245; <ul style="list-style-type: none"> T.120 codepoint MPEG-2 audio AAL type 1 CS options AAL type 5 unassured/assured option 	H.245 MN
22	ATM network adaptation capabilities	The syntax has been modified to offer greater flexibility. The syntax supports mixed AAL types and mixed TS/PS in one call.	H.245 MN H.310 HR
23	H.245 Appendix I	This appendix is to illustrate coding and should be more extensive. Contributions are sought.	?? H.245 MN
24	H.245 A.5.1 FR-SSCS	Some text on using this service are required	KH H.245 MN
25	H.245 clause 6.2 Point to Multipoint working	Clarification of this section is required. Once clarified the terms "connectionless" and "connection orientated" should be replaced by more appropriate ones.	clarification MN H.245 MN
26	H.245 style	H.245 should be written in a generic manner, so that it is applicable to a wide range of applications.	H.245 MN
27	H.245 progress	Good communication between AVC and LBC groups is required. Post comments at both AVC and LBC reflectors.	
28	H.245 and H.323	Requirements from the H.323 perspective are to be reflected by means of an input to the SG15 meeting in November.	

29	Descriptor priority rules	To be corrected as advised	H.222.1 SD
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- end -

Attachment 1 / Annex 8 to AVC-800R



CM: Call Management
CE: Capability Exchange
SAAL: Signalling AAL

SE: H.222.1 Signalling Entity
MID: Tx: Multiplex ID management
Rx: Multiplex ID map
ME: H.222.1 Management Entity

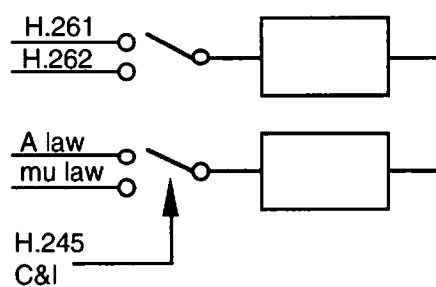
Logical channel signalling and H.245

Attachment 2 / Annex 8 to AVC-800R

H.245 PDUs

function	subfunction	PDU	parameter
capability exchange		REQCAPSET	-
		ACKCAPSET	-
		NACKCAPSET	cause
mode request		REQMODE	-
logical channel signalling	establishment	BGN	VCn, PID/stream_id, sequence number, stream parameters
		BGAK	VCn, PID/stream_id
		BGREJ	VCn, PID/stream_id, cause
	release	END ENDAK	VCn, PID/stream_id, source VCn, PID/stream_id
C&I	H.233 data	C&I	
	unacknowledged data transfer	UDATA	user_data
		FLOWCONTROL	
	multiplex table (GSTN only)	MUXTABLE	
		ACKMUXTABLE	
		NACKMUXTABLE	
		SETMUXTABLE	
		ACKSETMUXTABLE	
		NACKSETMUXTABLE	
	mode switching		

