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

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Source: RAPPORTEUR (Sakae OKUBO)
Title: REPORT OF THE SIXTEENTH EXPERTS GROUP MEETING IN GRIMSTAD (13-22 July 1994) - Part III
Purpose: Report

Part I General (see AVC-673R)
Part II Sole sessions (see AVC-673R)
Part III Joint sessions

Part III Joint sessions in Grimstad

Contents

A. Introduction

The joint sessions with MPEG were held at Sorlandet Hotel and Conference Center during 18-22 July 1994 at the kind invitation of Norwegian Standards Association (NSF). At the opening session on 22 July, Mr. Knut Lindelien, Manager of NSF, made a welcoming address on behalf of the hosting organization.

The Experts Group appreciated the support and hospitality of the hosting organization.

A list of documents considered during the joint sessions is attached to this report as Annex 1. Though the DSM-CC group discussion was not a part of the declared joint sessions, its report is contained as Annex 2 because of its high relevance to the work of Experts Group.

B. REQUIREMENTS sub-group (by Sakae OKUBO)

B.1 Introduction

The Requirements sub-group met four days (Monday, Tuesday Wednesday and Thursday) under chairmanship of Mr. Sakae Okubo. The summary of the work was as follows:

Monday: Available input documents were reviewed briefly and discussion items were identified in a sole session. A joint session with DSM group was held to discuss the requirements description of DSM-CC extension.

Tuesday: In addition to two sole sessions, a joint session with Audio group and a joint session with Systems group were held to discuss the requirement descriptions for the NBC audio coding and Real Time Interface, respectively.

Wednesday: In addition to a sole session, a joint session with Video group was held to discuss the requirement description for 10-bit video.

Thursday All of the requirements descriptions and achievements during the week were reviewed in two sole sessions. Another joint session with Video was also held.

B.2 Documents

Input documents

MPEG94/183	NTR	Increase of frame rate from 30 to 60 Hz in Main Level (ML)
MPEG94/212	Nakasu et al.	Results of reviewing the tables of permissible layer combinations in high Profile
MPEG94/214	ITU-T Japan	Necessary provision for applying H.222.0 to the H.32X terminals
MPEG94/240	Australian NB	Closed captioning and MPEG environment
MPEG94/262	ITU-T EG	Support of ITU-T Control and Indication signals

Output documents

WG11 N0741	Requirements Group	Description of requirements for MPEG-2 extensions
WG11 N0762	Requirements Group	Bitstream restrictions for scalable profiles

B.3 Requirements description for MPEG-2 extensions

The following extensions of MPEG-2 standards were agreed at the previous meetings:

Part 6 Extension for DSM-CC
Part 7 Extension for Non Backward Compatible audio coding
Part 8 Extension for 10-bit video coding
Part 9 Extension for Real Time Interface for Systems decoders

Based on the joint discussion between Requirements sub-group and relevant sub-groups, requirements description was produced as a single document WG11 N0741. This has been approved by WG11 and is expected to receive comments from MPEG members as well as members of outside communities for further elaboration.

B.4 Pro-scan signal consideration for ML (MPEG94/183)

Document 183 proposed to extend the frame rate upper bound of the Main Level from 30 to 60 for pro-scan sources within the same upper bounds for luminance sample rate. The meeting did not identify clear applications and were concerned with the specification change at this stage. If many decoder implementers can accommodate this extension, however, the meeting was of the opinion that the proposal is useful for making the standard more versatile.

B.5 Closed caption and other frame synchronous signals (MPEG94/240, 214, 262)

Documents 240 addressed closed captioning in broadcasting and Documents 214 and 262 addressed control and indication signals in videoconferencing applications. Both of these signals are synchronous with the corresponding video frames. The meeting recognized the need to provide for a mechanism in a harmonized way for various applications. The mechanism is recognized to be already available in the Systems specifications.

B.6 High Profile parameters (MPEG94/212)

Document 212 presented a material to clarify the allowed combinations of Profile and Levels in a high Profile bitstream. Considering that we requested members to thoroughly review relevant information in Annex E.2 of Video DIS, the meeting decided to produce a supplementary document to clarify the issue. Mr. Birch undertook this task; the outcome was submitted as WG11 N0762.

