CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

Document AVC-256R
Revision
March 27, 1992

SOURCE : CHAIRMAN
TITLE : REPORT OF THE SIXTH MEETING OF THE EXPERTS GROUP FOR ATM VIDEO CODING IN STOCKHOLM/HAIFA (March 18-27, 1992) - PART I
Purpose: Report

PART I SOLE SESSIONS

Contents

1. General

The sixth meeting of the Experts Group consisted of two parts; CCITT sole sessions in Stockholm and joint sessions with ISO/IEC JTC1/SC29/WG11 (MPEG) in Haifa. The list of participants appears at the end of this report.

The first part was held during 18-20 March 1992 at Najaden Hotel in Haninge, Sweden, at the kind invitation of Telia Research AB. At the opening session, Dr. Oesten Maekitalo, Director of Telia Research, made a welcoming address on behalf of the hosting organization.

At the end of the Stockholm sessions, Chairman thanked the hosting organization for the meeting facilities provided and the excellent secretarial support. Chairman also thanked Mr. Katsuyuki Yamazaki, Special Rapporteur SWP XVIII/8-3, for his participation in this meeting and for his efforts to communicate between SGXVIII and this Experts Group.

The Experts Group also had a short closing session on March 27 in Haifa.

2. Documentation (TD2)

For this meeting, 52 AVC-numbered documents and 8 temporary documents were available as listed in Annex 1.

3. Tape demonstration (TD4)

Several video tape demonstrations were given with D1 as detailed in Annex 2 to present experimental results.

Display of progressive scan materials at different scanning formats were

first made available for the meeting, thanks to the effort of the hosting organization. Experimental results were brought in by recording in either of Exabyte or D1 tape.

4. Reports of the meetings relevant to the Experts Group

4.1 SGXVIII meeting in Melbourne (AVC-178,207,208)

Mr. Biggar presented an overview of SGXVIII achievements focusing on the matters about which we sent liaison statements. Correction was made on the QoS of the low priority cells (Section 3.6/AVC-178) that at the moment it is not guaranteed.

Mr. Yamazaki gave detailed content and background for each technical item contained in the SGXVIII liaison responses as introduction of our discussion.

The meeting appreciated this mutual attendance of representative experts between this group and WP XVIII/8, and recognized it quite valuable for the progress of each group's work. Further opportunities should be sought in the future.

4.2 CMTT/2 SRG meeting in Singapore

Mr. Brusewitz outlined the current SRG activities of the Special Rapporteur's Group which is focusing on the compatible coding between HDTV and Conventional TV.

5. Picture format

5.1 Status before this meeting

Chairman summarized the study progress up to this meeting as follows;

- Interim common understanding was obtained in August 1991 as recorded in Annex 3 to AVC-106R (Report of the Santa Clara meeting).
- We had agreed at that time to reach an agreement on the picture format issue at the earliest occasion in 1992 (Section 4.2.5/AVC-106R).

5.2 Format conversion (AVC-213,225,239,240,244; AVC-242)

Several format conversion experiments were presented as in Documents AVC-213,239,240 with tape demonstration, which carried out conversion from the CCIR-601 format to the progressive SCIF as in AVC-29 or further back to the CCIR-601 format. The issue is whether there are any practical conversion filters between CCIR-601 (525/60 and 625/50) and SCIF. AVC-242 gave an evaluation of several interlace to progressive conversion methods in terms of camera cost, conversion hardware, possible picture quality and codec hardware. In AVC-244, a trial to provide objective evaluation of format conversion was presented for the future work.

The following general comments were given;

- SNR comparison of conversion methods may not be sufficient, pictures should be observed.
- Existence of cameras with fast shutter and crispening post-process should be taken into account. They may make conversion extremely

difficult.
- An underlying question is whether the hypothesis stands here that "we are coding pictures but not pixels". Interlace to progressive conversion and frame rate conversion are two challenging items.

In addition to the format conversion results, progressive pictures obtained from film sources and their interlaced version were also presented (AVC-252). The following is the summary of impressions expressed after having observed those pictures;

- Loss of quality is noticeable, particularly for frame rate conversion. Broadcasters will not accept this degradation.
- Progressive scan display for progressive materials are very impressive compared to their interlace version.
- Displaying on a small CRT monitor or a large projection monitor gives different impression.

5.3 Coding at SCIF (AVC-239,241,252)

Simulation results for coding through SCIF were reported in AVC-239 and 241, addressing its impacts on coding efficiency and prediction structure. It was found that practical conversion filters may lose 10-30% in coding efficiency and require multiframe prediction.

AVC-252 gave coded results for two progressive materials, pointing out that coding rate does not double due to progressive scan.

5.4 Decision policy (AVC-215,219,220,243,246,250; TD-5)

Considerations were given for making a decision on the H.26X format issue in AVC-219,220,246,250 where a flexible resolution approach, clarification of SCIF aims, and square pixel approach were studied. During the discussion, the following was pointed out;

- H.26X should be generic to be applicable to a wide range of applications, thus it should cover a range of formats. What picture formats are to be used may be the issue of H.32X (audiovisual communication terminal for B-ISDN).
- What applications are really transported through B-ISDN should be carefully studied. As extreme arguments, there would be no demand for videoconferencing at higher bit rates such as 5-10 Mbit/s, or there would be outside the terminal solutions for interworking between different television standards such as in broadcasting.

After some discussion, Mr. Morrison undertook to coordinate a drafting group to make a summary of discussion for considerations, conclusion at this meeting and necessary future actions. The outcome is contained in Annex 3.

There was a discussion on the linkage between format and algorithm, and the meeting confirmed that at this stage H.26X should include operation at CIF/QCIF as well.

6. Network aspects

6.1 AAL Type 1/2 updated specifications (AVC-208,210,214)

Mr. Yamazaki gave the meeting a tutorial presentation on the updated

specifications of AAL Type 1 and possible candidates for AAL Type 2 functionalities.

6.2 Review of AAL Type 1 specifications

Video sampling clock recovery was reviewed in AVC-249 with reference to the SRTS method of AAL Type 1. Based on the agreement that we provide a mechanism in H.26X which allows video sampling clock recovery (Section 5.8/AVC-177R), the meeting considered whether this be achieved using AAL function or as part of video codec functions.

This should be further studied considering VBR operation of the video codec and clock recovery for multiple sources. It should be noted that some audio coding such as Compact Disc uses sampling frequency independent of the network's 8 kHz and quite jitter sensitive. The following was also pointed out;

- At T/S reference points, 150 MHz network clock is available, but its submultiples may have to be generated inside the terminal.
- Some NT2 equipment, such as LAN and PBX, does not provide precise clock frequency nor are locked with B-ISDN clock frequency. SRTS method is based on the availability of the identical clock at both ends.

An experimental result addressing the jitter specification was presented in AVC-230. It was pointed out that the jitter specification uses a template for its frequency characteristics and that such specifications are found in G.810, G.823 and G.824. It was also pointed out there may be such sampling clock jitter specifications in the existing standards, and that component and composite television signals may require different characteristics.

6.3 Required functions of AAL Type 2 (AVC-210,222,228; AVC-226)

Mr. Yamazaki clarified during the presentation of AVC-210 that SGXVIII intends to finalize the protocols for video transport in the 1994 Recommendations, thus welcomes the input from this group on required functions. It was also clarified in response to questions that CLP is determined on a per-VCC base as well as a per-cell basis, and that use of particular AAL Type is made known between the terminal and the network through designation of a bearer service (Type A, B, C or X).

As to the necessity of partially filled cells, it was pointed out that there is a possibility to use stuffing bits in the video coding instead of using length indicator in the AAL.

The meeting accepted several items listed in AVC-222, together with others identified in the multi-media/multi-layered video support, as possible requirements to the AAL Type 2 and agreed to communicate with SGXVIII on a "may be required" basis except the commonality item. This exception is reflecting the SGXVIII's intention to make the protocols common as far as possible. "Framing of video data" item was enhanced by pointing out the necessity of cell boundary indication at AAL-SAP.

