

**INTERNATIONAL ORGANIZATION FOR STANDARDISATION
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 **N1718**

July 1997

Source: Leonardo Chiariglione - Convenor
Title: Report of Stockholm meeting
Status: Draft

1. Opening

The 40th WG11 meeting was held in Stockholm, SE, on 97/07/21-25 at the kind invitation of ITS, the Swedish 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 documents submitted

5. Communications from Convenor

There was no specific communication to be made.

6. Report of previous meeting

The Convenor apologised with the meeting on his inability to provide the Bristol meeting report. Because of the recurrence of these episodes he promised this to be the last. If needed he would make recourse to *very* strong actions.

7. Processing of NB Position Papers

These were considered and appropriate responses drafted and approved.

8. MPEG Phase 2

8.1 Part 10 (DSM-CC Conformance)

Version 2 of WD13818-10 was produced.

8.2 Verification of MPEG-2

Work on AAC verification was continued.

8.3 Amendments

8.3.1 Table for 4:2:2 and MV profiles (Sys #4)

The document was progressed to AMD status.

8.3.2 System table entries for AAC (Sys #5)

The document was progressed to FPDAM status.

8.4 Corrigenda

Corrigendum 1 to MPEG-2 part 4 was approved.

8.4 Workplan

This was approved.

9. MPEG Phase 4

9.1 Requirements

The results of the IPR management call were analysed.

Four documents were produced

MPEG-4 applications

MPEG-4 requirements

MPEG-4 profiles

Management of identification and protection of content in MPEG-4

9.2 Tools

9.2.1 DMIF

Several tools were considered for inclusion in the WD

9.2.2 Systems

Several tools were considered for inclusion in the WD

9.2.3 Natural Video

Several tools were considered for inclusion in the WD

9.2.4 Synthetic Video

Several tools were considered for inclusion in the WD

9.2.5 Natural Audio

Several tools were considered for inclusion in the WD

9.2.6 Synthetic Audio

Several tools were considered for inclusion in the WD

9.3 Verification Models

9.3.1 System

Systems decided to abandon the use of VM as a tool to developing the standard.

9.3.2 Video

A new version of the VM was produced

9.3.3 Audio

A new version of the VM was produced

9.3.4 SNHC

A new version of the VM was produced

9.4 Tests

The results of the July 97 tests were analysed. No statistically significant difference in performance between the two submissions and the MPEG-4 Video VM was detected. Planning of Audio and Video Verification Tests was progressed.

9.5 Simulation software

A complete inventory of all donated software was made.

9.6 Working Draft

9.6.1 System

A new version of the WD was produced.

9.6.2 Video

A new version of the WD was produced.

9.6.3 Audio

A new version of the WD was produced.

9.6.4 DMIF

A new version of the WD was produced.

9.6.5 Simulation software

A new version of the WD was produced.

9.7 Workplan

This was approved.

10. MPEG Phase 7

The following documents were produced:

MPEG-7 Context and objectives

MPEG-7 applications

MPEG-7 requirements

10.1 Requirements

A new version of the MPEG-7 requirements document was produced.

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 the MPEG-4 Overview was produced. Several documents to be made public were identified.

14. Organisation of this meeting

14.1 Tasks for subgroups

Task for Requirements

- MPEG-4 Requirements
- MPEG-4 Profiles
- Process IPR management submissions
- Timing for MPEG-4 IPR management part (v. 2.0?)
- MPEG-4 applications for DVD
- MPEG-7 Requirements
- MPEG-4 Overview
- Contributions to Press Release

Task for DMIF

- DMIF WD
- DMIF software
- Review of MPEG-4 Overview
- Decision about DSM-CC Conformance Testing
- Contributions to Press Release

Task for Systems

- Systems VM
- Systems WD
- Review of MPEG-4 Overview
- Private Data Identification DOC & AMD
- Semantic & table def. f. 4:2:2 & MV profiles DOC & AMD
- Contributions to Press Release

Task for Video

- Video VM
- Video WD
- Contribution to MPEG-4 ver. 1.0 Verification Tests plan
- Review of MPEG-4 Overview
- Decision about new technology from July tests
- Ver. 2.0 item list
- MPEG-7 Video

- Contributions to Press Release

Task for Audio

- Audio VM
- Audio WD
- Contribution to MPEG-4 ver. 1.0 Verification Tests plan
- Review of MPEG-4 Overview
- Decision about new technology from July tests
- Ver. 2.0 item list
- MPEG-7 Audio
- Contributions to Press Release

Task for SNHC

- SNHC VM
- Transfer to Systems/Video/Audio WD
- Contribution to MPEG-4 ver. 1.0 Verification Tests plan
- Review of MPEG-4 Overview
- Ver. 2.0 item list
- Contributions to Press Release

Task for Test

- AAC Verification Tests
- MPEG-4 ver. 1.0 Verification Tests
- Contributions to Press Release

Task for Implementation Studies

- Report on complexity estimation tools
- Systems Complexity
- Video Complexity
- Audio Complexity
- Contributions to Press Release

Tasks for Liaison

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

Task for MPEG-4 Player

- Inventory of MPEG-4 software (promises and deliveries)
- MPEG-4 part 5 WD

14.2 Finalisation of meeting allocation

The following joint meetings were held:

Group 1	Group 2	What for	Day	Time	Where
Requirements	Video	Profiles	Mon	17-18	Video
Requirements	Audio	Profiles	Mon	16-17	Audio

Requirements	Systems	IPR	Tue	17-18:30	Systems
DMIF	Systems	FlexMux	Tue	9-5	Systems
Video	ISG	complexity issues	Mon	15-14	Video
Video	Test		Tue	9-11	Video
Audio	Test		Tue	2-3	Audio
Systems	SNHC		Tue	9-11, 2-5	SNHC
Requirements	SNHC		Wed	11-12:30	
Audio	Systems	Sync-Buffer	Wed	5-6	Systems
Video	Systems	Sync-Buffer	Wed	5-6	Systems
SNHC	Systems	Sync-Buffer	Wed	5-6	Systems
Audio	Test	Verif. Test	Thu	11-12	Audio
Requir	ISG	Video Tools	Thu	10-11	Requirem.
Video	ISG	Wavelet	Wed	6-6,30	Video
Video	Requir	Video Prof.	Thu	9-9,30	Video
Audio	Requir.	Audio Prof.	Thu	9,30-10	Audio
Video	Test	Error Rob.	Thu	10-11	Err Rob
SNHC	Video	B3 CE	Wed	5,30-6	Video
SNHC	Test		Thu	2-3	SNHC
System	MPEG-4 Play		Thu	9-10	Systems
Guaranteed Perfor	In MPEG-4 decoder		Thu	2-6	ISG

15. Planning of future activities

The following ad hoc groups were established:

1806	AHG on AAVS scene description
1817	AHG on advanced layered coding for high resolution video
1759	AHG on Audio MPEG website
1760	AHG on Audio/Systems transport issues
1805	AHG on BIFs scene description
1823	AHG on computational graceful degradation (CGD)
1739	AHG on Content Related IPR Issues in MPEG-4
1814	AHG on core experiments on coding efficiency in MPEG-4 video
1811	AHG on core experiments on coding of arbitrarily shaped objects in MPEG-4 video
1812	AHG on core experiments on error resilience in MPEG-4 video
1813	AHG on core experiments on multifunctional coding in MPEG-4 video
1822	AHG on decoder quality of service levels
1819	AHG on DMIF reference source code
1815	AHG on editing the documents of the MPEG-4 video verification model and the MPEG-4 visual working draft
1774	AHG on face/body animation
1753	AHG on MPEG-2 AAC Conformance and Technical Report
1754	AHG on MPEG-2 AAC stereo verification tests
1757	AHG on MPEG-4 Audio core experiments
1761	AHG on MPEG-4 Audio error resilience
1755	AHG on MPEG-4 Audio WD and VM
1820	AHG on MPEG-4 bitstream exchange for texture and mesh coding
1762	AHG on MPEG-4 Conformance and Technical Report preparation
1818	AHG on MPEG-4 encoder optimization
1736	AHG on MPEG-4 Low Delay Evaluations
1737	AHG on MPEG-4 Requirements
1756	AHG on MPEG-4 Structured Audio WD, VM and other developments

1804	AHG on MPEG-4 systems decoder model and multiplex specification
1807	AHG on MPEG-4 systems implementation
1803	AHG on MPEG-4 systems WD editing
1758	AHG on MPEG-4 verification test preparations
1816	AHG on MPEG-4 Video Verification Model Complexity
1738	AHG on MPEG-7 Requirements
1794	AHG on object content information in MPEG-4
1828	AHG on SNHC VM editing

16. Resolutions of this meeting

These were approved

17. A.O.B

A new group "Delivery" was established to continue the DMIF work.

18. Closing

The meeting was concluded with thanks to the hosting organisation.

Annex 1
Attendance list

	First Name	Family Name	Company	Country
1.	Jörgen	Ahlberg	Linköping University	SE
2.	Kenzo	Akagiri	Sony	JP
3.	Osama K.	Alshaykh	University of California, Berkeley	US
4.	Ola	Andersson	Telia Research AB	SE
5.	Ichiro	Ando	JVC	JP
6.	Tsutomu	Ando	Canon InC.	JP
7.	Douglas	Armati	Intertrust Technologies International	UK
8.	John	Arnold	The University of New South Wales	AU
9.	Kohtaro	Asai	Mitsubishi Electric Corporation	JP
10.	Cheung	Auyeung	Motorola	US
11.	Olivier	Avaro	FT. CNET	FR
12.	Vahe	Balabanian	BNR	CA
13.	Makeash	Balakrishnan	Philips Research	US
14.	Vittorio	Baroncini	FUB	IT
15.	Kevin	Barron	KPN Research	NL
16.	Sven	Bauer	Bosch	DE
17.	Bob	Bell	Mitsubishi	US
18.	Ulrich	Benzler	University of Hannover	DE
19.	Gunnar	Betnér	Telia Research AB	SE
20.	Steffen	Binder	HHI	DE
21.	Stefan	Blom	KTH	SE
22.	Choong Seng	Boon	Matsushita	JP
23.	Jan	Bormans	IMEC	BE
24.	Marina	Bosi	DTS	US
25.	Frank	Bossen	EPFL	CH
26.	Lionel	Bouchard	PHILIPS-LEP	FR
27.	Noel	Brady	Teltec Ireland	IE
28.	Jim	Brailean	Motorola	US
29.	Karlheinz	Brandenburg	FHG-IIS	DE
30.	Alvar	Bray	PACT	UK
31.	Harald	Brusewitz	Ericsson Radio Systems	SE
32.	P.M	Buckley	Lucent Technology	UK
33.	Bo	Burman	Ericsson Radio Systems	SE
34.	Ronnie R	Burns	Hughes Electronics	US
35.	Franco	Casalino	CSELT	IT
36.	Thomas J.	Casey		UK
37.	Kiran	Challapali	Philips Research	US
38.	Christopoulos	Charilaos	Ericsson Telecom AB	SE
39.	Kwok	Chau	NJR Corporation	US
40.	Homer	Chen	Rockwell Science Center	US
41.	Wei-ge	Chen	Microsoft Corporation	US
42.	Xuemin	Chen	General Instrument Corp.	US
43.	Cha Keon	Cheong	LG Corporate Inst._of Technology	KR
44.	Leonardo	Chiariglione, Convenor	CSELT, Convenor MPEG	IT
45.	Ahn	Chieteuk	ETRI	KR
46.	Dae-Sung	Cho	Samsung AIT	KR
47.	W.J	Christmas	Elec.Eng. University of Surrey	UK
48.	Charles	Chui	Teralogic Inc.	US
49.	Leszek	Cieplinski	Elec.Eng University of Surrey	UK
50.	Anna	Cognell	Telia Research AB	SE
51.	Mike	Coleman	Five Bats Research	US
52.	Laura	Contin	CSELT	IT

53.	Jonathan	Courtney	Texas Instruments	US
54.	Regis	Crinon	Sharp Laboratories of America INC.	US
55.	Dominique	Curet	France Telecom	FR
56.	Marie	Dahlqvist	Telia Research AB	SE
57.	Robert	Danielsen	TeleNor R&D	NO
58.	Colin	Davies	NDS	UK
59.	Neil	Day	Ricoh Co. Ltd	JP
60.	Jan	De Lameillieure	HHI BS	DE
61.	Christoper	de Vleeschowwer	University Catholique de Louvain	BE
62.	Jÿrgen	Deicke	Darmstadt University of Technology	DE
63.	Jean-Fran•ois	Delaigle	Universite Catholique de Louvain	BE
64.	Nuno	Delgado	CSELT	IT
65.	Gary	Demos	DemoGraFX	US
66.	Sung	Deuk Kim	KAIST	KR
67.	Yoshiharu	Dewa	Pioneer Corp.	JP
68.	Klaus	Diepold	International Digital Technologies_IDT	DE
69.	Peter K.	Doenges	Evans&Sutherland	US
70.	Frederic	Dufaux	Digital Equip. Cord.	US
71.	Jean-Claude	Duford	ENST	FR
72.	Dan	E. Tamir	Multimedia R&D	IL
73.	Touradji	Ebrahimi	EPFL	CH
74.	Bernd	Edler	University Of Hannover	DE
75.	Bob	Eifrig	General Instrument Corp.	US
76.	Jan	Eikeset Knudsen	Telenor	NO
77.	Torbj•rn	Einarsson	Ericsson Telecom AB	SE
78.	Christel	Ekvall	Telia Research AB	SE
79.	Alexandros	Eleftheriadis	Columbia University	US
80.	Wayne	Ellis	BT Labs	UK
81.	A. Tanju	Erdem	Eastman Kodak Company	US
82.	Joaquin	Esmerado	EPFL-LIG	CH
83.	Joaquin	Esmerado	EPFL-LIG	CH
84.	Minoru	Etoh	Matsushita	JP
85.	Joachim	Euchner		DE
86.	G•rard	Eude	France Telecom	FR
87.	Pascal	Faudemay	University of Paris	FR
88.	Frank	Feige	Deutsche Telekom Berkom GmbH	DE
89.	Paul	Fellows	SGS Thomson Microelectronics Ltd	UK
90.	Gerard	Fernando_	Sun Microsystems Inc.	US_
91.	Anibal	Ferreira	INESC	PT
92.	Yuval	Fisher	Rockwell	US
93.	Roberto	Flaiani	Aethra	IT
94.	Robert	Flint	CRL	UK
95.	Robert	Forchheimer	Link•pings Universitet	SE
96.	Steve	Forshay	Dolby Laboratories	US
97.	Charles	Foshee	Booz, Allen & Hamilton	US
98.	Olle	Franceschi	Teracom AB	SE
99.	Guido	Franceschini	CSELT	IT
100.	Bossen	Frank	EPFL	CH
101.	Michael	Frater	School of Electrical Engineering	AU
102.	Hiroyoki	Fukuchi	NSC LSI	JP
103.	Shigeru	Fukunaga	Oki Electric Industry Co.,Ltd	JP
104.	Marco	Gandini	CSELT	IT
105.	Paul	Garrett	University Gate, Pact	UK
106.	Uwe	Gbur	FHG-IIS/A	DE
107.	Hamid	Gharib	BT Labs	UK
108.	Serge	Gourrier	Lab. d'Electronique Philips	FR
109.	Andreas	Graffunder	Deutsche Telekom Berkom	DE
110.	Guido	Grassel	Nokia Research	FI

