INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE NORMALISATION
ISO/IEC JTC 1/SC 29/WG 11
CODING OF MOVING PICTURES AND AUDIO

ISO/IEC JTC 1/SC 29/WG 11 N1615

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Source: **Leonardo Chiariglione - Convenor**
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Status: **Draft**

1. Opening

The 39th WG11 meeting was held on 97/04/07-11 in Bristol, UK at the kind invitation of BSI, the UK National Body.

2. Roll call of participants

Annex 1 gives the attendance list

3. Approval of agenda

Annex 2 gives the approved agenda

4. Allocation of contributions

Annex 3 gives the list of submitted documents

5. Communications from Convenor

There were no specific items to communicate

6. Report of previous meeting

The reports of the Maceió and Sevilla meetings were approved.

7. Processing of NB Position Papers

These were considered and appropriate responses drafted and approved.

8. MPEG Phase 2

8.1 Part 1 (Systems)

There was no specific activity

8.2 Part 7 (AAC)

Part 7 of MPEG-2 was finally approved as an IS.

8.3 Part 10 (DSM-CC Conformance)

A first WD was produced and approved.

8.4 Verification of MPEG-2

There was no specific activity

8.5 Amendments

8.5.1 Private Data (System #3)

The document was progressed to DAM stage

8.5.2 Semantic & table definition for 4:2:2 and MV profiles

The document was progressed to AMD stage

8.5.3 Systems-related table entries for AAC

The document was progressed to PDAM stage

8.5.4 AAC Conformance and Technical Report

The documents were progressed to PDAM stage

8.6 Workplan

This was approved

9. MPEG Phase 4

9.1 Requirements

A new version of the Requirements documents was produced.

9.2 Architecture

No specific activity took place

9.3 Tools

9.3.1 DMIF

Several tools were considered for inclusion in the WD

9.3.2 Systems

Several tools were considered for inclusion in the WD

9.3.3 Natural Video

Several tools were considered for inclusion in the WD

9.3.4 Synthetic Video

Several tools were considered for inclusion in the WD

9.3.5 Natural Audio

Several tools were considered for inclusion in the WD

9.3.6 Synthetic Audio

Several tools were considered for inclusion in the WD

9.4 Verification Models

9.4.1 DMIF

DMIF does not use the Verification Model approach for development

9.4.2 System

A new version of the VM was produced

9.4.3 Video

A new version of the VM was produced

9.4.4 Audio

A new version of the VM was produced

9.4.5 SNHC

A new version of the VM was produced

9.5 Call for Proposals

A Call for proposals for IPR management support in MPEG-4 was approved.

9.6 Tests

A thorough review of the July '97 tests was carried out.

9.7 Simulation software

Considerable effort was dedicated to the "MPEG-4 player" project.

9.8 Working Draft

9.8.1 DMIF

The first version of the WD was produced

9.8.2 System

A new version of the WD was produced

9.8.3 Visual

A new version of the WD was produced

9.8.4 Audio

A new version of the WD was produced

9.9 Workplan

This was approved

10. MPEG Phase 7

A new version of the MPEG-7 Context and Objectives document and the first version of the MPEG-7 requirements documents were produced.

10.1 MPEG-7 Seminar

A very successful MPEG-7 seminar was held.

11. Overall WG11 workplan

This was approved

12. Liaison matters

Input documents were reviewed and liaison documents produced where appropriate.

13. Administrative matters

13.1 Schedule of future MPEG meetings

This was approved

13.2 Promotion of MPEG

Several updates to the MPEG home page and a press release were produced. In addition a first, not yet public. MPEG-4 Overview was produced. This contained a first attempt at identification of the technical content of MPEG-4 in 1998 and of later versions.

14. Organisation of this meeting

14.1 Tasks for subgroups

Tasks for Requirements

- MPEG-4 overview
- MPEG-4 Requirements document
- Profiles into WDs
- MPEG-7 Context and objectives
- MPEG-7 Acceptance criteria form (SC29)
- MPEG-7 Requirements doc
- Final form of MPEG-4 Overview

Tasks for DSM

- DSM-CC Conformance Testing WD
- Decision on DMIF Reference Software
- DMIF PWD
- MPEG-4 on DSM, e.g. DVD
- Contribution to MPEG-4 Overview

Tasks for Systems

- Private Data Identification Doc and DAM
- Systems VM 4.0
- Systems WD 4.0
- Inventory of Reference Software
- Contribution to MPEG-4 Overview

Tasks for Video

- ITU-T extension DoC and AMD
- Video VM 7.0
- Visual WD 3.0 (joint with SNHC)
- Consideration of new video proposals
- Contribution to MPEG-4 Overview

- Video FAQ
- Guess at beyond 98/11

Tasks for Audio
- MPEG-2 AAC DoC and IS
- MPEG-2 Conformance Testing PDAM
- MPEG-2 Technical Report PDAM
- Audio VM 4.0
- Audio WD 3.0
- Audio FAQ
- Consideration of new audio proposals
- Contribution to MPEG-4 Overview

Tasks for SNHC
- SNHC VM 3.0
- Visual WD 3.0 (joint with Video)
- SNHC FAQ
- Contribution to MPEG-4 Overview
- Inventory of Reference Software

Tasks for Tests
- Selection of test material
- Competition test plan and procedures
- Verification plan
- Collection of MPEG test material

Tasks for Implementation
- Advise Video
- Advise Audio
- Advise SNHC

Tasks for Liaison
- Study liaisons received
- Receive proposed external liaisons from other subgroups
- Issue liaison statements to other bodies

Cross-subgroup tasks
- MPEG-4 viewer
- Liaisons (all through Liaison sub-group)
- Resolution drafting
- Collection of subgroup resolutions
- Collection of ahg forms
- Responses to National Bodies
- Promotion of MPEG
- Press Release
- MPEG Home Page(FAQs)

14.2 Finalisation of meeting allocation

The following joint meetings took place

Video-Test	Mon	5-6:30	Video
Audio- Test	Tue	1-2	Audio
SNHC-Systems	Mon	5-7	Systems
SNHC-Req	Tue	5-7	Req
SNHC-A-S-V	Tue	3-5	Systems
SNHC-Systems	Tue	9-3	Systems
Systems-DMIF	Tue	9-2	DMIF
Video-Impl	Tue	5:30-6	Implem
Audio-Test	Wed	11-12	Audio
Audio-Systems	Thu	8:30-10	Systems
SNHC-Req	Thu	11-12	Req
SNHC-Sys	Wed	11-12	SNHC
SNHC-Sys	Thu	10-11	Sys
SNHC-Impl	Thu	10-10:30	Impl
Video-Test	Thu	9-9:30	Video
Audio-Req	Thu	12-13	Audio
Sys-Req	Thu	2-3	Sys
Sys-Impl	Thu	11-12	Sys
MPEG-4 player	Thu	3-4	Sys

15. Planning of future activities

The following ad-hoc groups were established

1657	Adhoc group on AAC verification test preparation
1641	Adhoc group on API core experiments
1640	Adhoc group on audio FAQs
1711	Adhoc group on computational graceful degradation techniques
1675	Adhoc group on content-related IPR issues
1654	Ad-hoc group on core experiments on coding efficiency in MPEG-4 video
1649	Ad-hoc group on core experiments on coding of arbitrarily shaped objects in MPEG-4 video
1652	Ad-hoc group on core experiments on error resilience in MPEG-4 video
1653	Ad-hoc group on core experiments on multifunctional coding in MPEG-4 video
1655	Ad-hoc group on editing the documents of the MPEG-4 video verification model and the MPEG-4 visual working draft
1671	Adhoc group on face and body animation
1702	Adhoc group on joint video/systems activities
1710	Adhoc group on logistics for MPEG-4 July 1997 tests
1636	Adhoc group on MPEG-2 AAC conformance and technical report
1638	Adhoc group on MPEG-4 audio core experiments (including SNHC audio)
1637	Adhoc group on MPEG-4 audio WD and VM
1677	Adhoc group on MPEG-4 Low Delay Evaluations
1708	Adhoc group on MPEG-4 player
1673	Adhoc group on MPEG-4 requirements
1639	Adhoc group on MPEG-4 Video VM complexity evaluation
1674	Adhoc group on MPEG-7 requirements
1687	Adhoc group on SNHC FAQ
1668	Adhoc group on SNHC MITG
1667	Adhoc group on SNHC visual texture/mesh coding
1670	Adhoc group on SNHC VM editing
1701	Adhoc group on systems composition

1700	Adhoc group on systems multiplex specification
1703	Adhoc group on systems QoS
1697	Adhoc group on Systems VM
1698	Adhoc group on Systems VM implementation 1
1699	Adhoc group on systems VM implementation 2
1696	Adhoc group on Systems WD editing

16. Resolutions of this meeting

These were approved

17. A.O.B

There were no other businesses

18. Closing

The meeting was concluded with thanks to the hosting organisation.

Annex 1

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Annex 2

Agenda

1.	***Opening***
2.	***Roll call of participants***
3.	***Approval of agenda***
4.	***Allocation of contributions***
5.	***Communications from Convenor***
6.	***Report of previous meeting***
7.	***Processing of NB Position Papers***
8.	***MPEG Phase 2***
8.1	***Part 1 (Systems)***
8.2	***Part 7 (AAC)***
8.3	***Part 10 (DSM-CC Conformance)***
8.4	***Verification of MPEG-2***
8.5	***Amendments***
8.5.1	***Private Data (System #3)***
8.5.2	***Semantic & table definition for 4:2:2 and MV profiles***
8.5.3	***Systems-related table entries for AAC***
8.5.4	***AAC Conformance and Technical Report***
8.6	***Workplan***
9.	***MPEG Phase 4***
9.1	***Requirements***
9.2	***Architecture***
9.3	***Tools***
9.3.1	***DMIF***
9.3.2	***Systems***
9.3.3	***Natural Video***
9.3.4	***Synthetic Video***
9.3.5	***Natural Audio***
9.3.6	***Synthetic Audio***
9.4	***Verification Models***
9.4.1	***DMIF***
9.4.2	***System***
9.4.3	***Video***
9.4.4	***Audio***
9.4.5	***SNHC***
9.5	***Call for Proposals***
9.4.6	***Tests***
9.7	***Simulation software***
9.8	***Working Draft***
9.8.1	***DMIF***
9.8.2	***System***
9.8.3	***Visual***
9.8.4	***Audio***
9.8.5	***SNHC***
9.9	***Workplan***
10.	***MPEG Phase 7***
10.	***MPEG-7 Seminar***
11.	***Overall WG11 workplan***
12.	***Liaison matters***
13.	***Administrative matters***
13.1	***Schedule of future MPEG meetings***
13.2	***Promotion of MPEG***
14.	***Organisation of this meeting***
14.1	***Tasks for subgroups***
14.2	***Finalisation of meeting allocation***
15.	***Planning of future activities***

16. Resolutions of this meeting
17. A.O.B
18. Closing

Annex 3

Documents submitted

No.	Source	Title
1882	Pete Schirling	Document Register for 39th Meeting in Bristol, UK
1883	Fernando Pereira	Report of the Ad Hoc Group on MPEG Requirements
1884	UK National Body, (D. J. Meares)	Provision of Matrix-mixdown stereophony in MPEG-2 AAC
1885	UK National Body, (D. J. Meares)	Use of pre-empahsis and de-emphasis in MPEG-2 AAC
1886	UK National Body, (D. J. Meares)	MPEG-2 AAC: changes to data_stream_element specification
1887	John Muller	Report of the adhoc group on core experiments on coding efficiency in MPEG-4 video
1888	Marina Bosi	Report of the Ad Hoc Group on MPEG-2 IS 13818-7 (MPEG-2 Advanced Audio Coding, AAC) Progression
1889	J.P. Cosmas, Y. Paker, A. Pearmain, A. Hamosfakides	Parallelisation of MPEG-4 Video Verification Model Encoder (version 5) in Inter/Intra Separate Mode
1890	Anthony Vetro, Huifang Sun	Core Experiment Q2: Joint Rate Control for Multi-VO
1891	R. Talluri, I. Moccagatta, Y. Nag	E8 - Core Experiment on Error Concealment by Data Partitioning
1892	Marc Escher, Igor Pandzic, Tolga Capin, Nadia Magnenat Thalmann, Daniel Thalmann	Proposal for extension of FDP facial feature points
1893	S. R. Quackenbush	Report of the Ad-hoc Group on Reducing AAC Prediction Complexity
1894	Toshio Miki, Toshiro Kawahara, Takashi Suzuki, Toshiaki Watanabe, Yoshihiro Kikuchi, Yutaka Machida	QoS control issues for MPEG-4 error resilient video coding
1895	Sven Bauer, Ralf Harneit, Bernd Schmale	Results of CE P8 on Motion and Alasing Compensating Prediction
1896	Ulrich Benzler	Results of core experiment P8 (Motion and Aliasing Compensating Prediction)
1897	Caspar Horne, Ganesh Rajan	Report of the AdHoc Group on SNHC VM editing
1898	Caspar Horne, Ganesh Rajan	SNHC Verification Model 3.1
1899	Jean-Claude Dufourd, Frederic Bouilhaguet	Report on SNHC MITG core experiments
1900	Luis Torres, David Gimeno, David Garcia	SVQ Results of CE Z1
1901	Minoru Etoh, Takao Yamaguchi, Hiroshi Arakawa, Yoshinori Matsui	Proposal for Configurable Adaptation Layer Header
1902	Hirokazu Tanaka, Osamu Yamagishi	A Study on MUX for Mobile Packet Network
1903	Andre Kaup, Anke Lorenz	Results of Core Experiment on Modified SA-DCT for Interframe Coding
1904	Stefan Horbelt, Fred Jordan, Touradj Ebrahimi	Results of Core Experiment Z2
1905	Richard J. Qian, M. Ibrahim Sezan	Methods for Vertex-Based Scalable Shape Coding
1906	Toshiaki Watanabe, Yoshihiro Kikuchi	Comparison of Binary Shape Coding (Core Experiment S4d)
1907	Toshiaki Watanabe, Yoshihiro Kikuchi	Scalability for Modified MMR Method
1908	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of EREC (Core Experiment E7)
1909	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of Data Partitioning (Core Experiment E8)
1910	Jean-Claude Dufourd	Report on an implementation of the 2D composition scheme
1911	Jean-Claude Dufourd	The "Interaction with a Multimedia Database" profile

No.	Source	Title
1912	Carsten Herpel (Thomson), James Van Loo (Sun)	Report of AHG on DMIF activities for MPEG-4
1913	Carsten Herpel	Report of AHG on Systems Multiplex Specification and Signaling
1914	Jan Bormans, Toon Gijbels, Lode Nachtergaele	Initial Assessment of the Video VM 5.0 Memory Requirements
1915	Philippe Schmid, Gloria Menegaz	Results of CE Z1 for efficient coding of textures
1916	Joern Ostermann	Report of the AdHoc Group on Core Experiments for Coding of Arbitrarily-Shaped Objects in MPEG-4 Video
1917	Erich F. Haratsch, Joern Ostermann	Implementation of Face Animation Parameters and of Face Definition Parameters: Issues and Questions
1918	Joern Ostermann, Erich Haratsch	Let Animals and Furniture Speak: Proposal for Extending the Scope of Face and Body Animation
1919	Joern Ostermann, Andrea Basso, Mark Beutnagel	Synchronisation between TTS and FAP based on bookmarks and time-stamps
1920	Marco Mattavelli	Report of the ad-hoc group on Computational Graceful Degradation.
1921	Marco Mattavelli, Sylvain Brunetton, Pascal Fleury	Some results of the video VM complexity using the instrumentation tools
1922	Carsten Herpel	Update of Multiplex API in Systems VM
1923	Pete Schirling	Proposal for Transport Private Data registration option
1924	The National Body of Japan	Japan's Comments on MPEG-4 VM Encoder Software
1925	T.K.Tan, S.M.Shen, Brent Wilson	Results of CE N1
1926	M. Frater, J. Arnold, M. Kuchlmayr	Further Results of Core Experiment T15
1927	T.K.Tan, S.M.Shen, Brent Wilson	Quantization Issues for Visual VM
1928	S.M.Shen, T.K.Tan, Brent Wilson	Results on VM, Merged Mode, and Spatial-Temporal Weighting for B1.1
1929	S.M.Shen, T.K.Tan, Brent Wilson	DCT Based Progressive Scalability With Fine Granularity
1930	Uwe Gbur, Andreas Ehret, Martin Dietz	FhG pre-screening test results
1931	Ulrich Horbach	Implementation of Audio Compositing Functions: Algorithms and Hardware Requirements
1932	Matthias Rosenthal	Implementation of Audio Compositing Functions: Software Considerations
1933	Peter List	Results from T16 INTRA-Prediction
1934	Shigeru Fukunaga, Toshihisa Nakai	Results of Core Experiment E4 (Backward Channel Signaling)
1935	S. Jeannin	Results of T3 core experiment
1936	S. Jeannin	Report of the Ad Hoc Group for FAQ on MPEG-4 Video
1937	David Kirby	Results of the subjective listening tests on reduced complexity AAC prediction
1938	Goran Eriksson	Some thoughts regarding conditional access issues
1939	Sofie Olsson	One possible MPEG-4 TransMux instance: DAB
1940	Olle Franceschi	Suggested revisions of Main Profile
1941	Fernando Pereira	First Proposals for MPEG-7 Visual Requirements
1942	Fernando Pereira, Pedro Geada	Sketch-based database retrieval: a demonstration of an MPEG-7 application
1943	Luis Ducla-Soares, Fernando Pereira	Error Resilient Syntax for MPEG-4 I-VOPs
1944	Rob Koenen	Revision of MPEG-4 Overview
1945	Rob Koenen	Report of AHG on MPEG-4 Overview
1946	Juergen Herre, Uwe Gbur	On the Selection of New Audio Test Material for MPEG-4 Audio
1947	Niels Rump, Juergen Herre	Copyright protection of Multimedia Data: The "Multimedia Protection Protocol" (MMP)
1948	Peter Gerken, Roland Mech, Giuseppe	Merging of temporal and spatial segmentation (CE N2)