AVC-228 gave a stimulus to study the implications of LAN/MAN characteristics on the ATM video coding standard. Since this is a new item, the members are requested to provide input. There were comments that;

- 802.6 like networks are considered as a possible NT2 configuration,

- the distance between gateway and the terminal will affect the problem,
- there will be difference between the case of "from the encoder in B-ISDN to the decoder in LAN/MAN" and the case of the other way around,
- difference between LAN and MAN should be taken into account.

6.4 CLP (AVC-208,223)

In the presentation of AVC-208, it was clarified that one bit can be provided as part of AAL video transport service, which classifies the cell into two types.

The meeting agreed to the view contained in AVC-223 that CLP bit be used only for cell loss priority indication.

6.5 UPC/TD (AVC-208,227,247)

Mr. Yamazaki provided the SGXVIII results on the negotiation of peak cell rate for CLP=0,1 and Cell Delay Variation (CDV) definition points, presenting the three causes for CDV; multiplexing in AAL layer, multiplexing in ATM layer and GFC at ATM layer.

The meeting accepted the proposed items for clarification addressing CDV in AVC-227 and agreed to communicate with SGXVIII.

Document AVC-247 discussed monitoring points of VBR traffic, emphasizing the following fundamental problems;

- Difference of methods to monitor the traffic between the terminal and the network may cause cell discards which the terminal can not predict.
- If a UPC mechanism is not standardized, different UPC methods in different networks may further cause unpredictable cell discards.

Since these are quite serious for achieving VBR video coding, the issues should be kept alarming even if we sent SGXVIII the same comments before.

AVC-247 also brought up the issue of using performance metrics for UPC performance evaluation. As long as different UPC algorithms conform to the performance metrics bounds specified, no standardization of a UPC algorithm may be needed. Its implication on the VBR coding should be addressed.

6.6 Multimedia multiplex (Multi-component multiplex) and B-N interworking

6.6.1 Multimedia multiplex for audiovisual services (AVC-211,224,226,248)

Document AVC-211 includes Draft Recommendation I.37y "Network capabilities to support multimedia services" which gives general conceptual guidance on the subject matter. Chairman gave a comment that real time audiovisual services of our concern seems not covered in this document.

Document AVC-224 proposed to ask SGXVIII the possibility of providing B-ISDN to N-ISDN audiovisual service interworking which includes the H.221 protocol conversion inside the network, but the meeting felt this not practical and concluded not to include this question in the liaison document.

AVC-226 and 248 are addressing the study item of what multiplex method be appropriate for the H.32X terminal. In AVC-226, a concept of switchable

multiplex between H.221 based and cell oriented ones is provided. As to the comments in AVC-248 on comparison of the multimedia multiplex methods, Japan was requested to take them into account in the future contribution. We need further study on this study item.

During the discussion, Mr. Morrison pointed out that the descriptions concerning multimedia multiplex method specified in the MPEG-1 system (Section 4.1/AVC-226) are not correct.

6.6.2 Support of multi-layered video (AVC-216,221)

These two documents address a similar topic; transport of multi-layered coded video signals over B-ISDN. Taking into account that this topic has also some similarity with multimedia multiplexing discussed above, listed questions to the network specialists were integrated and sent to SGXVIII as part of the liaison document.

6.7 Cell loss

6.7.1 network characteristics (AVC-208)

Mr. Yamazaki presented SGXVIII's response to our question concerning the network performance; cell error ratio and cell loss estimated from the G.82X specification. It was noted that these values are based on the radio transmission systems and optical fiber systems are used in actual B-ISDN, thus much better performance is expected. It was also noted, however, that the estimation in this liaison document does not include cell losses which may be caused by ATM nodes at the time of congestion, thus worse performance than this may be provided.

The meeting felt it safe that the video codec be resilient to this level of network performance; by means of e.g. including FEC to cope with bit errors as in H.261, and cell loss resilience techniques in the video source coding.

6.7.2 cell loss resilience techniques (AVC-235,236,252; AVC-222)

There were presented experimental cell loss resilience techniques and survey of possible techniques as well as their selection criteria. Mr. Haskell commented on the leaky predictor approach that channel hopping characteristics may be covered by leaky prediction instead of cyclic I-frame insertion and that trade-off between use of I-pictures and leaky prediction should be carefully studied in terms of coding efficiency. Mr. Tabatabai commented on Figure 1/AVC-236 that trade-off between delay and "interleave+FEC" transmission efficiency should also be carefully studied.

In AVC-252, layering of packetizers for two priority channels are experimented where the decoder ignores all the subsequent bits after a lost cell and used cell loss concealment techniques.

6.7.3 elements to be adopted in the standard

The meeting discussed for a while what elements be chosen for the standard or what should be studied toward that target. The possible elements are as follows though they are not exhaustive;

- use of CLP bit (transmission coding)
- layering (source and/or transmission coding)
- leaky prediction (source coding)

- FEC/interleave (AAL)
- structured packing of video data into cells (transmission coding)
- concealment (outside the standard)

During the discussion, it was clarified that for layered video coding each layer can use different options of AAL on a per-VCC basis at the call set-up.

Mr. Parke pointed out that the selection of error resilience techniques depends on such system considerations as the H.26X compatibility with H.261 or other standards.

The meeting concluded that further study is required.

6.8 Reference terminal configuration (Figure 1/AVC-227)

The meeting recognized the importance of reference configuration of the audiovisual ATM terminal toward the following;

- identification of reference points and interface signals at those reference points
- clarification of responsibility for specification
- identification of missing elements for designing audiovisual communication terminals connected to B-ISDN

and appreciated Figure 1/AVC-227 as a useful input. Members are requested to elaborate this.

6.9 Liaison to SGXVIII (TD-6)

As a summary of the discussion, the meeting agreed to send SGXVIII a liaison statement containing our responses to the request of comments and our new questions identified through the discussion of the week. Mr. Biggar undertook to coordinate a drafting group for this purpose.

The outcome of this drafting group is contained in Annex 4.

7. Source coding

7.1 CBR and VBR (AVC-218,255; AVC-252)

An overview of the issue and checkpoints for choice were given in AVC-255. The questions raised in the illustration have been recognized as open in this group. Contributions are awaited.

This contribution will be presented at the workshop during the joint sessions with MPEG in Haifa.

7.2 TMO experiments

7.2.1 Specifications (AVC-212)

Mr. Schinkel introduced the preliminary working draft for Test Model as a starting point of the convergence phase work, which was edited by an adhoc group established at the Singapore meeting. Stress was made on the following points;

- Cell loss experiment specification should be materialized as real experiments.
- H.261 compatibility should be experimented. Currently the syntax allows it, but work needs to be done to achieve compatibility.

7.2.2 Performance and improvements

The following items were experimented mostly under the TM0 framework.

1) Field vs frame coding (AVC-231,232)

There was a comment on AVC-232 that multiplication by the coefficients for field adjusted motion compensated prediction and dedicated motion detection may bring hardware complexity. It was also clarified that by setting "MVfld" to zero progressive formats can be dealt with.

2) Half-pel MC (AVC-237,245)

Two comparison results were presented on whether the original picture or previous coded picture be used for final half-pel accuracy motion detection, but they differ in conclusion. One possibility was thought to be whether the integer pixel position is recalculated in the final vector search of AVC-237. This point need be checked.

3) Averaging two fields/frames for prediction (AVC-233,245,251)

Three different techniques imply that averaging two fields/frames for prediction is effective in improving coding efficiency. Effectiveness of bi-directional B-frames is in line with this fact.

4) Quantization (AVC-245)

It was clarified that shifting the decision level is effective if variable length coding after quantization is also counted (lower level of coefficients generate less bits), though the decision level which gives minimum quantization error is in the middle of two adjacent reconstruction levels. Mr. Haskell commented that this shift of decision level had been found effective, but it may be related to perceptive or temporal filtering effects.