111.	Patricia	Gray		US
112.	Herve	Greff	Atlantide	FR
113.	Bernhard	Grill	University of Erlangen	DE
114.	Ian	Grimstead	University Gate, Pact	UK
115.	Minsoo	Hahn	ETRI	KR
116.	Harri	Hakulinen	Nokia Research Center	FI
117.	Seok-won	Han	Video Research Center	KR
118.	Sung-Hoo	Han	Samsung	KR
119.	Chris	Hansen	INTEL	US
120.	Ed	Hartley	Lancaster University	UK
121.	Frank H.	Hartung	University of Erlangen	DE
122.	Takashi	Hasegawa	Hitachi, Ltd.	JP
123.	Barry G.	Haskell	AT&T Labs	US
124.	Jacob	Hawley	Joint E-MU/Creative Technology Center	US
125.	Hans	Hermansson	Ericsson Radio Systems	SE
126.	Carsten	Herpel	Deutsche Thomson-Brandt GmbH	DE
127.	Jürgen	Herre	Fraunhofer	DE
128.	Laurent	Herrmann	PHILIPS-LEP	FR
129.	Keiichi	Hibi	Sharp Corporation	JP
130.	Keith	Hill	MCPS LTD	UK
131.	Narumi	Hirose	ITSCJ	JP
132.	Guy	Hirson	NDS	UK
133.	Yo-Sung	Ho	Institute of Science and Technology_	KR
134.	Kuen Pyo	Hong	Sam Sung Electronics	KR
135.	Caspar	Horne	Mediamatics Inc.	US
136.	Kazuhiza	Hosaka	Sony Corporation	JP
137.	Sanae	Hotani	NTT DoCoMo	JP
138.	Karen	Hsing	NIST	US
139.	Si Jun	Huang	Scientific Atlanta	US
140.	Jyri	Huopaniemi	Helsinki University	FI
141.	Andreas	Hutter	Technical University of Munich	DE
142.	Koji	Imura	Matsushita	JP
143.	Masahiro	Iwadare	NEC	JP
144.	Naoki	Iwakami	NTT	JP
145.	Caroline	Jacobson	Teracom	SE
146.	Ramesh	Jain	Virage	US
147.	Euee S	Jang	SP Lab SAIT	KR
148.	Radu Serban	Jasinschi	Tektronix Inc.	US
149.	Sylvie	Jeannin	Philips-Lep	FR
150.	Kazuyuki	Iijima		JP
151.	Ako	Jin	NTT	JP
152.	Tom-Ivar	Johansen	TeleNor	NO
153.	Fred	Jordan	Swiss Federal Institute of Technology	CH
154.	Hirohisa	Jozawa	NTT	JP
155.	Magnus	Jšndel	Ericsson Telecom AB	SE
156.	Janne	Juhola	Nokia Mobile Phones	FI
157.	Lee	Jungchul		KR
158.	Toshifumi	Kanamaru	OKI Electric Industry CO.Ltd	JP
159.	Itaru	Kaneko	GCL	JP
160.	Mukta L.	Kar	Cable Television	US
161.	Marta	Karczewicz	Nokia Research Center	FI
162.	Hiroyuki	Katata	Sharp	JP
163.	Yasuo	Katayama	ASCII Labs.Inc.	JP
164.	AndrŽ	Kaup	Siemens AG	DE
165.	Toshiro	Kawahara	NTT Mobile Comm. Network Inc	JP
166.	Michael	Keith	INTEL	US
167.	Yoshihiro	Kikuchi	Toshiba co.	JP
168.	Hae-Kwang	Kim	Hyundai Electronics	KR

169.	Hyun Mun	Kim		KR
170.	Jin-Hun	Kim	Video Research Center	KR
171.	Munchurl	Kim	Electr. and Telecom.Research Inst.	KR
172.	Sang-Wook	Kim	SP LAB.SAIT	KR
173.	Yong Han	Kim	Seoul City University	KR
174.	Hideaki	Kimata	NTT	JP
175.	Jun-ichi	Kimura	Hitachi, Ltd	JP
176.	Gerald	Knabe	Q-Team	DE
177.	Angelika	Knoll	Deutsche Telekom Berkom GmbH	DE
178.	Rob	Koenen	KPN Research	NL
179.	Takuyo	Kogure	Matsushita Electric Ind. Co.Ltd	JP
180.	Faouzi	Kossentini	University of British Columbia	CA
181.	Hitoshi	Koyama	NEC Corporation	JP
182.	Andreas	Kraft	GMD FOKUS	DE
183.	Peter	Kroon	Bell Laboratories	US
184.	Christian	Köchling	Bosch	DE
185.	Katherine	Kwan	8x8, Inc	US
186.	Ji Heon	Kweon	Huyn dai _Electronics	KR
187.	Claudio	Lande	CSELT UF	IT
188.	Matthew	Leditschke	CSELT	IT
189.	Michael H.	Lee	University of Western Australia	AU
190.	Jim-Hak	Lee	KAIST	KR
191.	Kwang-Kee	Lee	Samsung	KR
192.	Sang-Mi	Lee	ETRI PEC	KR
193.	Yung-Lyu	Lee	KAIST	KR
194.	Ming-Chieh	Lee	Microsoft	US
195.	Shawmin	Lei	Sharp Labs of America	US
196.	Haibo	Li	Linköping University	SE
197.	Mengxiang	Li	Ericsson Radio Systems	SE
198.	Jin	Li	Sharp Laboratories of America	US
199.	Weiping	Li	Lehigh University	US
200.	Zvi	Lifshitz	VDOnet Corporation Ltd	IL
201.	Lars	Liljeryd	Stocktronics AB	SE
202.	Young-Kwon	Lim	Video ETRI	KR
203.	Koon-Seng	Lim	Columbia University	US
204.	Morgan	Lindqvist	Ericsson Radio System	SE
205.	Adam	Lindsay	Research Scientist	BE
206.	Björn	Lindström	Telia Research AB	SE
207.	Brian	Link	E-MU Systems Inc.	US
208.	Peter	List	Deutsche Telekom Berkom GmbH	DE
209.	John C	Liu	Silicon Graphics Inc.	US
210.	Lara	Louren•o	INESC	PT
211.	Chuck	Lueck	Texas Instruments	US
212.	Wera	Lundström	ITS	SE
213.	Ajay	Luthra	General Instrument Corp.	US
214.	Yutaka	Machida	Matsushita	JP
215.	Mitsuru	Maeda	Canon Inc.	JP
216.	Atsuto	Maki	Toshiba Corporation	JP
217.	Neil	Mammen	NUKO Information Systems	US
218.	Xavier	Marie	CRIL. Ingenierie	FR
219.	Maria Isabel	Martins	INESC	PT
220.	Yoshinori	Matsui	Matsushita	JP
221.	Yasuko	Matsumura	Oki Electric Industry Co.,Ltd	JP
222.	Marco	Mattavelli	Swiss Federal Institute of Technology	CH
223.	Andy	Maxfield	Philips	NL
224.	Jeff	Mc Veigh	Intel Corporation	US
225.	David J.	Meares	BBC	UK
226.	Rajiv	Mehrotra	Eastman Kodak Co.	US

227.	Toshio	Miki	NTT Mobile Comm. Network Inc.	JP
228.	Steve	Minnes	BSI-DISC	UK
229.	Yoshihiro	Miyamoto	NEC	JP
230.	Iole	Moccagatta	Texas Instruments	US
231.	Joo-Hee	Moon	Hyundai Electronics	KR
232.	Eishi	Morimatsu	Fujitsu Laboratories Ltd	JP
233.	Takehiro	Moriya	NTT	JP
234.	John H.	Muller	Iterated Systems	US
235.	Kohei	Murao	Fujitsu	JP
236.	Frank	Nack	GMD-IPSI	DE
237.	Toshihisa	Nakai	Oki Electric Industry Co.,Ltd	JP
238.	Yasufumi	Nakamura	Fujitsu Ltd	JP
239.	Yuichiro	Nakaya	Hitachi Ltd	JP
240.	Jae-Yeal	Nam	Seoul City University	KR
241.	Sam	Narasimhan	General Instrument	US
242.	Luc	Neumann	Fraunhofer IGD/ZGDV	DE
243.	Eric	Ngyen	Canon Research Centre	FR
244.	Wolfgang	Niehseh	Inst. Für El. Nachrichten Technik	DE
245.	Masayuki	Nishiguchi	Sony Corporation	JP
246.	Toshiyuki	Nomura	NEC	JP
247.	Takeshi	Norimatsu	Matsushita Electrical Industrial Co.Ltd	JP
248.	Paulo	Nunes	Instituto Superior Técnico	PT
249.	Deidre	O«Connell	Teltec Ireland	IE
250.	Christer	Odmalm	Telia Research AB	SE
251.	Yasuji	Ohta	Fujitsu Laboratories Ltd	JP
252.	Sofie	Olsson	Teracom AB	SE
253.	A.W.R	Oomen	Philips Research Labs	NL
254.	Kinya	Oosa	NSC LSI	JP
255.	Joern	Osterman	AT&T Labs-Research	US
256.	Sinan	Othman	TeraLogic	US
257.	Igor	Pandzic	University of Geneva	CH
258.	Gwang Hoon	Park	Yonsei University	KR
259.	Sung-Hee	Park	SP LAB.SAIT	KR
260.	Alan P.	Parkes	Lancaster University	UK
261.	Giorgio	Parladori	Alcatel Telecom	IT
262.	Eric	Pauwels	K.U.Leuven	BE
263.	Fernando	Pereira	Instituto Superior TŽcnico	PT
264.	Karen	Perlmutter	America Online	US
265.	Sharon	Perlmutter	America Online	US
266.	Philippe	Person	IFPI	UK
267.	Eric	Petajan	Bell Labs	US
268.	Roberto	Pockaj	DIST-University of Genoa	IT
269.	Gerald	Powell	Institute of Microelectronics	SG
270.	Bill	Powell	Microsoft	US
271.	Atul	Puri	AT&T Labs	US
272.	Heiko	Purnhagen	University of Hannover	DE
273.	Schuyler	Quackenbush	AT&T Bell Labs	US
274.	Ganesh	Rajan	General Instrument Corp.	US
275.	Michael	Randén	Telia Research AB	SE
276.	Cliff	Reader	Samsung	KR
277.	Jordi	Ribas	Sharp Labs.	US
278.	Hugo	Ribeiro	INESC	PT
279.	Ga'l	Richard	Matra Commun	FR
280.	Birgitte	Rodger	Telia Research AB	SE
281.	Lara C.	Rodrigues Lourenço	INESC	PT
282.	RŽmi	Ronfard	INA	FR
283.	Matthias	Rosenthal	Studer Professional Audio AG	CH
284.	Göran	Roth	Ericsson Radio Systems	SE

285.	Niels	Rump	Fraunhofer IIS	DE
286.	Giuseppe	Russo	Fondazione Ugo Bordoni	IT
287.	Thomas	Rydén	Teracom AB	SE
288.	Ilan	Sadeh	VISNET Ltd	IL
289.	Shinichi	Sakaida	NHK	JP
290.	Philippe	Salembier	UPC	ES
291.	Alan T.	Scarboro	AGICOA	CH
292.	Richard	Schaphorst	Delta Information Systems	US
293.	Eric	Scheirer	MIT Media Lab	US
294.	Peter	Schirling	IBM	US
295.	Peter G.	Schreiner	Scientific Atlanta	US
296.	Helmut	Schubert	Frannhofer PST	DE
297.	Shun-ichi	Sekiguchi	Mitsubishi Electric Corporation	JP
298.	Takanori	Senoh	Matsushita Electric Industrial Co Ltd	JP
299.	Yang-Seock	Seo	Signal Proc. Lab, SAIT	KR
300.	Chilsung	Seo	Korean Telecom	US
301.	Ibrahim	Sezan	Sharp Labs of Amerika	US
302.	Hyundoo	Shin	Samsung Electronics Co.	KR
303.	Julien	Signes	France Telecom	FR
304.	Thomas	Sikora	HHI	DE
305.	Jim	Snydel	AT&T Labs-Research_	US
306.	Iraj	Sodagar	Sarnoff Corporation	US
307.	Sehoon	Son	Samsung AIT	KR
308.	John	Soraghan	University of Strathclyde	UK
309.	Anibal Jo-o	Sousa Ferreira	INESC	PT
310.	Ralph	Sperschneider	FHG-IIS/A	DE
311.	Jens	Spille	Deutsche Thomson-Brandt GmbH	DE
312.	Benno	Stabernack	Heinrich-Hertz-Institut	DE
313.	Thomas	Stingl		DE
314.	Jacob	Stršm	Linköping University	SE
315.	Clive	Stubbings	NDS	UK
316.	David	Stuttard	BSI-DISC	UK
317.	Gary	Sullivan	PictureTel Corp	US
318.	Huifang	Sun	Mitsubishi Elektrik	US
319.	Teruhiko	Suzuki	Sony Corporation	JP
320.	Michael	Szwarc	Nynex Science&Technology Inc.	US
321.	Eugene	Taits	VDOnet Corporation Ltd.	IL
322.	Raj	Talluri	Texas Instruments	US
323.	Ah Peng	Tan	Panasonic Singapore Labs	SG
324.	Thiow Keng	Tan	Panasonic Singapore Labs	SG
325.	Hirokazu	Tanaka	Toshiba	JP
326.	Naoya	Tanaka	Panasonic	JP
327.	R.	Taori	Philips Research Labs	NL
328.	Bodo	Teichmann	FHG-IIS/A	DE
329.	Andrew	Tescher, G.	Lockheed Martin Corporation	US
330.	James	Thi	Rockwell Multimedia Com. Div.	US
331.	Per	Tholin	Telia Research AB	SE
332.	David	Thom	Delta Information Systems, Inc.	US
333.	Graham	Thomas	BBC Research&Development	UK
334.	Per	Thorell	Ericsson Telecom AB	SE
335.	Norio	to	Sharp	JP
336.	Martin	Todd	CRL	UK
337.	Yasuhiro	Toguri	Sony Corporation	JP
338.	Yuji	toh	TIJ R&D Center	JP
339.	Deepak	Tolani	University of Pennsylvania	US
340.	Yasuhiro	Tomita	NTT	JP
341.	Mineo	Tsushima	Matsushita Electrial Industrial Co.Ltd	JP
342.	Yoshihiro	Ueda	OKI Electric Industry CO.Ltd	JP