Attachment 3 / Annex 8 to AVC-800R



stream_type = H.261
resource_id = 10

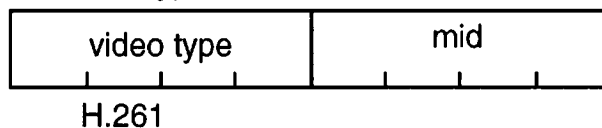
stream_type = H.262
resource_id = 10

stream_type = A law
resource_id = 11

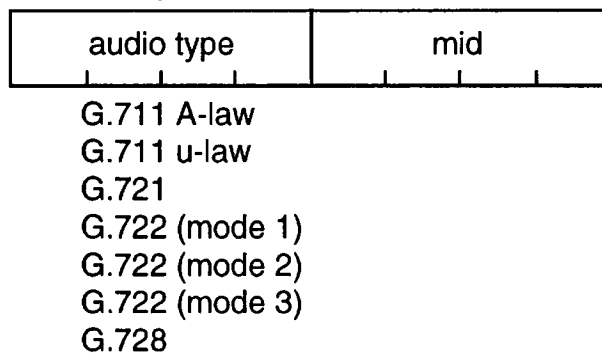
stream_type = mu law
resource_id = 11

Attachment 4 / Annex 8 to AVC-800R

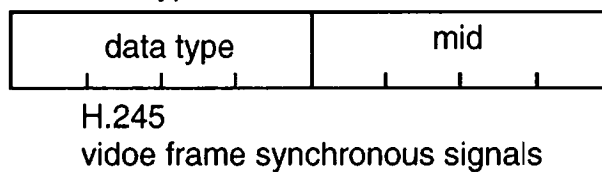
ITU-T H.222.1 type A:



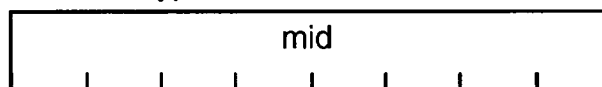
ITU-T H.222.1 type B:



ITU-T H.222.1 type C:



ITU-T H.222.1 type D:



ITU-T H.222.1 type E:



Attachment 5 / Annex 8 to AVC-800R

Default coding mode and logical channels

channel	Program Stream		Transport Stream	
	stream_id_ext	network adapt	PID	network adapt
H.245			0x00010	
G.711 A-law			0x00011	
G.711 m-law			0x00012	

Add the following three paragraphs to Section 12 / H.222.1

In order to improve error resilience, especially during severe error bursts, the video information may be encoded according to the data partitioning (DP) specification of H.262 with all End-of-Block (EOB's) in the base layer. Then the enhancement layer contains only Sequence, GOP, Picture and Slice headers, and may be transmitted on a low-loss virtual channel.

The base layer could be decoded, in principle, by both DP as well as non DP decoders. However, the presence of the `sequence_scalable_extension()` and priority break points may disrupt some standard-profile non DP decoders.

Thus, in order to improve interoperability, the above encoding may be implemented with a base layer that does not contain priority break points or `sequence_scalable_extension()`, in which case a **default_break_point** value of 128 is used, which means that all EOBs are in the base layer. The Hierarchy descriptor (H.222.0, Sec. 2.6.6) defines the DP enhancement layer, which in this case contains only Sequence, GOP, Picture and Slice headers.

END

Proposed Addition to H.245 for Jitter Control (in ATM Networks)

Source: AT&T (Amy R. Reibman and Barry Haskell)
Title: Proposed Addition to H.245 for Jitter Control (in ATM Networks)
Purpose: Review

IN: Section 4.1 Multimedia system control messages ADD:

jitterControl [APPLICATION 12]IMPLICIT JitterControl

ADD NEW SECTION (syntax)

Section 4.13 Jitter control

```
JitterControl                    ::=SEQUENCE
{
    logicalChannelNumber        INTEGER (0,8191), -- for 13 bit PID --
    estimatedReceivedJitter     5-bit STRING
    skippedFrameFlag            BOOLEAN
    skippedFrameCount          OPTIONAL INTEGER (0,15)
    availableBufferFlag         BOOLEAN
    additionalDecoderBuffer     OPTIONAL INTEGER (0,2^18-1)
}
```

ADD NEW SECTION (semantics)

Section 5.13 Jitter control

This message is used to specify the amount of jitter estimated by the the receiver of a logical channel. It may be useful for choice of bit-rate, buffer control in video channels, or to determine the rate of PCR transmission in PCR channels, etc.

The video encoder will then have the option of using this information to restrict the video bit-rate or the video decoder buffer fluctuations to help prevent decoder buffer underflow or overflow, given the occurring jitter. If the encoder takes this option, it will enable correct operation for existing designs of video decoder buffers, regardless of the amplitude of received jitter, as well as allow correct operation with minimum delay.