5) Low delay mode (AVC-233,252)

Two experiments are in line to show that use of B frames improve coding efficiency at the cost of delay time. Improvements of low delay mode operation are encouraged.

6) Embedded coding (AVC-234)

Use of base-layer for prediction is discussed in this document. Difference in the down- and up-conversion filters affected the coded results in the first experiment but not in the second. It was commented that this may be due to difference of the coding noise included in the base-layer pictures. Another comment was given that coding efficiency may be affected by use of temporal interpolation instead of field-repeating in the up-conversion of base-layer pictures.

7) Adaptive VLC (AVC-245)

Three dimensional VLC using LEVEL, RUN and whether the coefficient is the last in a block or not as entry values was shown effective for both block scanning and frequency scanning.

8) Low bit rate operation (AVC-238)

This document indicates a lower boundary of the current rate control method. It was noted that this should not be confused with the low bit rate operability of the coming standard. For example, spatial or temporal pre-filtering may allow the satisfactory low bit operation.

7.3 Framework for H.26X (AVC-229; AVC-216,221; AVC-253)

Impacts of embedded coding were discussed in AVC-229. The following comments were given;

- Being generic and guaranteeing connectability need a careful balance.
- Structure to switch embedded and simulcast might solve some problems.
- In LAN applications, storage capacity and throughput requirements of the server may need embedded coding. Its usefulness depends, however, on the choice of complexity in the database or that in decoders.
- "Scalability" is relevant to this discussion, but distinction should be made between upward/downward compatibility and forward/backward compatibility.
- Activities toward H.261 compatibility should be enhanced.

The meeting recognized this as a stimulus for the future work, awaiting further input.

Document AVC-253 is a list of requirements for MPEG-2/H.26X. As noted in the summary of picture format discussion, the Experts Group should clarify the probable applications and their implications for H.26X.

7.4 Position of Experts Group for the first Test Model definition

7.4.1 Work method (AVC-217; TD-7)

The meeting discussed how the source coding work should be organized in this group. There was raised a question whether we should define our own Test Model as a subset of the MPEG TM.

It is a common view of the group that the Test Model be joint CCITT/MPEG model and not that we use the MPEG model. We should make efforts to improve TM features of our concern such as low delay, cell loss resilience, compatibility. Other members from different fields may concentrate on another features. TM improvements will be a collection of such efforts.

There was also expressed a concern on the procedure to improve Test Model. Currently, if an improvement is to be included in the Test Model, core experiments using the Test Model are required. Since this seems to be a cyclic argument, necessary procedures should be clarified during the joint sessions.

It was further commented that the syntax to be developed through the Test Model work should be reviewed before finalizing the standard from transmission efficiency and hardware complexity point of view and necessary modifications should be made.

As to the low delay experiment, the meeting agreed to make a specific proposal as in Annex 7.

The meeting agreed to the view expressed in AVC-217 that Video and Requirements sessions be in sequence for matters relevant to MPEG-2/H.26X, recognizing that there may be some difficulty due to limited practical arrangements.

7.4.2 Documents

The following AVC-numbered documents are put forward for consideration of the joint sessions;

Proposal : Annex 5 to this report, AVC-217
Discussion : AVC-229, 236, 251, 252
Information: AVC-231, 233, 234, 235, 254, 255

Note: Those documents are not included whose contents are covered by the ones submitted through the MPEG channel.

7.4.3 Representatives

The following is appointed as representative to the joint session;

Requirements/Test	S. Okubo
Video	G. Bjoentegaard
System	B.G. Haskell
Implementation	D.G. Morrison

7.4.4 Speakers at the Haifa workshop

Chairman reported that on behalf of the Experts Group Mr. Barry G. Haskell (AT&T Bell Labs) and Mr. Peter List (DBP-Telekom) will kindly give talks on variable bit rate coding under UPC at the workshop in Haifa.

8. Work plan

8.1 Joint work with MPEG

See Section 7.4.1 above. Relation between H.26X and MPEG-2 in the final form should be further studied.

8.2 Coordination with CMTT/2 SRG

Further actions toward the joint work may be necessary, but the meeting could not find time to discuss this matter.

8.3 Consideration of relevant CCIR works

Since the impact of digital broadcasting on the B-ISDN communication terminals will be great, the meeting felt it necessary for the Experts Group to liaise with CCIR groups and invite to use the outcome of the joint MPEG/CCITT EG standard development. As an initial step, the meeting agreed to send a progress report of this group to a relevant CCIR Bologna meeting on coding in May 1992.

8.4 Participation in the SGXVIII meeting

Volunteers are solicited who can attend the SGXVIII meeting held during 9-19 June 1992 in Geneva to liaise between this Experts Group and SGXVIII as mentioned in Section 4.1 above.

8.5 Milestones

Though "outline recommendation" for H.26X had been intended around this time (see Annex 5 to AVC-22R) for an input to WPXV/1 meeting in May 1992, the meeting concluded that we have not sufficient materials and that submitting a progress report would be more appropriate. This conclusion was also affected by the fact that Working Party meetings are held regularly without being constrained by the study period change at the end of this year.

9. Others

9.1 Intellectual property (TD-3)

The practice of the patent application disclosure in the previous Specialists Group was reviewed, which collected such information before the applied patents appear in the public domain on a "if everybody does so" basis. Since some difficulty is felt this time because of the joint work with MPEG, the meeting agreed to raise to start the collection of patent information relevant to the Test Model for consideration of MPEG/Chairmen meeting.

9.2 Document handling

The Experts Group agreed to distribute written contributions 7 calendar days in advance of the meeting. Contributions received after that deadline may not be considered by the meeting.

9.3 Future meeting plan (sole sessions)

- July 1-3, 1992 in New Jersey before the Rio de Janeiro joint sessions with MPEG
- September 1992 in USA, joint sessions with MPEG
- October 28-30, 1992 in Ipswich (?) before the London joint sessions
- March 1993 in Australia, sole and joint sessions

END

* * *

Annexes

Annex 1 Documentation
Annex 2 List of tape demonstration
Annex 3 Summary of discussion on the picture format issue
Annex 4 Liaison statement to SGXVIII
Annex 5 Proposal on low delay mode experiments

Participants of the sixth meeting of
Experts Group for ATM Video Coding
(18-27 March 1992, Stockholm and Haifa)

			S	H	
FRG	Mr. P. List	DBP Telekom		X	
	Mr. F. May	Daimler-Benz	X		CM
	Mr. G. Zedler	DBP Telekom	X	X	CM
Australia	Mr. M. Biggar	AOTC Labs	X	X	CM
	Mr. G. Smith	AUSSAT	X	X	
Belgium	Mr. O. Poncin	RTT Belgium	X	X	CM
	Mr. B. Voeten	Bell Telephone	X		
Canada	(advised that no one can attend)				
USA	Mr. B.G. Haskell	AT&T Bell Labs	X	X	
	Mr. N. Randall	DIS	X	X	(CM)
	Mr. A. Tabatabai	Bellcore	X		CM
	Mr. F. Tobagi	Starlight Networks	X	X	
France	Mr. J. Guichard	CNET	X	X	CM
Italy	Ms. L. Conte	CSELT	X	X	CM
Japan	Mr. S. Okubo	NTT	X	X	Chairman
	Mr. K. Sakai	Fujitsu	X	X	
	Mr. Y. Takishima	KDD	X		(CM)
	Mr. T. Tanaka	NTT	X	X	CM
	Mr. K. Yamazaki	KDD	X		
	Mr. T Yukitake	Matsushita	X	X	
Norway	Mr. G. Bjoentegaard	NTA	X	X	
	Mr. H. Sandgrind	NTA	X		CM
Netherlands	Mr. D.A. Schinkel	PTT Research	X		CM
UK	Mr. I. Parke	BT	X	X	
	Mr. D.G. Morrison	BT	X	X	CM
Sweden	Mr. H. Brusewitz	Telia Research	X	X	CM
	Ms. C. Verreth	Telia Research	X	X	
Korea	Mr. J-H. Jeon	Korea Telecom	X	X	Observer
	Mr. J-Y. Nam	ETRI	X	X	Observer

CM: Coordinating Member
(CM): Substitute for CM

Documents for the sixth meeting of the Experts Group
18-27 March 1992, Stockholm/Haifa

Normal Documents

Note: Contributions with "*" have also been sent to MPEG for consideration at the joint sessions. Some documents are also registered directly through the MPEG channel, which are not marked with * but have been considered at the joint sessions. See AVC-257R.