343.	Tomas	Uhlin	Telia Research AB	SE
344.	Peter	van Beek	University of Rochester	US
345.	Leon	van de Kerkhof	Philips S&V	NL
346.	James	van Loo	Sun Microsystems	US
347.	David	Van Wie	Intertrust Technologies CORP.	US
348.	Marius	Vassiliou	Rockwell Science Center	US
349.	Anthony	Vetro	Mitsubishi Electric ITA	US
350.	Jean-Francois	Vial	Thomson Multimedia R&D	FR
351.	Paulo	Villegas	Telefónica	ES
352.	Theodore	Vlachos	BBS Research&Development	UK
353.	Mauri	VŠŠnŠnen	Nokia	FI
354.	Liam	Ward	Teltec Ireland	IE
355.	Hiroshi	Watanabe	NTT	JP
356.	Kaoru	Watanabe	NHK	JP
357.	Schuichi	Watanabe	Sharp Corporation	JP
358.	Toshiaki	Watanabe	Toshiba R&D Center	JP
359.	Robert	Weber	Intertrust Technologies CORP.	US
360.	Jiangtao (Geng)	Wen	UCLA	US
361.	Per-Ola	Wester	Telia Research AB	SE
362.	Peter	Westerink	IBM T.J Watson Research Center	US
363.	Fritz	Whittington	Texas Instruments	US
364.	Marie	Wilhelmsson	Telia Research AB	SE
365.	Brent	Wilson	Panasonic Singapore Labs	SG
366.	Michael	Wollborn	University Hannover	DE
367.	Yoichi	Yagasaki	Sony Corporation	JP
368.	Kunio	Yamada	Victor Company of Japan_JVC	JP
369.	Yoichi	Yamada	Oki Electric Industry Co.,Ltd	JP
370.	Takao	Yamaguchi		JP
371.	Chao-Kung	Yang	Hughes Electronics DIRECTV	US
372.	Yoshio	Yasumoto	Matsushita	SG
373.	Lin	Yin	Nokia	FI
374.	Eiichi	Yokoyama	Sony Corporation	JP
375.	Dominique	Yon	CISAC	FR
376.	Markus	Zeller	Fraunhofer-Institute for Solid State Technology	DE
377.	Michael R.	Zeug	Iterated Systems	US
378.	Ya-Qin	Zhang	Sarnoff Corporation	US
379.	Mats	Ögren	Telia Research AB	SE
380.	Karl-Anders	Öygard	Telenor	NO

Annex 2
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 - 8.3.2 Table for 4:2:2 and MV profiles (Sys #4)
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Annex 3

List of submissions

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2186	Pete Schirling	Document Register for 40th meeting
2187	Cliff Reader	Real-time Multimedia Software Environments
2188	Rob Koenen	Renewed Proposal for MPEG Press Release Procedure
2189	Rob Koenen	Report of AHG on MPEG-4 Requirements
2190	Julien Signhs	Proposal for BIFS update mechanism
2191	Zvi Lifshitz	Work plan for AHG on Systems VM Imp-1 till July meeting
2192	Zvi Lifshitz	APIs for Systems VM Implementation 1
2193	INFORNOVA	SC 29 N 2048: Statement from MARS to MPEG and MHEG
2194	Vivek S Nittoor	MPEG-4 Content Creation Tool
2195	SC 29 Secretariat	Summary of Voting on ISO/IEC 13818-1/PDAM 5
2196	ISO/IEC ITTF	Summary of Voting on ISO/IEC 13818-1/DAM 4
2197	ITU-T SG 9	Liaison Statement from ITU-T SG 9: Request for info about the decoder function under error and cell loss conditions
2198	Guido Franceschini	Issues regarding SMI, TMI and ObjectDescriptors
2199	Guido Franceschini	Walk through a client-server scenario
2200	Guido Franceschini	Review of the SMI and TMI
2201	Guido Franceschini	Review of the ObjectDescriptor
2202	Vahe Balabanian	Proposed Text for DMIF Phase 1 ISO/IEC 14496-6 WD
2203	Regis J. Crinon	Reference to MPEG-4 streams, MPEG-7 streams and on-line sprites in MPEG-4 applications .
2204	Zvi Lifshitz	Proposed extension of DMIF PWD version 3
2205	SC 24 Chairman	Liaison Statement from SC 24 to SC 29 on MPEG-4 and VRML (SC 29 N 2089)
2206	ISO Central Secretariat	ISO Template and Model Document (Version 1.8) for the Preparation and Formatting of Draft Standards (SC 29 N 1970)
2207	R. Koenen (editor) for AHG on MPEG-7 Requirements	Draft revision of "MPEG-7: Context and Objectives"
2208	Rob Koenen (editor) for AHG on MPEG-4 Requirements	Draft revision of "MPEG-4 Overview"
2209	Fernando Pereira (AHG chairman)	Report of the Ad Hoc Group on MPEG-7 Requirements
2210	Fernando Pereira (editor) for AHG on MPEG-7 Requirements	Proposal for Second Draft of MPEG-7 Requirements
2211	ITU-R Working Party 11A	Draft Recommendation ITU-R BT. 709-2, Worldwide Unified Colorimetry and Related Characteristics of Future Television and Imaging Systems (SC 29 N 2090)
2212	ITU-R Working Party 11A	Draft Rec. ITU-R BT. 709-2, Parameter Values for the HDTV Standards for Production and International Programme Exchange (SC 29 N 2091)
2213	D.CURET, E.PETAJAN, T.MIKI, B.EDLER, V.BALABANIAN	Report of Ad Hoc group on QOS parameters
2214	ITU-T SG 12	Liaison Statement from ITU-T SG 12 to ISO/IEC JTC 1/SC 29/WG 11 on Subjective and Objective Quality Assessment (SC 29 N 2095)
2215	ISO/TC 46/SC 9	Liaison Statement from ISO/TC 46/SC 9 to SC 29/WG 11 on Standard Identifiers for Audiovisual and Multimedia Objects ISO/TC 46/SC 9 N 242 (SC 29 N 2096)
2216	ISO/TC 46	Excerpt from ISO/DIS 3166-3, Codes for the representation of names of countries and their subdivisions - Part 3: Code for formerly used names of countries (SC 29 N 2097)

2217	USNB	USNB Contribution -- MPEG-4 Systems
2218	USNB	USNB Contribution -- MPEG-2 Systems
2219	Anthony Vetro, Huifang Sun	CE Q2: Multiple video object rate control
2220	Caspar Horne, Ganesh Rajan	Report of the AdHoc Group on SNHC VM Editing
2221	Caspar Horne, Ganesh Rajan	SNHC Verification Model V4.1
2222	Sinan Othman,, Charles Chui,, Lefan Zhong,, Haishan Wang,, Rongxiang Yi,, Veyis Nuri	Wavelet-based Adaptive Spline Modeling for Coding Motion-compensated Residual Frames
2223	Takao Yamaguchi, Minoru Etoh, and Makoto Hagai	Implementation of Computational Graceful Degradation
2224	Theo Vlachos	Description of Studio and Television Post-production Applications
2225	Theo Vlachos	Modifications to the Video Random-Access Object Profile
2226	B. Grill, B. Teichmann	Improved Integration of a Core Coder into a T/F Coder
2227	Karen Hsing of NIST, Chil-Sung Seo of Korean Telecom	Conformance Test Suite for the DSMCC UU Protocol
2228	Andrew Johnson a.johnson@trl.telstra.com.au, Michael Biggar m.biggar@trl.telstra.com.au	Digital watermarking of video/image content for copyright protection and monitoring
2229	Ulrich Benzler	Results of core experiment P8 (Motion and Aliasing compensating prediction)
2230	M. Mattavelli, S. Brunetton	Some results of core experiment on CGD: methods to measure bitstream video decoding complexity for CGD implementation.
2231	M. Mattavelli, S. Brunetton	Proposal for a MPEG-4 syntax supporting CGD
2232	M. Mattavelli	Report of the ad-hoc group on Computational Graceful Degradation.
2233	Amy Reibman, Jack Lacy, David P. Maher, James H Synder	Proposal for the identification and protection of content in MPEG-4
2234	Frank Hartung	Hybrid Embedding of Content-Related IPR Data Sets into MPEG-4 Video Objects
2235	Yen-Kuang Chen, Anthony Vetro, Huifang Sun, S. Y. Kung	CE P15: Rate Optimization Based on True Motion
2236	Chris Birch, SJ Huang	Comments on MPEG-2 Systems
2237	Douglas Chai,, King N. Ngan.	Automatic Face Segmentation Algorithm
2238	Thomas Meier, King N. Ngan	Automatic Segmentation Based on Hausdorff Object Tracking
2239	Shigeru Fukunaga, Yasuko Matsumura, Toshihisa Nakai	Results of Core Experiment E4 (Backward Channel Signaling)
2240	Shigeru Fukunaga, Yasuko Matsumura, Toshihisa Nakai	Results of Core Experiment E12 (Dual-P)
2241	Yasuko Matsumura, Shigeru Fukunaga, Toshihisa Nakai	Results of Core Experiment E13 (Adaptive Intra-MB Refresh)
2242	Wolfgang Niehsen	Results of Core Experiment P8 (Motion and Aliasing Compensating Prediction)
2243	Angelika Knoll, Juergen Deicke, Jens Schmitt, Ulrich Mayer, Manfred Glesner	TransMux Interface (TMI) for a Statistical Multiplexer
2244	Cheung Auyeung (Motorola), TK Tan (PSL)	Description of Core Experiment T14A +
2245	TK Tan, SM Shen	Results of Core Experiment T14A
2246	TK Tan, SM Shen	Information on VM 7.0 Appendix F
2247	Toshiro Kawahara, Toshio Miki, Nobuhiko Naka, Takashi Suzuki	QoS control issues for MPEG-4 error resilient video/audio coding
2248	Keith Hill	Proposed Revision of N1680 (IPR management)
2249	Touradj Ebrahimi (editor)	Video Verification Model 7.1
2250	Russell C. Dooman	Proposed Modifications to Chapter 4: User-to-Network Session

		Messages
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2253	Martin Dietz, Laura Contin	Report of the ad hoc group on AAC verification test preparation
2254	Laura Contin	List of video and audiovisual sequences for use by MPEG in audio-visual coding standard development
2255	Massimo Visca, Laura Contin	New audiovisual sequences for use by MPEG
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2257	John Muller, Video coding efficiency ad hoc chair	Descriptions of sprite and prediction core experiments on coding efficiency in MPEG-4 Video
2258	John Muller, Video coding efficiency ad hoc chair	Descriptions of rate control and texture coding core experiments on coding efficiency in MPEG-4 Video
2259	AGICOA	Request for Establishment of Liaison between AGICOA and SC 29/WG 11 (SC 29 N 2124)
2260	ISO/IEC ITTF	Summary of Voting on ISO/IEC 13818-1/DAM 4 (SC 29 N 2123)
2261	Dominique CURET	table signaling syntax
2262	Dominique CURET	buffer model: demultiplexing and buffer state
2263	Leszek Cieplinski	Efficient texture coding using multiresolution vector quantization
2264	Toshiaki Watanabe, Yoshihiro Kikuchi	Results of core experiment S10 on motion estimation/compensation of binary shapes
2265	Toshiaki Watanabe, Yoshihiro Kikuchi	Results of core experiment S11 (Predictive BAB mode coding)
2266	Toshiaki Watanabe, Yoshihiro Kikuchi	Results of core experiment S13 (Interpolation of binary shape)
2267	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of EREC (Core Experiment E7)
2268	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of Data Partitioning and RVLCs (Core Experiment E8)
2269	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of Error Resilient Advanced Prediction (Core Experiment E9)
2270	Toshiaki Watanabe, Yoshihiro Kikuchi	Error Resilient Performance of Intra-VOP mode (Core Experiment E10)
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2272	Toshiaki Watanabe, Yoshihiro Kikuchi	A study on combination of Video Error Tools and MUX for mobile network
2273	Jean-Claude Dufourd, Frederic Bouilhaguet	Results of SNHC/Systems Core Experiments G2
2274	Jean-Claude Dufourd	Interaction with a Multimedia Database Profile
2275	Guido Franceschini	ObjectDescriptor baseline text v5.1
2276	Jean-Claude Dufourd	Request for experiments on an extended Layout node
2277	Jean-Claude Dufourd	Update of the description of the BIFS node Transform2D
2278	Fred Jordan, Stefan Horbelt, Touradj Ebrahimi	Results of CE V1 using wavelets
2279	Stefan Horbelt, Fred Jordan, Touradj Ebrahimi	Results of CE V1 using DCT
2280	Josep Marimon, Fred Jordan, Touradj Ebrahimi	Results of CE V3
2281	Fred Jordan, Martin Kutter, Touradj Ebrahimi	Proposal of a watermarking technique to hide/retrieve copyright data in video
2282	Fernando Pereira (editor) for AHG on MPEG-7 Requirements	Proposal for First Draft of MPEG-7 Applications

2283	Touradj Ebrahimi, Atul Puri	Report of ad hoc group on video VM/WD editing
2284	Yutaka Machida, Koji Imura	Simulation Results on Dual Prediction(Dual-P) Coding ÖCore Experiment E12â
2285	Koji Imura, Yutaka Machida	Simulation Results on Error Propagation Control ÖCore Experiment E9b
2286	Laurent Pautet, Samuel Tardieu, Jean-Claude Dufourd	Synchronisation simulator for concurrent MPEG-4 terminals
2287	Koji Imura, Yutaka Machida	Simulation Results on Adaptive Intra Refresh(AIR) Method ÖCore Experiment E13â
2288	Weiping Li, F.Ling,H.Sun,J.P.Wus	Description of a Video Coding Proposal by Vector Vision, Inc. and Lehigh University
2289	Peter Kauff, Jan De Lameillieure, Klaas Schueuer	Results of Core Experiment O4
2290	Yong Rui, Thomas S. Huang, Sharad Mehrotra	MARS and Its Applications to MPEG-7
2291	Simon Winder, Wei-ge Chen	Results of coding efficiency evaluation of padding techniques for motion compensation
2292	Ganesh Rajan (grajan@gi.com), Ram Nagarajan (ram@hitchcock.hac.com)	Report on the activities of the Ad Hoc group on MITG
2293	Eishi Morimatsu, Akira Nakagawa	Results of Core Experiment P13(Dynamic Resolution Conversion)
2294	Eishi Morimatsu, Kimihiko Kazui	Results of Core Experiment C1.1(Optimization of Object based Temporal Scalability)
2295	TK Tan, SM Shen	VOP Time Increment Resolution
2296	TK Tan, SM Shen	Results of Core Experiment V2 using DCT
2297	Norio Ito, Hiroyuki Katata	Result of Core Experiment O3 (Object wavelet for texture coding mode)
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2299	Hiroyuki Katata, Ryuji Kitaura, Tomoko Aono	Result of Core Experiment C1.1 (Object-based Temporal Scalability)
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2301	Sung Deuk Kim, Jaeyoun Yi, Jong Beom Ra, Hyun Mun Kim, Young Su Lee	Results of core experiment N1
2302	Sung Deuk Kim, Jong Beom Ra, Hyun Mun Kim, Young Su Lee	Results of core experiment P15
2303	Rob Koenen, Dominiqye Yon	Overview of Responses to IPR CfP
2304	Rob Koenen for AHG on MPEG-4 Requirements	MPEG-4 Applications Document
2305	Guido Franceschini	DAI (was SMI) and TMI baseline text v5.0
2306	Peter List	Proposal for a final decision on INTRA-Prediction
2307	Vahe Balabanian (Nortel), Carsten Herpel (Thomson Multimedia)	June 10-11 Mux-DMIF joint AHG Meeting Report
2308	Olivier AVARO	Report of the Palo Alto Systems VM Meeting
2309	Jian Zhang, Norbert Gerfelder, Luc Neumann	Collaborative scene visualization
2310	Markus Schutz	Results of CE Z3 on mesh coding using PRVQ
2311	Michael Zeug - Editor	MPEG-4 Profile Requirements version 3.1
2312	Peter K. Doenges, Ganesh Rajan	Report of Ad Hoc Group on FAQs for SNHC
2313	Peter K. Doenges, Ganesh Rajan	SNHC FAQs
2314	Jvrn Ostermann	Report of the Adhoc group on Coding of Arbitrarily-shaped Objects in MPEG-4 Video