No.	Source	Title
	Russo, Stefania Colonnese, Chieteuk Ahn	
1949	Peter Gerken, Roland Mech	Automatic segmentation of moving objects (Partial results of core experiment N2)
1950	NB of Ireland	Offer to host - July 1998
1951	Wolfgang Niehsen	Results of Core Experiment P8
1952	Klaus Stuhlmueller, Thomas Wiegand	Results of Core Experiment P9
1953	Bernhard Grill, Heiko Purnhagen	Report of the AhG on MPEG-4 Working Draft Editing and VM Software Implementation
1954	Anthony Vetro, Huifang Sun	Core Experiment Q2: Verification of Mutli-VO rate control
1955	F. Seytter	Efficient Multimedia Transmission via Mobile Channels
1956	Heiko Purnhagen, Bernd Edler	Considerations on scalability and bitstream format for MPEG-4 Audio
1957	Bernd Edler, Frank Baumgarte	Results of the core experiment on Nokia backward prediction proposal
1958	P. J. L. van Beek, A. M. Tekalp,	CE M2: Compression efficiency using 2D dynamic mesh
1959	P. J. L. van Beek, A. M. Tekalp,	CE Z4: 2D dynamic mesh compression
1960	P. E. Eren, C. Toklu, P. J. L. van Beek, A. M. Tekalp	Specification of interactive 2D mesh API
1961	Jordi Ribas-Corbera, Shawmin Lei	Q2 parQ2 part A: macroblock layer rate control
1962	Mike Coleman, David Thom	Report of Ad-Hoc Group for AAC Conformance and Technical Report
1963	Kevin O'Connell, Peter Gerken, Corinne LeBuhan, Jongil Kim	Error Resilient Vertex-Based (S4h) Shape Coding Description
1964	Ram Nagarajan	Core Experiment on Reducing Decoder Memory Requirements for Sprites
1965	Ram Nagarajan, Ganesh Rajan	Report of AHG on Media Integration of Text and Graphics
1966	Kenzo Akagiri, Yoshiaki Oikawa	Listening test report of the MPEG-2 AAC SSR profile multichannel audio coding
1967	Yasuhiro Tomita, Tsukasa Kimura	Results of Core Experiment on Back Channel Signaling (E4)
1968	Eishi Morimatsu, Akira Nakagawa	Result of Core Experiment P13(Dynamic Resolution Conversion)
1969	Eishi Morimatsu, Akira Nakagawa	Result of Core Experiment C1.1(Optimization of Object based Temporal Scalability)
1970	Yung-Lyul Lee, Salk-Mann Ji, Yoon-Soo Kim, Hyun-Wook Park	Results of Core Experiment N1 (Deblocking filter)
1971	Yung-Lyul Lee, Yoon-Soo Kim, Hyun-Wook Park	Results of Core Experiment N1 (Deringing/Demosquito filter)
1972	Ibrahim Sezan, Dean Messing	Experimental Results on Z4
1973	Zhixiong Wu, Toshifumi Kanamaru	Improved Wavelet Coding for Still Images
1974	G.Russo, S.Colonnese, U.Mascia, C.Tabacco	Core Experiment N2: Preliminary FUB Ruslts on the Combination of FUB and HU Automatic Segmentation Techniques
1975	Marta Karczewicz	A filter for removing blocking artefacts.
1976	Shinya Kadono, C.S.Boon, Taisuke Matsumoto	Results on Shape Core Experiment S4d
1977	V.Baroncini	July 97 Competition Test
1978	Rakesh Taori,, Werner Oomen	Submission for Audio-prescreening
1979	Roberto Pockaj, Marco Baudino	Data for FAP evaluation and compression
1980	Roberto Pockaj,, Marco Baudino	Data for FAP evaluation and compression
1981	Hiroyuki Katata	Result of Core experiment P13(Dynamic Resolution Conversion)
1982	Hiroyuki Katata, Ryuji Kitaura, Hisashi Saiga	Result of Core experiment C1.1(Object based Temporal Scalability)

No.	Source	Title
1983	Tomoko Aono, Hiroyuki Katata, Hisashi Saiga	Report of Core experiment Z2
1984	Norio Ito, Hiroyuki Katata	A proposal of object wavelet transform for still image
1985	Rob Koenen for AHG on MPEG Requirements	draft revision of "MPEG-7 Context and Objectives"
1986	Guido Franceschini	Configuring parameters for the TransMux data plane interface
1987	Guido Franceschini	TransMux Control Interface
1988	Guido Franceschini, Reinhard Baier, Susanne Wasserroth	Definition of tools to support DSMCC-UU conformance testing
1989	Guido Franceschini, Reinhard Baier, Susanne Wasserroth	Problems found in DSMCC-UU implementations
1990	Laura Contin (editor)	MPEG-4 evaluation methods
1991	Laura Contin (editor)	Logistics for July '97 competitive tests
1992	Laura Contin (editor)	Proposal for verification tests
1993	Laura Contin (editor)	Report of the ad hoc group on MPEG-4 Test methods and procedures
1994	Mauro Quaglia, Stefano Battista, Franco Casalino	Implementation Scenarios for an MPEG-4 Player
1995	Michael Zeug	MPEG-4 Profile Requirements Version 2.1
1996	Michael Zeug	Report of the AHG on Low Delay Evaluations
1997	Gakl Richard, Pierre Bonnard, Ariane Le Dori	A Solution for a Scalable Audio and Speech Coder based on Core Coders
1998	Pierre Bonnard, Gael Richard, Cedric Sibade, Franck Rigoulet	An implementation of graceful-degradation concept in a 3D audio compositor
1999	Eddie Cooke(Teltec Ireland), Liam Ward (Teltec Ireland)	3D VM Plug-and-Play Interface for 2D AVObjects
2000	Gilles Privat, Marc Brelot	Using a generic object-oriented metadata description as the MPEG4 scene description format
2001	Regis J. Crinon	Universal MPEG-4 Object Descriptor
2002	David Thom - MELA, Mike Coleman - Five Bats	Ad Hoc Group Report on MPEG-2 AAC Conformance Testing & Technical Report
2003	Sylvie Jeannin	Answers for video FAQ questions
2004	Noel Brady, Fergal Connor	Results of Core Experiment S4D (Block-based Binary Shape Coding)
2005	Ali Tabatabai	Composition AdHoc Group Report
2006	Ibrahim Sezan, Richard Qian	Scalable Shape Coding Requirements
2007	Bob Eifrig, Xuemin Chen, Ajay Luthra	Interlaced Video Coding Results (Core Exp P-14)
2008	Bob Eifrig, Xuemin Chen, Ajay Luthra	Interlaced Video Software for P-14
2009	Shi-Hwa Lee, Dae-Sung Cho, Yu-Shin Cho, Jae-Seob Shin, Se-Hoon Son, Euee-Seon Jang, Yang-Seobk Seo	Results of CE S4 : Comparison of Shape Coding Technique
2010	Seong-Jin Kim, Euee-Seon Jang, Jae-Seob Shin, Yang-Seobk Seo	Results of CE S4n : Shape Rate Control
2011	Euee-Seon Jang, Se-hoon Son, Yu-Shin Cho, Yang-Seobk Seo	Experimental Results of Scalable Shape Coding (S4d/S4e)
2012	Sung-Gul Ryoo, Jae-Seob Shin, Yang-Seock Seo	Results of CE Q2 : Improved Rate Control Technique
2013	Jae-Seob Shin, Yang-Seock Seo	Performance Verification of Improved Motion Vector Coding Technique
2014	Vahe Balabanian, Fernando Cuervo	Proposal of an Interface Framework for Control of Bindings between DMIF Network and Media Dependent Parts
2015	Vahe Balabanian	Binding Interface Base Operations
2016	Vahe Balabanian	A Multiplex for Low Rate, Delay Sensitive Applications (I.363.2)

No.	Source	Title
2017	Vahe Balabanian	Mapping of MPEG-4 ESs to Tap IDs and Association Tags
2018	Vahe Balabanian	A Method for the Transparent Transfer of an MPEG-4 ES from one connection to another
2019	Vahe Balabanian	A Method for Rapid Transfer of Assignment Tag Pairing with a Channel ID
2020	Vahe Balabanian	Temporary Displacement of Lower Priority MPEG-4 ESs in order to carry Higher Priority ESs
2021	Vahe Balabanian	Predictive Connection Capacity Generation
2022	Vahe Balabanian	Transfer of MPEG-4 ESs from Best Effort to QoS Guaranteed Connections
2023	Vahe Balabanian	A First Scenario for DMIF Integration with Internet for the 14496-6 PWD
2024	Vahe Balabanian	Updates to the DSM-CC FAQ
2025	Vahe Balabanian	Feedback on the DSM-CC Tutorial Presentation in Sevilla
2026	Dominique CURET, Annie GRAVEY	QOS considerations
2027	Dominique Curet	Interface between video & systems
2028	Dominique CURET	Interface between audio & systems
2029	Dominique CURET	Flexmux considerations
2030	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE B1.1 : Optimization of Spatial Scalability
2031	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE B1.1 : Object Based Spatial Scalability
2032	Lin Yin, Mikko Suonio, Mauri Vaananen	Proposal for a Core Experiment on Forward Prediction in MPEG-4
2033	Weiping Li, F.Ling,H.Sun,J.P.Wus	Progress of Vector Wavelet Coding
2034	Corinne Le Buhan Jordan, Touradj Ebrahimi	Scalable vertex-based shape coding - S4h results
2035	Jin Li, Shawmin Lei	Improvements of Core Experiment T1: Wavelet coding of I Pictures
2036	Jin Li, Shawmin Lei	Proposal of Core Experiment Z1: Efficient Coding of Textures
2037	Jin Li, Shawmin Lei	Proposal of Core Experiment Z2: Spatial and Quality Scalability
2038	Hirohisa Jozawa, Kazuto Kamikura	Results of core experiment N3
2039	C. S. Boon, J. Takahashi, K. Horiike	Complexity Analysis of Padding
2040	C. S. Boon, S. Kadono	Comments on Visula VM/WD - Arbitrary Shape Related Issues
2041	C. S. Boon, S. Kadono	A Scaled VLC Scheme for Encoding DCT Coefficients - A New Proposal
2042	C. S. Boon, T. Nishi, S. Kadono	Core Experiment Description of Motion Compensation of Grayscale Alpha Plane
2043	Toshio Miki, Satoru Adachi, Tomoyuki Ohya	Results of Core Experiments on Error Resilience (E7)
2044	Eric Scheirer, Barry Vercoe, Machine Listening Group	Audio BIFS nodes for Audio Composition using SNHC Audio
2045	Eric Scheirer, Barry Vercoe, Machine Listening Group	Result of Core Experiment SA2 (non-Java Structured Audio)
2046	Eric Scheirer, Barry Vercoe, Machine Listening Group	Proposed Changes to SNHC Structured Audio
2047	Frank Bossen	Results of CE S4d/CAE
2048	Frank Bossen	Results of CE Z3 on mesh coding
2049	Karlheinz Brandenburg	Report of the Ad-hoc Group on core experiments for MPEG-4 audio
2050	Ralph Neff, Osama Al-Shaykh, and Avideh Zakhor	Experiment T3: Matching Pursuit Prediction Error Coding
2051	Ganesh Rajan	Results of Core Experiment Z4 (Dynamic 2D-Mesh Compression)
2052	Ganesh Rajan	Results of Core Experiments in Media Integration of Text and

No.	Source	Title
		Graphics
2053	Simon Winder, Chuang Gu, Ming-Chieh Lee	Report on coding efficiency and complexity of candidate padding algorithms
2054	Ming-Chieh Lee, Bruce Lin, Wei-ge Chen, Simon Winder	Complexity Analysis on Overlapped vs. Non-overlapped Motion Compensation
2055	A. Eleftheriadis, C. Herpel, L. Ward (Editors)	MPEG-4 Systems Working Draft 3.1
2056	Yoshinori Matsui	Syntax Modifications for transmission of ES Header
2057	Byung Cheol Song, Jong Beom Ra (KAIST),, Hyun Mun Kim, Young Su Lee (LGS)	A new proposal on motion estimation with the OBMC on/off mode for the advanced mode
2058	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa, Naoya Tanaka	Proposal of bitrate scalability for TwinVQ based core and comparison with NTT scalable coder
2059	Hyun Mun Kim,Young Su Lee	Results of Core Experiment S4e
2060	A. Eleftheriadis, C. Herpel, L. Ward	Report of AHG on Systems Working Draft Editing
2061	S.-W. Kim, Y. B. Thomas Kim	Results of the check phase experiment of NTT scalable CODEC proposal for MPEG-4 Audio
2062	H. Kalva, A. Eleftheriadis, A. Puri, R. Schmidt	Stored File Format for MPEG-4
2063	Y. Fang, A. Eleftheriadis, A. Puri, R. Schmidt	Adding Bitstream I/O Library to Java
2064	Kinya Oosa	Results of N1 core experiment
2065	Yoichi Yagasaki, Teruhiko Suzuki	IDCT Mismatch Protection for MPEG Quantization
2066	Yoichi YAGASAKI	Tool for Non Linear Quantization
2067	Yoichi YAGASAKI	Tool for Random Access
2068	Koji Imura, Yutaka Machida	The Adaptive INTRA Refresh Method for Error Robustness.
2069	Yutaka Machida, Koji Imura	Error Resilient Coding with Dual Motion Vector
2070	Kazunaga Ikeda, Takeshi Mori, Takehiro Moriya, Naoki Iwakami, Akio Jin, Satoshi Miki	Proposal of error protection tools for T/F coder of MPEG-4 Audio VM
2071	Akio Jin, Naoki Iwakami, Takehiro Moriya, Satoshi Miki, Kazunaga Ikeda, Takeshi Mori	Report of the core experiments of the bit-rate scalability tools for MPEG-4 Audio VM
2072	Takehiro Moriya, Akio Jin, Naoki Iwakami, Kazunaga Ikeda, Takeshi Mori, Satoshi Miki	Report on the prescreening test for 16 and 40 kbit/s audio coders
2073	Touradj Ebrahimi (editor)	Video Verification Model 6.1
2074	Touradj Ebrahimi, Atul Puri	Report of ad hoc group on video VM/WD editing
2075	Touradj Ebrahimi, Homer Chen	Report of ad hoc group on core experiments for generic SNHC object coding
2076	Ad hoc group on generic SNHC object coding	Description of core experiments for generic SNHC object coding
2077	Keiichi HIBI,Nobuyuki EMA	Report of core experiment P6 "Multimode Warping Prediction"
2078	Minsoo Hahn, Shinya Nakajima	Considerations for the comments on MPEG-4 TTS Interface
2079	Hang-Seop Lee, Young-Kwon Lim, Minsoo Hahn, Jungchul Lee	Report on the Core Experiment of "STOD with MPEG-4 TTS"
2080	Hang-Seop Lee, Young-Kwon Lim, Minsoo Hahn, Jungchul Lee	Suggestions for the MPEG-4 TTS Interface bit stream syntax
2081	The National Body of Japan	Comments on the July 97 tests
2082	Masahiro Iwadare, Toshiyuki Nomura	Core experiment results for Nokia's proposal on backward prediction
2083	Toshiyuki Nomura, Kazunori Ozawa, Masahiro Serizawa, Masahiro Iwadare	A bitrate scalable tool for the narrow band CELP coder of the MPEG-4/Audio VM
2084	Toshiyuki Nomura, Masahiro Iwadare	Pre-Screening test results for MPEG-4/Audio '97 July test

No.	Source	Title
2085	Takuyo Kogure, Takanori Senoh	DMIF for DVD
2086	Pete Schirling, Richard Clarke	Comments on JTC 1 Electronic Distribution Policy
2087	Kazuhisa Hosaka, Yoichi Yagasaki	Tools for S4d to Improve Coding Efficiency
2088	S.-W. Kim, Y.-B. Thomas Kim, S. H. Park	Proposal for a Core Experiment on low complexity scalable codec for MPEG-4 Audio
2089	Jong-Il Kim, Jin-Hun Kim, Sang-Hoon Lee, Kyu-Whan Chang	Result of core experiment S4 :Vertex Based Algorithm
2090	Masami Ogata, Andrew Mackinnon	Results of Core Experiment T1
2091	Jae Gark Choi, Munchurl Kim, Myoung Ho Lee, Chieteuk Ahn	Automatic segmentation based on spatio-temporal information
2092	Jin Soo Choi, Myoung Ho Lee, Chieteuk Ahn	Geometry compression using predictive residual vector quantization (Results of core experiment Z3)
2093	Young-Kwon Lim, Sang Gyu Park, Chieteuk Ahn	Proposal for the final definition of ISG core experiments on CGD (Computational Graceful Degradation)
2094	Young-Kwon Lim, Sang Gyu Park, Chieteuk Ahn	Revised proposal for the issue of priorities for VIdeo Object Class and Video Object Layer Class
2095	Jun Matsumoto, Masayuki Nishiguchi, Kazuyuki Iijima	Prescreening test results of audio proposals at 2.0 and 6.0 kbps
2096	Keiichi HIBI, Tadashi UCHIUMI	Report of the improvement on E8 core experiment (with texture data partitioning)
2097	Masami Ogata, Andrew Mackinnon	Proposals of the syntax for still image coding mode
2098	Robert Danielsen	Results from CE T14
2099	Sung Deuk Kim, Jaeyoun Yi, Jong Beom Ra(KAIST), Hyun Mun Kim, Young Su Lee(LGS)	Results of Core Experiment N1
2100	Sung Deuk Kim, Jong Beom Ra(KAIST), Hyun Mun Kim, Young Su Lee(LGS)	A New Motion Vector Coding Technique
2101	Sung Deuk Kim, Jong Beom Ra(KAIST), Hyun Mun Kim, Young Su Lee(LGS)	An Improved Motion Vector Coding Scheme
2102	Minoru Etoh, Takeshi Ankei	Core Experiment Report on N3, Dynamic Sprite and Global Motion Compensation
2103	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE B1.1 : Improvement for Spatial Scalable Coding
2104	Y. Suzuki, Y. Nakaya, S. Misaka	Results of Core Experiment N3 (Dynamic Sprite and Global Motion Compensation)
2105	Yuichiro Nakaya, Yoshinori Suzuki, Satoshi Misaka	Accuracy and complexity of warping algorithms
2106	Yuichiro Nakaya, Yoshinori Suzuki, Satoshi Misaka	Results of core experiment P6 (Multimode warping prediction)
2107	Peter K. Doenges	Report of Ad Hoc Group on SNHC VM/WD Integration into MPEG-4 VM/WD
2108	Yuji Itoh	Results of Core Experiment N1
2109	Yuji Itoh	Results of Core Experiment P14
2110	Yuji Itoh	Syntax and coding details of Universal VLC in E8
2111	Anthony Vetro, Huifang Sun	Core Experiment Q2: Verification of Quantizer Control Tool
2112	Yoshihiro Miyamoto	Results of Core Experiment P6 (Multimode Warping Prediciton)
2113	James Brailean	Report of ad-hoc group on error resilience
2114	Michael Zeug	Editor's Notes in MPEG-4 Profile Requirements version 2.1
2115	Cheung Auyeung	Results of Core Experiment T14a on Adaptive 3D VLC
2116	Cheung Auyeung	A Proposal on Inter-Frame Adaptive 3D VLC
2117	Wei-ge Chen, Ming-Chieh Lee, Chuang Gu, Simon Winder	Microsoft Software C++ Implementation for MPEG-4 Video VM 6.1