AVC-177R REPORT OF THE FOURTH MEETING OF THE EXPERTS GROUP FOR ATM VIDEO CODING IN YOKOSUKA (CHAIRMAN)

Achievements and action points obtained at the Kurihama joint sessions and the Yokosuka sole sessions are recorded.

AVC-178 REPORT OF SGXVIII MELBOURNE MEETING (SGXV REPRESENTATIVE TO SGXVIII MELBOURNE MEETING - M. BIGGAR)

Outcome of the SGXVIII Melbourne meeting is presented focusing on the issues of this Experts Group concern. SGXIIII response to our questions is outlined and further actions which we should take are suggested. It is recommended that any further opportunities for the Experts Group members to attend SGXVIII meetings and vice-versa be exploited.

AVC-206R REPORT OF THE FIFTH MEETING OF THE EXPERTS GROUP FOR ATM VIDEO CODING IN SINGAPORE (CHAIRMAN)

Achievements and action points obtained at the sole and joint sessions are recorded. This meeting handled mainly those topics related to the source coding algorithm.

AVC-207 REPORT OF THE MEETING OF SWP XVIII/8-3 - SERVICES, IVS AND AAL TYPES 1 AND 2 (SWP XVIII/8-3)

This report covers the following topics; AAL Type 1, AAL Type 2, liaison to this Experts Group and CMTT/3 regarding AAL Types 1 and 2, service aspects including updating the IVS Baseline Document

AVC-208 LIAISON STATEMENTS TO ATM VIDEO CODING EXPERTS GROUP (SGXVIII)

The following study results of SGXVIII are contained as responses to the questions sent from the Experts Group;

- IVS Baseline Document
- AAL for supporting video signal transport
- liaison statement to CMTT/3 on AAL for supporting high quality audio signals
- use of CLP bit and UPC for peak cell rate
- standardization of Network Performance parameter values
- G.82X provisional objectives and ATM cell loss

AVC-209 IVS BASELINE DOCUMENT (SWP XVIII/8-3 - EDITOR OF IVS BASELINE)

This has been updated by incorporating new texts proposed by CCIR IWP 11/9, CMTT/3 and this Experts Group, results of the IVS coordination meeting, and recent achievements in SGXVIII.

AVC-210 OUTCOME OF AAL STUDY (SGXVIII)

Draft text of section 2/I.363 (AAL Type 1) and possible candidate functions for AAL Type 2.

AVC-211 LIAISON STATEMENT TO EXPERTS GROUP FOR ATM VIDEO CODING IN SGXV (WPXVIII/5 - MELBOURNE MEETING)

The following items are addressed concerning the multimedia service support on B-ISDN;

- interworking user multiplexed signals from N-ISDN with those of VC multiplexed signals in B-ISDN
- resource allocation rearrangements during a call
- multimedia synchronization

Draft I.37y "Network capabilities to support multimedia services" is attached for information and comment.

AVC-212* PRELIMINARY WORKING DRAFT - PWD (PWD EDITING GROUP)

This document contains a basis of Test Model specifications which has been obtained by the adhoc group established at the Singapore meeting. Some points are indicated as being not clear.

AVC-213 FILTERS FOR CONVERSION BETWEEN CCIR-601 AND SCIF (NORWAY)

Filter coefficients for converting SCIF back to CCIR-601 signals are given. Tape demonstration for SCIF pictures converted from CCIR-601 sequences and CCIR-601 signals reconstructed are accompanied. This document is supplementary to AVC-203.

AVC-214 INTRODUCTION TO AAL TYPE 1
(SPECIAL RAPPORTEUR SWP XVIII/8-3 - K. YAMAZAKI)

This document is a collection of tutorial diagrams and explanations to understand the specification of AAL Type 1 and their background.

AVC-215 CONSIDERATIONS ON SUPER CIF (BELGIUM, FRG, ITALY FRANCE, THE NETHERLANDS, NORWAY, SWEDEN, UK)

Three options (single format, dual format, generic) and their combinations are discussed for the H.26X format specification. Since the development of MPEG-2/H.26X video coding is directed toward a generic standard, it is argued that the selection of a SCIF format will not aid the algorithm development in the way that CIF did for H.261. As a conclusion, the following is proposed;

Though a solution which permits world-wide conversational services is needed, the CCITT Experts Group should defer making a firm decision about

the incorporation of Super-CIF in H.26X. Study on the topic should continue.

AVC-216 THE NETWORK ACCESS FOR MULTI-LAYER AND MULTI-RESOLUTION VIDEO SERVICES OVER THE B-ISDN (UK)

Multi-layer coded signals require sufficiently small transmission delay for low bit rate components, differing QOS for different layers, and minimal relative skew timing (or stipulation of maximum value of skew between layers). After discussing three possible scenarios (1 VP with 2VCs having different QOS, 1 VP with 1 VC having CLP bit for multiplexing, 2VPs each with 1 VC), some questions for clarification are placed to the network specialists.

AVC-217* PROPOSAL FOR THE JOINT WORK BETWEEN ISO/MPEG AND CCITT/AVC EG (BELGIUM, FRANCE, FRG, ITALY, NORWAY, THE NETHERLANDS, SWEDEN, UK)

It is proposed that the meetings of the Video and Requirements groups on matters related to H.26X/MPEG-2 should be held in sequence.

AVC-218 A SURVEY ON CBR VERSUS VBR (DBP-TELEKOM)

Choice of CBR or VBR is discussed by comparing the five potential codings; CBR, VBR with peak rate regulation where charge may be based on the declared rate or number of transported cells, VBR with peak and average regulation, and 2-layer VBR. Checkpoints are listed for each VBR alternative, stressing the impact of preventive UPC and possible coding efficiency loss of 2-layer schemes.

AVC-219 FLEXIBLE SPATIAL RESOLUTIONS (AUSTRALIA)

Flexible spatial resolutions, which lie within some maximum resolution limits, is proposed so that a wide range of applications be covered. It is claimed that this approach does not significantly impact on the complexity of codecs and MCUs.

AVC-220 FLEXIBLE FRAME RATES (AUSTRALIA)

It is proposed to introduce a limited flexibility through frame dropping (as used in H.261) in H.26X. Since the quality requirements of some applications make frame rate conversion unacceptable, it is proposed to consider introducing mechanism to allow a range of frame rates. One simple mechanism to insert explicit source frame timing information in the bitstream is proposed as a starting point of discussion.

AVC-221 TRANSPORT OF LAYERED VIDEO ON B-ISDN (AUSTRALIA)

The following is pointed out concerning layering of video signals;

- to use network capacity efficiently in a layered multipoint video call, multiple virtual channels are required,
- layering within an interworking layer, to control the effect of cell loss and match ATM loss priority, should be studied, and
- the components within each layer need to be multiplexed in a way that minimizes the impact of cell loss.

AVC-222 ATM ADAPTATION LAYER TYPE 2 FUNCTIONALITY (AUSTRALIA)

Necessary functions for AAL Type 2 are discussed, raising the following for discussion and communication to SGXVIII;

- commonality between AAL Type 2 and AAL type 1 is not required,
- aligning video data with cell payload may assist in minimizing error propagation,
- cell payload length indicator may be needed to deal with partially filled cells,
- sequence number is required to detect cell loss, whose length is to be determined by the B-ISDN cell loss characteristics,
- multiplexing capabilities within the AAL may be required to indicate different layers of coded video signal.