When the **logicalChannelNumber** is zero, the information pertains to the whole multiplex. Each transmission of this command can affect a specific logical channel or the entire multiplex. More than one such command may be in effect at the same time, up to the number of open logical channels plus one, for the overall multiplex limitation.

estimatedReceivedJitter provides an estimate of the jitter that has been received by the unit sending the message. The meaning of the 5-bit STRING is defined as follows. The possible range is from 1 usec to 7.5 sec. The first 2 bits indicate the magnitude of the received jitter as described by the table below:

bits	meaning
00	1
01	2.5
10	5
11	7.5

The next 3 bits indicate the exponent of the received jitter:

bits	meaning
000	larger than 7.5 sec
001	* 1 usec
010	* 10 usec
011	* 100 usec
100	* 1 msec
101	* 10 msec
110	* 100 msec
111	* 1 sec

[Example: 5-bit STRING = 01011 means 250 usec.] If the last 3 bits are 000, the **estimatedReceivedJitter** is greater than 7.5 seconds, which is the maximum that the syntax can specify.

skippedFrameFlag is "1" if **skippedFrameCount** is present. It is "0" otherwise.

skippedFrameCount indicates how many frames have been skipped by the decoder since the last **JitterControl** message. [Since frames are skipped when the decoder buffer underflows, additional jitter may cause the decoder buffer to underflow more or less often than the encoder expects frame skips to happen.] Since the maximum value here is 15, this information must be transmitted (if the decoder implements this option) before more than 16 frames have been skipped.

availableBufferFlag is "1" if **additionalDecoderBuffer** is present. (This is only necessary to be transmitted once, since it doesn't change during the call.) It is "0" otherwise.

additionalDecoderBuffer indicates the additional size of the video decoder buffer over and above that required by the indicated profile and level. This uses 18 bits, and is defined the same way as **vbv_buffer_size** in section 6.3.3 of ITU-T H.262.

Figure 1 shows a possible signaling time-line for the encoder and decoder.