No.	Source	Title
2118	Chuang Gu, Wei-ge Chen, Ming-Chieh Lee	A Syntax Change Proposal for VOP Size
2119	Rohit Agarwal	Media Transmission for the Flexible APIs
2120	Rohit Agarwal	3D Integration Strategy for the Flexible Composition APIs
2121	Rohit Agarwal	Content Cache abstraction for content reuse
2122	Rohit Agarwal	Characterization of InputStreams, The Transform Class and application level manipulation of Logical Time
2123	Bob Efirig, Xuemin Chen, Ajay Luthra	Updated Description Interlaced Video Coding (CE P-14)
2124	Mauri Vaananen, Mikko Suonio, Lin Yin	Listening test results of Nokia backward prediction core experiment check phase
2125	Jiro Katto	Results of Core Experiment M3/G2
2126	Frederic Dufaux	Update results for dynamic sprites and global motion compensation (CE N3)
2127	Michael Zeug	An Abstract Model for Layer Interfaces in MPEG-4
2128	Simon Winder, Wei-ge Chen	Report of the Ad Hoc Group on Video VM Complexity Analysis
2129	Simon Winder	Report of the Ad-Hoc Group on Investigating Reduced Complexity Padding Techniques
2130	Jiangtao Wen, John Villasenor	Results Report on Core Experiment on Error Concealment by Data Partitioning - E8
2131	Atul Puri	Report of Ad hoc Group on Multifunctional Coding in MPEG-4 Video
2132	R. L. Schmidt, A. Puri, B. G. Haskell	Results of Coding Efficiency Experiment T16 in MPEG-4 Video
2133	A. Puri, R. L. Schmidt, A. Eleftheriadis, H. Kalva, Y. Fang	APIs for MPEG-4 Systems
2134	Yuval Fisher, Homer Chen	Integration of MITG with the System VM
2135	Wei Wu, Homer Chen	Results of Z2 Core Experiment
2136	Wei Wu, Homer Chen, Scott Cabelli	Results of N-Bit Video Coding Core Experiment
2137	Wei Wu, Jim Scholl, Homer Chen	Results of Z1 Core Experiment
2138	J.W. Chung, J.-h. Moon, J.H. Lee, S.H. Lee, C.S. Park, J.H. Kweon, J.-k. Kim	Results of CE S4h: Geometrical(Vertex-Based) Representation Method
2139	John H. Muller	Descriptions of sprite and prediction core experiments on coding efficiency in MPEG-4 Video
2140	John H. Muller	Descriptions of rate control and texture coding core experiments on coding efficiency in MPEG-4 Video
2141	Frank Bossen	On adding colors, normals and other useful things to the generic mesh syntax
2142	Peter K. Doenges	Proposed Changes to MPEG-4 Requirements v. 2 (N1595) re: SNHC
2143	Rohit Agarwal	Results of Experiment on Composition API changes
2144	Rohit Agarwal	Results of Experiment on Simple Audio Composition API Integration
2145	John H. Muller	Results of Core Experiment T14b
2146	Rohit Agarwal, Stefano Battista, Pallavi Shah	Report of the AHG on Systems VM
2147	Gary Sullivan, Richard Schaphorst	Liaison Statement from ITU-T LBC to MPEG Regarding H.263+
2148	Gary Sullivan, Richard Schaphorst	Liaison Statement from ITU-T SG16 to MPEG Video (MPEG-2 and MPEG-4)
2149	Eric Petajan, Tolga Capin	Report of the adhoc group on Face and Body Animation
2150	Tanju Erdem, Candemir Toklu, Murat Tekalp	Alpha-plane generation functionality of mesh-based video object tracking.

No.	Source	Title
2151	Iraj Sodagar, Hung Ju Lee, Dinei Florencio	Report on Core Experiment T1: Improvements on Wavelet Coding of VM.
2152	Jeff McVeigh	Results of Core Experiment S4k on Video Shape Coding
2153	Iraj Sodagar, Dinei Florencio, Hung Ju Lee	Report on Core Experiment Z1: Efficient Coding of Textures.
2154	Iraj Sodagar, Hung Ju Lee, Dinei Florencio	Report on Core Experiment Z2: Spatial, Quality and View Dependent Scalability.
2155	Jordi Ribas-Corbera, Shawmin Lei	Experimental results for Q2 experiment, parts B and C
2156	Regis J. Crinon, Ibrahim Sezan	Sprite-based Coding without Prior Segmentation
2157	Sanae Hotani, Toshio Miki	The report on error sensitivities of AAC audio coding
2158	Hung-Ju Lee, Tihao Chiang and Ya-Qin Zhang	Q2 Core Experiment: Multiple VO Rate Control
2159	Tihao Chiang, Hung-Ju Lee and Ya-Qin Zhang	Q2 Core Experiment: Macroblock Rate Control
2160	Hung-Ju Lee, Tihao Chiang and Ya-Qin Zhang	Q2 Core Experiment: Multiple VO Rate Control Verificatio
2161	Grill, Bernhard	Improved Scalable Bitstream Syntax

Annex IV

Report of Requirements Meeting

Source: Rob Koenen, chairman Requirements

Introduction

The Requirements Group met during the entire week of the MPEG Sevilla meeting. The discussion addressed MPEG-4 as well as MPEG-7. The most important topics were:

MPEG-4

- General Requirements
- Profiles
- IPR
- MPEG-4 Overview

MPEG-7

- Seminar
- First Draft of Requirements Document
- Context & Objectives
- Work Item Proposal Acceptance Criteria

These issues will be discussed in detail below.

MPEG-4

Profiles and Levels

A considerable part of the meeting time was spent on discussing dealing with Profiles in MPEG-4. As this is an important discussion, this report will try to explain the reasoning followed by the requirements group.

First, let's start with two observations:

1) Profiles and Levels have two functions:
    - Defining the syntax of the bitstream and the tools needed to decode it (Profiles);
    - Providing a bound on the resources needed to decode the bitstream (Levels)
2) The Audio and Visual parts of the MPEG-4 standard specify the tools needed to decode single objects, while only in the Systems part the different objects are pieced together, in the compositor.

These two observations lead to the following conclusions:

1) In the Audio and Visual parts of MPEG-4, it is only possible to define Profiles and Levels for individual objects,
2) How many different objects the decoder can expect to decode and composite simultaneously is not an issue for the A and V parts of MPEG-4, but for the part where the compositor gets defined: the Systems part.
3) Following this reasoning, the A and V parts should contain so-called ***Object Profiles*** (with or without Level) while the S part can contain ***Composition Profiles*** (also with or without Level). These composition Profiles can exist for A and for V, and it is desirable not to combine them. (Not combining A and V was already the policy in the previous Profiles Document).
   Note that Audio and Video Composition Profiles actually define more than the composition, because they also specify the complete set of Audio decoders that the receiving terminal would need. A better name might exist, but the Requirements Group did not find one yet. Also, the terminology has to be harmonized with the Systems Group, who are also talking about Composition Profiles, but this does not necessarily mean the same.

Having reached this conclusion, the Requirements Group went on discussing how Levels could be defined. The possibility of defining ***Object Profile Levels*** was discussed, but the Requirements Group thought did not find it necessary to define these. This was not a firm conclusion, and the possibility may be reconsidered in the future. The need for both ***Composition Profiles*** and ***Composition Profile Levels*** was expressed by several people, and there was consensus that they would be necessary to provide interworking and performance guarantees. Several

broadcasters expressed the need to have these guarantees, because without them, content producers would not allow making use (i.e. broadcasting) of their content.
The requirements group discussed at length how these Composition Profiles and Levels could be specified. The Composition Profiles themselves are not so difficult: they are given by the set of objects the decoder should understand.
The Levels, however, are a different issue: it is very difficult, if not impossible, to define them for cases that are not as trivial as 'two or three objects maximum'. Let's explain two possible approaches, and their advantages and drawbacks.

1) Assume the Profile/Level specification in terms is written as follows: the types of objects to be supported, with a maximum number per object type. Example: 10 x (*Main Video/CIF/64 kbps*), 2 x (*Animated Face/30 paramaters/2 kbps*), 3 x (*formatted text)*, 1 x *(RGB graphics / CIF,8 bit per component)*, …
   This would mean that the decoder has to be able to have the tools to decode all the objects, and to have the capacity to decode the worst case: all of them together at the same time, all with maximum resolution and complexity.

   Advantage: a clear upper bound is given on what the decoder can expect.

   Problem: On average, much less than the maximum number of objects will be sent, and also their size will on average be much less than the maximum. This means that for almost 100% of the time, only a fraction (say 1%) of the resources of the decoder would be used. The decoder might be able to decode 100 objects of type *(formatted text)*, if no other objects were present, but this is disallowed by the Profile/Level combination. Concluding: the decoder will this case have to be much too powerful - and expensive.

   Possible solution: we define additional bounds, e.g. maximum bitrate and maximum total size of all the objects. It is then *still* hard to predict the needed computational power, especially for synthetic objects, that can require complex operations even at lower bitrates.

2) Assume that we define a hypothetical (reference) decoder, with parameters such as memory, MIPS, … The encoder will then have to know these bounds, and should be able to calculate the complexity of the bitstream it is sending to the decoder.

   Advantage: an upper bound is given on what the decoder can expect.

   Problem: It is very difficult to predict the processing power needed for some of the object types. Also, finding the right non-platform parameters will be difficult.

The Requirements Group Difference noted that there was a difference between two cases:

1. *the user has no control over the bitstream he receives* (e.g. in broadcast):
   In this case, profiling is desirable
2. *the user does have control over the bitstream* (e.g. PC application with many local objects):
   In this case, profiling looks impossible, because the user can make it arbitrarily difficult for the decoder by keeping combining bitstreams and objects.

There may also be a difference between natural and synthetic objects, as for natural objects it is easier to predict decoding complexity, while synthetic objects often involve complex operations described by relatively simple commands. (The same may however apply to compositing natural objects.) In the case of synthetic objects, graceful degradation is often given 'for free', whereas for (non-scaleable) natural objects decoding is 'pass or fail'.

The Profiles Document needs complete reviewing, based on the new approach. It was not possible to do this during the meeting, and the AHG on MPEG-4 Requirements has been given the mandate to complete this work. The Requirements Group thought that it will be possible to derive Object Profiles from the Profiles Document.

General Requirements

Version 3 of the General Requirements Document (N1682) was issued. Apart from some editorial issues, the most important changes were:

- Shape Coding requirements explicitly described;
- SNHC requirements are now consistent throughout the document;

In a joint meeting with the ***Video*** and ***SNHC*** groups, that took place on Sunday, still picture requirements were discussed. Some Requirements people were present, to explain the requirements point of view. The recommendation from that Ad Hoc Group meeting was followed by the requirements group, and still picture requirements in the requirements document were updated accordingly. The need for a tool to efficiently code homogeneous texture was discussed, but currently there is no documented need for such a tool.

The Video group announced that the current tools address bitrates from 5 kbit/s to 4 Mbit/s. The Requirements group were pleased to see the bitrate go up, as several people, notably broadcasters, have expressed a desire for visually lossless coding tools, sometimes with an additional requirement to keep this quality through multiple generations.

In a joint meeting with ***Audio***, Audio requirements were discussed. This was mostly dedicated to explaining the requirements group's thoughts on Profiling in MPEG-4. The audio Group announced that they are working on 'Object Profiles'. The conclusion was that while in general the 'Composition Profiles' will be hard to define, this may be less difficult for Audio than for Visual. When the 'Special Effects' part of Audio is concerned, however, the same difficulties may arise as exist for Video. This will also be true when an unknown number of audio objects is to be decoded.

In a joint meeting with ***Systems***, also the new Profile many issues were addressed. Some people expressed the need to define Composition Profiles, but recognized that a solution is not close at hand.

IPR Issues

Again experts from the content (management) world were present to work on the requirements for content-related IPR issues. Together with people with a more technical background, they discussed not only requirements for Identification and Protection of Content, bit also started thinking about solutions. Dominique Yon chaired a break-out session for three days,
with experts and interested people. As a result, the output Document: '*Management of Identification and Protection of Content in MPEG-4 (N1680)*. A Call for Proposals (N1714) was issued to obtain technology for fulfilling the requirements mentioned in this document.

A crucial element in the conclusions is that MPEG-4 should allow measures for protection to be implemented, by providing the appropriate hooks, but there is no requirement stating that MPEG-4 shall solve the issues itself.

Also at the Bristol meeting experts from the content (management) world will be present to further discuss the requirements, and it is expected that also experts will be present to start working on candidate solutions matching the requirements. To allow focused discussions for these content experts, three days have been designated for content-related IPR discussions: Tuesday 8 through Thursday 10 April. Discussions will again partly take place in the requirements group, and partly in a break out group.

MPEG-4 Overview

A new version was produced of the MPEG-4 Overview (N1683). This draft was the result of work in the AHG on the MPEG-4 Overview as well as on contributions received from the chairmen during the meeting. The document now gives a realistic view of what will be possible during the first phase of MPEG-4, and what needs to be done after that. Because things may change in this respect, it was decided not to produce a public version yet. This remains a goal for the next meeting, as the document is still a valuable source of information, also for people outside of MPEG.
The major changes were:

- a better view of what will be done in the 1st phase
- more examples of MPEG-4 enabled applications added (still more are welcome)
- much more harmonization between sections belonging to the different groups

The work on the Overview will continue in the AHG on MPEG-4 Requirements.
One Section of the Overview: 'List of functionalities to be supported by November 1998', was also put into a separate document, highlighting for all MPEG members, in a concise way, what it is that the 1st phase of MPEG-4 will support.

MPEG-7

There were two major milestones for MPEG-7: the release of the 'first draft of the MPEG-7 Requirements

document' (N1679) and the first MPEG-7 seminar, with invited experts from the field.

Seminar

To start with the last: the complete Wednesday after the morning plenary was used to have talks on MPEG-7 and related issues. The program was as follows:

- L.Chiariglione, CSELT, Italy, *"MPEG-7 - A Scenario"*
- R.Koenen, KPN Research Netherlands, *"MPEG-7: Context and Objectives"*
- M.Bryan, The SGML Centre, UK (SC18 Representative), *"Text-Based Data Navigation and Relationship Between Text and Image Searching"*
- R.Ronfard, INA, France, *"A Content Provider's View of Multimedia Indexing"*
- M.C.Brown, ORL, UK, *"The Video Mail Retrieval Project"*
- J.Ibbotson, IBM, UK, *"Overview on IBM QBIC Activities Related to MPEG-7"*
- R.L.Lagendijk, Delft University, NL, *"Overview on European ACTS-SMASH Data-Base Access Activities"*

The Seminar, organized by Thomas Sikora, was very well visited and resulted in much useful information. A report on the seminar can be found in N1686; this report also contains some conclusions drawn from the presentations. The results of the Seminar will be incorporated into the MPEG-7 Context and Objectives document (N1678), but this could not yet be done during the meeting. Also, there will be consequences for the MPEG-7 Requirements Document (N1679). Both documents will be revised during the work in the AHG on MPEG-7 Requirements (N1674).

First Draft of Requirements Document

Bases on contribution MPEG97/M1941: 'First Proposals for MPEG-7 Visual Requirements' by Fernando Pereira, a 'first draft of MPEG-7 Requirements' (N1679) was produced. It currently has more input for Audio than for Video, and needs some more work before it can be released outside of MPEG, but it is a useful and timely start of this work.

MPEG-7 Context & Objectives

The MPEG-7 Context and Objectives Document was updated following output from the Ad Hoc Group on Requirements. One more FAQ was added during the meeting ('Will MPEG-7 replace MPEG-1, -2 and -4?). Updating the document with the results of the Seminar, and proposing a new version for Stockholm, are tasks of the Ad Hoc Group on MPEG-7 Requirements.

Work Item Proposal Acceptance Criteria

A response to the 'Work Item Proposal Acceptance Criteria' was written (N1684). The conclusion of this response is that MPEG-7 is indeed necessary, and that technology that MPEG-7 can standardize exists, and that more is forthcoming. This procedure is necessary to have the Work Item accepted by JTC1.