AVC-223 END TO END SIGNIFICANCE OF THE ATM HEADER CLP BIT (AUSTRALIA)

It is proposed that the CLP bit of the ATM header be used only for its intended purpose of cell loss priority indication. Video layer indication is a function which is independent of the CLP bit.

AVC-224 NETWORK REQUIREMENTS FOR MULTIMEDIA INTERWORKING (AUSTRALIA)

In order to allow smooth migration to the long term goal of VC-base multimedia multiplexing, and to avoid that B-ISDN terminals must emulate 64 kbit/s ISDN user based multiplexing, the following is proposed for liaison to SGXVIII and SGXI;

- B-ISDN ISCP signalling and VC-base multiplexing must be able to provide user-user signalling and multimedia multiplexing facilities currently provided by H.221 etc. at a reasonable cost,
- network based interworking between B-ISDN and N-ISDN terminals must be provided.

AVC-225 DISPLAY FACILITIES (SWEDEN)

Information is given about the display facilities during the Stockholm meeting, which can display progressive as well as interlaced pictures. A synthetic test picture is also provided to compare progressive and interlaced displaying.

AVC-226 CONSIDERATIONS ON MULTIMEDIA MULTIPLEX METHODS (JAPAN)

Multimedia multiplex methods (user/SAR/VCI) are reviewed in the light of AAL Type 1 specification and AAL Type 2 functionality candidates. Then it is pointed out that the multimedia multiplex on one VC should be studied in addition to the reference VCI multiplex method. Finally, MPEG1 system is indicated to have potentially delay and error recovery problems for real time audiovisual communications.

AVC-227 REQUIREMENTS FOR TD - TRAFFIC DESCRIPTOR, ESPECIALLY CDV - CELL DELAY VARIATION (JAPAN)

After analyzing the terminal configuration with focus on cell delay variation (CDV), the following is proposed as liaison to SGXVIII;

- guidance is required for translation between service rated at AAL-SAP and cell rate at ATM-SAP,
- CDV of NT2 is the most influential in the terminals system,
- definition of CDV should be such that the maximum value is easily calculated at a certain probability, thus the receiving buffer can be designed,
- CDV specification should limit the total delay between the two S points so as to meet the requirements of conversational services.

AVC-228 CONSIDERATION OF LAN AND MAN (JAPAN)

LAN/MAN is characterized by the fact that there is no guarantee when a next video frame signal can be transmitted after the current video frame has been transmitted. Hence commonality between AAL Type 2 and AAL Type 3/4 may become more important in the LAN/MAN environments.

AVC-229* STUDY ITEMS FOR EMBEDDED CODING (JAPAN)

In addition to coding performance, hardware complexity, end to end delay and service aspects are listed as study items which should be clarified before adopting embedded coding with existing standard core in H.26X. Multipoint communication is discussed as a case involving H.26X and H.261.

AVC-230 JITTER PERFORMANCE OF AN ADAPTIVE CLOCK METHOD (JAPAN)

Clock recovery experiments are carried out using an adaptive clock method, where PCM video signals with 14.3 MHz (4fsc) sampling frequency are subject to the ATM cell arrival jitter and reproduced pictures are observed by varying the low pass filter characteristics of the VCO loop. It is concluded that the jitter of clock should be reduced to such level as EIA RS-170A standard requires.

AVC-231* CODING EFFICIENCY COMPARISON BETWEEN MULTI-FIELD PREDICTION AND ADAPTIVE FRAME/FIELD PREDICTION (JAPAN)

Multi-Field prediction and four frame based predictions (combination of adaptive/frame and MC/DCT) are compared in the TM0 framework. It is concluded that adaptive field/frame coding performs better in coding efficiency at the cost of delay and hardware complexity.

AVC-232 FIELD ADJUSTED MC FOR FRAME-BASE CODING - 2 - (JAPAN)

Prediction efficiency and coded results are reported for the field-time adjusted MC which uses different parity field to get high resolution reference pictures. From these results and analysis on complexity and syntax similarity with MPEG1, it is concluded that this be adopted instead of adaptive field/frame MC. Comparison of multi-field prediction and this technique is also given, supporting the frame base prediction.

AVC-233* A STUDY OF LOW DELAY MODE (JAPAN)

TM0 simulation is carried out for IBBP, IP'P'P, IPPP and IppP structures (P': non-recursive forward prediction, p: recursive forward prediction with larger stepsizes than those of P). It is concluded that backward prediction improves coding efficiency at the sacrifice of coding delay.

AVC-234* SIMULATION RESULTS ON COMPATIBLE CODING (JAPAN)

Results of two experiments are reported for the coding efficiency improvements obtained by using base layer pictures as a prediction mode; uncoded CIF pictures in an RM8 based algorithm, and coded SIF pictures in TM0. Consideration of down- and up-sampling filters, field skipping vs field merging is also included to have better prediction from the base layer. It is concluded that the coding efficiency does not deteriorate due to the base layer prediction mode but improvements are necessary for prediction of P and B pictures.

AVC-235* CELL LOSS COMPENSATION METHOD (JAPAN)

Information is provided on the two experiments addressing cell loss countermeasures; one is on estimation method for a lost motion vector using those of surrounding macroblocks, and the other is on cell loss concealment a) using two vertically adjacent macroblocks, B) cyclic intra pictures (N=12) and C) leaky prediction plus video structured cell in addition to A). The second experiment follows the agreed cell loss experiment specification and method C) is demonstrated to show acceptable picture quality even at CLR=10E-03.

AVC-236* COUNTERMEASURES AGAINST CELL LOSS FROM VIEWPOINT OF IMAGE DETERIORATION AND TRANSMISSION EFFICIENCY (JAPAN)

Several questions are raised to lead to the choice of cell loss protective measures in H.26X. Discussion is given on the picture quality degradation (spatial and temporal) and synchronization recovery from cell loss focusing on the transmission efficiency. There are also raised questions on cell loss characteristics of the network and necessary compromise between requirements from communication, broadcast and DSM.

AVC-237 SIMULATION RESULTS ON HALF PIXEL ACCURACY MOTION ESTIMATION (JAPAN)

Half-pel motion compensation is compared between searching in the decoded picture and searching in the original picture using TM0 field based coding. It is concluded that there is little difference in coding efficiency.

AVC-238 EVALUATION OF TM0 ALGORITHM AT LOW BIT RATE (JAPAN)

TM0 experiments are carried out to test lower bit rate operation. Lower bounds of 1.5 - 2 Mbit/s are found as the limit of normal rate control.

AVC-239 PERFORMANCE OF PROGRESSIVE SCIF (JAPAN)

Three format conversion methods for 525/60 CCIR-601 and progressive SCIF are compared with respect to picture quality of reconstructed local format as well as SCIF and coding efficiency; intra-field line insertion, adaptive intra-field/inter-field line insertion, intra-field line shift. It is also pointed out that interlace SCIF format may not necessarily be advantageous in coding efficiency.

AVC-240 PICTURE FORMAT CONVERSION ACCORDING TO AVC-203 (JAPAN)

Frame rate and line number conversion are carried out to obtain progressive scan SCIF pictures according to the filter suggested in AVC-203/213 and another higher order filter. Based on the observation results, it is

concluded that distortion due to the current format conversion is larger than the coding noise envisaged for directly coding 525/60 or 625/50 CCIR-601 pictures at 5-10 Mbit/s. Particularly, frame rate conversion is found to suffer from large area flickers.

AVC-241 IMPACT OF SCIF CONVERSION ON PREDICTION STRUCTURE (JAPAN)

SCIF pictures converted form 525 line CCIR-601 test sequences using NTA filters (AVC-203) are coded with an RM8 based algorithm. It is shown that single frame prediction suffers significant reduction in coding efficiency compared to multiple frame prediction, pointing out that the definition of coding structure may have to take into account the practical conversion methods.