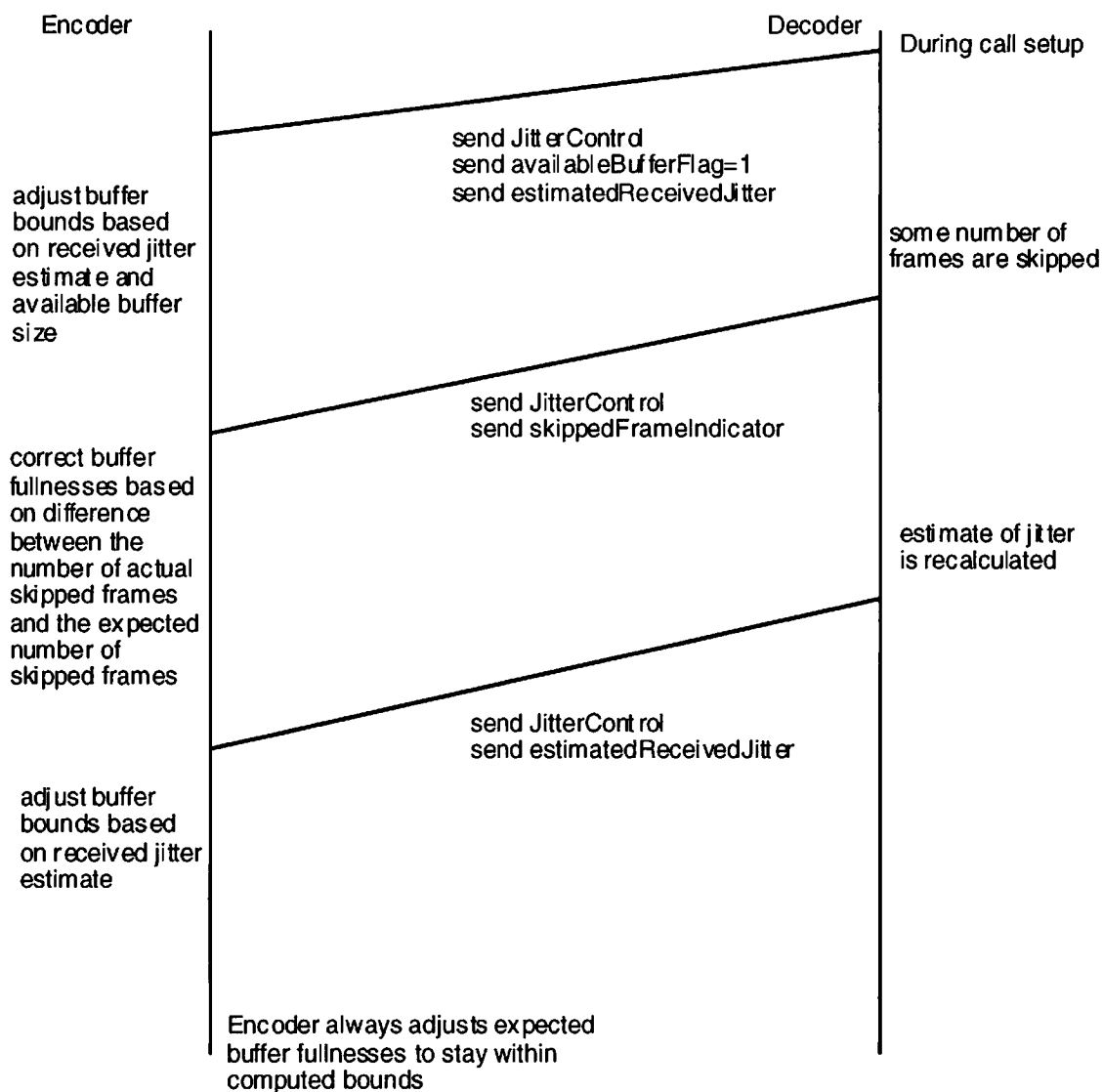


Figure 1. Possible scenario for jitter control signalling.

END

H.310 Action Items

- 1) Mapping of G.7XX audio to TS and PS (H.222.1 SD)
- 2) Mapping of TS/PS to AAL1/AAL5 (H.222.1 SD)
- 3) Define call procedures for : (Mr. Hibi)
 - Unidirectional terminals
 - Bi-directional terminals
- 4) H.245 Protocol Stack (Mr. Hibi)
(H.222.1 SD)
- 5) T.120 Protocol (Mr. Hibi)
- 6) Transfer rate description: (Mr. Haskell, Mr. Tanaka)
 - (a) Expression
 - (b) Mandatory modes
- 7) Multipoint and Broadcast mode support (Mr. Skran)

END

Issues to be considered for H.22Z and H.323

Source: Jörg Ott, TU Berlin
Title: Issues to be considered for H.22Z and H.323
Purpose: Discussion

This contribution lists a set of work items that should be considered in the progress of the standardization of H.22Z and H.323. The list below does not claim to be exhaustive and just covers a few of the issues that came up in the discussions so far. It is grouped according to subjects; neither grouping nor the sequence shall express any prioritization.