Public Documents and Ad Hocs

The following documents were released for public usage:

- MPEG-7 Context and Objectives (N1578)
- MPEG-7 Seminar Notice (N1579)
- Requirements for Identification and Protection of Content (N1580)
- MPEG-4 Requirements (N1595)

The Requirements Group recommended setting up 4 ad hoc groups:

- MPEG-4 requirements (N1673, Rob Koenen, co-chair Jean-Claude Dufourd on collecting requirements for use of MPEG-4 on the DVD)
- MPEG-7 Requirements (N1674, Fernando Pereira; co-chair Ed Hartley)
- Content-related IPR issues (N1675, Dominique Yon)
- MPEG-4 Low Delay Evaluations (N1677, Mike Zeug)

Annex 1: Agenda

Agenda Requirements meeting

When	What
Monday	
9.00-14.00	plenary
14.00-15.00	*lunch*
15.15-13.00	agenda, goals of meeting, report of chairmen's meeting
15.00-17.00	Report back about MPEG-4 issues from AHG (General Requirements issues) • 1883 Fernando Pereira - *Report of the Ad Hoc Group on MPEG Requirements*
17.00-19.00	Profile discussion
Tuesday	
8.00- 9.30	Shape Coding Requirements (joint with Shape People) • 2006 Ibrahim Sezan, Richard Qian, *Scalable Shape Coding Requirements*
9.30-10.30	Intellectual Property Rights Issues; kicking off the work that will continue is separate group. Address contributions: • 1938 Goran Eriksson - *Some thoughts regarding conditional access issues* • 1947 Niels Rump, Jürgen Herre - *Copyright protection of Multimedia Data: The "Multimedia Protection Protocol" (MMP)*
10.30-13.30	Profiles: • Profile policy (Object ↔ Decoder Profiles; need different Systems Profiles?) • 1995 Michael Zeug - *MPEG-4 Profile Requirements Version 2.1* • 2114 Michael Zeug - *Editor's Notes in MPEG-4 Profile Requirements version 2.1*
13.30-15.00	*lunch*
15.00-15.20	Brief look at MPEG-4 Overview
15.20-17.00	Profiles Conttributions, also discussing: • 1911Jean-Claude Dufourd - *The "Interaction with a Multimedia Database" profile*
start 16.00	• 2085 Takuyo Kogure, Takanori Senoh - *DMIF for DVD* (About a "DVD Profile")
17.00-19.00	Joint meeting with SNHC on SNHC Requirements
19.00-??	discussion, (small group), DMIF, SNHC, MUX and Reqs about scenarios
Wednesday	
9.00-11.00	Plenary
11.00-13.00	***MPEG-7 Seminar*** Extract requirements and information for updating MPEG-7 Context & Objective
13.00-14.00	*lunch*
14.00-18.00	***MPEG-7 Seminar continued***
18.00-18.45	Conclusions from MPEG-7 Seminar
19.15-	Social Event
Thursday	
9.00-11.00	MPEG-7 continued • 1941 Fernando Pereira - *First Proposals for MPEG-7 Visual Requirements* • 1942 Fernando Pereira, Pedro Geada - *Sketch-based database retrieval: a demonstration of an MPEG-7 application* • 1985 Rob Koenen for AHG - *draft revision of MPEG-7 Context MPEG Requirements and Objectives*
10.30-12.00	joint with SNHC (Profiles and SNHC Requirements)
12.00-13.00	joint with Audio (Profiles, Synthetic Audio)
13.00-14.00	*lunch*
14.00-15.00	joint with Systems
15.00-16.00	report back from IPR people
16.00-18.30	Profiles, Requirements
Friday	
8.00- 8.30	Joint with SNHC on SNHC requirements
8.30-13.00	Approving documents, final editing
13.00-14.00	*lunch*
14.00-late	plenary meeting

Annex V

Report of DSM Meeting

Source: Vahe Balabanian

1. Contributions

Doc #	Title	Contact	Relevance
M1987	TransMux Control Interface	Guido Franceschini	DMIF
M1988	Definition of tools to support DSMCC-UU conformance testing	Guido Franceschini	DMIF
M1989	Problems found in DSMCC-UU implementations	Guido Franceschini	DMIF
M2001	Universal MPEG-4 Object Descriptor	Regis Crinon	DMIF
M2014	Proposal of an Interface Framework for Control of Bindings between DMIF Network and Media Dependent Parts	Vahe Balabanian	DMIF
M2015	Binding Interface Base	Vahe Balabanian	DMIF
M2016	A Multiplex for Low Rate, Delay Sensitive Applications (I.363.2)	Vahe Balabanian	DMIF
M2017	Mapping of MPEG-4 ESs to Tap IDs and Association	Vahe Balabanian	DMIF
M2018	A Method for the Transparent Transfer of an MPEG-4 ES from one connection to another	Vahe Balabanian	DMIF
M2019	A Method for Rapid Transfer of Association Tag Pairing with a Channel ID	Vahe Balabanian	DMIF
M2020	Temporary Displacement of Lower Priority MPEG-4 ESs in order to carry Higher Priority Ess	Vahe Balabanian	DMIF
M2021	Predictive Connection Capacity Generation	Vahe Balabanian	DMIF
M2022	Transfer of MPEG-4 ESs from Best Effort to QoS Guaranteed Connections Vahe Balabanian DMIF		
M2023	A First Scenario for DMIF Integration with Internet for the 14496-6 PWD	Vahe Balabanian	DMIF
M2024	Updates to the DSM-CC FAQ Vahe Balabanian DMIF		
M2025	Feedback on the DSM-CC Tutorial Presentation in Sevilla	Vahe Balabanian	DMIF
M2180	Multiplex Architecture	Jim Van Loo	DMIF
M2181	FlexMux Protocol Proposal	Jim Van Loo	DMIF

Because of priorities and the shortage of time M2025 was not dealt with at this meeting.

2. Attendance

Name	Organization	Delegation
Guido Franceschini	CSELT	Italy
Jens-Uwe Kloecking	FhG IFT	Germany
Guy Hirson	NDS	UK
Vahe Balabanian	Nortel	Canada, Chairman
Toshifumi Kanamaru	Oki Electronics	Japan
Graham Pereboom	Philips	Netherlands
Laurent Herrmann	Philips	France
Tim Addington	Scientific Atlanta	USA, Editor
Regis J. Crinon	Sharp Labs Amer.	USA
Jim Van Loo	Sun Micro	USA
Mehrdad Ahmedi	Teracom	Sweden

3. Interface between MPEG-4 Systems and DMIF

A common ground of understanding and terminology has been reached between MPEG-4 Systems and DMIF Subworking groups. This is documented in the DMIF PWD N1688 and will give the chance for both MPEG-4

members in DMIF and Systems to think it over and finalize it at a joint ad hoc meeting on June 10-11/97, N1700.

4. DMIF 14496-6 PWD N1688
The Preliminary working draft identifies the motivation, scope, architecture, Interface primitives with the MPEG-4 Systems, Interface primitives between two connected DMIF peer terminals, the various networks the DMIF will accommodate and the control flows.

DMIF as a Multimedia Integration Framework provides a friendly environment to ISO/IEC, ITU-T and Internet standards. This is partly achieved by making the interface to the MPEG-4 coders and decoders used by the ISO/IEC MPEG-4 FlexMux, also available to ITU-T and Internet standards.

The MPEG-4 FlexMux is MPEG-4 Systems' responsibility and a Reference Model will be available by ISO/IEC and verified by ISO/IEC MPEG.

ITU-T and Internet through DMIF can integrate their standards with the MPEG-4 coders and decoders and/or as an underlying layer to the MPEG-4 FlexMux. The responsibility for this rests with the individual standards groups if they wish to carry MPEG-4.

5. DMIF Reference Model - N1689
Identifies the requirements for DMIF software for use in concept verifications. In order for DMIF to become a standard it is necessary that a DMIF Reference Model be supplied. The latter does not need to be a full implementation having commercial value. It needs just to demonstrate the concept. The requested date of availability is October 97. The interest of participating members is keenly requested.

The DMIF Reference Model will operate on a PC with Windows 95 over Internet point-to-point connection.

6. Reply to SG11 regarding Comments on Q.2941.1
Minor adjustments were requested but not at the expense of the delay for the approval of Q.2941 dated for September 1997.

7. Preparation of DSM-CC FAQ answers (version 1.1) - N1691
Incorporated input received from contribution M2024

FAQ appears on the MPEG Web http://drogo.cselt.it/mpeg/

8. Release of DSM-CC Conformance 13818-10 Working Draft - N1690
Incorporated input from M1988. More input is requested from the 19 companies who are implementing DSM-CC. If no further input is received by next meeting in Stockholm then this standard will not go through its Committee Draft phase (i.e., it will effectively be canceled).

9. DSM-CC Resolutions in Bristol:
1- Accept N1688 as the Preliminary Working Draft of ISO/IEC 14496-6 DMIF
2- Accept N1689 as the DMIF Reference model requirements
3- Accept N1690 as the DSM-CC conformance specification ISO/IEC 13818-10 Working Draft
4- Accept N1691 as version 1.1 of answers to the DSM-CC FAQ

10. Target Dates to meet:
· DSM-CC Conformance 13818-10
* Committee Draft -- July 1997,
* Draft International Standard – March 1998,
* International Standard July 1998

· DMIF 14496-6
* Working Draft -- July 1997
* Committee Draft -- October 1997,
* Draft International Standard – November 1998,
* International Standard January 1999

11. Upcoming meetings:

Joint Systems and DMIF Ad Hoc Hannover June 10-11/97
40th MPEG Full Meeting Stockholm SE, July 21-25/97
41st MPEG Full Meeting Fribourg CH, October 27-31/97
42nd MPEG Full Meeting Tokyo JP, March 16-20/98
43rd MPEG Full Meeting Dublin IE, July 6-10/98
44th MPEG Full Meeting Eilat IL, November 2-6/98

Annex VI

Report of Systems Meeting

Source: Olivier Avaro

The Systems group aimed during the Bristol meeting at reviewing contributions, and improving the specification of its related field of interest : composition, multiplex, time and buffer management and interaction.

The Systems group defined a workplan for its activities and gave priorities to the topics currently under consideration. The workplan gives a high priority to the specification of 2D scene description, multiplex, buffer management, synchronisation and IPR identification. These features are the ones targetted for the November CD. The success of this first set of specification is conditioning the other activities. Specifications for 3D scene description are currently well documented and may be present in the 98 IS if a software validation is made available. More long term issues, such as APIs definition, description of behavior, MPEG-7 Systems, ... are forseen. Detailed information about the overall Systems activities are described in the MPEG-4 Overview Document (N1683).

Two software projects (one in Java, managed by Rohit Agarwal (Intel), one in C++, managed by Zvi Lifshitz (VDOnet)) have been launched. They aim at developing and demonstrating a simple integrated Systems Layer (2D scene composition, synchronisation and multiplex with real-time performances), in order to demonstrate the short term goals. Other companies get involved in the process and we can now expect that the Systems software activity reach a sufficient momentum to validate the Systems specifications in November. The first results of these projects are expected by July. The description of the project and the partners involved can be find in document N1694.

The composition and multiplex activity devoted most of their time to reach a common understanding with the other groups. In that sense, the Bristol meeting was the first one at which a complete picture of the MPEG-4 standard have been sketched. The Systems multiplex found its place in the DMIF architecture, the various elements related to composition developed in the Audio/SNHC/Video groups have been identified and most of them have been integrated in the BIFS format (the MPEG-4 Systems format to describe audiovisual scene). However, the process is only at its beginning. The specifications need further harmonization, the sketch has to be refine up to finer details. The current specifications can be found in N1692 for the Systems WD and N1693 for the Systems VM.

The activity of developping the standard will keep going on in the various Ad Hoc group, based on the release of a new Working draft and Verification model.

Annex VII

Report of Video Meeting

Source: Thomas Sikora (Chairman MPEG Video Group)

The work in the MPEG video group mainly concentrated on issues related to the progression of the MPEG-4 Video Verification Model (VM) and the Video Working Draft (WD), the establishment of general video group work requirements and on video issues related to the joint MPEG-4 Video and SNHC activities. Additionally the July 1997 Subjective Tests were prepared in joint meetings with the MPEG Test group.

As one of the primary tasks the video group reviewed the goals and deliverables for the MPEG-4 CD in October 1997. The group reconfirmed its commitment to provide efficient tools and algorithms for the functionalities outlined in the video requirements over a range of bit rates between 5 kbits/s and 4 Mb/s. The only functionality that will not be sufficiently covered by October 1997 is related to the multiview coding functionality. This functionality will be provided with an extension to the MPEG-4 standard. The extensions envisioned include:

- Embedded 2-Stage lossless compression for video archiving
- Embedded coding of image and video for compression and feature extraction (MPEG-7)
- Fine granularity scalability
- Multiviewpoint video coding
- Stereoscopic video at lower bit rates
- Object based stereo of multiview coding
- Shape coding for MPEG-7 applications
- Efficient coding of 3-D meshes
- Various error resilience techniques

The MPEG-4 Video Verification Model was progressed into Version 7.0 based on results of Core Experiments which were performed by MPEG members between the Seville and Bristol meetings. The new MPEG-4 Video VM was extended with provisions for:

- Improved SA-DCT
- Texture coding mode syntax
- Changes to temporal scalability
- New postprocessing filter
- Interlaced coding tools
- 12 bit video coding tools
- Change in the initial value of frame memory
- Clarification of unrestricted motion compensation
- Removal of constraint on VOP-size lower bounds
- Clarification of temporal reference for prediction
- Sprite and GMC syntax updates

- Changes to spatial scalability syntax
- Error resilience partitioning
- Introduction of a Group of VOPs layer
- Larger VOP size
- New binary shape coding

The existing list of Core Experiments was revised and extended with new algorithm proposals. A significant amount of meeting time was allocated to the review of input documents related to results of existing Core Experiments and for proposals of new Core Experiments. Experimental conditions of the Core Experiments were harmonised to allow a more efficient evaluation of the results at the next meetings. Documents with new or revised descriptions of Core Experiments were issued related to "Coding Efficiency", "Shape and Alpha Channel Coding", "Object/Region Texture Coding", "Error Resilience" and "Multi-Functional Coding Aspects". One AdHoc group was established for each of these sets of Core Experiments to provide a forum for convergence on issues related to experimental conditions and proposed algorithms.

In addition to the new version of the Video VM the 3rd version of the WD was issued. This WD also contains tools and algorithms related to visual SNHC functionalities and is referred to as a „Visual“ Working Draft.

Joint meetings were held with the Requirements, SNHC, Systems and Implementation groups to harmonise efforts. An extended list of video requirements in particular for shape coding and texture coding was revised and used as a draft for the Requirements group. In a joint meeting between Video and Implementation groups various shape coding methods were evaluated in terms of software and hardware implementation complexity. In a meeting with the Systems group, the video requirements for the systems multiplex and composition were clarified. A joint Video/SNHC AdHoc group was established to collaboratively identify suitable texture coding tools for the MPEG-4 video VM.

In a joint meeting between Test and Video Groups the planned tests for July 1997 were organised and new test sequences identified. This addresses in particular the generation of the anchor sequences, the distribution of the test sequences, segmentation masks and experimental conditions.

At the next WG11 meeting in Stockholm in July 1997 the Video group will mainly concentrate its efforts on improving the MPEG-4 VM with respect to error resilience, coding efficiency and further improvements for texture coding. Separate AdHoc group meetings are scheduled for "Coding Efficiency" (2 days), "Joint Meeting with Video/SNHC" (1 day) and "Shape Coding" (1 day) on the weekend prior to the Stockholm MPEG meeting.

Annex VIII

Report of Audio Meeting

Source: **P. Schreiner, Chairman Audio Subgroup**
D. Meares, Secretary Audio Subgroup

Opening of the meeting

The MPEG/Audio Subgroup meeting was held during the 39th meeting of WG11 in Bristol, UK on April 7 to 11, 1997. The list of participants is given in Annex A-I. The Chairman welcomed the delegates to the meeting and outlined the work for the five days. He explained the purpose and scheduling of the joint activities with other groups.

Approval of agenda

The agenda as presented in Annex A-II was discussed and approved.

Sevilla meeting report

The Audio Subgroup portion of the Sevilla meeting report, February 1997, had been previously distributed and was approved.

Allocation of contributions

All contributions were listed (see Annex A-VI) and allocated to the agenda. All contributions directly related to the Subgroup were presented either in Audio plenary or in the task group discussions. Several relevant documents from Test, SNHC, Systems and Requirements were brought to the attention of the group.

Communications from the Chair

The Chairman summarised the detailed allocations and questions raised at the Chairman's meeting held on the evening before the main meeting started. The majority of these, by design, were already in the agenda.

- System issues seem not to be sufficiently advanced to support the functionalities being proposed by Visual, Audio and SNHC in MPEG-4. It is essential that the list of deliverables for October 1997 be trimmed to match what can be expected to be debugged by then. This will allow efforts to be concentrated.
- The MPEG-4 Overview document needed attention by Audio members. Mr Spille's proposals from the Sevilla meeting needed to be amalgamated into the document.
- The NB comments on AAC needed to be addressed.

Joint meetings

Joint meetings were held with Test, Systems, Requirements.

Report of Ad-hoc group activities

All Ad-hoc Group reports (M1888, 1893, 1953, 2002, 2049) had been presented in the opening Plenary. Each was briefly presented again in the Audio Subgroup. Additional details were taken into account in the main part of the meeting.

Resolution of National Body comments

Mr. Meares presented the UK NB comments on AAC. There was some discussion and they were all subsequently addressed in DoC, document WG11/N1651.
Mr. Watanabe presented the Japanese NB comment asking for information on error resilience to be collected in the appropriate MPEG-4 documents. This and the other Japanese NB comments were covered by the liaison response, document WG11/N1656.

The remaining comments were also addressed at the appropriate point in the agenda.

Temporary Task Group Formation

To accomplish the large number of tasks to be performed by the Audio Subgroup, 13 task groups were formed as indicated in Annex A-V. The results of each of the task groups were presented to and discussed by the entire Audio Subgroup, including iterations as necessary. The conclusions of the task groups are presented elsewhere in this report and are included in the output documents.

MPEG-2 BC coding

PDAM/1 IS 13818-5

Mr. Kerkhof took the part of this task of changing the MPEG-2 technical report to include an update to align the report with the 2nd edition of IS13818-3 into a small group. Editing continued during the week. The conclusions of this work are given in document WG11/N1627.

MPEG-2 audio quality update

It was reported that ITU-R 10C are proposing to carry out formal assessments of multichannel sound codecs in the near future. Members will keep MPEG advised of the progress of this work.

Bitstream tests

Mr. v.d. Kerkhof reported having more bitstreams available which could be uploaded onto the ftp site, together with a decoder implementation. These will be uploaded and a 'readme' file and input to the Stockholm meeting will be prepared.

MPEG-2 AAC

IS preparation

The issue of AAC prediction complexity had been addressed in an ad-hoc group and its output, M1893, was presented by Mr. Quackenbush. The group has demonstrated that there could be a worthwhile reduction in complexity by employing several proposed techniques. The subjective effect of this was addressed in M1937 which was presented by Mr. Meares. The tests, though brief, showed a slight reduction in quality. The Chairman asked for a decision on whether or not the complexity reduction should be accepted in view of the slight cost in terms of quality. After debate, it was decided that the value of complexity reduction was well worth having. The appraisal of complexity and the test results on prediction complexity are given in documents WG11/N1628 and WG11/N1629 respectively.

The IS editing task group discussed the German National Body Comment to disable the application of pulse coding to short MDCT blocks. This feature was not exercised during the formal testing of AAC. No experiment has been conducted to examine its effects. However, the German National Body believes that the benefit of complexity reduction is greater than the potential penalty of coding quality degradation for this proposal. Moreover, worries were expressed on the difficulties in making a clear and error free text description of the current application of pulse coding to short MDCT blocks and on the time constraints in editing. Therefore, it was agreed to accept the German NB comment, even though this change is considered to be more than a minor technical change.

Ms. Bosi's task group reviewed the NB comments on the DIS. Almost all of the comments were accepted and a response to each of the NBs was prepared. The accepted comments were mapped into the DIS which was recommended for progression to IS by a unanimous vote.

The disposition of comments on AAC and the final text of the IS are given in documents WG11/N1651 and WG11/N1650 respectively.

Technical Report

Mr. Coleman established a task group for the week and divided the work of drafting the changes to Technical Report 13818-5 between various volunteers. This effort is the other part of the work for PDAM/1 IS13818-5. The drafting work was commenced with the intention to complete the work by the Stockholm meeting. This is merged into output document WG11/N1627.

Conformance

Mr Lueck's task group worked on the PDAM to 13818-4. Their output, covering IS 13818-7 (AAC), is given in document WG11/N1626.