B.7 Recommendations of the sub-group

REQUIREMENTS sub-group recommend that:

1) WG11 approve the requirements description for the MPEG-2 extensions regarding DSM-CC, NBC audio coding, 10-bit video and Real Time Interface for the Systems decoder as contained in WG11 N0741, and use it as a means to communicate within MPEG as well as with communities outside of MPEG for its further clarification.

2.) WG11 draw attention of the members to the request made at the Paris meeting to review the details of permitted combinations of Profiles and Levels in different layers of High Profile and to the material contained in WG11 N0762 which clarifies the issue.

C. VIDEO sub-group (by Gisle Bjoentegaard)

C.1 Conformance testing

Most of the time was spent on conformance testing. The work is based on creating and decoding demanding bitstreams (evil bitstreams). 14 such bitstreams have been produced so far. At this meeting several new bitstreams have been proposed to check more coding elements.

C.2 VBV operation for VBR

There is some concern on the maximum bitrate to the decoder in VBR operation. In VBR mode the maximum of 15 Mbit/s may increase by 20 % to 18 Mbit/s. A joint meeting with Systems addressed the issue. No solution was found at this meeting. An activity was set up to solve the problem before the November meeting.

C.3 Discussions on changes to the DIS

At this meeting no changes to the DIS could be made. On the other hand, there are some items that delegates feel should be changed in the transition from DIS to IS. If such changes shall take place, it must be on request from National Bodies. This meeting addressed some issues to be prepared for response to national bodies at the next meeting.

C.3.1 Decoder memory size

With 50 Hz sequences, the 3:2 pulldown causes problems concerning memory size. Normally 16 Mbit decoder memory would be sufficient. However if 3:2 pulldown is used an additional field memory is needed. 3:2 pulldown should not be needed for 50 Hz but it has turned out that the technique may be used for purposes like 24:25 conversion and editing. One solution seems to be to disallow repetition of the first field of a B-frame. The group was positive to this change.

C.3.2 Concatenated sequences

There was some documents and discussion on this item in video as well as in the joint meeting with Systems. The result seems to be that seamless sequence change will be difficult to obtain because users would probably not restrict themselves to edit points anyway.

C.3.3 Increase of frame rate for progressive sequences.

The ITU-T Document AVC-646 (MPEG94/183) - where it is proposed to increase the frame rate for progressive sequences from 30 to 60 frames/sec - was presented. There was no negative reaction to the proposal. Several positive views were expressed.

D. SYSTEMS sub-group (by Stuart DUNSTAN)

D.1 Contributions

The Systems subgroup issues discussed in Grimstad, and the relevant documents, are shown in Table 1.

issue	document number
RTI	247, WG11 N0741, WG11 N0785
conformance	246, 258, 281, WG11 N0742
stream_id	262
closed captions	240, 267, WG11 N0771
registration & copyright descriptor	298, 299, WG11 N0776
PTS/DTS and AU definition	293, 302
H.32X mode change	214
editorial comments	230
timing recovery	253
multiple VCs	254
splicing	266
T-STD	271, 272
TS application	284, 285, 303

Table 1. Systems issues and relevant document numbers from the Grimstad meeting.

Many of the issues raised relate to DIS issues, and hence will not be resolved until the Singapore meeting. A number of the above documents represent output from the meeting. A DAT tape of Transport Streams for verification testing was made available at the meeting (MPEG 94/303).

D.2 Real Time Interface

The Real Time Interface (RTI) applies only to the Transport Stream, and allows a relaxation of the tight mathematical timing imposed by the T-STD. It is a coding interface and does not specify lower layer protocols. The RTI is required to support many types of existing networks. It should allow easy construction of network adaptors, and should itself be simple to implement. The work is documented in the RTI Working Draft WG11/N0785, and the requirements document WG11/N0741. There are two paths for inclusion of the work in ISO/IEC 13818. One is as ISO/IEC 13818-9, while the other is as a nominative annex in ISO/IEC 13818-1. The latter requires a request from a National Body to do so.