1. Connection setup and teardown

- a) Two approaches have been identified for call setup: either translating an E.164 address into a LAN (e. g. IP) address within the gateway or giving additional information (such as the within the called institution unique) name of the person to be contacted and using some directory service to translate this name into a LAN address. For both approaches it might be useful to carry out the respective procedure without the need for a translation table that is updated manually. Assuming that some means of authentication is provided anyway, the gateway might simply query the entire LAN for the requested address or name (as is done in the Address Resolution Protocol). This would have the side effect to allow some degree of user mobility in the LAN.
- b) It needs to be defined how data and audio/video information streams do relate to each other and whether the existence of an audio connection (only when talking to an H.320 terminal?) is a prerequisite for the establishment of a data path and whether closing the audio(visual) connection implies closing the data connection (which is the case in H.221). The various scenarios should be investigated.
- c) In conjunction with this it needs to be specified how bandwidth is allocated to the various information streams of the LAN terminals and how changes are made. The guarantee that the allocated bandwidth is not exceeded should be implemented in the H.323 terminal by some means of rate control.
- d) Furthermore, it should be considered that LANs might provide some means of prioritizing certain information streams over other traffic up to a preallocated bandwidth without giving a *guarantee* for this bandwidth (and delay, jitter) to be available.
- e) It should be specified how point-to-point connections are set up within a LAN (without the interference of an MCU or a gateway?).
- f) Will the same (TCP) connection that is used to exchange the Q.931-like PDUs of IEEE 802.9a be used for H.245 PDUs? As no commonly accessible D channel seems to be needed this approach seems feasible. The lifetime of this connection should determine the lifetime of the call (including T.120?).
- g) What is the maximum rate of H.22Z traffic allowed in a LAN with a certain load for the resulting communication quality to be considered acceptable (from a standardization point of view)? What is to be done if the LAN load varies (how long can a decrease in quality be tolerated; when shall the call be dropped; etc.)?

2. Aspects concerning signalling with H.245

- a) How are multiple information streams (audio/video/data) of H.245 identified to belong to the same logical connection?
- b) A reliable transport mechanism should be used to transmit H.245 PDUs to prevent loss of control information, e. g. a TCP connection.
- c) In some cases, e. g. for mode switches, it is required to synchronize H.245 PDUs and the affected information streams. This might be done by either including references in the

H.245 PDUs which PDU (referred to by means of its media type and sequence number) is the first to be affected by the change, or to provide some inter-stream synchronization by means of some global sequence number.

3. T.120 and other data streams

- a) How are the T.120 data stream, audio and video streams that belong together identified? Do they share a common identifier? Who assigns this identifier?
- b) What is done with other data streams that are not supposed to be reliable (for real-time applications such as far end camera control)? A separate content type is needed for this.

4. Multicasting issues

- a) Communication in LANs according to H.323 is point-to-point. The usage of multicasting is optional and is not standardized in the short term. However, a manufacturer-specific solution must be possible and has to be negotiated in a standardized way so that multicast and non-multicast terminals may be distinguished. Negotiation of multicasting capabilities should be included, and it must be possible to negotiate which (non-standard) way of multicasting is applied for which information (audio/video/data) stream.
- b) Which body is responsible for specifying the negotiation and usage of a multicast transport for both audio/video as well as data information? It is expected that SG15 defines the optional usage of audio and video but what is to be done with data. As part of a capability exchange this has to be done in SG15, however, the decision to actually use this capability needs to be taken during connection setup of the T.120 transport connections (or at some later point in time) - which then would be up to Q10/8. This raises the question which tasks are to be performed by this working group and what is to be done by Q10/8 concerning the T.120 protocol suite?

5. Security issues

- a) In LANs it might be crucial to the trustworthiness of a terminal that encryption of all kinds of information is supported. This signalling must be carried out end-to-end as the gateway cannot simply perform decryption (if it should, it needs to participate in a key exchange procedure and must be trusted as well).
- b) The H.233 encryption mechanisms would solve this problem (and should be provided anyway). This requires that either none, some, or all of the information streams are crypted with the same or different encryption keys. This requires that an H.323 terminal is able to identify all information streams belonging to the same H.221/H.223 connection.

6. Gateway issues

- a) How many gateways are allowed to interface to a LAN? If more than one (logical) entity is allowed, do they need to interact? How is this done?
- b) Which functionality is located in a gateway? We have suggested a range from a dumb transport layer converter to a smart MCU that includes T.120 functionality. As integration of both functions provides interesting perspectives (and thus is more than simply an MCU running on a gateway), with respect to future development, all possible scenarios should be considered.