2315	Jvrn Ostermann, Erich Haratsch, Barry Haskell	Ensuring Quality of Service for Downloaded Animated 3D Models
2316	Touradj Ebrahimi, Homer Chen	SNHC-obj ad hoc group report
2317	Touradj Ebrahimi, Homer Chen	Description of Core Experiments on Visual Texture/Mesh Coding
2318	Erich Haratsch *1 *2, Jvrn Ostermann *1	Results of Core Experiment FBA-5 (Animation of Downloaded Face Models)
2319	Erich Haratsch *1 *2, Jvrn Ostermann *1, Luis Araqo Guell *1 *3, Ming R. Wong *1 *3	Results of Core Experiment FBA-2 (FAP Interpretation)
2320	Naoki Iwakami, Takehiro Moriya, Masahiro Iwadare, Toshiyuki Nomura	Results of the core experiment on Nokia long term prediction proposal
2321	Kenzo Akagiri, Yasuhiro Toguri, Yoshiaki Oikawa	The technical report for the MPEG-2 AAC SSR profile
2322	Jvrn Ostermann, Erich Haratsch, Barry Haskell	Requirements for Facial Animation Systems
2323	Jeff McVeigh, T.K. Tan	Truncated Quantization Matrices for Visual WD/VM
2324	Shuichi Watanabe	Semantics proposal in AL_PDU_Header for continuous scalability application
2325	Tomoko Aono, Hisashi Saiga, Hiroyuki Katata	Report of Core Experiment V2 and proposal of syntax modification
2326	D.CURET	Duplicate mux packets
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2328	Akio Jin, Naoki Iwakami, Takehiro Moriya, Satoshi Miki, Kazunaga Ikeda, Takeshi Mori	Proposal of the core-experiment on improvement of t/f scalable coder.
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2331	Zhixiong Wu, Yoshihiro Ueda, Toshifumi Kanamaru, Yoichi Yamada	Simplification of Wavelet Coding
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2337	Laurent Herrmann, Dominique Curet	Padding for the FlexMux Model
2338	Adam Lindsay (adam@riv.be)	Draft of MPEG-7 Requirements Including Audio
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2350	Kazuto Kamikura, Hirohisa Jozawa, Hiroshi Watanabe	Modification of bitstream syntax for on-line sprite coding
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2356	Fabio Bellifemine	FIPA, MPEG-4 and MPEG-7
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2358	Keiichi HIBI, Tadashi UCHIUMI	Report of the improvement on core experiment E8 (with Texture Data Partitioning)
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2370	Noel Brady, Luis Ducla-Soares	Error Resilience of Arbitrarily Shaped VOs (CE E14)
2371	Olivier AVARO, Ganesh RAJAN, Carsten HERPEL	Systems Decoder MOdel : Time, Synchronization and Buffer Management
2372	Olivier Avaro (CNET), Ganesh Rajan (GI), Carsten Herpel (Thomson)	Systems Decoder Model : Time, Synchronization and Buffer Management
2373	Olivier Avaro	Management of IPR in Systems
2374	Roland Mech, Michael Wollborn	Automatic segmentation of moving objects by merged temporal and spatial segmentation (partial results of CE N2)
2375	Stephen W. Long	Video Metadata Fundamentals
2376	Regis J. Crinon	Channel Map Table descriptor syntax
2377	Osama Alshaykh, Ralph Neff, Toshio Nomura, Avidesh Zakhor	CE T3: Matching pursuit coding of prediction errors
2378	Iole Moccagatta	Interlaced Tools for Arbitrary Shaped Video Objects
2379	Eric Scheirer	Proposed changes to Structured Audio
2380	Brian Link	Proposal for Audio Sample Format for Structured Audio
2381	Jin Li, Shawmin Lei	Arbitrary shape wavelet transform with phase alignment
2382	Jiangtao Wen, John Villasenor (UCLA), Yashoda Nag, Raj Talluri (TI)	Report of Results on Core Experiment on Error Resilience for Motion Data with Structured RVLC - E8
2383	Munchurl Kim (ETRI), Jae Gark Choi (ETRI), Myoung Ho Lee (ETRI), Cheituek Ahn (ETRI), S. Colonnese (FUB), U. Mascia (FUB), G. Russo (FUB), P. Talone (FUB), Roland Mech (UH), Michael Wollborn (UH)	Combined algorithm of ETRI, FUB and UH on Core Experiment N2 for automatic segmentation algorithm of moving objects
2384	Ji-heon Kweon, Hae-kwang Kim, Joo-hee Moon	Results of Core Experiment O10 - Boundary Block Merging Technique
2385	Weiping Li, F.Ling,H.Sun	Report on Core Experiment O3
2386	Munchurl Kim, Jae Gark Choi, Myoung Ho Lee, Cheituek Ahn	Core Experiments N2: Test results on ETRI's combined module of temporal and spatial segmentations for automatic segmentation techniques
2387	Munchurl Kim, Jong Won Lee, Jae Gark Choi, Myoung Ho Lee, Cheituek Ahn	Core Experiments N2: Performance analysis of ETRI's Global Motion Estimation/Compensation and Scene Cut Detection for automatic segmentation techniques
2388	Yung-Lyul Lee, Yoon-Soo Kim, Hyun-Wook Park	Results of Core Experiment N1 (Deblocking and Deringing filter)
2389	MoMuSys System group	MoMuSys Player demo
2390	The National Body of Norway	Comments on compatibility
2391	C.S. Boon, J. Takahashi	Performance of Simplified Repetitive Padding on Sequences with Vertical Motion
2392	C.S. Boon, Ming-Chieh Lee, S. Winder, S. Kadono	Description of Motion Compensation Padding for Decoding Process
2393	C.S. Boon, S. Kadono	Clarification of Requirements for Shape Coding
2394	C.S. Boon, S. Kadono	Proposals for Arbitrary Shape Coding
2395	Se-Hoon Son, Shi-Hwa Lee, Euee S. Jang, Jae-Seob Shin	Results of CE S14 (Scaleable Binary Shape Coding)
2396	C.S. Boon, S. Kadono	Results of Core Experiment T14C
2397	T. Nishi, C.S. Boon, S. Kadono	A Preliminary Study on Intra-Coding of Interlaced Video
2398	Dae-Sung Cho, Jae-Seob Shin, Euee S. Jang, Yang-Seock Seo	Results of CE S13 (Interpolation of Binary Shape)
2399	Sung-Jin Kim, Euee S. Jang, Jae-	Results of CE S17 (Shape Rate Control)

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2400	Sung-Gul Ryoo, Jae-Seob Shin, Yang-Seock Seo	Results of CE Q2 (Improved Rate Control)
2401	Euee S. Jang, Noel Brady, Joo-Hee Moon, Hae Kwang Kim, Seokwon Han, Gwang-Hoon Park	CE S14 Description
2402	Euee S. Jang	VM Syntax Change Proposal : VOP level shape coding decision
2403	Julien Signhs, Raoul Mallart	Mixing 2D and 3D objects in BIFS
2404	Julien Signhs, Mikakl Bourges-Sivenier	Proposal for BIFS fields quantization
2405	Julien Signhs, Mikakl Bourges-Sivenier	Declaration of animation streams in a BIFS scene
2406	Julien Signhs	Report of the AHG on Composition
2407	Julien Signhs	Improvements for BIFS syntax
2408	Julien Signhs	A review of BIFS 2D nodes
2409	James Brailean	Error Resilience Ad hoc Group Report
2410	Sven Bauer, Jens Mueller	Comparison between MPEG-1, MPEG-2 and MPEG-4 for high data rates
2411	Wei Wu, Homer Chen, Janice Shen	Report on an Implementation of Videw Dependent Scalability
2412	Wei Wu, Homer Chen, Janice Shen	Mesh Compression Using Video Coding Tools
2413	Mike Coleman, David Thom	Report of Ad-Hoc Group on AAC Conformance and Technical Report
2414	Mike Coleman	Report of Ad-Hoc Group for MPEG-4 Player
2415	Xuemin Chen, Bob Eifrig, Ajay Luthra	Software Implementation of VM7 Interlaced Coding Tools
2416	David Shu, Ram Nagarajan	Results on Core Experiment on Reducing Decoder Memory Requirements for Sprites
2417	Xuemin Chen, Bob Eifrig, Krit Panusopone, Ajay Luthra	Interlaced Coding Tools : Results of Core Exp. P-14
2418	Jordi Ribas-Corbera, Shawmin Lei	Q2 part A: macroblock-layer rate control
2419	Yuval Fisher, Homer Chen	Parser Generators for BIFS Tools and Core Experiments
2420	Bob Eifrig, Xuemin Chen	Simulation Plots for CE-P14 at ITU-R 601 Resolution
2421	Bob Eifrig, Xuemin Chen	Simulation Plots for CE-P14 at HHR Resolution
2422	Minoru Etoh, Takeshi Ankei	Complexity Analysis of Feathering Filter
2423	Olivier AVARO	A Multimedia MPEG-4 Terminal
2424	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE B1.1 : Optimization of Spatial Scalability
2425	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE B1.1 : Object Based Spatial Scalability
2426	Fernando Pereira	Object Content Description Information (OCDI) in MPEG-4
2427	Jens Schmitt, Juergen Deicke, Ulrich Mayer, Angelika Knoll, Manfred Glesner	Important Instances of TransMux Signalling: ATM and Integrated Services Internet
2428	Zvi Lifshitz (VDOnet), Karl Anders Oygard (Telenor), Matthew Leditschke (CSELT)	Im1 Ad-hoc group report
2429	Zvi Lifshitz (VDOnet), Kevin Barron (KPN Research)	Systems Implementation 1 source code (core)
2430	Matthew Leditschke (CSELT), Franco Casalino (CSELT), Zvi Lifshitz (VDOnet), Kevin Barron (KPN Research)	Systems Implementation 1 source code (2D composition)

2431	Karl Anders Oygard (Telenor), Franco Casalino (CSELT), Zvi Lifshitz (VDOnet), Kevin Barron (KPN Research)	Systems Implementation 1 source code (3D composition)
2432	Liam Ward	BIFS Specification - "To Do" list
2433	Adam Lindsay	Auditory and Advanced Applications for MPEG-7
2434	James Brailean	Suggested Resynchronization Parameters for Higher Data Rates
2435	Eric Petajan	Report of the adhoc group on face and body animation
2436	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa	Results of core experiment on Samsung scalable coder(m2088)
2437	Teruhiko Suzuki, Yoichi Yagasaki	The results of CE V2
2438	Frederic Dufaux	Results from N3: dynamic sprites and GMC
2439	Toshiyuki Nomura	Core experiment test results for the NTT's proposal on 6 kbits/s T/F coder
2440	Toshiyuki Nomura	A core experiment report for the low delay speech profile
2441	Naoya Tanaka	Results of the core experiment on low delay speech profile
2442	Naoya Tanaka	Application of the LSP quantization tool of CELP VM to parametric VM
2443	Yoshinori Matsui	MPEG4 Stream Transmission Syntax on MPEG2 Transport Stream
2444	Toshio Miki, Tomoyuki Ohya, Satoru Adachi	Results of the Core Experiment on Error Resilience - E7 (Combined EREC and RVLC)
2445	Y. Yagasaki, T. Suzuki	IDCT Mismatch Protection
2446	Y. Yagasaki, T.Suzuki	Non Linear Quantization Tool
2447	Young-Kwon Lim, Sang Gyu Park, Chieteuk Ahn	Results of ISG core experiment on CGD
2448	Thomas Stingl, Rico Dreier, Klaus Bahr, Yankin Tanurhan	MPEG-4 Scene Update Formats and Event Model
2449	Minsoo Hahn, Jung-Chul Lee, Hang-Seop Lee	Comments on the MPEG-4 TTS
2450	YoungKweon Lim, Minsoo Hahn, Jung-Chul Lee, Hang-Seop Lee	Synchronization of MPEG-4 TTS with Moving Picture
2451	Shinya Kadono	Improvement the binary shape coding using bounding box
2452	Jens Spille	Report of the Ad Hoc Group on Audio FAQ for the MPEG Home Page.
2453	I. Pandzic, P. Beylot, M. Escher, T.Capin	Results of Core Experiments FBA1, FBA2 and FBA3
2454	Seokwon Han, Jin Hun Kim, Sang Hoon Lee, Kyu Whan Chang	Result of Line Interpolation (CE S13)
2455	Sungryul Cho, Jin Hun Kim, Kyu Whan Chang	Result of BBM (CE O10)
2456	Seokwon Han, Jin-Hun Kim, Sungryul Cho, Kyu Whan Chang	Information for MB_CR (CE S13)
2457	Jin-hak Lee, Jae-won Chung, Jae-kyoon Kim,, Jong Deuk Kim, Sung-Moon Chun, Hae-Kwang Kim, Joo-hee Moon	Results of Core Experiment S14 : Scalable Binary Shape Coding
2458	Jian Zhang, Norbert Gerfelder, Luc Neumann	Mobile Multimedia Applications
2459	Harald Brusewitz	Results from Core Experiment E10 (I-VOP)
2460	Goran Roth	Results of Core Experiment E7 (EREC)
2461	Juergen Herre	Low-Complexity Tool for Perceptual Noise Substitution in the MPEG-4 T/F Coder