D.3 Conformance

The Systems part of the conformance working draft WG11 N0742 was composed. For bitstream conformance a number of tests were written. Decoder conformance was considered in terms of timing, Program Specific Information, and action of the decoder to the bitstream syntax. It is anticipated that not all coders will implement all Systems functionality. A list of basic decoder functions, and optional functions, for each of the Program Stream and Transport Stream was composed. Further work is required to refine the working draft.

D.4 ITU-T C&I channel

The request from ITU-T SG15 EG for a stream_id value, for purposes of a Control and Indication channel in the Rec. H.32X terminal, was heard. In Atlanta an ITU-T stream_type was allocated. A matching stream_id is required. There appeared to be no objection to this request.

For the issue of mode change in the H.32X terminal, the use of PSM/PSI version number and stream_id was recommended.

D.5 Closed captions

There is currently no consensus upon how closed captions should be carried. While Systems provides the more flexible solution, the cost of this in the Transport Stream may be high, since a Transport Stream packet may be required to carry just a few bytes. The video user data solution is more efficient, but is less flexible. MPEG will not standardise this issue. A liaison document was sent to ITU-R SG 9, informing them of activities within the Grand Alliance and DVB, and requesting that there be some co-ordination between these three bodies.

D.6 Registration and Copyright descriptors

Descriptions of the intended procedures for the registration and copyright descriptor were composed. These are contained in MPEG 94/299 and WG11/N0776, respectively.

D.7 Joint meeting with Video

A joint meeting with the Video subgroup was held to discuss the following issues

D.7.1 Video VBV and the Systems T-STD

There is concern about the interaction of these two timing models, especially in the case of VBR. The Systems T-STD places a hard limit on the maximum bit rate into the decoder, which is related to the profile and level. The problem is that Video has no way to describe, or limit, VBR video. Currently, Video allows Systems to handle all timing in the case of VBR. The Video DIS says that when present, the Systems STD supersedes the Video part. This may or may not be also true for CBR. Input from National Bodies on how to deal with VBR is sought. An ad-hoc group to consider this issue was established.

D.7.2 seamless operation

In Video a change of bit rate, picture resolution, or frame rate requires a new sequence to begin. The problem is how to maintain buffer management, and a glitch free display, during a sequence change. Currently Video says nothing about what happens between a Sequence End Code and a Sequence Header. An informative annex may be added, if requested by National Bodies.

D.7.3 trick modes

There is some question as to how trick modes should be tested in the compliance specification, since trick modes imply the use of a display. The display, however, is outside of the Systems and Video standards.

D.8 Joint meeting with DSM-CC

The DSM-CC subgroup reported to the Systems subgroup upon their activities. DSM-CC requested that reference to elementary streams be allowed within DSM-CC. The Systems subgroup approved this. The DSM-CC subgroup are considering ITU-T C&I channel requirements. DSM-CC are considering using Remote Procedure Call (RPC) and ITU-T Rec. X.500 protocols. The following documents were relevant to the DSM-CC subgroup: MPEG 94/191, 213, 216, 217, 234, 262, 273, 274, 276, 288. A DSM-CC working draft is required at the Singapore meeting. In Grimstad, a preliminary DSM-CC working draft was produced (WG11/N0744).

D.9 PTS/DTS and Access Unit definition

A change to the DIS in Atlanta brought about inconsistencies in the DIS with respect to PTS/DTSs and what they refer to in the video structure: do they refer to sequence, GOP, or picture start codes? MPEG-1 appears to be also inconsistent. The issue is not yet resolved.

D.10 Ad-hoc groups

The following ad hoc groups were formed:

- ad-hoc group on Conformance Testing - chairman, Jan van de Meer (one meeting planned)
- ad-hoc group on real-time interface - chairman, Joel Zdepski
- ad-hoc group on relation between VBV and STD models - chairman, John Morris

END

List of Documents for the Joint Sessions in Grimstad (18-22 July 1994)