Test results

The test results on reduced complexity prediction given in M1937 were presented. These showed a minor effect on the subjective quality. This needs to be compared with a significant reduction in implementation complexity. As reported above, the results are given in document WG11/N1629.
The test results on the SSR profile were presented in document M1966. This compares SSR against the AAC low-complexity profile. The document shows little difference between the coders but the low anchor results were not given. These were subsequently presented and show a reduced sensitivity to coding artefacts compared to earlier tests. A revised document giving these additional results and comparisons on the low complexity profile and low anchor results from the formal AAC assessments was prepared and is given in document WG11/N1704.
Document M2157 presents the results on the error sensitivity of AAC coding. This shows the sensitivity of various bits in the bitstream to errors and thus confirms the need for appropriate error protection.

Verification tests

Mr. Feige's task group identified the necessary verification tests for both the AAC and the MPEG-4 VM codecs. It was decided that the first round of tests would be for AAC stereo and mono to be conducted prior to the October '97 meeting and the MPEG-4 tests would follow after the meeting.
Samsung kindly volunteered to collect new test material and a Call for New Test Material was prepared, document WG11/N1706.
The preparatory steps for the AAC tests which need to be conducted shortly after the July 1997 meeting were presented to the Audio Subgroup in a joint meeting with Test. Prioritisation of the bitrates and profiles to be tested took place. Different test methods are still needed for high quality codecs and low bit rate codec evaluations. The preliminary plans for the tests will be conveyed to the ad-hoc group on test preparations.
The question of copyright release of test material already used by MPEG for 'publication' on CD-ROM for use by MPEG members only on future MPEG tests was raised by Ms. Contin. Many members of the Audio Subgroup expressed real concerns with the idea of release of material, other than speech, by this means. The use of the existing ftp sites was preferred.
Also discussed was the content of the A/V test sequences. Some members of the Audio Subgroup reviewed a recording of existing material and advised on additional programme types. A Call for new A/V material was jointly drafted with Test, document WG11/N1709.

MPEG-4

Overview

The preparation of the audio aspects of the MPEG-4 Overview were addressed in a small task group during the early part of the week. In so doing, the full range of audio tools were 'filtered' to concentrate on those tools which were likely to be delivered by November 1997. The conclusions were reported via the Audio Subgroup to Requirements and are included in output document WG11/N1683.

VM activities

Mr. Grille continued his work on the amalgamation of all approved elements of the VM. Components approved at the previous meeting have now been merged as have some of the elements proven in the latest core experiments. The work of amalgamation will continue during the inter-meeting gap with the arrival of the SNHC Structured Audio source code from MIT (Synthesised) expected before the next meeting. The current state of the VM is given in document WG11/N1632.

Profiles

At a joint meeting with Requirements, Mr. Koenen outlined their concept of how the details of a profile can be defined. Syntax, bitstream and tools are easy, but performance is hard in the context of an object oriented system because it depends so much on the composition tools. He proposed that, for the time being, audio (and video) profiles will be defined, but the compositors will be left for a while until more is understood about them. The Audio Subgroup felt that this was too restrictive and that there were cases where the more simple composition

profiles could already be specified. Additionally, Mr. Koenen asked that object profiles be entered into the WD at the next meeting.
The Audio Subgroup noted the profile documents and the need to incorporate the SNHC profile information. The need for Random Access profile before Nov. '97 and 3-D audio profile after Nov. '97 were flagged. However, pressure of other work did not permit an update to the profiles to be prepared during the Bristol meeting.

MPEG-4 Audio Working Draft

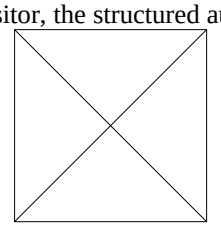
The Working Draft task group progressed well during the week and drew into the document corrections due to earlier errors, newly proven core experiment items, and SNHC Structured Audio and TTS interface elements. The final state of the draft is given in document WG11/N1631.

Systems Issues (MSDL)

The systems issues were addressed in joint meetings and task group activities with Systems Subgroup.
Document M2044 was described by Mr. Schreier. It specifies the audio transform parts of the structural approach to the tree- structured composition tools in SNHC. Examples are given of how this can be applied to simple events. Discussion showed some mismatch between this proposal and the VRML approach to locations. This will be developed before inclusion in the MPEG-4 WD.
Mr. Agarwal presented document M2144 describing the results of a core experiment on simple audio composition. It was pointed out, during a joint meeting, that even if this works, it will be limited to mono sources: it cannot be applied to multiple audio sources that themselves contain spatial inter-relationships.
The Audio Subgroup presented a proposal of the structure of the Systems Compositor function for audio. The architecture supports all of the audio functions identified by systems and other unique requirements of synthesised audio outputs.

SNHC

The SNHC compositor and its interaction with the audio part of MPEG-4 was discussed in Mr. Schreier's task group. Ways of handling the functionality of the compositor both outside, 'Basic composition', and inside, 'Advanced effects', the audio decoder were identified.
Profile '1' handles just synchronisation and routing. Profile 'Full composition' covers additionally mixing, tone control and sample rate conversion. Profile 'Advanced effects' includes reverberation, spatialisation, flanging, filtering, compression, limiting, dynamic range control etc.. Profiles 1 and Full can both be handled within the system part of MPEG-4, i.e. outside the audio decoder. Profile 'Advanced effects' is handled in the audio/SNHC compositor, the structured audio effects 'SAFX' box.



In discussion, it was decided that quality issues with synthetic audio cannot sensibly be evaluated in formal subjective tests. There will have to be demonstrations, 'check phase' evaluations, to the Audio Subgroup, and there will have to be conformance checks on the functionalities.

Other developments

MPEG-4 Player

Mr. Coleman presented an update to the MPEG-4 Player. The proposal is that the Player would represent a first subset of the MPEG-4 tools and would be comprised of a demultiplexer, a face-and-body animation algorithm, an audio AAC decoder, a compositor, and a presenter. The status of the Player is given in document WG11/N1705.

Compositors

Demonstrations of 2D and 3D compositors were given to a subset of the Audio Subgroup members. These are early demonstrators but clearly show the potential power of this tool.

Testing options

Document M1946 was presented by Mr. Dietz together with a demonstration. It addressed the question of how the existing test sequences can be supplemented. Additional items have been identified and informal tests showed some codec sensitivities (execrable quality) that had not been heard before. It was concluded that new test items are essential.
The documents from Ms. Contin, M1990, M1991 and M1992, were reviewed in task group and editing changes were discussed.

July 1997 tests

It was resolved that no tests are now required, see below, 221071.

Pre-screening results

The pre-screening results of the Philips proposals SAC and Harmony were reviewed. The FhG results showed marginal improvement of the SAC proposal at 40 kbps v twin-VQ but no improvement v AAC or at 16 kbps v twin-VQ. The Philips test results for their own proposals showed a slight improvement for 2 out of 19 speech items. The NTT results showed no significant differences at 40 kbps v current VM for compression and worse results for Philips v VM at 16 kbps scaleable. The NEC results also showed no improvement for the Philips Harmony coder at 6 and 2 kbps for compression nor at 2 kbps for speed control. The Sony results showed the Philips Harmony coder slightly worse for 3 out of the 4 comparisons.
For the 16 to 40 kbit/s SAC coder, it was agreed that there was no overall advantage. Philips pointed out, in contrast, that the Harmony coder has less delay and needs less memory than the existing VM. It was suggested that the proposal be viewed again as a low-delay core experiment rather than a 'July 97 test' task. After discussion, this proposal was adopted. Therefore no July 97 audio tests in response to the November 1996 call for proposals are required. Further discussion is reported under 'Core experiments'.
Mr. Moriya presented his document M2070. This gives some results on error resilience subjective tests and proposes a core experiment. Mr. Moriya presented a recording of his findings. The protection causes virtually no loss under error free conditions and radical improvement in error robustness.
Mr. S-W. Kim presented his document M2088 on a proposed low-complexity scaleable codec for MPEG-4 and played a demonstration tape. The pre-screening results show better quality at higher bitrates compared to NTT scaleable, but worse at lower bitrates. Samsung therefore propose using their module to support coding at high bitrates.

Core experiments

Mr. Brandenburg presented his ad-hoc group report. He suggested that in future some extra advisory email support would be useful to advise members about what experiments are taking place and to provide assistance to each testing group.
Mr. Meares advised the group, based on some of the recently reported test results, that there was a danger with the methodology as presently set up that there could be 'false positive' results. The methodology needs to be revised to protect against this. This was done and is presented in document WG11/N1634.
In discussion of the consequences of the pre-screening test results, it was decided that the low delay coder from Philips will be assessed in a core experiment against the existing VM speech coder. The target will be assessments at a delay of around 40 msec maximum. This core experiment is itemised in document WG11/N1630.
Mr. Brandenburg presented his task group's appraisal of the core experiment results and proposals. The group studied all the core experiment results. 3 proposals were withdrawn either completely or temporarily, 6 were accepted and 3 had reached check-phase status. 6 new core experiments were proposed. The final status is given in document WG11/N1633.

MPEG-7

The papers on MPEG-7 were drawn to the attention of the group for their consideration. There was unfortunately no time to consider this matter in any depth due to pressure of other work.

MPEG Audio FAQ

Mr. Spille collected new questions and answers and, with his task group, reviewed the FAQs already on the web site. The revised FAQs are given in document WG11/N1635.

Preparation of a press statement

A contribution to the press statement was prepared by Mr. Meares and approved by the Subgroup. It is included in the overall press statement, document WG11/N1617.

Liaison matters

There were no liaison matters to be dealt with at this meeting.

Discussion of unallocated contributions

All contributions were allocated to main agenda items.

Recommendations for final Plenary

A list of recommendations was prepared for approval at the final MPEG plenary meeting. The MPEG Audio FAQ and MPEG-4 Audio WD documents were approved for public release.

Establishment of new Ad-hoc groups

The following ad-hoc groups were established:

- Ad-hoc Group on MPEG-2 AAC Conformance and Technical Report, WG11/N1636 - Coleman/Thom
- Ad-Hoc Group on MPEG-4 Audio WD and VM, WG11/N1637 - Grill/Purnhagen
- Ad-Hoc Group on MPEG-4 Audio Core Experiments (including SNHC Audio), WG11/N1638 - Brandenburg/Moriya
- Ad-hoc group on Audio FAQ for the MPEG Home page, WG11/N1640 - Spille
- Ad-hoc group on MPEG-4 composition, WG11/N1641 - Scheirer
- Ad-hoc group on MPEG-2 AAC verification test programme item selection process, WG11/N1657 - Dietz/Contin
- Ad-hoc group on MPEG-4 Player - Coleman

Their mandates are given in the document WG11/N1614.

Additionally, the following joint ad-hoc groups were established

- Ad-Hoc group on MPEG-4 Requirements, WG11/N1673 - Koenen
- Ad-hoc group on joint visual/audio/systems activities, WG11/N1702 - Raj Taluri

Agenda for next meeting

The agenda for the MPEG Audio Subgroup meeting in July 1997 in Stockholm, Sweden was approved (see Annex A-III).

Any other business

There was no other business.

Closing of the meeting

Mr. Schreiner thanked the participants for all their hard work in preparation for and during this meeting. He also thanked Mr. Meares for acting as Subgroup Secretary. With that, he declared the Audio Subgroup meeting closed and wished members a safe return journey.

Annex A-I

39th MPEG/Audio Bristol Meeting Participant List (April 1997)

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Annex A-II
Agenda for the 39th MPEG/Audio Subgroup Meeting
in Bristol, 7-11 April 1997

I.	Opening of the meeting	
II.	Approval of agenda	
III.	Seville meeting report	
IV.	Allocation of contributions	
V.	Communications from the Chair	
	A. Joint meetings	
VI.	Report of ad hoc group activities	1888, 1893, 1953, (1993), 2002, 2049, (2107),
VII.	Resolution of National Body Comments	1884, 1885, 1886, 1924, 2081, 2175
VIII.	Temporary task group formation	
IX.	MPEG-2 BC	
	A. PDAM/1 IS 13818-5	
	B. MPEG-2 audio quality update	
	C. Bitstream tests	
X.	MPEG-2 AAC	
	A. IS preparation	
	B. Technical report	
	C. Conformance	
	D. Test results	1937, 1966, 2157,
XI.	MPEG-4	1944,
	A. Overview	1944, 1945,
	B. VM activities	1956, 1997, 2061, 2144,
	C. Requirements	(1947), (2142),
	1. Profiles	(1995),
	D. WD	
	E. Technical Report	
	F. Systems Issues (MSDL)	1919, 1939, (1999), 2028, 2029, (2055), 2062,
	G. SNHC	(1898), 1931, 1932, 1998, 2044, 2045, 2046, 2078, 2080, (2107),
	H. Other developments	2001,
	1. MPEG-4 Player	1994,
	I. Complexity	
	J. Testing options	1946, 1990,
	1. July 1997 tests	1991, 1992,
	2. Pre-screening results	1930, 1978, 2070, 2072, 2083, 2084, 2088, 2095
	3. Core experiments	1957, 2032, 2058, 2071, 2079, 2082, 2124,
	4. Verification testing	
	K. MPEG-4 Compositor	
XII.	MPEG-7	(1941), 1942, 1985,
XIII.	MPEG Audio FAQ	
XIV.	Preparation of a press statement	
XV.	Liaison matters	
XVI.	Discussion of unallocated Contributions	
XVII.	Recommendations for final plenary	
XVIII.	Establishment of new Ad-hoc Groups	
XIX.	Agenda for next meeting	
XX.	A.O.B.	1950, 2086,
XXI.	Closing of the meeting	

Annex A-III
Agenda for the 40th MPEG/Audio Subgroup Meeting
in Stockholm, 21 to 25 July 1997

I. Opening of the meeting
II. Approval of agenda
III. Bristol meeting report
IV. Allocation of contributions
V. Communications from the Chair
  A. Joint meetings
VI. Report of ad hoc group activities
VII. Resolution of National Body Comments
VIII. Temporary task group formation
IX. MPEG-2 BC
  A. PDAM/1 IS 13818-5
  B. MPEG-2 audio quality update
  C. Bitstream tests
X. MPEG-2 AAC
  A. Technical report PDAM/1
  B. Conformance PDAM/1
  C. Verification tests
XI. MPEG-4
  A. Overview
  B. Requirements
    1. Profiles
    2. SNHC elements
  C. Systems issues
    1. MPEG-4 Player
    2. Error resilience
  D. SNHC (Structured audio and TTS)
  E. Testing options
    1. Pre-screening results
    2. Core experiments
  F. VM development
  G. WD (including object profiles)
  H. Other developments
XII. MPEG Audio FAQ
XIII. Preparation of a press statement
XIV. Liaison matters
XV. Discussion of unallocated Contributions
XVI. Recommendations for final plenary
XVII. Establishment of new Ad-hoc Groups
XVIII. Agenda for next meeting
XIX. A.O.B.
XX. Closing of the meeting

Annex A-V

Audio Task Groups

1. MPEG Audio FAQ - Spille
2. MPEG Audio - Preparation of press statement - Meares
3. MPEG-2 PDAM/1 IS 13818-5 preparation - Kerkhof
4. MPEG-2 AAC IS preparation - Bosi
5. MPEG-2 AAC Conformance - Lueck
6. MPEG-2 AAC Technical Report - Coleman
7. MPEG-2 & -4 stereo/mono verification tests - Feige, Watanabe
8. MPEG-4 SNHC Audio amalgamation (including compositor) - Schreier
9. MPEG-4 Core Experiments, A/V test material - Brandenburg
10. MPEG-4 WD editing, Functionalities and Tools - Grill
11. MPEG-4 Player - Coleman
12. MPEG-4 Preparations for the Audio July 97 tests
13. MPEG-4 Overview - Burns

Annex A-VI

Input/Output Documentation

Contributed documents

The following documents were contributed to the Audio Subgroup and were considered during this meeting:

Number	Source	Title
M1884	UK National Body, (D. J. Meares)	Provision of Matrix-mixdown stereophony in MPEG-2 AAC
M1885	UK National Body, (D. J. Meares)	Use of pre-emphasis and de-emphasis in MPEG-2 AAC
M1886	UK National Body, (D. J. Meares)	MPEG-2 AAC: changes to data_stream_element specification
M1888	Marina Bosi	Report of the Ad Hoc Group on MPEG-2 IS 13818-7 (MPEG-2 Advanced Audio Coding, AAC) Progression
M1893	S. R. Quackenbush	Report of the Ad-hoc Group on Reducing AAC Prediction Complexity
M1930	Uwe Gbur, Andreas Ehret, Martin Dietz	FhG pre-screening test results
M1937	David Kirby	Results of the subjective listening tests on reduced complexity AAC prediction
M1946	Juergen Herre, Uwe Gbur	On the Selection of New Audio Test Material for MPEG-4 Audio
M1953	Bernhard Grill, Heiko Purnhagen	Report of the AhG on MPEG-4 Working Draft Editing and VM Software Implementation
M1956	Heiko Purnhagen, Bernd Edler	Considerations on scalability and bitstream format for MPEG-4 Audio
M1957	Bernd Edler, Frank Baumgarte	Results of the core experiment on Nokia backward prediction proposal
M1962	Mike Coleman, David Thom	Report of Ad-Hoc Group for AAC Conformance and Technical Report
M1966	Kenzo Akagiri, Yoshiaki Oikawa	Listening test report of the MPEG-2 AAC SSR profile multichannel audio coding
M1978	Rakesh Taori,, Werner Oomen	Submission for Audio-pre-screening
M1997	Gakl Richard, Pierre Bonnard, Ariane Le Dori	A Solution for a Scaleable Audio and Speech Coder based on Core Coders
M2002	David Thom, Mike Coleman	Ad Hoc Group Report on MPEG-2 AAC Conformance Testing & Technical Report
M2032	Lin Yin, Mikko Suonio, Mauri Vaananen	Proposal for a Core Experiment on Forward Prediction in MPEG-4
M2045	Eric Scheirer, Barry Vercoe	Result of Core Experiment SA2 (non-Java Structured Audio)
M2046	Eric Scheirer, Barry Vercoe	Proposed Changes to SNHC Structured Audio
M2049	Karlheinz Brandenburg	Report of the Ad-hoc Group on core experiments for MPEG-4 audio
M2058	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa, Naoya Tanaka	Proposal of bitrate scalability for Twin VQ based core and comparison with NTT scaleable coder
M2061	S.-W. Kim, Y. B. Thomas Kim	Results of the check phase experiment of NTT scaleable CODEC proposal for MPEG-4 Audio
M2070	Kazunaga Ikeda, Takeshi Mori, Takehiro Moriya, Naoki Iwakami, Akio Jin, Satoshi Miki	Proposal of error protection tools for T/F coder of MPEG-4 Audio VM
M2071	Akio Jin, Naoki Iwakami, Takehiro Moriya, Satoshi Miki, Kazunaga Ikeda, Takeshi Mori	Report of the core experiments of the bit-rate scalability tools for MPEG-4 Audio VM