AVC-242 HARDWARE CONSIDERATION ON LINE SCANNING CONVERSION (JAPAN)

Comparison of several methods for converting interlace to progressive scan signals are tabulated with respect to camera cost, hardware of scanning converter, hardware size of video codec, coding efficiency and picture quality. It is concluded that the progressive scanning format improves picture quality for only those who have expensive cameras (or complicated scanning converters) and progressive monitors.

AVC-243 COMMENTS ON THE PICTURE FORMAT FOR ATM VIDEO CODING (JAPAN)

Based on the experimental and other surveys on the impacts of SCIF to picture quality degradation, loss of coding efficiency, increase of delay and hardware/software burden, it is concluded that progressive scan format as proposed in AVC-29 is not promising. It is pointed out that interlace formats my need further study, and that if the SCIF approach cannot give satisfactory solutions, dual format and other approaches should be checked against the above mentioned items.

AVC-244 OBJECTIVE EVALUATION SCHEME FOR PICTURE FORMAT CONVERSION (JAPAN)

To evaluate the possibility of SCIF, an objective method for comparing format conversion is proposed, which used synthetic test pictures so that exact representation in any format is carried out.

AVC-245 TM0 AND IMPROVEMENTS (NORWAY)

The following improvements to TM0 are tested and actions in Test Model are suggested;

- offset of quantizing decision levels (to be included in TM)
- use of decoded pictures for half pixel motion search (to be included in TM)
- averaging two fields/frames for prediction (testing to be continued)
- adaptive VLC
- 3-D VLC (room for further testing to be made)

AVC-246 SCIF FORMAT + REQUIRED TESTS (SWEDEN)

Based on the reality that progressive cameras and monitors are not widely available now, the purpose of a new coding format is questioned by listing the following three scenarios;

- interlaced input/output with intermediate format being always used,
- interlaced input/output with intermediate format being used only for interregional communications,
- progressive input/output with interlaced input as a temporary solution.

Necessary tests including conversion and coding are listed.

AVC-247 MONITORING VBR VIDEO TRAFFIC (BELLCORE)

After reviewing the current activities of SGXVIII on Usage Parameter Control and Traffic Descriptor, it is pointed out that the codec rate controller and the UPC may monitor the traffic differently, thus some congruency may be needed between the UPC parameters and the codec rate controller parameters.

AVC-248 COMMENTS ON THE TABLE FOR MULTIMEDIA MULTIPLEXING METHODS (BELLCORE)

It is raised that the following three service attributes be added to the list of requirements; Quality of Service (QOS), Operation and Management (OAM), Cost per VC.

AVC-249 CLOCK RECOVERY FOR VIDEO (BELLCORE)

SRTS defined by SGXVIII is examined against CBR and VBR video applications which requires recovery of video sampling clock. CBR can use the current specification as it is, but VBR needs some modification in the RTS channel; restricting the minimum information generation, increasing the counting period, or buffering to store RTS temporarily. Collaboration with SGXVIII on this matter is suggested.

AVC-250 MERITS OF SQUARE-PEL ASPECT RATIO (AT&T, BELLCORE, DIS, NCS)

Currently used pel aspect ratios are listed for such applications as personal computer and workstation, videoconferencing, digital TV broadcasting, HDTV, digital film production and super HDTV. Based on the the fact that computer and film industries require the square pel, and that HDTV follows similar trend, some of its merits are further elaborated. It is concluded that specific parameters close to CCIR-601, such as 704x528 or 768x576, require further study.

AVC-251* IMPROVED PREDICTION FOR LOW DELAY VIDEO CODING MODE (FRG - DAIMLER-BENZ)

IBBP, IPPP and IP'P'P' structures are compared on SM3 where P' is forward predicted pictures and a prediction mode using weighted interpolation from two preceding coded pictures is added to the preceding frame prediction. IP'P'P' is reported to perform significantly better than IPPP but not better than IBBP.

AVC-252* CODING RESULTS FOR SCIF PROGRESSIVE IMAGES (AT&T)

Progressive scan signals having 720 pels x 576 lines x 60Hz and obtained from two films were coded according to MPEG1 encoder. Simulation results are presented for coding efficiency comparing the IBP and IP'P structures, VBR traffic descriptor parameters for leaky bucket and sliding window, and impact of cell loss on the one-layer and two-layer transmission.

AVC-253 LIST OF REQUIREMENTS FOR VIDEO REQUIREMENTS LISTING (ADHOC GROUP FOR VIDEO REQUIREMENTS LISTING)

This is a report of the adhoc group correspondence work, providing a general requirements list for the MPEG Phase 2 video coding standard and a guide for the Video group work.

AVC-254* COMPATIBLE CODING STRUCTURE (PTT RESEARCH)

A proposal is made for inclusion of a compatible coding structure in the Test Model. The encoder system consists of two loops, an upper loop processing the high resolution image, and a lower loop processing the compatible image. The prediction error in the upper loop is predicted by the coded error signal in the compatible loop.

AVC-255* ABOUT THE CONSTRAINTS ON VARIABLE BIT RATE CODING (DBP-TELEKOM)

This is an update of AVC-218, including discussion on VBR coding for distribution purposes.

Temporary Documents

TD-1 Agenda (Chairman)
TD-2 Available documents (Chairman)
TD-3 Chronicle on the disclosure of patents relevant to px64 (Chairman)
TD-4 List of tape demonstrations (Chairman)
TD-5 Report of small group meeting on video format (Mr. Morrison)
TD-6 Report of small group meeting on network issues (Mr. Biggar)
TD-7 Proposal on low delay mode experiments (Mr. Bjoentegaard)
TD-8 Draft meeting report for the sole sessions (Chairman)

END

List of Tape Demonstrations
(18 March 1992, Stockholm)

No	Organization	Topics	Tape	Doc.
a.	Telia Research	- Display facilities	SCIF	AVC-225
b.	NTR	- SCIF conversion	SCIF	AVC-213
		- TMO and improvements	D-50	AVC-245
c.	KDD	- Picture quality of SCIF	SCIF	AVC-239
		- Converted synthetic pictures	D-60	AVC-244
d.	NTT	- SCIF conversion	SCIF	AVC-240
			D-60	
e.	NEC	- Format conversion	SCIF	AVC-240
f.	Toshiba	- Compatible (embedded) coding	D-60	AVC-234
g.	AT&T	- Coding results for SCIF	SCIF	AVC-252
			D-60	
h.	Fujitsu	- Cell-loss compensation scheme	D-60	AVC-235
		- Low delay mode	D-60	AVC-233
i.	Matsushita	- Jitter performance of an adaptive clock	D-60	AVC-230
		- FAMC for frame based coding	D-60	AVC-232
		- Cell-loss compensation scheme	D-60	AVC-235

Summary of discussion on the picture format issue

Small meeting on Video Format 19 March 1992

Present:

G Bjoentegaard
L Conte
B Haskell
F May
G Morrison (Chair)
S Okubo
D Schinkel
G Smith
Y Takishima
C Verreth

At the Santa Clara meeting in August 1991 the Experts Group had determined to make a decision on video formats at the earliest opportunity in 1992.

One proposal was the Super Common Intermediate Format (SCIF), being an upscaled version with twice the number of pixels in horizontal, vertical and temporal axes of CIF from Recommendation H.261. The SCIF concept would provide the guaranteed compatibility between all equipments including connections between 525 and 625 line regions in the same way as CIF in H.261. The other benefits of more commonality in equipments and ease of multipoint working would also apply.

Another proposal offered much more flexibility of the internal format used for coding. A modest number of classes would be defined, characterised by maximum numbers of pels in the three axes. Decoders belonging to a class would be able to decode any image smaller than the relevant maxima. (Spatial dimensions could be restricted to integer multiples of 16 to fit the macroblock configuration.) In this proposal the issue of possibly different capture and display formats (pels per line, lines per picture, pictures per second, pel or picture aspect ratio) would be handled entirely by the receiving terminal. Coding would take place in the originating scanning format thus avoiding any quality degradations from unnecessary standards conversion in connections where the display format was the same as the originating format. Conversion might or might not be employed in receiving terminals after decoding in connections where display and originating formats were not the same.