MPEG 94/	Source	Title
167	ITU-R	Liaison statement
168	ITU-T	Liaison statement
169	ITU-R	Rapporteur's group on interactive television broadcasting system
170	ITU-R	Liaison statement on digital television vocabulary
171	ITU-T	Liaison statement
172	IEC TC 60	New work item proposal
173	SC29 Secretariat	Notice of withdrawal: proposal of establishment of JTC1/SC29 ad-hoc group on Intellectual Property Rights
174	Various sources	Statement of intention to submit NBC audio proposal
175	US NB	Position paper
176	CH NB	Position paper
177	B NB	Position paper
178	Nicoulin	The LTS/EPFL video sequence for very low bitrate coding
179	SC29 Secretariat	Summary of voting on draft corrigendum 1 to 11172-1
180	SC29 Secretariat	Summary of voting on draft corrigendum 1 to 11172-2
181	SC29 Secretariat	Summary of voting on draft corrigendum 1 to 11172-3
182	Zhang et al.	High-compression video coding using generic vector mapping for MPEG-4
183	Bjontegaard	Increase of frame rate from 30 to 60 Hz in main level (ML)
184	F.Pereira et al	Applications for MPEG4
185	F.Pereira et al	Classification of MPEG4 applications as supported by basic or extendedrequirements
186	F.Pereira	Some improvements on MPEG4 requirements
187	T. Alpert et al.	Proposal for new MPEG-4 scheduling
188	T. Alpert	Clustering of the applications based on the kind of quality required
189	T. Alpert et al.	Specification of test audio-visual sequences
190	T. Alpert et al.	Subjective test methods for video quality assessment at very low bitrate
191	Lookabaugh	Report of ad-hoc group on DSM-CC extension
192	Hidaka	Report of ad-hoc group on MPEG-2 verification test
193	Moriya	Report of ad-hoc group on Subjective testing of coders at low sampling frequencies
194	Laczko	Report of ad-hoc group on MPEG-2 Audio Conformance Testing
195	Brandenburg	Report of ad-hoc group on Requirements for low bitrate audio coding
196	Wells et al.	Bitstreams for conformance testing of MP, SNR and Sparial profiles
197	Mau	Report of ad-hoc group on Establishment of standard conditions for MPEG-4 simulations and demonstrations
198	Homer	Report of ad-hoc group on Study of Combined Audio/Visual Environments
199	Shen	Report of ad-hoc group on Study of syntax
200	Baroncini	Report of ad-hoc group on MPEG-4 Test Procedures
201	Savatier	Report of ad-hoc group on Video bitstream exchange
202	Fogg	Report of ad-hoc group on Video conformance testing
203	Fogg	Report of ad-hoc group on MPEG-2 Technical Report
204	Fernando	Report of ad-hoc group on Collection of channel characteristics
205	O' Connell	Report of ad-hoc group on Editing of MPEG-4 requirements document
206	Schirling	Report of ad-hoc group on edit the Systems DIS