M2072	Takehiro Moriya, Akio Jin, Naoki Iwakami, Kazunaga Ikeda, Takeshi Mori, Satoshi Miki	Report on the pre-screening test for 16 and 40 kbit/s audio coders
M2081	The National Body of Japan	Comments on the July 97 tests
M2082	Masahiro Iwadare, Toshiyuki Nomura	Core experiment results for Nokia's proposal on backward prediction
M2083	Toshiyuki Nomura, Kazunori Ozawa, Masahiro Serizawa, Masahiro Iwadare	A bitrate scaleable tool for the narrow band CELP coder of the MPEG-4/Audio VM
M2084	Toshiyuki Nomura, Masahiro Iwadare	Pre-screening test results for MPEG-4/Audio '97 July test
M2088	S.-W. Kim, Y.-B. Thomas Kim, S. H. Park	Proposal for a Core Experiment on low complexity scaleable codec for MPEG-4 Audio
M2095	Jun Matsumoto, Masayuki Nishiguchi, Kazuyuki Iijima	Pre-screening test results of audio proposals at 2.0 and 6.0 kbps
M2124	Mauri Vaananen, Mikko Suonio, Lin Yin	Listening test results of Nokia backward prediction core experiment check phase
M2157	Sanae Hotani, Toshio Miki	The report on error sensitivities of AAC audio coding
M2161	Grill, Bernhard	Improved Scaleable Bitstream Syntax
M2182	David Meares	Informal assessment of AAC downmix stereo performance

The following documents were also noted as relevant to the business of Audio Subgroup and discussed accordingly

Number	Group	Section	Source	Title
1898	MPEG-4	SNHC	Caspar Horne, Ganesh Rajan	SNHC Verification Model 3.1
1919	MPEG-4	SNHC	Joern Ostermann, Andrea Basso, Mark Beutnagel	Synchronisation between TTS and FAP based on bookmarks and time-stamps
1924	HoD	General	The National Body of Japan	Japan's Comments on MPEG-4 VM Encoder Software
1931	MPEG-4	SNHC	Ulrich Horbach	Implementation of Audio Compositing Functions: Algorithms and Hardware Requirements
1932	MPEG-4	SNHC	Matthias Rosenthal	Implementation of Audio Compositing Functions: Software Considerations
1939	MPEG-4	Systems	Sofie Olsson	One possible MPEG-4 TransMux instance: DAB
1944	MPEG-4	General	Rob Koenen	Revision of MPEG-4 Overview
1945	MPEG-4	General	Rob Koenen	Report of AHG on MPEG-4 Overview
1947	MPEG-4	Requirements	Niels Rump, Juergen Herre	Copyright protection of Multimedia Data: The "Multimedia Protection Protocol" (MMP)
1977	MPEG-4	Test	V.Baroncini	July 97 Competition Test
1985	MPEG-7	Requirements	Rob Koenen for AHG on MPEG Requirements	draft revision of "MPEG-7 Context and Objectives"
1990	MPEG-4	Test	Laura Contin (editor)	MPEG-4 evaluation methods
1991	MPEG-4	Test	Laura Contin (editor)	Logistics for July '97 competitive tests
1992	MPEG-4	Test	Laura Contin (editor)	Proposal for verification tests
1993	MPEG-4	Test	Laura Contin (editor)	Report of the ad hoc group on MPEG-4 Test methods and procedures
1994	MPEG-4	Systems	Mauro Quaglia, Stefano Battista, Franco Casalino	Implementation Scenarios for an MPEG-4 Player

Number	Group	Section	Source	Title
1995	MPEG-4	Requirements	Michael Zeug	MPEG-4 Profile Requirements Version 2.1
1998	MPEG-4	SNHC	Pierre Bonnard, Gael Richard, Cedric Sibade, Franck Rigoulet	An implementation of graceful-degradation concept in a 3D audio compositor
1999	MPEG-4	Systems	Eddie Cooke(Teltec Ireland), Liam Ward (Teltec Ireland)	3D VM Plug-and-Play Interface for 2D AV Objects
2028	MPEG-4	General	Dominique CURET	Interface between audio & systems
2029	MPEG-4	Systems	Dominique CURET	Flexmux considerations
2044	MPEG-4	Systems	Eric Scheirer, Barry Vercoe, Machine Listening Group	Audio BIFS nodes for Audio Composition using SNHC Audio
2055	MPEG-4	Systems	A. Eleftheriadis, C. Herpel, L. Ward (Editors)	MPEG-4 Systems Working Draft 3.1
2062	MPEG-4	Systems	H. Kalva, A. Eleftheriadis, A. Puri, R. Schmidt	Stored File Format for MPEG-4
2078	MPEG-4	SNHC	Minsoo Hahn, Shinya Nakajima	Considerations for the comments on MPEG-4 TTS Interface
2079	MPEG-4	SNHC	Hang-Seop Lee, Young-Kwon Lim, Minsoo Hahn, Jungchul Lee	Report on the Core Experiment of "STOD with MPEG-4 TTS"
2080	MPEG-4	SNHC	Hang-Seop Lee, Young-Kwon Lim, Minsoo Hahn, Jungchul Lee	Suggestions for the MPEG-4 TTS Interface bit stream syntax
2107	MPEG-4	SNHC	Peter K. Doenges	Report of Ad Hoc Group on SNHC VM/WD Integration into MPEG-4 VM/WD
2142	MPEG-4	SNHC	Peter K. Doenges	Proposed Changes to MPEG-4 Requirements v. 2 (N1595) re: SNHC
2144	MPEG-4	Systems	Rohit Agarwal	Results of Experiment on Simple Audio Composition API Integration

Output Documents

The following output documents were produced by the Audio Subgroup. Those shown in Italics were approved for public release.

Number	Author	Title
N1622	D. Meares	Bibliography of Audio Subgroup Documents
N1623	D. Meares	Informal assessment of AAC downmix stereo performance
N1626	C. Lueck	Information Technology - Generic Coding Of Moving Pictures And Associated Audio Information: Conformance Testing ISO/IEC TR 13818-4 PDAM/1
N1627	M. Coleman, L. v.d. Kerkhof	Information technology — Generic coding of moving pictures and associated audio information — Part 5: Software Simulation PDAM/1
N1628	S. R. Quackenbush, H. Fuchs, M. Dietz	Report on Reduction of Complexity in the AAC Prediction Tool

Number	Author	Title
N1629	David Kirby & David Meares	Results of the Subjective Listening Tests on Reduced Complexity AAC prediction.
N1630	L. v.d. Kerkhof et al	Core experiment on the low delay speech profile
N1631	B. Grill et al	Working Draft of ISO/IEC 14496-3 MPEG-4 Audio V3.0
N1632	Bernhard Grill	Software decoder VM for MPEG-4 audio V 3.0
N1633	K. Brandenburg	Status of MPEG-4 audio core experiments
N1634	B. Edler, J. Herre, K. Brandenburg (for the update)	Core experiment methodology for MPEG-4 audio
N1635	J. Spille	MPEG Audio Frequently Asked Questions, Version 3
N1650	M. Bosi et al	IS 13818-7 (MPEG-2 Advanced Audio Coding, AAC)
N1651	M. Bosi et al	Disposition of Comments on ISO/IEC DIS 13818-7 (MPEG-2 Advanced Audio Coding)
N1704	Kenzo Akagiri and Yoshiaki Oikawa	Listening test report of the MPEG-2 AAC SSR profile multichannel audio coding.
N1705	M. Coleman	Status of MPEG-4 Player Activities
N1712	S. R. Quackenbush	Report on Complexity of MPEG-2 AAC Tools

Annex IX

Report of SNHC Meeting

Source: Peter Doenges

Summary

The Bristol meeting was undoubtedly the most challenging difficult work for SNHC to date. Many contributions and core experiment results had to be reviewed carefully. The individual working groups needed to concentrate on more rigorous bitstream refinement, bitstream exchange, and verification work to meet MPEG standards. Much progress has been made in the last four meetings on the SNHC VM text editing and working VM software that accomplishes several forms of SNHC functionality. The dedication of SNHC people to be practical and specific beyond working in design generalities, and to make operating models of VM software, is exemplary. This does credit to MPEG, especially since SNHC contributions have not been developing for as long as those of other MPEG-4 work areas.

Mature elements of SNHC transitioned to the WD framework of Audio, Visual, and Systems parts, while other candidate technologies were excluded or delayed for further work to contain the complexity of tools and to ensure a viable, stable SHNC core for MPEG-4. SNHC joined the work processes of Audio, Video and Systems groups. There were many combined meetings that were quite productive. Requirements revision, core experiment and D1 reviews, and evaluation and pruning of texture/mesh coding with Video were productive. Structured Audio and TTS transitioned to the Audio WD, and related changes were made in Requirements, Technical Overview, and Systems.

The most demanding and complex process was transitioning of SNHC A/V object design, scene composition, and synchronization (e.g. FBA, MITG, meshes, SA) into the Systems framework for timing, multiplexing, composition, and BIFS. This revealed that work is needed to achieve focus and specific SNHC design requirements within Systems. Systems has evolved architecture over time, and is stabilizing concepts now. SNHC has been more application-focused and has developed working SNHC VM software, including standalone implementations of A/V object representation, composition, synchronization, and rendering/compositing on PCs and workstations.

Bringing these two areas together and achieving a single shared understanding of the combined Systems and SNHC functionality were most challenging, time consuming, yet very productive. Joint meetings were carefully attended by many capable people, and at times seemed chaotic with the divergent opinions that were ultimately clarified. This also required high multiplexing of SNHC-oriented people. The joint-meeting priority began to divert needed work in SNHC away from bitstream and functionality closure. Systems integration is crucial, yet resource tradeoffs will be a real challenge in moving SNHC to Systems vs. refining SNHC details to achieve required SNHC stability in the next several months before CD. This resource tradeoff in SNHC compression, functionality refinement, and profiling vs. Systems integration will persist, until Systems and SNHC enthusiasts verify a Systems core that recreates SNHC functionality accomplished so far in more standalone SNHC VM software. The proof will be in Stockholm results.

In addition, SNHC working groups had to give priority to making accurate contributions to MPEG-4 Requirements and Technical Overview documents, which were accomplished. Application vignettes and outlining of SNHC profiles were given a significant push, but there is still much work in profiling and implementation complexity. The pressures to merge completely into a Systems-based implementation while adapting SNHC functionality and test data for the System syntax, to maintain focus on bitstream exchange and verification in all areas, and to build meaningful profiles, may cause some functionality compromises to achieve a high-quality SNHC core by CD date.

After so much SNHC software and Systems progress has occurred, decisions were made to narrow scope or postpone work by dropping SVQ from texture compression and by delaying 3D, interactivity in several SNHC areas, more comprehensive geometry compression, and specific functionalities in FBA, MITG, SA, etc. for the CD. In the trials involving DCT and wavelet technology for texture compression, challenging decisions must still be made about uniqueness of tools for functionality and performance. Top priority will be given to making the "system" work with accurate bitstreams, so (if unavoidable) SNHC functionality may be reduced in the CD to

ensure MPEG-4 integrity.

Recognition must be given to SNHC people across all MPEG-4 groups who have worked so diligently, and who must still adhere to the process, balance schedule pressures, and achieve MPEG quality.

Work Plan

Bristol Meeting Objectives for SNHC

SNHC met most of its work plan in Bristol. SNHC planned an essential functionality "freeze" in Bristol, and a shift from considering new functionality to accomplishing refinements for stable SNHC contributions to the CD. As such, the work scope decided in Bristol became the deliverables for CD on the commitment which SNHC made in Bristol to complete. SNHC transitioned sufficiently mature work into the MPEG-4 WD main parts. SNHC also planned to select working examples of SNHC that could be extracted from VM work and adapted for the MPEG-4 Player by July 1997. The Player focus should be: to demonstrate bitstream compliance for valid interoperability of MPEG-4 terminals along with associated functionality of decoded bitstream content, to achieve performance as close to real-time as possible to verify synchronization of mixed media based on a software solution without optimized silicon, and to exercise meaningful test data in a representative scenario. The fidelity or realism of models that are not part of the MPEG-4 standard, and the realistic rendering and presentation of A/V objects beyond their decoding and composition, were treated as secondary. SNHC was also committed to help bring the Requirements and Technical Overview in line with SNHC scope commitment, and to work on profiling later in the meeting as time permitted.

SNHC Meeting Work Plan & Priorities

The top priority was determining the scope and maturity of SNHC work to commit to CD, and then what SNHC work should go forward for incorporation in the three main parts of the WD, while satisfying criteria for promotion to WD outlined in N1546 from Sevilla. Special meetings were held on Sunday to look at these issues in MITG and in joint session of Video, SNHC, and Requirements, as well as in an editors' meeting on the WD process and work status. The Sunday joint V/S/R meeting also provided time to evaluate again the requirements and extensive core experiment results in texture coding. On Monday, the joint session of SNHC considered recommendations from working group leads about justification for WD transition. This was followed into Tuesday by parallel break-out sessions of the SNHC working groups as the only practical way to review SNHC core experiment and contribution presentations, and confirm the WD transition plan. Editors and teams were identified to work transition items with the other groups, while non-transitioned SNHC VM work remained with the SNHC VM editor. Structured Audio and TTS were transitioned for further work to the Audio group early in the week. By Wednesday afternoon, SNHC had reviewed the remaining work sufficiently to approve or delay specific work areas for promotion to WD.

The next major work area was the revised implementation of most SNHC functionalities in the Systems architecture, and the development of a partitioning model between Visual, Audio, and Systems specification parts. The basis for this partitioning was agreed by Tuesday. Basically, SNHC A/V object decoder technology transitioned to Audio and Video. Composition and synchronization of mixed SNHC A/V object types went to Systems. In one peculiar but necessary exception, the on-going review of architecture for incorporating Structured Audio into Systems required a basic decision about the granularity with which SA objects should be partitioned for Systems control of composition and timing. Due to the demanding speeds and functional integration of DSP required within SA (for scheduling, interpreting Orchestration downloads at short event intervals specified by Score commands, and implementing the networks involved with SA special effects and audio source mixing), a SA decoder model was adopted that places less demands on Systems. This provides Systems with an interface to a SA decoder that exercises higher-level control for composing SA objects in space and time, while leaving the more demanding synthetic audio composition details within the SA decoder. FBA, MITG, and texture/mesh coding still required more specific low-level partitioning to restructure for the A/V object representation and composition of Systems.

With a somewhat clearer idea of how SNHC would be partitioned and implemented in Audio, Visual, and System parts, several meetings were held to look at the MPEG-4 Player objectives. This included discussion and decisions on the speed and functionality of VM software candidates to include in the Player. Also decided was how to

combine coding and composition functionalities of MPEG-4 with rendering and presentation layers beyond MPEG-4 scope without diverting unnecessary resources away from integrating MPEG-4 tools. This led to useful and pointed discussions about tradeoffs associated with Systems compositing of 2D image/video planes vs. 3D composition of objects and their viewpoint-specific rendering into a Z-buffer. Player complexity issues and the need to focus on a 2D core for the baseline of the MPEG-4 CD eventually led to Player simplifications that should be manageable.

Additional meetings were held between SNHC, Requirements, and Technical Overview to evaluate suggested changes and agree on editing revisions to those documents. Some effort produced a draft internal document within SNHC (not approved as a meeting document) on application classes and profiling. This can be used as a baseline for contributing more specific profiling proposals for SNHC at Stockholm. A tentative meeting with Implementation Complexity was planned but not eventually scheduled due to overall workload. The decoder functionalities in SNHC still require an assessment of their loading on terminal resources. However, the absence of more mature profiling and the movement of FBA, MITG, mesh coding, SA, etc. into the Systems framework suggested that Implementation Complexity should wait until these efforts are better integrated at the next meeting.