2462	A. Ehret, J. Herre, Y.-B. Thomas Kim, S.-W. Kim	Result of Core Experiment with M2088 Noiseless Coding Core
2463	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa	Additional report on core experiment of Matsushita scalable coder
2464	S.-W. Kim	Results on collection of new test excerpts for MPEG-2 AAC verification test
2465	S.-W. Kim, S.-H. Park, Y.-B. Thomas Kim	Listening test results of Matsushita bitrate scalability tool core experiment check phase
2466	S.-W. Kim, S.-H. Park, Y.-B. Thomas Kim	Core experiment results on Matsushita' bitrate scalability tool by NTT, Matsushita and Samsung
2467	Carsten Herpel	Report of AHG on Systems Multiplex Specification
2468	Y.B. Thomas Kim, S.H. Park, S.W. Kim	Listening test results of Samsung fine granule Scalability tool(BSAC) core experiment check phase
2469	Naoki Iwakami, Takehiro Moriya	Proposal for a core experiment on bandwidth control in T/F coder
2470	Kazuhisa Hosaka, Yoichi Yagasaki	Results of CE S11 (Predictive BAB Mode Coding)
2471	Kazuhisa Hosaka, Yoichi Yagasaki	Results of CE S13 (Interpolation of Binary Shape)
2472	Lin Yin,, Mikko Suonio,, Mauri Vaananen	Complexity Analysis of Nokia Backward Predictor in MPEG-4 Audio
2473	Masayuki Nishiguchi, Kazuyuki Iijima, Jun Matsumoto	Technical description of Sony's proposal for low delay speech profile
2474	Michael Zeug	Report of Ad Hoc Group on MPEG-4 Low Delay Evaluations
2475	Jin Soo Choi, Myoung Ho Lee, Chieteuk Ahn	Results of core experiment Z3: Geometry compression using PRVQ
2476	Jin Soo Choi, Myoung Ho Lee, Chieteuk Ahn	Proposal for modification of bit stream syntax for 3D mesh coding
2477	Masayuki Nishiguchi, Jun Matsumoto, Kazuyuki Iijima	Test results of the core experiment on low delay speech profile
2478	Gwang-Hoon Park, Jae-Hyung Park, Jong-Suk Kim, Jong-Bo Kim, Jung-Bong Suk	Partial Cross-Checked Results of N1: Noise Removal Technique
2479	Vahe Balabonian (Nortel),, Tim Addington (Scientific Atlanta),, Jim Vanloo (Sun microsystems),, Aurel A. Lazar (Columbia University NY, USA),, Koon-Seng Lim (Columbia University NY, USA)	A Proposal for DMIF Phase 1 Reference source Code Development
2480	Heiko Purnhagen, Bernd Edler, Charalampos Ferekidis	Proposal of a Core Experiment for extended "Harmonic and Individual Lines plus Noise" Tools for the Parametric Audio Coder Core
2481	Heiko Purnhagen, Bernd Edler, Yuji Maeda, Kazuyuki Iijima, Masayuki Nishiguchi	Proposal for the Integration of Parametric Speech and Audio Coding Tools based on an Automatic Speech/Music Classification Tool
2482	Ichiro Ando, Kunio Yamada	Stuffing on B-VOPs
2483	Heiko Purnhagen, Bernhard Grill	Report of the Ad-hoc Group on MPEG-4 Audio Working Draft editing and Verification Model software implementation
2484	Ichiro Ando, Kunio Yamada	Extension of Dynamic Range of TCOEF flc levels
2485	A. Puri	Report of Adhoc Group on Multifunctional Coding in MPEG-4 Video
2486	Toshiyuki Nomura, Masahiro Serizawa, Masahiro Iwadare, Kazunori Ozawa	An extension of the narrow-band CELP VM coder to a bandwidth scaleable CELP coder
2487	A. Puri, R. L. Schmidt, B. G.	Simplified KeyRegions from Error Resilience Syntax

	Haskell	
2488	Yoshinori Suzuki, Yuichiro Nakaya, Satoshi Misaka	Results of Core Experiment N3 (Dynamic Sprite and Global Motion Compensation)
2489	Yuichiro Nakaya, Yoshinori Suzuki, Satoshi Misaka	Results of core experiment P6 (Multimode warping prediction)
2490	T. Chen, A. Puri, R. L. Schmidt	Improved ChromaKey Shape Representation (S4k)
2491	Yuichiro Nakaya, Satoshi Misaka, Yoshinori Suzuki	Avoidance of error accumulation caused by motion compensation
2492	Yasuhiro Toguri	Japanese national body comments related to the ballot of 13818-4/PDAM1 and 13818-5/PDAM1
2493	A. Puri, R. L. Schmidt, B. G. Haskell	Review of Results of Coding Efficiency Expt T16
2494	Rakesh Taori, Werner Oomen, Leon van de Kerkhof	Description of Harmony-1 Low Delay speech coding system
2495	Andy Gerrits, Rakesh Taori	Proposal for lossless coding in the CELP core of the audio VM
2496	Yoshihiro Miyamoto	Results of Core Experiment P6 (Multimode Warping Prediction)
2497	Lin Yin, Mauri Vaananen	Report on Nokia Long Term Predictor for MPEG-4 Audio
2498	The National Body of Japan	Comments on the core experiment for low delay speech profile
2499	P.J.L. van Beek, M. Xia, I. Celasun, A.M. Tekalp	CE Z4: 2D dynamic mesh compression
2500	Hideki Irisawa, Yuji Itoh	Results of Core Experiment N1
2501	Yuji Itoh	Results of Core Experiment E8a
2502	Yuji Itoh, Hideki Irisawa	Results of Core Experiment P14
2503	Yuji Itoh	Results of Core Experiment P15
2504	Frank Bossen	Making a better shape coder
2505	Takehiro Moriya, Naoki Iwakami, Akio Jin, Kazunaga Ikeda, Takeshi Mori, Satoshi Miki	Requirements of low bit rate audio transmission system
2506	Masayuki Nishiguchi, Kazuyuki Iijima, Jun Matsumoto	Tool proposal for reduced delay version of 2.0-4.0 kbps parametric coder core of the VM
2507	Karlheinz Brandenburg	Report of the Adhoc Group on MPEG-4 Audio Core Experiments
2508	Guido Franceschini	Scope of parameters in the Mux-DMIF model
2509	Guido Franceschini, Nuno Delgado	Simulation of a TransMux instance for IP
2510	Anthony Vetro, Huifang Sun	Results of Core Experiment Q2
2511	Franco Casalino, A. Arena, M. Leditschke, M. Quaglia	Binary Format for Scenes Encoder Software
2512	P.J.L. van Beek, P.E. Eren, A.M. Tekalp	CE G2d: Composition of 2D dynamic meshes
2513	Franco Casalino, Leditschke M., Quaglia M.	MPEG-4 Video Software Improvements
2514	Jie Liang, Iole Moccagatta	Status Report of Core Experiment TZ1: Efficient Coding of Texture
2515	Rakesh Taori	Independent implementation of the Harmony-1 Low delay speech coding system
2516	Jie Liang, Iole Moccagatta	Status Report of Core Experiment V2: Spatial and Quality Scalability
2517	Uwe Gbur, Martin Dietz, Andreas Ehret, Mauri Vaananen, Lin Yin	FhG Check Phase Results of the Core Experiment on Backward Prediction and the Core Experiment on Long Term Prediction both proposed by Nokia Research Center
2518	Uwe Gbur, Juergen Herre, Martin Dietz	FhG Check Phase Results on Samsung's Scalable Codec
2519	Uwe Gbur, Martin Dietz	FhG Quality Assessment of the Matsushita Scalable Codec
2520	Martin Dietz, Andreas Ehret, Ralph Sperschneider, Uwe Gbur,	Proposal for a Core Experiment on Error Resilience for MPEG2-AAC

	Sanae Hotani, Toshio Miki	
2521	Lara Lourenço, Luis Corte-Real	Comparison of the performance of VM7.0 and TMN8 rate control algorithms adapted for coding of Regions Of Interest
2522	Members of the Composition AHG - editor: Liam Ward	Proposed revision of BIFS Specification
2523	T. Einarsson, P. List	Proposal for changes to B-VOP syntax
2524	Bob Eifrig, Xuemin Chen	Efficiency of Universal VLCs for Motion Vector Coding of Interlaced Video
2525	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results on AAC with different predictors (m1830 and m2032)
2526	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results for the core experiment of 6 kbit/s t/f coder proposed in m1508
2527	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results on TwinVQ+LTP vs. TwinVQ+AAC
2528	Gerald Schuller, Bernd Edler	Proposal of Core Experiment on Low Delay Filter Banks for MPEG-4
2529	Regis Crinon, Ibrahim Sezan	Requirement for referencing MPEG7 streams by MPEG4 Objects
2530	Carsten Herpel	Object Descriptor Usage and Content Addressing
2531	Michael Wollborn	Improved signalling of the VOP coded status
2532	Carsten Herpel	Review of Systems Layers
2533	Carsten Herpel	Revision of FlexMux Specification
2534	John Muller, Ghassan Farah	Results from coding with the common Video VM software
2535	Karlheinz Brandenburg	Collaboration of AES SC-06-04 and MPEG Audio
2536	A. Eleftheriadis, H. Kalva, A. Puri, R. Schmidt	Stored File Format for MPEG-4 (Rev. 2.0)
2537	Pallavi Shah (Sun), Rohit Agarwal (Intel), Olivier Avaro (France Telecom)	MPEG4 Multimedia Terminal
2538	A. Eleftheriadis, C. Herpel, L. Ward	Report of AHG on MPEG-4 Systems WD Editing
2539	A. Eleftheriadis, C. Herpel, L. Ward	MPEG-4 Systems Working Draft Version 4.1
2540	Pallavi Shah (Sun), Gerard Fernando (Sun)	MPEG4 Requirements for Internet Applications
2541	Regis Crinon, Ibrahim Sezan	On-Line Sprite Based Coding with Automatic Object Segmentation
2542	Gerard Fernando (Sun)	Proposal for reducing size of scene description data
2543	Gerard Fernando (Sun)	Information on Java
2544	Iraj Sodagar., Hung Ju Lee., Paul Hatrack	Report of Core Experiment TZ1; Efficient Coding of Textures
2545	Iraj Sodagar., Hung Ju Lee., Paul Hatrack	Report of Core Experiment V2; Spatial and Quality Scalabilities
2546	Gerard Fernando (Sun)	RTP encapsulation of MPEG4 data
2547	Gerard Fernando (Sun), Pallavi Shah (Sun)	Demonstration of IM2 experiments using Java
2548	Simon Winder, Wei-ge Chen	Guidelines for Complexity Evaluation
2549	Simon Winder, Wei-ge Chen	Report of the Ad-Hoc Group on Video VM Complexity
2550	Peter K. Doenges	Some SNHC Profiling Considerations
2551	Pallavi Shah (Sun)	IM2 AHG Status Report
2552	Jiro Katto	Implementation of IM1 Text Renderer and Remarks on MITG Syntax
2553	Jim Brailean, Kevin O'Connell	Mapping Video Tools to the MPEG-4 Video Object Profiles
2554	Hung-Ju Lee, Tihao Chiang, Ya-Qin Zhang	Joint Proposal: Multiple video objects rate control and single B video object rate control
2555	Tihao Chiang, Hung-Ju Lee, Ya-Qin Zhang	Joint Proposal: Macro-Block layer rate control

2556	Cheung Auyeung	Results of Core Experiment T14a on adaptive 3D VLC
2557	Tihao Chiang, Ya-Qin Zhang	Results on Core Experiment P14
2558	Hung-Ju Lee, Tihao Chiang, Ya-Qin Zhang	Results on Core Experiment Q2
2559	Cheung Auyeung	Results of Core Experiment T14c on 3-Mode ESCAPE
2560	Ajay Luthra, Xuemin Chen, Bob Eifrig, Ganesh Rajan, Sam Narasimhan	Tool Requirements of Video Main Object Profile for Broadcasting Applications
2561	Cheung Auyeung, Rick Dean	Results of Core Experiment on Modified T14a using ISP
2562	Cheung Auyeung, Rick Dean	Results of Core Experiment on Modified T14a using ISP
2563	Hai Tao, Homer Chen, Wei Wu	Results of FAP Coding Using DCT and PCA
2564	James Van Loo, Jonathan Courtney	Review of BIFS
2565	Jonathan Courtney	Object-Motion-Based Video Retrieval
2566	Jonathan Courtney, Pallavi Shah, Jennifer Webb, Gerard Fernando, Viswanathan Swaminathan	Adaptive Audio-Visual Session Format
2567	Jonathan Courtney, Jennifer Webb	Capabilities of the Adaptive Audio-Visual Session Format
2568	Regis Crinon	Reserved streamType for MPEG7 stream in the object descriptor
2569	Sanae Hotani, Toshio Miki	Proposal of error resilience tools for MPEG-4 AAC
2570	Hyun Mun Kim (LGS), Young Su Lee (LGS)	Simplified motion vector coding method(p15a)
2571	SC 24 and VRML	Joint Statement from JTC 1/SC 24 and the VRML Consortium to SC 29 on MPEG-4 Working Draft (SC 29 N 2135)
2572	Teruhiko Suzuki, Yoichi Yagasaki	Composition issues for scalability
2573	Jonathan Courtney	Automatic Video Indexing via Object Motion Analysis (PDF format)
2574	Teruhiko Suzuki, Yoichi Yagasaki	Comments from VRML experts
2575	Chuck Lueck	TI test results for core experiment on the low delay speech profile
2576	DAVIC	Liaison Statement from DAVIC to SC 29 on Choosing an MPEG Audio Standard for DAVIC (DAVIC/Lo031p (SC 29 N 2146)
2577	Masahiro Iwadare, Toshiyuki Nomura	Core experiment results for the Nokia's proposal on backward and long-term prediction
2578	Claudio Lande	Results of Core Experiment FBA-2 (FAP interpretation)
2579	Claudio Lande	Results of Core Experiment FBA-5 (Animation of downloaded models)
2580	Raj Talluri (TI, Olivier Avarro (CNET)	AHG Report on Joint Audio/Video and Systems Activities

Annex IV
Report of Requirements Meeting

**Source: Rob Koenen, chair Requirements
Niels Rump for IPR part**

Introduction

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

MPEG-4

- General Requirements
- Profiles
- Responses to the IPR Call for Proposals
- MPEG-4 Overview

MPEG-7

- Second Draft of Requirements Document
- MPEG-7 Context & Objectives
- MPEG-7 Applications Document

These issues will be discussed in detail below.

MPEG-4

General Requirements Issues

Shape Coding

The requirements for shape coding were revised based on the contribution: 2393 *C.S. Boon, S. Kadono - Clarification of Requirements for Shape Coding*". A requirement for shape without texture was introduced, both in the Requirements Document and in the Profiles Document. This functionality was deemed important for interactive applications, e.g. on the DVD. Furthermore, other shape coding requirements were defined more clearly, as requested in the mentioned contribution.

Object Content Information

A request for 'Object Content Information' in MPEG-4 was received through contribution 2426 - *Fernando Pereira - Object Content Information (OCI) in MPEG-4*.

The Requirements Group agreed with the need for such information in MPEG-4, but some members were afraid that it would interfere with MPEG-7. Indeed this could be regarded as the first step towards MPEG-7. After a long but very useful discussion, it was decided to have a requirement for this type of information in the Requirements Document (N1727, section 4.1.12), which requires that a very limited set of information be included in MPEG-4 already, preferably the first version of it. It was felt that this was needed to prevent proprietary solutions from emerging. It shall not interfere with the development of MPEG-7. A Call for Proposals was discussed, but it was decided not to have one, and to do the work in an Ad Hoc Group. (N1794).

Reference to MPEG-7 data

2529 *Regis Crinon, Ibrahim Sezan - Requirement for referencing MPEG-7 streams by MPEG-4 Objects*

The Requirements group agreed with the contribution that a reference to MPEG-7 data or streams from MPEG-4 streams is desirable. It is included as requirement 4.1.17 in the Requirements document. (N1727)

Other issues

2345 *Gerald Knabe - User interaction and object behavior: Walk through requirements for content creation*

After a presentation it was concluded that the requirements are partly covered already, partly covered in the AAVS work, are partly application requirements MPEG-4 does not cover, and that for the remaining part this contribution gave an interesting application description, that could be included in the Applications Document if the author wants to work on that.

Profiles

Much time of the meeting was devoted to discussing the translation of Profile Requirements to Tools. A very useful start to the discussion in the area of the Visual part was given by *Jim Brailean, Kevin O'Connell - Mapping Video Tools to the MPEG-4 Video Object Profiles.*

In general, it makes only sense to define Profiles for the tools available in the Standard, so for Version 1 Profiles only Version 1 tools can be used.