These two proposals can be regarded as the extreme ends of a range with many others in between. These would comprise a number of defined formats available for use in the coding kernel, probably comprising the natural formats of the major applications requiring the highest quality. Other source formats could be converted before coding to the nearest suitable one of the set of defined formats. Receivers would display the decoded version directly or after conversion to any other required format.

For the March 1992 meeting much work had been done on the proposed SCIF, including simulations of various conversions and coding performances. Facilities were available at the meeting for viewing all the relevant formats, some for the first time such as SCIF directly. After these informal assessments the Experts Group agreed that:

1. Line number conversion can be achieved with small or invisible quality loss.

2. Conversion from interlace to progressive format is not totally satisfactory from a quality viewpoint though several methods have been tried.

3. Picture rate conversions are almost always accompanied by visible defects.

Thus it was concluded that the use of SCIF in circumstances requiring conversions other than of line number cannot, at least with the methods tried, yield the picture quality expected of H.26X at bit rates in excess of about 5 Mbit/s.

One demonstration where the progressive format was used throughout the capture, coding and display processes was acknowledged to provide very pleasing pictures and showed the potential benefits of progressive over interlaced formats.

A contribution at the March 1992 meeting pointed out the approach adopted so far by ISO/MPEG would result in their video coding algorithm being able to cover all the formats discussed in the CCITT Experts Group. The Experts Group anticipates that H.26X will be the same or fundamentally the same as the MPEG one. Therefore, a decision by the Experts Group would not hasten the algorithm development and can be deferred.

The Experts Group agreed:

1. to defer a final decision on picture formats to be specified in H.26X.

2. to continue to use both 525/60 and 625/50 versions of CCIR-601, and where possible the related Extended Definition (EDTV) and High Definition (HDTV) formats, in the development of the H.26X coding algorithm.

3. to continue investigation of format conversion methods. In some circumstances these will be unavoidable and availability of satisfactory methods is highly desirable even if not subject to standardisation. Guidelines are listed at the end of this annex. (More advanced methods exist, such as motion compensated techniques, though they may be uneconomic for widespread use in terminals.)

4. to study application scenarios to identify issues which really need solutions and the performance targets which should be met, and try to have a common understanding by the London meeting (November 1992).

5. to be aware that square pixels are utilized in some potential applications. (Currently displays with square pixels are available, but the corresponding digital acquisition equipment is not.)

6. to be aware that formats other than those from the television industry may be applicable for some applications. An example is computer displays.

7. that the specification of complete systems giving interworking is required by CCITT. Though it is not yet clear whether the format issue will be dealt with entirely by the video coding Recommendation H.26X or entirely

by the terminal Recommendation H.32X or by both in combination, the expertise of the Experts Group is needed by SGXV.

8. to recognise the potential of progressive formats and endeavour to support them in H.26X/H.32X for eventual use sooner or later.

* * *

Requirement guidelines for format studies

1. Degradation from standards conversion must be consistent with intended use.

2. Any loss of coding efficiency caused by standards conversion must be acceptably small.

3. Delay introduced by standards conversion must be acceptably small for the intended use.

4. Equipment complexity overhead must be acceptable. More study is required to determine the true impact of formats with higher numbers of pels.

5. In circumstances when standards conversion is required there are the two approaches of going directly from one to the other or of going via a third (intermediate) format (such as SCIF). The two approaches should be compared.

END

Liaison statement to SGXVIII

CCITT SGXVIII
June 1992
Geneva
Questions XVIII/2, 13, 22

Source: CCITT SGXV Experts Group on Video Coding for ATM Networks
Title : Liaison to CCITT SGXVIII from SGXV Video Coding Experts Group

Abstract

This liaison represents a brief report of aspects of the Experts Group work at the Stockholm meeting that is considered relevant to SGXVIII. Comments on the issues raised and answers to specific questions are requested.

1. Introduction

The SGXV Experts Group on Video Coding for ATM Networks held its sole sessions of the 6th meeting in Stockholm 18-20 March 1992. The comprehensive liaisons from SGXVIII were welcomed and provided important input to our continuing work.

The following Sections provide an update of the work of the Experts Group that may be of interest to SGXVIII, as well as additional network related queries on which we request guidance.

2. Timing Requirements

The need for end-to-end timing recovery has been recognised by the Experts Group. Precise requirements are under consideration. The availability of a network reference clock will be essential to ensure timing recovery necessary for high quality video applications.

8 kHz structured data reference will be required for circuit emulation support of existing audiovisual systems based on Rec. H.221.

The SRTS timing recovery approach, adopted by SGXVIII at its Melbourne meeting, has been investigated. It appears to be appropriate for timing recovery for CBR video services. Some extension may be necessary for VBR, and this is currently a topic for study. Whether timing recovery is achieved using AAL functionality or as part of the video codec function is also under consideration.

3. Access Networks

The Experts Group recognises that access to the B-ISDN may, at least for a considerable interim period, be via other networks such as LANs and MANs. Video services must also be supported over these access networks. The implications of the differing network characteristics, in terms of resource allocation, timing requirements, protocol conversions, UPC control, etc., require study. Comments are requested from SGXVIII on this subject.

4. AAL

The Experts Group is studying requirements for support of video services by both AAL Type 1 and Type 2. While we believe that the details of AAL Type 2 are likely to differ from those of Type 1, we recognise the value of maintaining common types of function, and will identify this in future recommendations concerning AAL requirements.

Possible AAL functions identified by the Experts Group are:

- Multiplexing capabilities;
- Sequence number;
- Cell payload length indication;
- Requests for priority level;
- Alignment of packet data to cell boundary.

Work is ongoing to define precise requirements, and other functions may be added to this list. It is possible to avoid the use of a cell payload length indicator by using embedded end-of-data code words, and both options are under study.

Detailed requirements for sequence number cannot be determined without more knowledge of anticipated cell burst lengths. The differing cell loss tolerance of video data from that of other data types suggests that a 3-bit sequence number may not be sufficient.

It is also recognised that functions of AAL Type 1 for video signal transport require further consideration. Use of AAL Type 1 or 2 may depend on decisions regarding video coding in VBR or CBR for H.26X.

5. Multiplexing

The Experts Group is considering audiovisual and other multimedia services support on the B-ISDN, and therefore the possible multimedia multiplexing alternatives. VC-based multiplexing has been identified as a long-term target, but early service implementation may have to use other means of multiplexing, since

- interworking with audiovisual equipment on other networks (64 kbit/s ISDN) will require a user multiplex mode of operation;

- we understand that the network will not be able to support VC-based multimedia multiplexing at the early stages of standardisation.

For your information and comment, we have included Table 1, which summarises our current perceptions regarding multiplexing approaches.

We have also developed a reference terminal configuration (Figure 1) which shows where the alternative multiplexing operations are performed, and we hope this will be useful to identify the division of responsibilities. The Experts Group has some concern about the measurement of Traffic Descriptors by the user at the AAL-SAP and by the network at the T reference point, and of the effect on CDV from multiplexing and the NT2.

In supporting multiple media and different streams representing the one medium (e.g. different layers of a layered video signal representation), the Experts Group recognises the value of matching the channel QoS to the characteristics of the signal being carried.

Though there appears to be some ambiguity, our understanding is that all VCs in a given VP will have the same QoS, though two different CLRs will be available according to the selected value of the CLP bit. It would therefore seem that there is no advantage to support of the different bit streams in different VCs of the one VP. Furthermore, for efficient delivery of layered video signals in configurations that provide for interworking between terminals of different capabilities, the different signal streams may need to be routed over different parts of the network.