MPEG 94/	Source	Title
207	MacInnis	Report of ad-hoc group on real-time interface to MPEG-2 decoders
208	IEC/ISO/ITU	Multimedia - A challenge for international standardisation
209	Zhang	A proposal for very low bit rate video coding using vector subband coding
210	Delahoy	SNR Scalable profile subjective viewing testing conducted in Australia
211	Nakasu	Results of SNR@ML subjective assessment tests at NHK
212	Nakasu et al.	Results of reviewing the tables of permissible layer combinations in High Profile
213	Minakata et al.	Proposal for multimedia scripting language for DSM extension
214	ITU-T/J	Necessary provision for applying H.222.0 to the H.32X terminals
215	SISIR	Invitation to the 29th MPEG Meeting
216	Rodi, Prampolini, De Nardis	Use of X.500 and RPC standards for DSM CC
217	Rodi	Overview of X.500
218	Dehery et al.	Verification of multichannel audio and extension to lower sampling frequencies corresponding to DIS 13818-3, layer II
219	Dehery et al.	Public C-code of Multichannel Audio DIS 13818-3, Layer II
220	CT Chen	Closed caption in ITU-T H.262/ISO 13818-2 *(withdrawn)*
221	Mau	Establishment of standard conditions for MPEG4 seminar simulations and demonstrations
222	Hidaka	Comparison of each organization's results for SNRP@ML Verification Test
223	Ozawa	Results of SNRP@ML Verification Test in YTSC
224	Hidaka	Participation members in MPEG-2 Verification Tests
225	Japan	Communication Procedure for H.222.1
226	A. Bock	Proposal to raise the maximum number of bits per macroblock for intra-coded macroblocks to an expansion factor of two
227	S. Okubo	Patent Statements and information for draft ITU-T Rec. H.262/ISO/IEC 13818-2
228	S. Okubo	ITU-T approval of common text recommendations international standards
229	SC29 Secretariat	Proposed Modifications to JTC 1/SC29 Programme of Work, Nominations of Project Editors and Updated Target Dates
230	Japan	Editorial comments for Draft Rec. H.222.0/ISO/IEC 13818-1
231	Dehery et al.	Public MPEG-1 Audio, Layer II syntax analyser and decoder software
232	Wells et al.	Level of conformance as a tool for conformance testing
233	Savatier	Tape containing video bitstreams for conformance testing
234	Hooper et al.	DSM-CC extensions using remote procedure call
235	Fernando	Workstation based applications for MPEG-4
236	Kogure	Very low bitrate coding demonstration by hybrid wavelet/DCT scheme
237	Convenor	List of companies having provided patent statements for MPEG-2
238	Yamada et al.	A consideration of MPEG-2 IDCT specification for better implementation
239	Meares	MPEG-2 backwards compatible codecs: proving the route to quality
240	AUS NB	Closed captioning in the MPEG environment
241	Chen et al.	Audio-visual test sequences
242	Grinnell	Test video sequences for MPEG-4 algorithm testing
243	Urano	Results of MPEG-2 MP@ML verification test at NTV (addendum)

MPEG 94/	Source	Title
244	Urano	Results of MPEG-2 SNRP@ML verification test at NTV
245	Auyeung	An MPEG-4 object oriented syntax proposal
246	van der Meer	MPEG-2 bitstream verification
247	Rosengren	Real-time MPEG-2 trasnport stream interface (RIF) compliance
248	F NB	Position paper
249	Nasse	Video quality verification tests for SNR@ML
250	Nasse	Revision of doc. N0673 "results of MP@ML video quality verification tests"
251	Nasse	Compilation of the test sequences of MPEG-2 verification tests for MPE@ML and SNR@ML
252	Nasse	Video quality verification tests beyond MP@ML
253	AT&T	Fast timing recovery in the presence of cell delay jitter
254	KPN-PTT	Multiplex at ATM layer with H.222
255	O'Connell	MPEG-4 Requirements Document - Revised First Draft
256	Fogg	MPEG-2 Video bitstream verifier and proposed formula
257	Fogg	WG11 FTP site
258	Gaspar	Use of nearly-compliant bitstreams for MPEG Systems development
259	O'Connell	RF Channel test conditions and test procedures
260	Fautier et al.	Need to focus on implementation issues in conformance testing definition
261	De Lameillieure	3:2 pulldown in 50Hz systems using 16 Mbits of memory at MPML
262	ITU-T	Support for ITU-T Control and Indication Signals
263	Baroncini	MPEG-4 Test procedures document
264	Pearlstein	Encoding and decoding of concatenated video sequences
265	Puri et al.	Video games, multimedia databases and stereo video application requirements for MPEG-4
266	Egawa	A method to ensure proper buffer behavior at any selected splice point
267	Akiwumi-Assani et al.	Grand Alliance Private Stream Identifier
268	ISO/IEC	IS 9281-1 Information technology - Picture coding method Part 1 - Identification
269	ISO/IEC	IS 9281-2 Information technology - Picture coding method Part 2 - Procedure for registration
270	Horne et al.	MPEG-4 applications
271	Ostermann	Bug fix in the TB leaky bucket model
272	Ostermann	Necessary constraints on multiplex buffering
273	Porter	Stream Service Interface
274	Porter	Media Net Concepts and Interface
275	Bompard et al.	First demonstration of some VADIS developments
276	Chakrabarti	DSM-CC Extension Protocol and Multimedia