Video

Based on this document, many discussions, and two joint meetings with Video, the following organisation of Visual tools is proposed:

Intra Coding Mode (I) Inter Prediction Mode (P) AC/DC Prediction Reversible VLC Slice Resynchronization Data Partitioning <i>[Binary Shape]</i>	Simple
H.263/MPEG-2 Quantization Table Bidirectional Prediction Mode (B) Advanced Prediction Mode Static Sprites Alpha (Gray Scale) Shape	Main

Interlaced Content Temporal Scalability	

This is still very much under discussion, and depends on the complexity of the tools. Implementation Studies was asked to evaluate the complexity of the Error Resilience tools, and they proved not to burden the Simple Profile. Inclusion of Binary Shape in Simple is still a question, as the tools may not work well together with the error resilience tools. The Requirements Group found it important to have shape tools in the Simple Profile, however. More details on the considerations and options can be found in *N1768 (Translation from Profile Requirements to Profile Specifications.)* An important point is the discussion of interlaced tools vs. scalability. Some people want interlace in Main, some scalability. Maybe it is needed to create two Profiles here, for applications that don't want to be burdened by scalability and for those that have problems with interlaced.

Audio

Two joint meetings with Audio provided useful insights in the thinking about profiles to both groups. Based on these discussions, the Audio Group has come up with a proposal, which the Requirements Group did not get a chance to evaluate yet. The first discussions learn that while the terminology and approach is not yet consistent with that of the Requirements Group, the structuring is useful and can very probably be used to arrive at Audio Object Profiles.

SNHC

A joint meeting with SNHC got the principle of defining Profiles across. The result was two Object Profiles for Facial Animation. The Advanced Facial Animation Object Profile will use the following tools Facial Animation Parameters, Facial Definition Parameters (feature points, Facial Animation Tables, 3D Mesh, Texture). The decoder with this Object Profile is obliged to use all the information it receives, as opposed to the Simple Facial Animation Object Profile.

The Simple Facial Animation Object Profile has the same tools as the Main Facial Animation Object Profile, but the decoder is only obliged to use the Facial Animation Parameters.

Similar Profiling activity will be needed in the area of text and graphics, perhaps together with Systems because

this must lead to a restricted set of BIFS nodes in some of the Profiles.

Systems

No Systems Profiles have been defined yet. It is currently considered to define profiles that restrict the capabilities in the area of the allowed transforms (i.e. BIFS nodes) in the compositor.

Support for Studio Applications

Support for Studio Applications was discussed using 2225 - *Theo Vlachos - Modifications to the Video Random Access Object Profile*. It was decided to include the application in the Applications document. The Profile Requirements are such that they will not be supported in MPEG-4 Version 1. The contribution will have to be revisited at the next meeting, when a decision is necessary with respect to the Random Access Object Profile. This profile has never been well-developed. Two decisions can be taken: the Random Access Object Profile is changed to accommodate Studio Applications (meaning it will lose its original intent) or a new Object Profile is created.

Tools for broadcast applications

After discussing the contribution: 2560 - *Ajay Luthra, Xuemin Chen, Bob Eifrig, Ganesh Rajan, Sam Narasimhan - Tool - Tool Requirements of Video Main Object Profile for Broadcasting Applications*, it was decided to delete support for 4:2:2 and 10 bit Video from the Main Profile. Some of the contribution goes towards a composition Profile. The Requirements Group wants to wait and see what happens with the activity 'QoS in an MPEG-4 Decoder', before writing Composition Profiles, but keeps this contribution as a first step in that direction.

12 bit Luminance

The need for the 12 bit Video Object Profile was discussed again. It was decided to define such a Profile iff enough support was shown at the next meeting, by multiple parties wishing to utilise the Profile.

Other Profile Issues

It was decided not to publish the Profiles Requirements Document (N1728) yet, because the Requirements Group felt it was still not suitable for publication. Moreover, publication was not necessary because contrary to the original intention, the MPEG-4 Applications Document makes no direct reference to the Profiles Requirements Document.

Applications Document (N1729)

An applications document was created, following the discussions in the AHG on MPEG-4 Requirements. The applications document lists applications enabled by MPEG-4, the specific requirements induced by the application, as well the MPEG-4 tools that are needed to enable them. These tools have only been well filled out in the Visual area; more information needs to be added for Audio and also for Systems (and perhaps also DMIF, although this was not discussed during the meeting.)

Currently 12 applications are described in the document. The intention is to describe a number of representative applications, and *not* to have as many applications as possible. If people bring application description close to what is already in the document, an attempt will be made to merge them. During the meeting, a number of contributions found their way into the applications document, some of them entirely, some of them contributed to existing application descriptions:

- 2560 Ajay Luthra, Xuemin Chen, Bob Eifrig, Ganesh Rajan, Sam Narasimhan - Tool Requirements of Video Main Object Profile for Broadcasting Applications
- 2224 Theo Vlachos - Description of Studio and Television Post-production Applications
- 2274 Jean-Claude Dufourd - Interaction with a Multimedia Database Profile
- 2309 Jian Zhang, Norbert Gerfelder, Luc Neumann - Collaborative scene visualization
- 2458 Jian Zhang, Norbert Gerfelder, Luc Neumann - Mobile Multimedia Applications
- 2334 Rainer Buchta, Karlheinz Brandenburg, Michel Base - Request for a MPEG-4 Audio Profile for Digital AM Broadcasting

Klaus Diepold is the editor of this new document, that is available to the general public.

MPEG-4 IPR

Seven proposals were received in response to the "Call for Proposals for the Identification and Protection of

Content in MPEG-4". These were presented to the Requirements Group, together with two proposals previously received. The proposals including the two older submissions (with document numbers were appropriate) are listed below:

- 1947 Niels Rump, Jürgen Herre. *Copyright protection of Multimedia Data: The "Multimedia Protection Protocol" (MMP)*. Submitted for the Bristol meeting.
- 2228 Andrew Johnson and Michael Biggar. *Digital watermarking of video/image content for copyright protection and monitoring*.
- 2233 Amy Reibman, Jack Lacy, David P. Maher, James H Synder. *Proposal for the identification and protection of content in MPEG-4*.
- 2234 Frank Hartung. *Hybrid Embedding of Content-Related IPR Data Sets into MPEG-4 Video Objects*.
- 2281 Fred Jordan, Martin Kutter, Touradj Ebrahimi. *Proposal of a watermarking technique to hide/retrieve copyright data in video*.
- 2303a¹ Robert Fint. *Watermarking Technology*.
- 2303b Jean-Delaigle, Catherine Simon. *Protection and Automated Monitoring of Digital Objects*
- 2333 Itaru Kaneko. *A proposal for identification and protection of the content*. A revised version of a proposal submitted for the Maceiò meeting.
- 2591 Douglas Armati, David Van Wie, Robert Weber. *Intellectual Property Rights Management for MPEG-4: The InterTrust Commerce Architecture*.

A first evaluation of the responses to the CFP can be found in "Evaluation of the Responses to the CFP about content related IPR Issues" (N1767). The contributions were categorised as either watermarking systems or complete systems for protecting IPR.

Beside evaluating the responses, the IPR break out group discussed about what is essential to be included into the first version of the MPEG-4 standard and what has to be postponed to the second version.

It is common opinion that two things have to be included into the first version of the standard:

1. The identification of the IPR owners;
2. Some „hooks“ for protecting the IPR data sets as defined in N1632 and the content (called „payload“) itself against illicit usage and illicit changing.

While the first item is already available in its first iteration (see below and N1732), the latter needs further discussion. The topics addressed here were:

- The need for cryptography to ensure the protection of the IPR data sets and the payload;
- The need for watermarking to ensure that IPR information is bound to the corresponding payload;
- The needs of MPEG-4 to provide an interface towards commercial systems to enable these commercial systems to use MPEG-4.

Furthermore, the document "Management of Identification and Protection of Content in MPEG-4" was revised in Stockholm. This document was edited by Keith Hill and was issued as document N1732.

A first definition of the syntax to store and transmit IPR information in an MPEG-4 bit stream was developed and included into N1732. To the IPR break out group it seemed to be appropriate to create an *n:m* relationship between IPR information and MPEG-4 elementary streams. Therefore it was decided to embed the IPR data sets into the BIFS and to incorporate pointers to these IPR data sets into each elementary stream.

In joint meetings with the Systems group, the architecture for the IPR related data was discussed. The outcome of this discussion was a common understanding between the Systems group and the IPR break out group of what is to be achieved in the first version of the MPEG-4 standard and how this can be achieved technically.

A first version of the syntax of the IPR data sets was provided in N1732. This syntax has to be included into the Systems WD until the Fribourg meeting in October.

¹ The document archive 2303 contained (beside a list of the contributions to the CFP) two different contributions to the CFP itself. These two contributions are referenced to as 2303a and 2303b.

It was decided in the Stockholm meeting that when standardising watermarking is deemed a necessity, core experiments will have to provide the answer to which method is best. The first Verification Model for the Core Experiments shall then be built using the proposals evaluated in Stockholm in co-operation with the Audio and Video groups. After that, the process is open to new technologies, which is the standard procedure in MPEG.

And AHG was set up to further discuss these issues (N1739).

MPEG-4 Overview (N1730)

Contributions from the Systems and the DMIF Groups were received during the final days of the meeting, and incorporated immediately after. The Section "List of functionalities to be supported after November 1998" was put into a separate document (N1731) and the Applications were moved to the MPEG-4 Applications Document.

The document was stripped of annotations and editorial remarks, and released for public usage. It is not yet entirely consistent within itself, and more work is needed in the AHG.

MPEG-7

There were three milestones for MPEG-7: the public release of the MPEG-7 Applications Document, the 'Second draft of the MPEG-7 Requirements document' (N1734) and the fourth version of the MPEG-7 Context and Objectives.

As was already the case during the last few meetings, more people came to MPEG exclusively for MPEG-7. The MPEG-7 part of the meeting was attended by some 40-50 people, and the presentations of the contributions led to good discussions. The outcome of these discussions has been incorporated into the 3 mentioned MPEG-7 documents. Specifically this applies to the following contributions:

- 2209 Fernando Pereira (AHG chairman) - Report of the Ad Hoc Group on MPEG-7 Requirements
- 2338 Adam Lindsay - Draft of MPEG-7 Requirements Including Audio
- 2433 Adam Lindsay - Auditory and Advanced Applications for MPEG-7
- 2290 Yong Rui, Thomas S. Huang, Sharad Mehrotra - MARS and Its Applications to MPEG-7
- 2375 Stephen W. Long - Video Metadata Fundamentals
- 2565 Jonathan Courtney Object-Motion-Based Video Retrieval
- 2573 Jonathan Courtney - Automatic Video Indexing via Object Motion Analysis

MPEG-7 Applications Document (N1735)

Based on a contribution by Adam Lindsay, (m2338) and a number of examples that were written during the meeting, an MPEG-7 Application Document was created. Adam will from now on also act as the editor of the document. It documents applications that would be enabled by MPEG-7 descriptions, the requirements for these applications, and relevant references for further reading related to these applications. The goal of the document is threefold:

- to get a better understanding of what MPEG-7 should be, and what functionality it should deliver;
- to use as a 'Public Relations' instrument, that can help explaining what MPEG-7 is;
- to use when writing the concrete requirements for MPEG-7.

Second Draft of Requirements Document

A second draft of the MPEG-7 Requirements Document was issued, in which much more audio requirements are given than in the first draft. Also, an appendix with definitions and terminology was added, as well as a list with open questions. Although it is clearly still a draft, the Requirements Group recommended it be made publicly available. Editor of this document is Fernando Pereira.

MPEG-7 Context & Objectives

The MPEG-7 Context and Objectives Document was updated following output from the Ad Hoc Group on Requirements, and the discussions during the meeting. Notably, it was stressed that MPEG-7 is for streamed as well as stored applications, real time and non-real time operation, and on-line as well as off-line usage. The word 'search', that appears a number of times in the C&O, was deemed too limited in its meaning, and many occurrences of it were replaced by other wording throughout the document. The list of contact people was adjusted to the actual people participating in the work.

Other MPEG-7 Issues

Liaisons

Liaisons were sent out to:

- SMPTE on activities of MPEG-4 and MPEG-7 on the standardization of multimedia content description.
- Liaison statement to ITU-R WPs 10 & 11A on activities of MPEG-4 and MPEG-7 on the standardization of multimedia content description.

Relation to FIPA

2356 *Fabio Bellifemine - FIPA, MPEG-4 and MPEG-7*

After presentation of this document it was concluded that MPEG and FIPA could benefit from each others' work. FIPA could benefit from MPEG-4 OCI and MPEG-7 types of descriptions. MPEG could use the ontology tools that FIPA describes for developing ontologies related to AV material. This work will come in a later stage of MPEG-7. A liaison was not yet sent out, but should be sent out at the next meeting.

Public Documents and Ad Hocs

The following documents were released for public usage:

MPEG-4

MPEG-4 Requirements Document - v.4	N1727
MPEG-4 Applications Document - v.4	N1729
MPEG-4 Overview	N1730
Management of identification and protection of content in MPEG-4 - v.2.....	N1732

MPEG-7

MPEG-7 Context and Objectives - v.4	N1733
Second Draft of MPEG-7 Requirements	N1734
MPEG-7 Applications Document	N1735

The Requirements Group recommended setting up 5 ad hoc groups:

AHG on MPEG-4 Low Delay Evaluations (Mike Zeug).....	N1736
AHG on MPEG-4 Requirements (Rob Koenen)	N1737
AHG on MPEG-7 Requirements (Fernando Pereira, Co-chair Adam Lindsay).....	N1738
AHG on content-related IPR Issues in MPEG-4 (Niels Rump).....	N1739
AHG on Object Content Information in MPEG-4 (Ibrahim Sezan and Fernando Pereira)	N1794

Annex 1: Agenda

When	What
Monday	
9.00 - 14.00	plenary
13.00 - 14.00	lunch
± 14.00 - - 16.00	agenda, goals of meeting, report of chairmen's meeting, <i>Report back about MPEG-4 issues from AHG (General Requirements issues)</i> agenda 2553 Jim Brailean, Kevin O'Connell - Mapping Video Tools to the MPEG-4 Video Object Profiles
16.00 - 17.00	<i>Joint meeting with Audio about Profiling</i> 2334 Rainer Buchta, Karlheinz Brandenburg, Michel Base - Request for a MPEG-4 Audio Profile for Digital AM Broadcasting
17.00 - 18.00	<i>Joint meeting with Video about Profiling</i> 2553 Jim Brailean, Kevin O'Connell - Mapping Video Tools to the MPEG-4 Video Object Profiles
Tuesday	
9.00-13.00	<i>IPR Issues - (notably responses to Call for Proposals)</i> 2303 Overview IPR Responses 2228 Andrew Johnson Michael Biggar - Digital watermarking of video/image content for copyright protection and monitoring 2233 Amy Reibman, Jack Lacy, David P. Maher, James H Synder - Proposal for the identification and protection of content in MPEG-4 2234 Frank Hartung - Hybrid Embedding of Content-Related IPR Data Sets into MPEG-4 Video Objects 2281 Fred Jordan, Martin Kutter, Touradj Ebrahimi - Proposal of a watermarking technique to hide/retrieve copyright data in video n.a. Douglas Armati - The Intertrust Commerce Architecture n.a. Robert Fint (CRL) - Watermarking Technology n.a. Jean-Delaigle, Catherine Simon (Talisman) - Protection and Automated Monitoring of Digital Objects 2333 Itaru Kaneko - A proposal for identification and protection of the content 2248 Keith Hill - Proposed Revision of N1680 (IPR management)
13.00-14.00	lunch
	<i>Various Requirements Issues</i> 2393 C.S. Boon, S. Kadono - Clarification of Requirements for Shape Coding 2560 Ajay Luthra, Xuemin Chen, Bob Eifrig, Ganesh Rajan, Sam Narasimhan - Tool Requirements of Video Main Object Profile for Broadcasting Applications 2224 Theo Vlachos - Description of Studio and Television Post-production Applications 2225 Theo Vlachos - Modifications to the Video Random-Access Object Profile 2274 Jean-Claude Dufourd - Interaction with a Multimedia Database Profile 2309 Jian Zhang, Norbert Gerfelder, Luc Neumann - Collaborative scene visualization 2458 Jian Zhang, Norbert Gerfelder, Luc Neumann - Mobile Multimedia Applications 2345 Gerald Knabe - User interaction and object behavior: Walk through requirements for content creation
17.00 -18.30	<i>Joint with Systems about Profiling and IPR issues</i> 2540 Pallavi Shah (Sun), Gerard Fernando (Sun) - MPEG4 Requirements for Internet Applications
Wednesday	
9.00-11.00	Plenary meeting
11.00-12.30	Joint meeting with SNHC on Profile issues 2322 Jörn Ostermann, Erich Haratsch, Barry Haskell - Requirements for Facial Animation Systems
12.30-13.30	lunch