7. Protocol format

- a) The H.22Z header should start with two zero bits to simplify distinction from RTP packets.
- b) The packetization rules for various media specified by the IETF AVT working group should be used whenever applicable. This would be useful for possible "transcoding".
- c) The 16- and 32-bit words used in the PDU format should be aligned to 16-bit and 32-bit boundaries, respectively.

END

Correspondence to SA&A/The ATM Forum

To: George Dubrowski Chair, ATM Forum Technical Committee
Dean Skidmore Chair, SA&A / AMS

From: ITU-T SG15 Experts Group for Video Coding and Systems in ATM and Other
Network Environments

Subject: Current Status of ITU SG-15 ATM Terminal Definition

The ITU-T SG15 Experts Group for Video Coding and Systems in ATM and Other Network Environments met in Haninge, Sweden, May 15 - 18th. Many aspects related to the profiling and functional features of ATM audio-visual and multimedia terminals were discussed and decided.

Attached is the meeting report of the SG15 experts group. The ITU-T SG 15 requests that the ATM Forum consider this work in its development of Implementation Agreements for audio-visual and multimedia services.

Furthermore, we identified that the following work items of SA&A/The ATM Forum are relevant to the work of this Experts Group and we appreciate to be informed of the outcome:

- Network performance, CDV in particular,
- Definition of uni-directional communication terminals, and
- DSM-CC mapping to Q.2931.

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Fax : +81 3 5351 0185
e-mail : okubo@gctech.co.jp

Attachment: AVC-800R Report of the Haninge meeting of the Experts Group

END

Correspondence to ETSI NA5

To: Mr. H-J. Breuer, Chairman ETSI NA5

From: Mr. S. Okubo, Rapporteur for Q.2/15 in ITU-T SG15
ITU-T SG15 Experts Group for Video Coding and Systems in ATM
and Other Related Environments

Purpose: FOR INFORMATION

Subject: ITU-T SG15/Q.2 video experts group's progress on ATM network adaptation

ITU-T SG15 Q.2 video experts group thanks ETSI NA5 for its liaison statement clarifying the Convergence Sub-layer (CS) functions associated with AAL 1 and a proposed AAL 2, which SG15 reviewed at its meeting in Haninge, Sweden (15-18 May 1995).

The liaison was very helpful in clearly identifying the CS functionality with respect to I.363. SG15 also noted NA5's concern that in the AAL 2 proposal some traditional CS functions (e.g. timing recovery and error correction) had been repositioned by SG15 into its H.222.1 layer.

We understand that NA5's liaison was also presented and discussed at the rapporteur's meeting of SG13 AAL (chaired by Mr. Yamazaki), in Stockholm, prior to the SG15 meeting. We also understand that it was agreed at the SG13 meeting that SG15's proposal for moving some CS functions into high layers was not against the principles of I.363. SG15 is therefore fully entitled to perform some CS functions in H.222.1 if it is needed to meet SG15's requirements. SG15 would also like to inform NA5 that as a result from its Haninge meeting SG15 has decided to only consider constant bit rate encoded video services (i.e. H.262/MPEG-2, H.261) in its first phase of Recommendations (e.g. H.222.1, etc.) due in November 1995. Although SG15 has no immediate need to transport variable bit rate encoded MPEG-2 signals this will be a requirement in its next phase of work.

SG15 wishes to thank NA5 for its past contributions on the development of AAL 2 and would be interested in any further progress that NA5 makes on AAL 2 development. I have attached meeting documents TD9 and TD19 to assist NA5 in any future AAL developments that it may undertake and will continue to keep it informed of any relevant progress made within SG15's experts group on adaptation requirements.

Attachments:

TD-9	Report on Network Adaptation issues (AAL, FEC, CDV compensation)	May 1995
TD-19	Request for FEC without interleaver in AAL type 1	May 1995

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