WG11N	Title
731	Liaison statement to IEC SC 60 B
732	Description of MPEG-2 Video extension on 10 bit input
733	Resolutions of 28th meeting
734	Report of 28th meeting
735	List of companies having made statements for ISO/IEC DIS 13818
736	MPEG-1 Workplan
737	MPEG-2 Video SNRP@ML verification test results
738	MPEG-2 Video verification test workplan
739	MPEG-2 Audio verification test workplan
740	Ad-hoc group on DSM-CC WD development
741	MPEG-2 extension requirements
742	1st WD of MPEG-2 part 4 (CT)
743	1st WD of MPEG-2 part 5 (TR)
744	1st WD of MPEG-2 part 6 (DSM-CC)
745	Statement about DSM-CC and C&I
746	NBC Audio Proposal package description
747	10-bit Video Call for proposals
748	10-bit Video Proposal package description
749	MPEG-2 Workplan
750	Draft of MPEG-4 Proposal package description
751	Ad-hoc group on MPEG-2 Audio Conformance testing
752	Ad-hoc group on MPEG-4 test procedures
753	Ad-hoc group on MPEG-4 proposal package description
754	Registration of MPEG-1 in 9281
755	Overall MPEG workplan
756	Disposition of Comments of Draft Corrigendum to ISO/IEC 11172-1
757	Disposition of Comments of Draft Corrigendum to ISO/IEC 11172-2
758	Disposition of Comments of Draft Corrigendum to ISO/IEC 11172-3
759	Revised text of Draft Corrigendum to ISO/IEC 11172-1
760	Revised text of Draft Corrigendum to ISO/IEC 11172-2
761	Revised text of Draft Corrigendum to ISO/IEC 11172-3
762	Bitstream restrictions for scalable profiles
763	Additional results on MP@ML verification test results
764	Editors of MPEG standards
765	Response to the National Bodies of AUS, B, CH, F, K, USA
766	Liaison statement to ITU-R WP 11F
767	Liaison statement to ITU-T SG 15 WP 1
768	Liaison statement to ITU-T SG 15 WP 2
769	Liaison statement to ITU-T SG 9
770	Liaison statement to IEC JET/1
771	Liaison statement to ITU-R WP 11D
772	Liaison statement to JTC1/SC18
773	29th meeting notice
774	Updated guide to MPEG meeting hosts
775	Guidelines for Registration Authority on Reg. Descriptor
776	Guidelines for Registration Authority on Copyright
777	Ad-hoc group on Systems Conformance
778	Ad-hoc group on Real-time interface
779	MPEG-2 Audio verification test procedure
780	MPEG-2 Audio verification test
781	Subjective testing of coders at low sampling frequencies
782	Refined requirements for MPEG-2 Audio NBC coding mode extension
783	Draft requirements list for low bitrate audio coding
784	Recommendations on merging of MPEG-Audio work items

WG11N	Title
785	1st WD of MPEG-2 part 9 (RTI)
786	Ad-hoc group on brief MPEG-2 BC coder subjective listening tests
787	Ad-hoc group on subjective testing of low sampling frequency coders
788	Ad-hoc group on requirements for low bit-rate audio coding
789	Ad-hoc group on subjective testing of NBC codecs
790	Ad-hoc group on MPEG-2 technical report
791	Five-year meeting schedule
792	Ad-hoc group on MPEG-2 video verification tests
793	Ad-hoc group on bitstream exchange
794	Ad-hoc group on conformance testing of video
795	Ad-hoc group on systems-related video issues
796	Call for multichannel audio test sequences
797	Ad-hoc group on MPEG-4 requirements

END

Source: Chia-Chang Li, AT&T Bell Laboratories
Title: Norway Meeting of MPEG-2 DSM-CC Extension
Purpose: Report

1. Introduction

The 28th meeting of MPEG-2 was held in Grimstad, Norway on July 18-22, 1994. One of the most important activities is the Digital Storage Medium Control Command Extension (DSM-CC Extension), which will become Part 6 of MPEG-2, i.e., ISO/IEC 13818-6, in the form of Working Draft (WD) by 11/94, Committee Draft (CD) by 7/95, Draft International Standard (DIS) by 11/95, and finally International Standard (IS) by 7/96. The scope of the this new MPEG-2 work item is to extend beyond the existing DSM-CC specification, which is now a normative annex of MPEG-2 Systems (ISO/IEC 13818-1) and provides only "VCR-like" controls in a single-user-single-server environment, to cover more diverse and heterogeneous network environments for many more applications.