<i>Description of Objects and Content in MPEG-4 and MPEG-7</i>	
13.00 - 19.15	2426 Fernando Pereira - Object Content Information (OCI) in MPEG-4 2529 Regis Crinon, Ibrahim Sezan - Requirement for referencing MPEG7 streams by MPEG4 Objects 2356 Fabio Bellifemine - FIPA, MPEG-4 and MPEG-7 2209 Fernando Pereira (AHG chairman) - Report of the Ad Hoc Group on MPEG-7 Requirements 2282 MPEG-7 Applications document 2210 MPEG-7 Requirements document 2207 MPEG-7 Context and Objectives 2338 Adam Lindsay - Draft of MPEG-7 Requirements Including Audio 2433 Adam Lindsay - Auditory and Advanced Applications for MPEG-7 2290 Yong Rui, Thomas S. Huang, Sharad Mehrotra - MARS and Its Applications to MPEG-7 2375 Stephen W. Long - Video Metadata Fundamentals 2565 Jonathan Courtney Object-Motion-Based Video Retrieval 2573 Jonathan Courtney - Automatic Video Indexing via Object Motion Analysis Draft Rec. ITU-R BR (Use of wrappers and metadata in television production Social Event (busses leave from hotel 19.30)
Thursday	
9.00 - 9.30	Joint with Video on Profiles
9.30 - 10.00	Joint with Audio on Profiles
10.00 - 11.00	Joint with ISG on Implementation issues (Interlace, error resilience)
10.00 - 13.00	<ul style="list-style-type: none"> • profiling issues <ul style="list-style-type: none"> 2189 Rob Koenen - Report of the Ad Hoc Group on MPEG-4 Requirements 2304 MPEG-4 Applications Document 2311 MPEG-4 Profiles Document. 2208 MPEG-4 Overview + • New document "functionalities to support after Nov. '98"
13.00 - 14.00	lunch
14.00 - 15.30	Report back from IPR Break Out Group
15.30 - late	<ul style="list-style-type: none"> • backward compatibility issues, • Norwegian NB resolution • DVD Requirements in Applications Document • Profiling continued
Friday	
8.00 -13.00	Approving all requirements documents (including IPR, MPEG-7), final editing, joint meetings, starting with MPEG-7
13.00-14.00	lunch
14.00-21.45	plenary meeting

Annex V
Report of Delivery Meeting

Source: Vahe Balabanian, Chair

The list of attendees and the documents reviewed are attached at the end of this report.

The following are the results of the meeting grouped under the headings of DMIF and DSM-CC.

DMIF

1. Joint Systems-Mux/DMIF meeting
 - DMIF is strictly responsible for defining the MPEG-4 delivery control primitives at the DMIF-Application interface for the establishment of the FlexMux and TransMux channels.
2. Release DMIF WD N1763 WD 1.0
 - Specified control interface to Systems using IDL
 - Mapping to ATM Q.2931 and H.225 for IP Signaling
 - Transparent information flows provided for operation with Interactive peer MPEG-4 terminals, Broadcast Carousels and MPEG4 File systems
 - Issue: Resolve consistent addressing at the Interface with Systems
 - Issue: Resolve consistent QoS metrics at the Interface with Systems
1. Decision on the DMIF Reference Source Code
 - An Adhoc Group is created to review the possibility of using the Columbia University software for reference source code N1819
2. Work on DMIF beyond Oct/97 CD N1765 (DMIF WD 1.0 for MPEG-4 Version 2)
 - This document contains the DMIF operation over heterogeneous networks and the use of a network based Session and Resource Management function.
3. Prepare response to the SG16 liaison N1777
4. Initiated a liaison to IETF AVT group N1790
5. Created terms of reference for the new group MPEG-Delivery Group where DMIF is moved to under. N1800

DSM-CC

1. Release of the DSM-CC conformance test ISO/IEC 13818-10 WD V2 instead of a CD (N1764)
 - Reason is to Give a chance for others to review since the DSM-CC community was not fully represented at this meeting.
2. DSM-CC IS Corrigenda
 - The corrections were classed as minor editorial. Will use the channel of SC29 to distribute after verifying with the editor of DSM-CC IS.

Attendees:

Guide Franceschini, CSELT, Italy
 Guy Hirson, NDS UK
 Vahe Balabanian, Nortel, Canada
 Michal Szwarc, NYNEX, USA
 Koon-Seng Lim, Columbia University, USA (invited expert)
 Per Tolin Telia, Sweden
 Jurgen Diecke, Darmstadt University, Germany
 Nuno Delgado, CSELT, Italy
 Creff Herve, Atlantide, France

Yong Han Kim, University of Seoul, Korea
 Harri Hakulinen, Nokia, Finland
 K Hsing NIST, USA (invited expert)
 Chilsung Seo, Korea Telecom, Korea (invited expert)

Documents reviewed:

Doc #	Title	Contact	Relevance
N1690R	Revised 13818-10 WD since Bristol	Jurgen Ruf	DSM-CC
M2227	Conformance Test Suite for the DSM-CC U-U Protocol	Karen Hsing, Chil-Sung Seo	DSM-CC
M2250	Proposed Modifications to Chapter 4: User-to-Network Session Messages	Russell C. Dooman	DSM-CC
M2251	Proposed Editorial Modifications to Chapter 4: User-to-Network Session Messages	Russell C. Dooman	DSM-CC
M2202	Proposed Text for DMIF Phase 1 ISO/IEC 14496-6 WD	Vahe Balabanian	DMIF
M2305	DAI (was SMI) and TMI baseline text v5.0	Guido Franceschini	DMIF
M2376	Channel Map Table descriptor Syntax	Regis J. Crinon	DMIF
M2204	Proposed extension of DMIF PWD version 3	Zvi Lifshitz	DMIF
M2479	A Proposal for DMIF Phase 1 Reference Source Code Development	Koon-Seng Lim	DMIF
M2307	June 10-11 mux-DMIF joint AHG Meeting Report	Vahe Balabanian Carsten Herpel	DMIF/Systems
M2427	Important Instances of Transmux Signaling: ATM and Integrated Service Internet	Jens Schmitt et al.	DMIF/Systems
M2540	MPEG-4 Requirements for Internet Applications	P. Shah, G. Fernando	DMIF/Systems
M2546	RTP Encapsulation of MPEG-4 Data	Gerard Fernando	DMIF/Systems
M2509	Simulation of a Transmux Instance for IP	Guido Franceschini et al	DMIF/Systems
M2508	Scope of parameters in the Mux-DMIF model	Guido Franceschini	DMIF/Systems
M2532	Review of Systems Layers	Carsten Herpel	DMIF/Systems
M2533	Revision of FlexMux Specification	Carsten Herpel	DMIF/Systems
M2213	Report of Ad Hoc group on QoS parameters	Dominique Curet et al.,	DMIF/Systems
M2443	MPEG-4 Stream Transmission Syntax on MPEG-2 Transport Stream	Yoshinori Matsui	DMIF/Systems
M2536	Stored File Format for MPEG-4 (Rev. 2.0)	A. Eleftheriadis, H. Kalva, A. Puri, R. Schmidt	DMIF/Systems
M2208	Draft revision of "MPEG-4 Overview"	Rob Koenen	DMIF/General

Annex VI
Report of Systems Meeting

Source: Olivier Avaro, Chair

1- Systems Working Draft

Working draft V5.0 (N1825) is the major achievement of the Systems sub-group during the Stockholm meeting. Quality was reached thanks to the incredible editing efforts made by the group, and particularly by the editors. In order to make the editing task a little bit easier, some rules has been decided (N1799). Editors are the authoritative persons to include/refuse any changes to the WD according to these rules.

Among the major changes and improvements of the Working Draft :

1.1. Systems Decoder Model

The specification of the Systems Decoder Model has been significantly improved. The mapping of Audio/Video and SNHC in this model begun. The model has still to be refined (e.g. ETS, refinement of the concepts of time).

1.2. Scene Description (BIFS)

The BIFS specification reached a good quality. Joint issues with audio/video and SNHC have been addressed in details. New and compelling features (like animation streams) have been introduced. The structure of the nodes in term of content nodes, structure nodes and behavior nodes has been clarified. The specification provides now for consistent syntax and semantic that are sufficient for implementation and bitstream exchanges for most of the nodes.

1.3. Scene Description (AAVS)

The Systems experts recognized the relevancy to develop a set of APIs in order to support scene description (the previous APIs have been scope to a relevant and manageable subset). The current specification however is not mature, that's why it is not yet in the working draft but rather in a technical annex. A path to introduce them have been defined. It consists in the following steps :

1. Improvement of the specification,
2. Implementation of AAVS in the Systems Software Framework,
3. Demonstration of the AAVS capabilities and their added value.

If sufficient validation is reached, this format for scene description will be part of MPEG-4 Systems Version 1.0.

1.4. Interface with Streaming Data

The object descriptor has been improved from the initial proposals (Regis and Guido). The syntax and semantic of the StreamType field has been precised. However, the tables of the supported algorithms still have to be filled. Guidance from the Requirements group is needed. It has been recognized that the OD is a good place to put IPR data set. A syntax and semantic of these data have been proposed by the IPR community but still have to be approved and introduced in the WD.

1.5. File Format

The Systems sub-group initiated a new activity in order to defined a file format for storing MPEG-4 coded audiovisual scenes. The first specification is now available.

2. Systems Implementation Project

The Systems implementation activity has reached a good momentum. The two implementation activities (formerly Im1 and Im2) have converged in a joint platform. The project description is given in document N1801. The project is now getting bigger : indeed, participating to this activity is the best way for a company to acquire Systems know-how.

3. Experiments

A new experiment document has been produced (N1773). The goal of these experiments, now the Systems version 1.0 has been frozen in the Systems WD, is to gather issues that need to be investigated, either to validate the current WD (the results of these experiments could be introduce in the WD as informative annexes), either to prepare the

Systems VM for MPEG-4 Phase-2 (e.g. composition issues).

4. Collaboration with the VRML community

The highly desired close collaboration with the VRML community has been a hot topic during this meeting. Besides the formal contributions from SC24, to which appropriate answer has been send, it is very promising to see that a ground for real technical collaboration and cross-fertilization of the work is now taking place. In particular, companies that have expertise in both fields (e.g. Sony) presented valuable inputs and are very likely to play an important role in the cooperation process.

Annex VII
Report of Video Meeting

Source: Thomas Sikora, Chair

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 MPEG-4 video requirements and on issues related to bitstream exchange activities. Additionally, results of the July 1997 Subjective Tests were reviewed in joint meetings with the MPEG Test group.

July 1997 Subjective Tests:

Two algorithm proposals were submitted to MPEG and compared in formal subjective viewing tests. These tests were conducted by the MPEG Test Group in conjunction with the Video Group. The statistical results of the tests were provided by the Test Group and indicated that - based on standard statistical tests - the two proposals and the MPEG-4 VM 7.0 algorithm under comparison performed statistically without significant differences. The proposers were given the opportunity to provide details of their algorithms. Informal small („mini“) experiments will be conducted between the Stockholm and October Fribourg meeting to evaluate, whether some of the concepts - if proven successful and of minor algorithm change - can still be incorporated into Version 2 of the MPEG-4 standard.

March 1998 Subjective Tests of the MPEG-4 Standard Version 1:

In joint meetings with the Test Group a detailed plan was issued which outlines the first subjective evaluation of the MPEG-4 standard Version 1 in March 1998. This plan foresees an evaluation of the Error Resilience methods currently under development for Version 1.

Bitstream Exchange:

The primary task of the video group was to review the status of the bitstream exchange required to arrive at a robust and stable MPEG-4 video coding algorithm by October 1997. It was identified that there was still a significant amount of exchange needed between the Stockholm and the October Fribourg meeting to ensure that most of the tools arrive at a satisfactory level of maturity. In general, it was evident that only the „Error Resilience“ tools and in part the „Shape Coding“ tools were thoroughly tested. The baseline MPEG-1-like coding algorithm was only cross-checked in terms of bitstream exchange on a basic level. At the same time a number of tools are at present not implemented in either of the official MOMUSYS or Microsoft implementations - and no sufficient bitstream exchange had been performed so far. As an outcome it was decided to issue the MPEG-4 standard in two versions, with a CD Version 1 containing the basic elements of the standard in October 1997 and a CD Version 2 one year later.

Based on the tools already implemented in either the MOMUSYS C or Microsoft C++ software platforms the following algorithms or tools were identified for MPEG-4 Video Version 1:

- I,P,B-Prediction
- Error Resilience
- Interlace Prediction

- Binary Shape Coding
- Static Sprites
- Temporal and Spatial Scalability (2 Layers)
- Object-Based Temporal Scalability (2 Layers)
- Wavelet-Based Scalable Texture Coding

The above tools will be verified in terms of bitstream exchange by October 1997 and only the ones that arrive at a reasonable maturity - and which are implemented in at least one of the two software platforms - will be considered for MPEG-4 Version 1 CD at the October meeting in Fribourg. The remaining tools will be considered for Version 2 CD which is scheduled for October 1998.

Verification Model (VM) and Working Draft (WD):

The existing list of Core Experiments (CEs) was revised. A significant amount of meeting time was allocated to the review of input documents related to results of existing CEs. Experimental conditions of the CEs were harmonized to allow a more efficient evaluation of the results at the next meetings. Documents with new or revised descriptions of CEs were issued related to "Coding Efficiency", "Shape and Alpha Channel Coding", "Object/Region Texture Coding", "Error Resilience" and "Multi-Functional Coding Aspects".

For SNHC texture coding functionalities the decision was taken to assist a wavelet-based scalable texture coding method for the Version 1 CD which provides a high level of scalability with high coding efficiency.

In addition to a new version of the Video VM 8.0 a 4th 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. Starting from the end of the Stockholm meeting the Verification Model 8.0 will be used only for the development of the MPEG-4 Video Standard Version 2. For the forthcoming MPEG-4 Video Version 1 CD the Working Draft 4.0 is the basis for bitstream exchange.