SNHC & Related Contribution Reviews

Bristol contributions were presented or discussed from Monday through Thursday in SNHC working group meetings and in joint meetings with other groups, based on an allocation of contributions outlined below:

SNHC VM/WD & Integration

M1897 Horne, … Report of the Ad Hoc Group on SNHC VM Editing
M1898 Horne, … SNHC Verification Model 3.1
M2107 Doenges Report of Ad Hoc Group on SNHC VM/WD Integration into MPEG-4 VM/WD

SNHC Face/Body Animation

M1917 Haratsch, … Implementation of Face Animation Parameters and of Face Definition Parameters: Issues and Questions
M1918 Ostermann, … Let Animals and Furniture Speak: Proposal for Extending the Scope of Face and Body Animation
M1919 Ostermann, … Synchronization Between TTS and FAP based on Bookmarks and Time-Stamps
M1979 Pockaj Data for FAP Evaluation and Compression
M1980 Pockaj, … Data for FAP Evaluation and Compression
M2149 Petajan, … Report of the Ad Hoc Group on Face and Body Animation

SNHC Media Integration of Text & Graphics

M1899 Dufourd, … Report on SNHC MITG Core Experiments
M1965 Nagarajan, … Report of the AHG on Media Integration of Text and Graphics
M2052 Rajan Results of Core Experiments in Media Integration of Text and Graphics
M2125 Katto Results of Core Experiment M3/G2
M2134 Fisher, … Integration of MITG with the System VM

SNHC Audio - Text-to-Speech

M2078 Hahn, … Considerations for the Comments on MPEG-4 TTS Interface
M2079 Lee, … Report on the Core Experiment of “STOD with MPEG-4 TTS”
M2080 Lee, … Suggestions for the MPEG-4 TTS Interface Bitstream Syntax

SNHC Audio - Structured Audio

M1931 Horbach Implementation of Audio Compositing Functions: Algorithms

and Hardware Requirements

M1932 Rosenthal — Implementation of Audio Compositing Functions: Software Consideration
M2044 Scheirer, ... — Audio BIFS Nodes for Audio Composition Using SNHC Audio
M2045 Scheirer, ... — Results of Core Experiment SA2 (non-Java Structured Audio)
M2046 Scheirer, ... — Proposed Changes to SNHC Structured Audio

SNHC Texture Coding

M1900 Torres, … — SVQ Results of CE Z1
M1904 Horbelt, … — Results of Core Experiment Z2
M1915 Schmid — Results of CE Z1 for Efficient Coding of Textures
M1959 van Beek, … — CE Z4: 2D Dynamic Mesh Compression
M1972 Sezan — Experimental Results on Z4
M1983 Aono, … — Report of Core Experiment Z2
M2036 Li, … — Proposal of Core Experiment Z1: Efficient Coding of Textures
M2037 Li, … — Proposal of Core Experiment Z2: Spatial and Quality Scalability
M2048 Bossen — Results of CE Z3 on Mesh Coding
M2051 Rajan — Results of Core Experiment Z4 (Dynamics 2D-Mesh Compression)
M2075 Ebrahimi, … — Report of the Ad Hoc Group on Core Experiments for Generic SNHC Object Coding
M2076 AHG on Generic SNHC Object Coding — Description of Core Experiments for Generic SNHC Object Coding
M2135 Wu, … — Results of Z2 Core Experiment
M2137 Wu, … — Results of Z1 Core Experiment
M2153 Sodagar, … — Report on Core Experiment Z1: Efficient Coding of Textures
M2154 Sodagar, … — Report on Core Experiment Z2: Spatial, Quality and View-Dependent Scalability

SNHC Geometry/Mesh Coding

M2092 Choi, … — Geometry Compression Using Predictive Residual Vector Quantization (Results of Core Experiment Z3)
M2141 Bossen — On Adding Colors, Normals and Other Useful Things to the Generic Mesh Syntax

Video re: SNHC

M1964 Nagarajan — Core Experiment on Reducing Decoder Memory Requirements for Sprites
M1973 Wu, … — Improved Wavelet Coding for Still Images
M2035 Li, … — Improvements of Core Experiment T1: Wavelet Coding of I-Pictures
M2090 Ogata, … — Results of Core Experiment T1
M2097 Ogata, … — Proposals of the Syntax for Still Image Coding Mode
M2131 Puri, … — Report of Ad Hoc Group on Multi-functional Coding in MPEG-4 Video
M2150 Erdem, … — Alpha-plane Generation Functionality of Mesh-Based Video Object Tracking
M2151 Sodagar, … — Report on Core Experiment T1: Improvements on Wavelet Coding of VM

Systems re: SNHC

M1910 Dufourd — Report on an Implementation of the 2D Composition Scheme
M1922 Herpel — Update of Multiplex API in Systems VM
M1998 Bonnard, … — An Implementation of a Graceful-Degradation Concept in a 3D Audio Compositor
M1999 Cooke, … — 3D VM Plug-and-Play Interface for 2D A/VObjects
M2000 Privat, … — Using a Generic Object-Oriented Metadata Description as the MPEG-4 Scene Description Format
M2005 Tabatabai — Composition Ad Hoc Group Report
M2055 Eleftheriadis, … — MPEG-4 Systems Working Draft 3.1
M2060 Eleftheriadis, … — Report of AHG on Systems Working Draft Editing
M2062 Kalva, … — Stored File Format for MPEG-4

M2119	Agarwal	Media Transmission for the Flexible APIs
M2120	Agarwal	3D Integration Strategy for the Flexible Composition APIs
M2133	Puri, …	APIs for MPEG-4 Systems
M2143	Agarwal, …	Results of Experiment on Composition API Changes
M2144	Agarwal, …	Results of Experiment on Simple Audio Composition API Integration
M2146	Agarwal, …	Report of the AHG on Systems VM

Requirements & General re: SNHC

M1883	Pereira	Report of the Ad Hoc Group on MPEG Requirements
M1911	Dufourd	The "Interaction with a Multimedia Database" Profile
M1940	Franceschi	Suggested Revisions of Main Profile
M1944	Koenen	Revision of MPEG-4 Overview
M1945	Koenen	Report of AHG on MPEG-4 Overview
M1947	Rump, …	Copyright Protection of Multimedia Data: The Multimedia Protection Protocol (MMP)
M1995	Zeug	MPEG-4 Profile Requirements Version 2.1
M2006	Sezan	Scalable Shape Coding Requirements
M2085	Kogure	DMIF for DVD (with SNHC thread)
M2142	Doenges	Proposed Changes to MPEG-4 Requirements v2 (N1595) re: SNHC

SNHC & Working Groups

With the complex efforts in joint meetings to accomplish WD transition, Systems integration, and Player objectives, the uniform experience of many SNHC contributors was hectic. While much was accomplished in the joint activities, less detailed SNHC VM editing and work on bitstream syntax and exchange was accomplished, a widening concern for SNHC contributors and the SNHC editor. Some SNHC VM software was not yet adequately segregated where the encoder, bitstream, and decoder parts can be accessed cleanly enough, but commitments were made to accomplish needed changes within 6-8 weeks after the Bristol meeting. This will enable contributors to conduct bitstream exchanges where this has not yet been achieved consistently with all of the SNHC VM software. Summaries of working group results and core experimenting for the Stockholm meeting are given later below.

SNHC Profiling

On Thursday, an outline on SNHC profiling was presented and discussed. This work began to consider the construction of profile-oriented sets of functionalities with mixed media synchronization:

- Conversational services: FBA, HSTTS, phonetics, LBR speech coding
- Graphics & text overlay: Text, audio, 2D graphics, video objects
- Augmented video compression with 2D mesh motion estimation
- Landscape fly-over from a remote server with scalable texture
- Synthetic/natural orchestration coordinated with visual mixed media

Although no attempt has been made yet to map these into the established MPEG-4 broadcast and interactive profiles, the goal was to relate these service groups to broad classes of applications. An example of a conversational services profile might include facial animation, text-to-speech or an efficient speech coder, and background audio for a conferencing or story telling application, where these tools are linked and synchronized to provide correlated speech intelligibility and a sense of "presence" for participants. A more complex service such as MITG would combine several of the compositional, multiplex and control capabilities of Systems, specific audio and video decoders, text streams, texture maps, and 2D graphics, subject to the rendering power of the terminal and bandwidth limitations of the connected channel(s). SNHC applications, depending on decoder and terminal complexity, are considered for the PDA, video cellular telephone, audio-video e-mail and conferencing, set-top box, the PC, kiosk device, and workstation, so profiling with some corresponding complexity variation is expected. A few representative SNHC applications picked from many possible should cross-reference the services and tools with this complexity variation.

Some SNHC applications are: low-bitrate interpersonal audio-visual conferencing in real-time or by e-mail; networked synthetic environments integrating talking heads with supporting graphics and spatialized audio; multimedia and informational broadcasting (e.g. program guides, graphic financial news, ads, overlays on sporting and other public events) with animated overlays of text, images, and graphics on static or video backgrounds; Internet or Web music or graphics using compressed structured real-time media; distance learning that combines audio, video, text, annotations/pointers, and graphics in an animated whiteboard; communication karaoke that combines music scoring, video, text, and a lyric pointer augmented by other special effects; text-to-speech synthesis for story teller on demand or facial animation; efficient compression of texture and 2D/3D meshes for mapping, rendering or reanimation in a terminal; server-based view-dependent terrain or object rendering; view-scalable audio-video in 2D/3D environments; image mapping on animated meshes; mesh-augmented video manipulation and dubbing; MIDI integration with other media in a synthetic environment; interactive multimedia presentations (e.g. product/service promotion, virtual travel agency); mixed media training systems; CD-ROM guided tours; remote service manuals; etc. Abstracting a few essential service and tool kit combinations remains the challenge.

SNHC Functional Demonstrations

By prior agreement among the MPEG-4 groups, and with valuable help on media equipment from Paul Fellows, approximately an hour and a half were dedicated Monday night to narrated demonstrations contributed by SNHC, Systems, Audio, and Video people. A shared workstation, audio player, and several PC lap-tops were used to speed the demonstrations. Additional video in NTSC/PAL was available, but the VCR player was misplaced. No Core Experiment sequences were allowed and D1 was unavailable. The purpose of this demonstration series was to share more tangible impressions of working prototypes. Standalone partial implementations of some of the above applications were shown in 5-minute or so intervals. Many demonstrations of mixed media composition and synchronization were shown, some with limited interaction. This included video sprites, sound effects, MITG, video mapped into 2D and 3D synthetic environments, synchronized animated 2D image icons and video clips, and more.

FBA

Core experiment work led to extensive huddles by FBA (combined with the insistent joint meeting priorities). It was recognized that insufficient bitstream exchanges had been accomplished to verify FBA work, and thus to promote FBA to the WD in Bristol, so FBA attempted to finalize as much as possible for the MPEG-4 WD in Stockholm. Decisions were made to use arithmetic coding for FAP/BAP compression, to change FAP masks in the detail syntax, to develop FAP/FDP file formats for the SNHC VM 4.0, to generate additional test sequences and a facial animation program of 3D feature points for FAP quantization tests to isolate better the effects of FAP compression, and to define the support of facial animation to be synchronized with speech for the MPEG-4 Player project. Related items of work planning were scheduled to be complete by mid-May, including viseme and facial expression definition for the SNHC VM 4.0 publication deadline, the updating of FAP compression and decoder software to enable bitstream exchange and verification work, and completion of FDP core experiment definition.

Significant time was spent in joint discussion with Systems developing the transition of FBA into Systems with valid solutions to time coding, identifying companion face models and audio, resolving what to do with 3D delayed, and arriving at a clear approach to facial rendering after the application of the facial animation control program that responds to FAPs. Five separate core experiments (N1672) for FBA are planned by five partners, plus additional Core Experiment G2e on FBA under the Systems VM 4.0 (N1693). These include: very LBR FAP compression with predictive coding and variable quantization step sizes to match different precision requirements of facial movements; verification of the valid interpretation of FAPs on different facial models; verification that different facial models can interpret FDPs in a consistent way for combinations of feature points, mesh, and texture to enable customization of the decoder's facial model for a particular face; similar verification of the interpretation of BAPs on different body models; and animation of two downloaded face models in VRML 2.0 format with tables defining the FAPs while using facial animation sequences from the second core experiment.

MITG

Systems and MITG contributors (encouraging that they are increasingly difficult to distinguish!) focused on MITG

integration with Systems. The MITG group spent significant time in joint meetings with Systems, Requirements, Overview, and other SNHC groups. MITG made steady progress on functionality and the process framework for integration with Systems. The 2D BIFS specification under Systems provides significant features to enable MITG applications and to boost functionality of MITG from Maceió/Sevilla meetings. The stylistic variety of MITG compositional elements, and their arrangement in mixed media 2D formats, provides a framework for useful and interesting content, as well as needed rigor in a new MITG bitstream syntax. The prior MITG object descriptions were reworked to fit with BIFS, and the SNHC VM was updated with beneficial results of all this work. Profiling was also discussed with Requirements, a development area that is much needed across SNHC applications and tools but has lagged due to prior meeting priorities, and a work item for Stockholm. Modularity in selecting groups of nodes with subsets of MITG functionality should provide the basis for supporting a handful of profile-oriented tool kits for decoders (and corresponding animation/rendering services) within lower-cost and more complex terminals

The focus of the groups for Stockholm is to verify and extend MITG capabilities, class libraries, and the BIFS syntax such that integration with the Systems A/V object classes and scene composition architecture is achieved. An extensive core experiment package supported by at least five companies is planned to verify the successful transition to Systems while preserving previously accomplished MITG functionality. A fairly rich but manageable set of media types and composition will be used in MITG core experiments (N1664 and Core Experiment G2b within Systems VM 4.0 N1693). The MITG core experiments include: finite and streaming text with style, layout, language, and animation alternatives mixed with still images and video; a multimedia scrolling ticker tape with object modification within the scroll stream, as well as mixed text formats and text/image combinations; challenging layouts including varied text direction, orientation, justification, and text wrap within a layout frame; and manipulation/composition of 2D graphics primitives such as line, square, triangle, polygon, ellipse, and curve with supported line/fill styles. This work taps Unicode, VRML, ISO/IEC 639/3166, and ISO/IEC 10646. The intended result of Stockholm core experiment submissions is to verify the BIFS-based approach, and to achieve necessary rigor with the objective of full bitstream exchange among participants for proper operation on varied decoders. SNHC and Systems owe thanks to Jean-Claude Dufourd (ENST) who during joint meetings volunteered his MITG-oriented software for the VM.

SA & TTS

As mentioned in the Summary and overview for this major section, Structured Audio and Text-to-Speech have essentially moved under the wing of Audio. This was done to achieve focus, the optimization of SA orchestration/scoring/mixing for real-time audio synthesis, the architectural integration of an encapsulated multi-function Audio decoder model with Systems, and the merging of synthetic and natural audio expertise. The SNHC group will continue to participate in and review results of this important work. The current approach to SA and TTS encapsulates SA implementation details that must be performed at high rates (those of audio events as opposed to visual frames) within the audio decoder (including low-level, high-speed audio event scheduling), while fitting within the Systems architecture for instantiating aggregates of audio sources in space and time at the level of overall scene composition. This basic separation is drawn at the boundary defined by adoption of three "Audible" audio leaf nodes (NaturalAudio, StructuredAudio, and TTSAudio) and what can be done with them in a Systems composition of audio sources. Each of these Audio node types can have a connection to a corresponding elementary stream for Systems manipulation. Any SA/TTS core experimenting for Stockholm is with the Audio group, while the integration of SA in the Systems context is described in Core Experiment G2f under the Systems VM 4.0 N1693. TTS-assisted facial animation is expected in the WD, partitioned among Audio, Systems, and Visual appropriately.

NOTE: There is a significant strategy issue involved with the current choice to embed much of the Structured Audio composition detail in the Audio decoder model. The issue is the hiding of SA details in the Audio decoder for speed and audio network integration vs. the compositional flexibility in space and time and the more equal treatment of single SA sound sources (e.g. this or that musical instrument, a sound effect) that might be achieved under the composition paradigm of a scene graph at Systems level, where composition nodes specify the temporal and spatial instantiation of Audio children. This report recommends that MPEG experts clarify the exact constraints that result from the current partitioning of SA and Systems, and whether a path exists to evolve Audio composition in Systems.

Visual Texture/Mesh Coding

Visual texture and mesh coding were major points of convergence for decisions to be made by Video and SNHC groups. Virtually all of Sunday before the WG11 meeting was spent in a joint meeting of SNHC and Video about competing texture coding techniques, tools consolidation, realism or pertinence of specific requirements, the phasing of work relative to commitments that must be made in Bristol about CD scope, extensive core experiment results, and the planning for continued work (e.g. 3D mesh or more general geometry compression) likely to move beyond the CD date. This and a further meeting on Tuesday morning drilled into review of the technologies in the VMs of SNHC and Video, the need to converge those into one VM, the validity of requirements that drives the current technology insertion in the VM, the adjustment of requirements to be as realistic as possible in serving the greatest simplest most flexible core of those requirements, and the review of numerous core experiment results and D1 tapes. Core experiments for Bristol dealt with the use of SVQ, DCT, wavelets, and 2D mesh compression with implicit topology for coding of different types of texture content and for the manipulation of texture by 2D animated control meshes. New core experiments for Stockholm extend much of this work with multiple partners in each case.

The extensive comparisons of SVQ and wavelets for high-efficiency texture coding with SNR/compression ratio scalability resulted in observing that SVQ clearly does better at high compression rates and on homogenous texture content, while wavelets do better over a broader range of content at lower compression ratios. The fundamental quandary is how much to tune the basis functions and algorithms for specialized forms of texture compression vs. the benefit, and whether the requirements for specialized texture compression are sufficiently compelling and timely relative to target MPEG-4 applications. Applications for homogeneous texture have been offered by several in previous reflector discussions. However, after much discussion in the SNHC/Video sessions, the decision was made that there is not yet enough support for the coding of specialized textures in the MPEG-4 CD to justify the tool diversity that results. The importance of high-compression texture coding is not lost however. Special mention is given to Luis Torres and his colleagues for the championship of SVQ and for the inspiration and spur this has provided others to focus the pursuit of high-efficiency texture under the constraints of reduced tool diversity. Further work in core experiments on coding efficiency (N1648) includes T1/Z1: High-Efficiency Visual Texture Coding with five partners, coordinated by that Ad Hoc Group. Further consideration of specialized texture content types in MPEG-4 extensions must be initiated by a persuasive argument on the Requirements reflector about requirements and target applications for which such techniques would be used.

Some important contributions were made in Bristol on 3D mesh coding (see section 3626 above). The presentations showed real promise for coding and quantization techniques to extend previous work on the use of spanning trees to collapse the structural coherence in 3D polygon meshes, supplemented by other coding of surface normals, colors, etc. Significant compression ratios over those previously accomplished were shown by combining spanning tree technology and predictive residual VQ. More work is needed to control quantization errors in more visually acceptable or non-distracting ways and to improve on the VQ training in the lossy modes. This work is crucial to MPEG-4 3D coding as it develops, and should continue. A general 3D geometry compression scheme originated in IBM research provides an example of these techniques now under consideration by the VRML Consortium. MPEG-4 or extensions might incorporate such technology. The Bristol work suggests that improvements can be made on the class of technology considered for the VRML binary format. Of course, the inclusion of 3D compression in MPEG-4 must be synchronized with Systems inclusion of 3D, with schedule and resources permitting. In addition to the coding efficiency work on visual texture mentioned above for Stockholm, a major group of ongoing core experiments was launched in the baseline areas of visual texture and mesh coding (N1665). Core experiment Z3 on Coding of 3D Mesh in N1665 will extend the greatly needed work on generic 2D/3D meshes. V3 on Compression of Grid Mesh uses an adaptation of texture/video coding for regular arrays of Z-height (e.g. terrain) that should provide low bitrate, low delay, high quality, and potential for progressive mesh. Large regular 3D meshes of Z-height will be rendered with matching terrain texture maps for realistic evaluation of the final quality. By the end of the Bristol meeting, no form of 3D specialized or general mesh compression was promoted to WD as a CD target. Z4 on dynamic 2D-mesh compression for interactive SNHC content manipulation compares compression efficiency of two dynamic (streaming) mesh compression methods, one based on linear mesh graph ordering with a 2D mesh by Delaunay triangulation with implicit topology, the other based on spanning tree ordering with explicit mesh topology and commonality with explicit mesh coding such as in Z3. Delaunay 2D mesh coding was promoted to WD.