2. General Information of the Meeting

2.1 Participants

The following is an incomplete list of the attendees of the meeting. Some people did not sign in on the attendance sheet.

Tom Lookabaugh(Chairman)	DiviCom
Matthew Goldman	DEC
Thomas Werner	R.I.C
Dieter Scherer	Hewlett-Packard
Kwangkee Lee	Samsung
Mark Porter	Oracle
Phil Roberts	AT&T
Vince Guaglianone	Mitsubishi
S. J. Huang	Matsushita
Chia-Chang Li (Editor)	AT&T
Guy Cherry	Tektronix
Michel Fortier	BNR
Frederic Bompard	MATRA
Leonardo Chiariglione(Convenor)	CSELT
Franco Prampolini	IBM (Italy)
Jeff Hamilton	General Instrument
Bill Helms	Scientific Atlanta
Chris Adams	Hewlett-Packard
Tony Wasilewski	Scientific Atlanta
Andria Wang	Bellcore
Bahman Amin-Saleh	Bell Atlantic

2.2 Submissions

The following list contains all the contributions discussed in the meeting. The first two contributions were submitted in the Paris meeting in March/94 and re-introduced in this meeting.

MPEG 94/083 (Paris)	Protocols for DSM-CC Connection-Oriented Service (Wasilewski, SA)
MPEG 94/087 (Paris)	Philosophy for Command and Control Protocols (Leach, Microsoft)
MPEG 94/213 (Norway)	Proposal for Multi-media Scripting Language (Minakata, Matsushita)
MPEG 94/214 (Norway)	Necessary Provision for Applying H.222.0 to the H.32X Terminals (Japan)
MPEG 94/216 (Norway)	Use of X.500 in RPC Standards for DSM-CC (Rodi, IBM)
MPEG 94/217 (Norway)	Overview of X.500 (Rodi, IBM)
MPEG 94/225 (Norway)	Communication Procedure for H.222.1 (Japan)
MPEG 94/234 (Norway)	DSM-CC Extension Using Remote Procedure Calls (Goldman, DEC)
MPEG 94/262 (Norway)	Support for ITU-T Control and Indication Signals (ITU-T EG ATM/Video)
MPEG 94/273 (Norway)	Stream Service I/F (Porter, Oracle)
MPEG 94/274 (Norway)	MediaNet RPC Proposal (Porter, Oracle)
MPEG 94/276 (Norway)	DSM-CC Extension Protocol and Multimedia (Chakrabarti, AT&T)
SC29/N825	Liaison Statement from ITU-T SG15 to JTC 1/SC 29 on Comments on the DSM-CC Work in MPEG (ITU-T SG15)
MPEG 94/288 (Norway)	Set-top Boot Protocol (Porter, Oracle)

3. Summary of Major Outcomes

3.1 Revision of Requirements

The requirements document was revised slightly. The major change is to include synchronization as one of the functionalities supported by DSM-CC Extension.

3.2 Preliminary Working Draft (PWD)

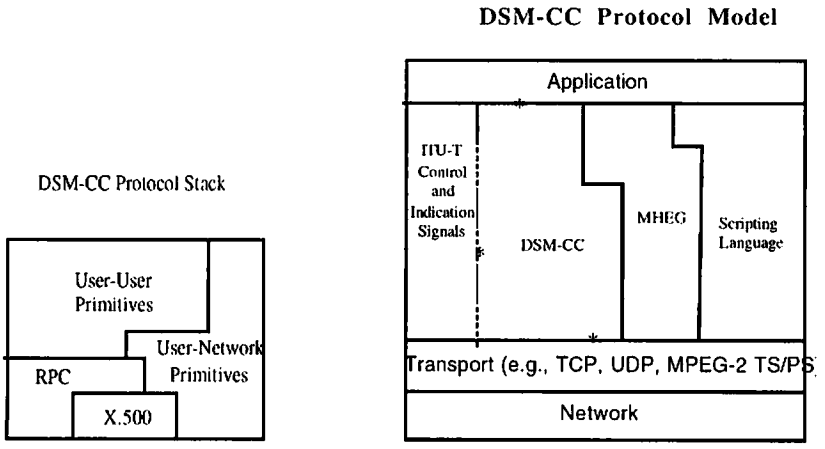
A baseline document was produced at the end of the meeting and was called the Preliminary Working Draft. A caveat was included at the beginning to indicate the preliminary nature of the document. The following sections summarize the major elements of the document.