These considerations imply that optimum service support will require the establishment of multiple VPs, each carrying a subset of the total number of multiplexed signal streams. Is this scenario attractive, or even possible, from the network point of view? Are there plans to develop a signalling system to allow a single end-to-end call to be allocated multiple VPs? Or are there any other methods suitable for supporting audiovisual/multimedia multiplexing?

6. UPC/NPC Algorithm Standardisation

The Experts Group remains concerned about the issue of UPC/NPC algorithm standardisation. The network Parameter Control technique must be mirrored in the terminal to ensure that no violation of the network agreement (which could lead to discarded cells) occurs. It is therefore essential that, for anything other than peak rate monitoring, the UPC/NPC algorithm must be standardised; it cannot be left to individual operators to choose.

The Experts Group seeks comment on this issue from SGXVIII, and wishes to express its interest in receiving information on the details of UPC/NPC algorithm development as they emerge. These algorithms have a significant impact on video service provision and efficient utilisation of network resources from the service point of view. It would be impractical to consider that terminals could adapt to different Parameter Control algorithms depending on which network, or combination of networks, is used.

The Experts Group continues to study UPC mechanisms from the video services viewpoint. Current indications are that leaky bucket techniques have some advantages in terms of efficient implementation.

7. Conclusion

An update of some of the activities within the Experts Group that are relevant to the activities of SGXVIII has been provided in this liaison. Comments on any of this material are welcome, and answers to specific queries requested. The Experts Group continues to benefit from close liaison with SGXVIII, and in particular welcomed the presence of Mr. Yamazaki (SGXVIII SWP 8-3 chairman), who provided valuable tutorial information and other advice at the Stockholm meeting. Future reciprocal representations are seen as beneficial to both groups.

END

Table 1 : The comparison of three multi-media multiplex methods

REQUIREMENTS \ SCHEMES		Cell multiplex (VC multiplex : VCI approach) merit : Variety of services	SAR multiplex (SAR-PDU multiplex : Packet approach) merit : Easiness for VBR?	User multiplex (Bit multiplex : H.221 approach) merit : Compatibility with H.320
1.Efficient channel utilization	Over head	0	192/(packet size+192) + 4/384 - (UW) (dummy bits) (IT bits) (Unique Words) *1)	16/p*640
	Sharing with other media	Impossible	Possible	
2.Multiplexing delay		No delay due to multiplexing.		
3.Compatibility	with H.320	H.221 is necessary (switchable)		Easy (Embedded)
	with MPEG	MPEG bit stream should be transmitted as data. MPEG demultiplexer is necessary.		
4.Multi-media	Media identification	HLC or user information at call setup	Indicated by IT?	BAS
	Bit rate identification	Call signaling	User protocol?	BAS
	Cross media synchronization	Not guaranteed now	Guaranteed	
5.Media selectability in Multi-point conference		Easy but copy function for each medium in network or MCU is required. Otherwise mesh type connection is required.	Difficult but possible by MCU with some transmission efficiency loss.	
6.Real time transmission for the low bit rate (eg. 2400bps) data		Delay and transmission efficiency is a trade off. delay = 384bits/bit rate*efficiency		300/1200/4800 bits etc.
7.The influence of one cell loss		One medium Recover at the next packet?		Several media Recover at the next packet? (The probability of FAS,BAS errors due to cell losses is assumed significantly low.)
8.Easy to implement		Easy by using media-VCI's table	Easy by using media-IT table	Already implemented in H.221 using LSI chip
9.QOS(Quality of Service)		Any QOS for each medium	QOS must be that of the most demanding medium	
10.Transmission cost		Multiple VCs may be expensive because of OAM for each VC	-	

*1) If GOB is aligned with cell, UW is GOB start code. If such alignment is not used, first term and third term can be deleted.

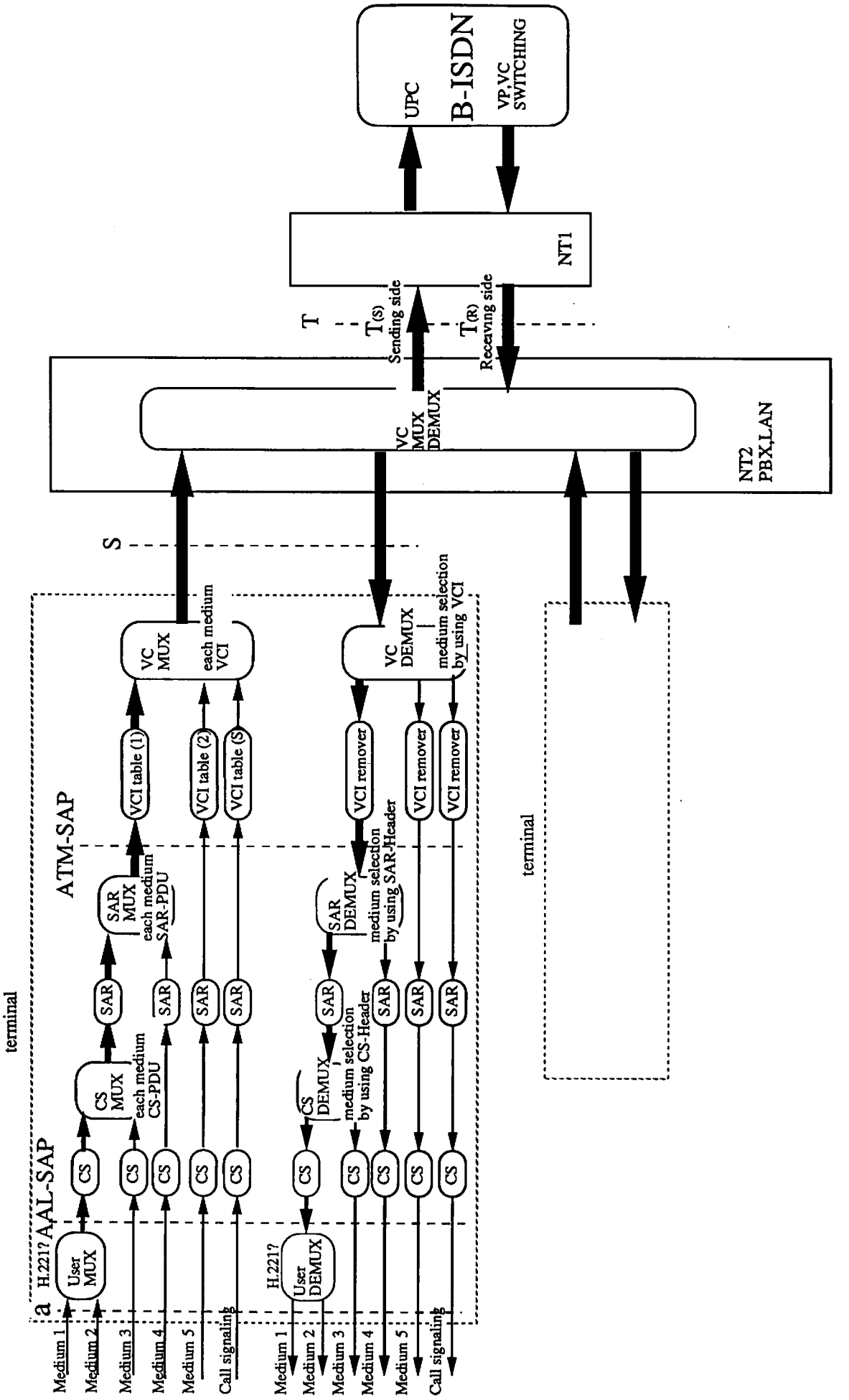

Fig. 1 Terminal configuration

Proposal on low delay mode experiments

For the CCITT SGXV "Experts Group for ATM Video Coding", it is indispensable that the algorithm resulting from the joint work with MPEG gives good results in the low delay mode. Hence, the following is proposed:

Proposal

It should be ensured that it is possible from a procedural point of view to carry out valid comparisons between the existing Test Model and proposed modifications using the low delay mode (i.e. M=1, N>>10). Comparison with M=3 should not be only possibility.

END