Work on view-dependent texture and wavelet-based spatial/quality scalability of texture continued along previous

lines with refinements and supporting D1 evidence that these are, based on currently available evidence, the best technologies to solve these problems. For Stockholm, two extensions in the core experiments for these areas were defined: V1 on View-Dependent Scalability Applied to Texture Images, and V2 on Spatial and Quality Scalability. The objective of V1 is to select tools which provide the best visual quality of a photo-textured environment for specified bitrates. Subjective evaluation of quality in results produced with the Swissair and E&S data sets will compare different techniques using selected viewer positions to generate a sequence of images by mapping decoded images on the 2D/3D surface with side-by-side views of the original and reconstructed sequences. V2 is planned again to select tools, in this case which provide spatial and quality scalability aimed at supporting computer graphics applications with MIP mapping as well as display of early versions of incoming texture in the case of limited channel bandwidth (e.g. progressive texture) with low bitrate, low delay, and high quality. Test sequences will begin with a face and a building at high resolution (2048x2048), and exercise a range of resolutions (64x64 - 2048x2048) over bands of different SNR-related bitrates (16k bits/s - 3M bits/s). Subjective evaluation will again use side-by-side views of originals and reconstructed sequences with window framing to handle large images. Spatial/quality scalable texture, based on wavelets in 11 levels subdividing 2048x2048 resolution, currently underpins the coding of texture objects in the WD. View-dependent texture may be added to the WD based on evaluation of results for Stockholm.

2D/3D Scene Composition (Systems)

As previously discussed, the merging of SNHC and Systems was an intense multi-faceted exercise with numerous meetings and much progress. The Systems VM 4.0 (N1693) provides the foundation for the “final run” at MPEG-4 integration of SNHC mixed media primitives and functionality. The models for Systems architecture, multiplexing, synchronization, media streaming, aural-visual and spatial-temporal scene composition, bitstream representation, caching of media for content reuse, events, and many other issues are covered in that document. Also a large number of experiments for adapting SNHC functionality into the Systems framework is given there. Rather than summarize this extensive work pertaining to SNHC in any detail, a portion of the outline follows including highlights of SNHC issues within about the first half of N1693, as well as less than half of the total formal experiments. The Stored File Format for MPEG-4 is also covered in Annex A. N1693 is mandatory reading for SNHC enthusiasts:

The SNHC portions of Systems are obviously in flux, and final WD content critically depends on results produced from experiments going into the Stockholm meeting. It is imperative for Stockholm that core experimenters in the SNHC working groups, who are using the Systems syntax, transform previous and new media content streams implemented under the standalone SNHC VM into the precise BIFS format equivalents or derivatives, and that common bitstreams are exchanged between experimenters in independent testing.

At the Bristol meeting there was much interest in 3D, and there continues to be 3D emphasis in core experiments. Some labs and companies came forward in Bristol with informal offers to make major 3D contributions to MPEG-4 to accelerate or at least preserve the 3D initiative. The opinion was expressed by these firms that 3D is key to their ability to contribute to MPEG-4 in the longer term. This was carefully discussed by the SNHC and Systems people as part of deciding on CD scope vs. extension work expected after CD date. Based on the desire to ensure the success and stability of the 2D SNHC core of MPEG-4, the decision was made not to include in the CD (based on current work maturity): 3D and associated 3D scene composition, scene interactivity in several SNHC areas and object picking (subject to core experimenting for Stockholm), or comprehensive 3D geometry compression. These decisions can be reviewed in Stockholm, but the priority must be on the 2D core if shared resources are concerned.

SNHC in Joint Meetings

There were many joint meetings among SNHC and other groups. The scheduling of these meetings was constantly challenging, with add-on meetings created spontaneously to ensure closure on different subjects when time ran out in the baseline meetings, while no unified record of SNHC joint meetings has been accurately retained. Please see other sections of this report for issues and results from these joint meetings.

SNHC Results & Recommendations

Overview of Results

For simplicity, the materials from the final WG11 Plenary presentation on SNHC in Bristol are outline below:

SNHC Work in Bristol

- Large emphasis on integrating with other groups.
- Some progress toward WD, also important insights about process & simplification of tools.
- Assistance to Requirements and Overview now reflects accurate picture of current SNHC work.
- Joint meetings with Video & Systems:
  - ⇒ very productive and revealing;
  - ⇒ needed level of problem solving initiated;
  - ⇒ work plans clear; the finish line is in details;
- Simplification of work plan for CD to reflect firm commitment by companies/labs to feature set.
- Valuable Core Experiments planned to help resolve maturity of work and competing solutions in other SNHC areas planned to reach WD at Stockholm.
- Some more work on Profiles, but key focus on this for Stockholm on Requirements reflector.

Results in Main WD Development:

- Criteria for partitioning SNHC contributions into WD (quality/maturity criteria given elsewhere in N1546):
- Visual section - Visual elementary stream which should be decoded separately, and is indivisible into its parts for composition by Systems.
- Audio section - Audio elementary stream which should be decoded separately, which is indivisible into its parts for composition by Systems.
- Systems section - Demultiplexing, spatial-temporal composition, synchronization, A/V Object naming, A/V Object types for broad access in Systems context.

Status of SNHC contributions to WD

- Facial Animation, not recommended for Visual WD incorporation, Systems integration incomplete, no Systems release;
- 2D Mesh Animation & Compression recommended for incorporation in Visual WD, no Systems release.
- MITG WD editing postponed for Stockholm 1st release with core experiments in Systems integration;
- High-efficiency texture coding unreleased with SVQ dropped, withheld from Visual WD pending further Core Experiments with DCT vs. wavelets;
- View-dependent texture coding in Visual VM (wavelets), withheld from Visual WD pending Core Experiments with augmented DCT vs. wavelets;
- SNR/resolution scalable texture in Visual VM (wavelets), baselined for Visual WD pending Core Experiments with augmented DCT vs. wavelets;
- Structured Audio transitioned to Audio Group, incorporated in Audio WD; Systems integration incomplete, no Systems release; and
- Text-to-Speech transitioned to Audio Group, incorporated in Audio WD; Systems integration incomplete, no Systems release.

Software Inventory for SNHC VM:

Functionality	Contributor	When
Facial Animation	MIRALab/LIG	Within 6 weeks
Facial Animation	Lucent	Within 6 weeks
Facial animation	Rockwell	Available
MITG	ENST	Within 6 weeks
Texture coding:		
View-dependent texture	EPFL	Available
SNR/resolution scalable	Sarnoff	Within 2 weeks
Mesh coding 2D mesh:		
animation/compression	U. of Rochester	Available
Structured Audio	M.I.T.	Within 6 weeks
Text-to-Speech	ETRI	Available

SNHC VM & Related Documents

N1666	Text of SNHC Verification Model 4.0 (with improvements, SA/TTS transferred to Audio)
N1669	SNHC Frequently Asked Questions

(first issue at Bristol, to be refined for later release)

Formation of SNHC AHGs

N1667 Ad Hoc Group on Core Experiments on Visual Texture/Mesh Coding
N1668 Ad Hoc Group on Media Integration of Text and Graphics
N1670 Ad Hoc Group on Editing the SNHC VM
N1671 Ad Hoc Group on Face and Body Animation
N1687 Ad Hoc Group on Frequently Asked Questions on Synthetic/Natural Hybrid Coding

Next-round Core Experiments

N1672 Face Body Animation Core Experiments
N1664 Core Experiments in Media Integration of Text & Graphics
N1665 Description of Core Experiments on Visual Texture/Mesh Coding

Publication of SNHC documents

N1666 Text of SNHC Verification Model 4.0
(2 weeks after WG11 meeting for public release)
N1669 SNHC Frequently Asked Questions
(1 month after WG11 meeting for public release)

Other SNHC resolutions

Resolution to approve Visual, Audio, and Systems WDs as edited this meeting.
(joint approval requirement.)

Resolution to accept commitments of following organizations for donation of SNHC Verification Model software:

- MIRALab/LIG for Facial Animation;
- Lucent for Facial Animation;
- Rockwell for Facial Animation;
- ENST for Media Integration of Text and Graphics;
- EPFL for view-dependent texture;
- Sarnoff for SNR/resolution scalable texture;
- Univ. of Rochester for 2D mesh animation & compression;
- M.I.T. for Structured Audio; and
- ETRI for Text-to Speech.

Resolution to publish documents N1666 SNHC VM 4.0 (after two weeks of editing for final corrections) and N1669 SNHC FAQs (after one month of editing).

Resolution for WG11 to develop a policy with respect to software copyrights (in the case of the GNU copyright agreement, for example, the obligation to publish sources of derivatives might prevent the inclusion of GNU software in VM) - *withdrawn in final Plenary as too broad.*

Related Ad Hoc Groups & Documents

Audio

N1631 Text of MPEG-4 Audio WD Version 3.0

N1633 Report of the Status of MPEG-4 Audio Core Experiments
N1634 Core Experiment Test Methodology for MPEG-4 Audio
N1635 MPEG-4 Audio FAQs, Version 3
N1638 Ad Hoc Group on MPEG-4 Audio Core Experiments (including SNHC Audio)

Video

N1642 Text of MPEG-4 Video VM - Version 7.0
N1643 Text of MPEG-4 Visual WD - Version 3.0
N1644 Description of Core Experiments on Shape Coding in MPEG-4 Video
N1645 Description of Core Experiments on Region-Oriented Texture Coding in MPEG-4 Video
N1648 Description of Core Experiment on Coding Efficiency in MPEG-4 Video (including SNHC)
N1649 Ad Hoc Group on Core Experiments on Coding of Arbitrarily Shaped Objects in MPEG-4 Video
N1654 Ad Hoc group on Core Experiments on Coding Efficiency in MPEG-4 Video (including SNHC)
N1713 MPEG-4 Video FAQ Version 1.0

Systems

N1692 Text of Systems WD Version 4.0
N1693 Systems Verification Model 4.0 (including extensive SNHC core experiment definitions)
N1695 Systems (MPEG-2 and MPEG-4) FAQs
N1701 Ad Hoc Group on Systems Composition

MPEG-4 Player

N1705 Report of Status of the MPEG-4 Player
N1708 Ad Hoc Group on MPEG-4 Player

Requirements

N1681 Text of MPEG-4 Profiles - Version 3
N1682 Text of MPEG-4 Requirements - Version 3
N1683 MPEG-4 Overview
N1685 List of Functionalities to be Supported in the First Phase of MPEG-4

Other Work Priorities

- MPEG-4 Player contribution of Facial Animation by E. Petajan - do all to assist this effort.
- Increase companies/labs participation to contribute more language-specific variety to prosodics and phonetics for TTS sample implementations.
- SNHC Profiling dialog and contribution document to complete before Stockholm on the Requirements reflector <mpeg4reqs@research.kpn.com>.

Documents & Meetings Needed in Stockholm

Joint Video and SNHC meeting before WG11 meeting on visual texture and mesh coding.

Improved SNHC FAQs to clarify relationship to other standards.

Implementation Complexity - Paul Fellows/Marco Mattavelli/Serge Gourrier:
1. Purpose: identify complexity or performance hot-spots
2. Two tools available:
   a) Complexity analysis - implementation/platform-dependent
   b) Complexity analysis - independent of platform

3. IC helps with tools & reporting, SNHC does profiling & testing
4. Must have people commitment - SNHC responsible for results
5. No AHG for Bristol, but plan an IC orientation session of SNHC

Testing - Michael Zeug:
1. Verification testing
2. Subjective testing

Elements of Future SNHC Workplan

This list highlights key elements of SNHC work planning beyond Bristol:

- Complete SNHC cut-over to MSDL after Bristol with VM/WD and Test Data Set modifications
- Configuration of SNHC VM reference software for integration in Mike Colman MPEG-4 Player
- Development of the profile definitions and implementation complexity analysis for SNHC tools
- SNHC application demonstrations to be developed by October/November 1997
- Development of requirements for and approaches to SNHC conformance testing

Pete Doenges
May 20, 1997

Annex X

Report of Test Meeting

Introduction

The main goals of the Test Subgroup meeting held in Bristol, during the 39th MPEG meeting, were:

1. Specification of test procedures and logistics for July '97 test
2. Definition of a test plan for verification tests
3. Selection of new audio-visual test material

July '97 test

At the beginning of the meeting the following proposals were pre-registered for the July '97 tests:

Proposal Name	Signal	Proposer	Company	Functionality	Class
Harmony	Audio	R. TAORI	Philips Research Labs	Compression	2, 6 Kbps
				Content-based scalability	6 Kbps
				Speed Control	2, 6 Kbps
SAC (Scalable Audio Coder)	Audio	A.W.J. OOMEN	Philips Research Labs	Compression	40, 64 Kbps
				Content-based scalability	2, 6, 16 Kbps
A Scaleable Wavelet-based Video Codec	Video	Dr. Sinan OTHMAN	Teralogic, Inc.	*All*	*All*
Vector Wavelet Coding	Video	Weiping LI	Vector Vision, Inc. and Lehigh University	Compression	A, B, C, E

After discussions within the Audio Subgroup it was agreed that Philips' proposals would have been evaluated by core experiments and then formal subjective tests were not needed in July '97 for audio.
The two proposals for video were confirmed, though Teralogic expressed the intention of confirming the registration only for compression, object scalability (class A) and temporal scalability (class A).

The logistics for July '97 tests were discussed and the agreements reached were summarised in document WG11/1676. In particular it was agreed that July '97 test will be hosted by FUB, in Rome and the anchor conditions (i.e.VM coded sequences) will be provided by Samsung, Telenor, University of Hannover and Iterated Systems for compression, by HHI for object scalability and by Sharp for temporal scalability.
The testplan for July '97 tests is summarised in the table below:

Activity	Dead-line
Delivery of pre-processed sequences	2nd May
Definition of VM coding parameters	15 May
Final registration & payment	15 May
Submissions and VM decoded sequences sent to FUB	2 June
Editing and test tape preparation	13 June
Grading phase	20 June
Statistical analysis	27 June
Report	4 July
Presentation of results	21 July

Test plan for verification tests

Verification tests will be carried out as soon as the technologies included in the VM will be considered stable. For this reason most of the verification activities will start after October '97, that is after MPEG-4 will have reached the status of Committee Draft.
It was also agreed that the first verification tests will deal with AAC for audio and error robustness for video. Both of them will be completed before the March '98 MPEG meeting. Further audio and video verification tests will be carried out after that meeting and the results presented by July '98.
The general work plan for MPEG-4 verification tests is summarised in document WG11/1707.
In the mean time the Test Subgroup is continuing to co-operate with Audio and Video Subgroup to define the experimental conditions and to collect the needed test items. For AAC test a call for new critical stereo material (WG11/1706) was issued.

New audio-visual test material

Audio-visual test items selected by the Test Subgroup in Sevilla and three new sequences provided by AT&T and showing views of New York was shown to the Video and Audio Subgroups and all of them were included in the new MPEG audio-visual library.
It was recognised that for a more comprehensive evaluation of MPEG-4 further sequences are needed.
The *video content* characteristics required are:

- high motion like in sport sequences
- fading
- local movement associated to global movement, like panning
- camera noise
- sequences with low motion, like those used for remote control
- sequences suitable for automatic segmentation (e.g. an object moving on a still and uniform background)

The *audio content* characteristics required are:

- music excerpts
- audio suitable to check the audio-visual synchronisation, like impulse noise as those produced during a tennis match or by clapping hands.

To this aim a call for new audio-visual test items was issued (1709)

Annex 11

Report of ISG meeting

Source: Paul Fellows

Technical support to other groups

Video Group

Padding.
Implementation was requested to investigate the complexity of some schemes devised to simplify frame based padding. The scheme that was most favourable from an implementation perspective, was the scheme known as Simplified Repetitive padding. The results of the Horizontal/Vertical switching mechanism needs however to be further investigated.

Documents reviewed on this subject were :-
1. m2039.doc : Complexity Analysis of padding.
2. m2050.doc : Report on coding efficiency and complexity of candidate padding algorithms

Shape Coding
Two techniques were analysed; block based and vertex. The complexity analysis performed indicated that the block based scheme should be adopted in preference to the vertex method.
1. m1905.doc : Methods for Vertex-Based Scalable Shape Coding
2. m2004.doc : Results of Core Experiment S4D (Block-based Binary Shape Coding)

Computational Graceful Degradation.

- Review of contributions

A number of contribution documents pertaining to this subject were reviewed
1. m1920.doc : Report of the ad-hoc group on Computational Graceful Degradation.
2. m1921.dco : Some results of the video VM complexity using the instrumentation tools
3. m2093.doc : Proposal for the final definition of ISG core experiments on CGD
4. m2129.doc : Report of the Ad-Hoc Group on Investigating Reduced Complexity Padding Techniques

Other studies :

The document M1914.DOC Initial Assessment of the Video VM 5.0 Memory Requirements, was a very welcome contribution which provided valuable information about memory bandwidth requirements for MPEG-4.

The document M1889.doc Parallelisation of MPEG-4 Video Verification Model Encoder (version 5) in Inter/Intra Separate Mode described the issues involved in parallelisation of an MPEG-4 video encoder.

Conclusion

The group played a very positive role during the meeting both reactively and pro-actively. Particularly good progress was made towards reducing the computational and memory bandwidth for MPEG-4 video decoding thanks to a number of significantly simplified padding schemes being proposed by video group members. Further steady progress has been made on computational graceful degradation, with new proposer's entering the discussion forum.

Annex XI

Report of Liaison Meeting

Source: Barry Haskell, Chairman

The Liaison group considered input documents

Liaison from ITU-T SG16 regarding H.262|ISO/IEC 13818-2 Amendment 4 and H.263+

Liaison from ITU-T SG16 LBC regarding H.263+

Liaison from ITU-T SG11 regarding Q.2941.1

Information from SMPTE concerning MPEG-2 seamless and non-seamless splicing

Information regarding VRML-MPEG streaming media joint working group

Liaison Report to S29 on Recent Activity in the IETF

Liaison from IEC TC100 on color measurement and management

Information on JAVA becoming a JTC1 Publicly Available Specification (PAS)

Comments from General Instruments on IEC CD 1883-4 regarding MPEG-2 RTI

Liaisons from ISO/TC 46/SC 9 on development of intellectual property identification projects ISAN for audiovisual and ISWC for audio.

The following output liaison documents were produced:

WG11/N1658 Liaison statement to ITU-T SG16 indicating our acceptance of their proposed text for Amendment 4 to 13818-2.

WG11/N659 Liaison statement to ITU-T SG11 regarding DMIF and Q.2941.1

WG11/N1660 Liaison statement to ISO/TC 46/SC 9 on development of intellectual property identification projects ISAN for audiovisual and ISWC for audio. Our representative will be Dominique Yon.

WG11/N1661 Liaison response to JPEG-2000 for sending to SC29/WG1 on the subject of MPEG-4 wavelet based texture coding.

WG11/N1662 Liaison response to ITU-T IMT 2000 (F.L.M.P.T.S.) on the subject of operability of MPEG-4 on wireless networks.

WG11/N1663 Liaison response to ETSI U.M.T.S on the subject of operability of MPEG-4 on wireless networks.