3.2.1 *Protocol Model*

Figure 1 shows the relationship between DSM-CC and other protocols.

DSM-CC provides access for general applications, MHEG applications, and scripting languages to primitives for establishing or deleting a network connection (User-Network Primitive) and communication between a client and a server across a network (User-User Primitive). U-U and U-N primitives may use a Remote Procedure Call (RPC) protocol. Naming, addressing, authorization, and authentication are provided by an X.500 distributed directory service to both RPC and User-Network primitives.

Figure 1: DSM-CC Protocol Model



DSM-CC may be carried as a stream within an MPEG 1 System Stream, an MPEG 2 Transport Stream, or an MPEG 2 Program Stream. Alternatively, DSM-CC may be carried over other transports, such as TCP or UDP.

The dotted line between DSM-CC and ITU-T Control and Indication Signaling indicates their relationship is for further study. The ITU-T Control and Indication Signals may be carried in a completely different mechanism, and hence outside the scope of DSM-CC, or, alternatively an integrated mechanism may be defined for the controls for all the audiovisual communication connections.

3.2.2 *DSM-CC Primitives*

As shown in Figure 1, there are two categories of primitives: User-to-Network, and User-to-User.

3.2.2.1 *DSM-CC User-to-Network Primitives*

DSM-CC User-to-Network Primitives describes network control operations. The syntax for the primitives is written in the style of function calls for an application programmer interface. These control operations assume a very high level end-to-end architecture in order to provide a very generic interface.

There were significant differences of opinion about the implementation of the function calls. Three possibilities have been mentioned: (1) translated into an existing message-based network control protocol (e.g., Q.2931 for ATM), (2) translated into other message-based protocol and (3) implemented as RPCs. A combination of them is also possible. The subgroup agreed on the disagreement and decided to present both the message-based and RPC-based approaches in the PWD.

3.2.2.2 *DSM-CC User-to-User Primitives*

Four groups of functions were proposed for this category of primitives. They are Playback, Record and Edit Assembly, File System Access, and Database Access. All the groups contain a set of functions with their syntax and semantics described except the group of Record and Edit Assembly, which serves currently as a place holder to invite contributions. The purpose of Playback group is self-evidenced in its name. The initial application of the File System Access and Database Access groups is for service logic download and navigation. However, their definitions are generic enough to support other applications.

3.2.3 *Service/Network Boot Procedures*

The subgroup, after significant amount of discussion, recognized the benefits to standardize such procedures but also understood the difficulties, especially for the network boot procedure. It was decided that the service boot procedure should be covered in the File System Access part of the User-to-User Primitives and a section was created as a place holder to invite contributions for the network boot procedure.

3.2.4 *Directory Service*

X.500 was proposed and accepted without much debate as the basis for naming, addressing, authentication and authorization.

3.2.5 *Mapping to Transport*

DSM-CC is intended for use over multiple transport protocols. On links which are carrying MPEG streams, DSM-CC may be embedded in the system streams or may be carried on a separate transport mechanism. When mapping DSM-CC protocol into MPEG System streams, the PES packet structure shall be used with certain packet header fields restricted to certain values. The associated PES packets shall have a stream_id value of 5 as specified in Table 2-18 of ITU-T Rec. H.222.0 | ISO/IEC 13818-1 and the elementary stream formed by these packets must have a stream type value of 0x08 as defined in Table 2-35 of ITU-T Rec. H.222.0 | ISO/IEC 13818-1. The mapping to other types of transport is for further study.

3.3 **Liaison Statement**

A liaison statement to ITU-T SG15 was drafted by the subgroup and approved by MPEG to recognize the existing work in ITU-T for end-to-end control and indication signaling, indicate MPEG's view of its relationship with DSM-CC, and express the desire to collaborate.

END