To ensure the appropriate handling of the MPEG-4 Video Standard Version 1 and Version 2 the table enclosed was developed. The table depicts the tools that are under consideration for Version 1 and Version 2 of the MPEG-4 Video Standard. The tools currently supported for Visual WD Ver. 4.0 will be considered for the release of the Version 1 CD in October 1997. All other tools that are either already part of the VM Ver. 8.0 and/or currently evaluated in the Core Experiments (CE) are under consideration for MPEG-4 Video Version 2.

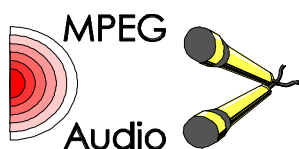
MPEG-4 VIDEO VERSION MANAGEMENT

Algorithm Tools	CE	Video VM Ver. 8.0	Visual WD Ver. 4.0	Software	
				Mo	MS
I and P modes		X	X	X	X
Binary shape		X	X	X	X
AC/DC prediction		X	X	X	X
Padding		X	X	X	X
Quantization types		X	X	X	
Slice synchronization		X	X	X	X
OB MC mode		X	X	X	X
B modes		X	X	X	X
Temporal scalability rectangular shape		X	X	(X)	
Temporal scalability (arbitrary shape)		X	X	(X)	
Spatial scalability rectangular shape		X	X	X	X
Static sprites		X	X	X	X
Data partitioning		X	X	X	
Reversible VLC		X	X	X	
Scalable wavelet		X	X		X
Interlaced coding		X	X		
Dynamic sprites		X		X	
Global motion compensation		X		X	
Gray level alpha shape		X		X	X
Effects		X			(X)
SA-DCT	X	X		X	X
12 bit video		X			
Temporal scalable shape coding		X			
Adaptive 3D VLC		X			
Matching pursuits		X			
Multiple VO rate control		X			
Macroblock rate control		X			
Frame level rate control		X		X	X
Shape adaptive wavelet		X	X		
Spatial scalable shape coding		X			
Boundary block merging		X			
1/4 pel motion compensation	X				
Dynamic resolution conversion	X				
VOP-CR		X			
Interlaced shape coding	X				
Universal VLC formation coding	X				
Arbitrary shape spatial scalability (texture)	X	X			
(Chroma-key shape coding)	(X)				

Joint Meetings:

Joint meetings were held with the Test, Requirements, SNHC, Systems and Implementation groups to harmonize efforts. An extended list of video requirements in particular with respect to profiles was revised and used as a draft for the Requirements group. In a joint meeting between Video and Implementation groups coding methods for shape coding and motion prediction 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.

At the next WG11 meeting in Fribourg in October 1997 the Video group will mainly concentrate its efforts on identifying the tools for Version 1 of the MPEG-4 Video Standard. Separate AdHoc group meetings are scheduled for "Coding Efficiency" (1 day), "Joint Meeting with Video/SNHC" (1 day), „Error Resilience“ (1 day) and "Shape Coding" (1 day) on the weekend prior to the Fribourg MPEG meeting.



Annex VIII
**Report of Audio
Meeting**



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

Status: Draft

Opening of the meeting

The MPEG/Audio Subgroup meeting was held during the 40th meeting of WG11 Stockholm, Sweden on July 21 to 25, 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

Approval of agenda

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

Bristol meeting report

The Audio Subgroup portion of the Bristol meeting report, April 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 in the MPEG-4 core experiments ad hoc group meeting, in task group discussions, or in Audio plenary. 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.

- New format specified for ISO documents. This is relevant to the WD of MPEG-4 Audio and the MPEG-4 Conformance WD for October.
- Bitstream exchange for verification has started in Visual but not yet, visibly, in Audio - this needs to be addressed.
- The Chairman had raised the issues of the content and size of the MPEG-4 Audio Working Draft to explain to the other Chairs its status. It is an ~800 page document so far.
- VRML usage issues need to be addressed in the Liaison items.
- Profiles for MPEG-4 Audio need to be addressed fairly thoroughly.
- DSM (new Delivery Subgroup) to address issues relating to DVD interface.

Joint meetings

Joint meetings were scheduled with Test, Systems and Requirements.

Report of Ad-hoc group activities

All major ad-hoc group reports had been presented in the opening MPEG Plenary. Each was briefly addressed again in the Audio Subgroup. Additional details were taken into account in the main part of the meeting.

The test schedule for MPEG-2 AAC verification (M2253) was noted to finish before Christmas 97.

Conformance testing (M2413) - issues include, sine-sweep at all bitrates, other signals at one bit rate, naming conventions, handling of joint stereo, etc.

FAQs on Audio (M2452) - little response to Mr. Spille's attempts to get email exchanges going.

The MPEG-4 WD progress (M2483) was presented by Mr. Grill. He explained the integration since the last meeting, including structured audio and TTS. He encouraged the early decisions on what is in/out of the WD prior to this week's revisions to it. The ad-hoc progress on the VM software was also reviewed. It was noted that this software had to be openly accessible to ensure maximum up-take by the industry. Most importantly, a source code

encoder has been provided (nearly complete).

The progress on MPEG-4 core experiments (M2507) had been briefly explained in plenary and is the subject of further discussion below. The ad-hoc group met prior to the main meeting to review progress. 18 core experiments had been reported: 6 covered integration of existing tools, the majority of the rest are delta improvements on specific tools.

Resolution of National Body comments

The Japanese NB comments, M2492, were discussed and a response was drafted. A Norwegian NB paper, M2390, raised a comment about audio compression transcoding and a response was supplied. The US NB paper (M2218) was discussed and comments were made to the US HoD.

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

Initial work on IS 13818-5 FPDAM 1

Mr. Kerkhof reported that there had been no comments on the PDAM relating to BC coding, but some editorial changes have been drafted, document WG11/N1742.

MPEG-2 audio quality update

No new work was reported.

Bitstream tests

No new work was reported.

MPEG-2 AAC

Technical Report 13818-4 FPDAM 1

Mr. Akagiri presented M2321 which relates to the availability of the source codes for encoder and decoder elements relating to SSR profile. Document M2352 was noted: it provides source code for the psychoacoustic model of the AAC encoder. Mr. Akagiri also presented the Japanese NB comments on the PDAM, M2492, raising minor technical changes to the standard, and encouraging the establishment of a time scale for the release of source code for AAC encoder. The task group was charged with accommodating these inputs and responding accordingly. The provisional text for the FPDAM is given in document WG11/N1742. The schedule of activities for the remaining technical tasks is given in document WG11/N1743.

Conformance 13818-5 FPDAM 1

The provisional text for the FPDAM 1 is given in document WG11/N1741. The schedule of activities for the remaining Conformance tasks is given in document WG11/N1759.

Systems 13818-1 /PDAM 5

The US NB comments on the PDAM vote, relating to the need to convey more than one AAC elementary stream in a single program stream, were discussed in the Audio Group. There was full agreement with the US position.

Verification Tests

Mr. Kim presented his document M2464 on the collection of test material for the verification tests on AAC and played to the group a sample of the items. The Subgroup queried the criticality of the new items: this will have to be resolved during the 'selection' process at the start of codec tests. To assist in ensuring that a good cross section of stereo material was included, the earlier MPEG-1 items will be added.

In a joint session with Test, the requirements of the verification tests, M2253, were reviewed; particularly in the context of programme items, test schedule and seeking volunteers to carry out the work.

Item	Contribution by
MPEG-1 test items	Thomas Ryden
Alignment of items	S-W Kim
Coded conditions	proponents
Bit stream/bit rate verification	M. Coleman for AAC BBC for LII S. Quackenbush for LIII
Prep of preview material	FhG
Site for preview	FhG
Preview panel	Telekom Berkom, BBC, Hannover
Prep of test tapes	AT&T
Prep for tests	NHK
Test site	NHK
Statistical analysis	Still to be resolved

The magnitude of the testing task was such that without some revision it would have been impossible to find volunteers (and the time) to conduct the tests. It was resolved to drop, for now, the mono tests as most applications for AAC would be stereo, and to reduce the number of codec/bitrate combinations to be previewed by the selection panel to 5, the lowest bitrate for each codec. The tests would however include all bitrate/codec combinations.

Test method and schedule is presented in document WG11/N1744.

MPEG-4

Overview

The MPEG-4 Overview was reviewed and edited in the context of the decisions that were made on profiles, tools and applications. Audio contributions were included in document WG11/N1730, but later removed at the request of Requirements.

Requirements

Profiles

In a joint meeting, Mr. Koenen asked that the profiles, tools and applications be assessed and clustered by Audio in order to refine them. The ensuing discussion determined that an audio object would have an *Audio Object Profile*. A stream profile, e.g. AAC stream type 1 with bitrate of x kb/s, n channels etc, is also a category of *Audio Object Profile*. *Tools* are used to create an *Audio Object Profile*. An *Audio Composition Profile* would be the a combination of several objects (each with an *Audio Object Profile*) of different types. Finally, *Audio Composition Profiles* relate directly to *Applications*.

The extent to which Structured audio needs profiles or levels was discussed and proposals were made. The proposal for a Composition Profile for Digital AM Broadcasting (M2334) was presented by Mr. Brandenburg. This would contain speech and music (the latter probably via structured audio) would provide stereo and mono, would have various sampling rates and bit rates. Delay would not be a real issue but receiver complexity would be. It was noted that if portable reception is targeted then low power consumption needs to be added.

Mr. Moriya presented M2505 as a Composition Profile for low bit rate transmission. However, his profile introduces editing and random access so this is probably a separate profile. This was taken into the profiles task group.

Mr. Meares gave a brief summary of M2224 to the group: its intention is to outline the needs of post-production users of MPEG-4.

Mr. Moriya presented the work of the profiles Task Group. In rationalising the profile options it had been seen that the Broadcasting Profile and the Storage (for speech) Profile could be established as separate subsets of the Storage (for audio) Profile. The Group agreed that the number of profiles should be kept to a minimum.

Mr. Meares encouraged the concept of 'random access' or editability in at least one of the profiles to ensure that the need to cascade codecs was kept to a minimum. In response, it was pointed out that the Systems layer of MPEG-4 defined time and editability down to nanosecond level for audio and video objects. This would enable editing to take place within an MPEG-4 compliant workstation.

There followed an extensive discussion both in Audio Plenary and in the Task Group to draw conclusions relating to the structure of the audio profiles.

The applications and their features were noted to be :-

feature	Applications							
	1. Real time communications	2. Content based storage and retrieval	3. Surveillance	4. Broadcast	5. Internet	6. Content Production	7. Games/VR	8. DVD
coding efficiency	#				#	#		
error robustness	#				#			
synchronisation	#					#		
channel allocation flex	#							
low delay	#							
user control	#	#				#	#	
security	#							
quality	#							
low BR	#							
low complexity	#							
easily encodable	#							
scalability		#			#	#		
random access		#				#	#	
content based multimedia tools		#				#		
content based manipulation						#		
bitstream editing						#		
sample rate changing						#		
fine parameter control							#	
environment model							#	

The tool set for MPEG-4 audio was noted to be:-

Compression type
parametric speech coding
parametric audio coding
CELP
wideband CELP
Twin VQ
AAC
BSAC

Compression feature
coding efficiency
low delay
noiseless compression
prediction
low complexity
very low bitrate
error robustness
scalability
structured audio
text to speech
mono/stereo /multichannel

Compression feature
speed change
pitch change
sample rate changing
environment modelling

Additional requirements
random access
synchronisation
user control
security
quality
bitstream editing

As a result of these discussions, the Audio Subgroup defined four Audio Object Profiles for MPEG-4. Each Audio Object Profile has several levels; a level of a certain object encapsulates certain functionality at a given implementation complexity.

Profile 1: Natural Audio

The natural audio profile is used for the coding of complex, wideband sounds such as music. The natural audio profile also includes “speech + audio” coding, where a single bitstream represents a signal containing both speech and non-speech sounds, either synchronously or sequentially. These levels are hierarchical; the higher-complexity levels include all capabilities at the low-complexity levels.

Level 1: Very low complexity: Monophonic T/F coding, using TWIN V/Q or AAC algorithms.

Level 2: Low complexity: Monophonic or low sample-rate stereo T/F coding

Level 3: Medium complexity: Stereophonic, high sample-rate T/F coding, or low-bitrate audio coding using the parametric algorithm.

Level 4: High complexity: Multichannel, high sample-rate T/F coding, or low-bitrate audio coding using the parametric algorithm.

Profile 2: Synthetic Audio

The synthetic audio profile is used for the coding of synthetic music and sound effects. Note that synthetic audio levels are not hierarchical.

Level 1: Low CPU complexity, low RAM usage: General MIDI-based music synthesis with non-normative sound quality.

Level 2: High CPU complexity, low RAM usage: Algorithmic synthesis using SAOL and SASL.

Level 3: Low CPU complexity, high RAM usage: Sampling synthesis using MIDI, SASL, and downloaded samples.

Level 4: High CPU complexity, high RAM usage: Algorithmic and sampling synthesis using SAOL, SASL, and downloaded samples.

Profile 3: Natural speech

The natural speech profile is used for the (potentially real-time) encoding/decoding of speech.

There is only one level for natural speech coding; it requires the CELP, wide-band CELP, and HVXC algorithms.

Profile 4: Synthetic speech

The synthetic speech profile is used for ultra-low bitrate transmission of synthetic speech data.

There is only one level within this profile. It uses the TTS algorithm.

At the next highest level in the hierarchy of profiles are the Audio Composition Profiles with scene description levels as follows:

<p>Main Audio Composition profile As many audio objects as desired, of all four types. Level 5 audio scene description.</p> <p>Real-Time Communication profile One Natural Speech audio object at level 2. level 1 audio scene description.</p> <p>Broadcast Communication profile Several Natural Audio audio objects, at level 4. A few Synthetic Audio audio objects, at level 3. Level 2 mixing capability.</p> <p>Portable Broadcast Communication profile A few Natural Audio audio objects, at level 3. One Synthetic Audio audio object, at level 2. Level 2 mixing capability.</p> <p>TTS profile A few Synthetic Speech audio objects. Level 1 mixing capability.</p> <p>Gaming/VR profile A few Natural Speech audio objects, at level 2. Many Synthetic Audio audio objects, at level 4. Level 5 mixing capability.</p>	<p>Audio Scene Description Levels</p> <p>Level 1: Simple switching of audio sources, using the AudioSource and AudioSwitch nodes. All audio objects must be transported at the same sampling rate.</p> <p>Level 2: Mixing of equal-sample-rate audio sources, using the AudioSource, AudioMix, and AudioSwitch nodes.</p> <p>Level 3: Effects processing and abstract composition of audio sources, using all audio nodes, but not the Spatialise bit in the Sound node. The sampling rates of the audio sources must be in a simple integer relationship (only resampling by a factor of 1/6, 1/4, 1/3, 1/2, 2/3, 3/4, 1, 4/3, 3/2, 2, 3, 4, or 6 is allowed).</p> <p>Level 4: Like Level 3, but allows audio sources to be transported at arbitrary sampling rates, and provides the appropriate resampling conversion.</p> <p>Level 5: Effects processing and 3-D composition of audio sources, using all audio nodes and the 3-D scene description.</p>
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These conclusions were communicated to the Requirements Subgroup with the recommendation that they form the basis of any between-meeting discussions on Audio Requirements, Profiles etc. Requirements reported that they had a different vision of profiles and levels and that the discussion would continue in the ad hoc activity and at the next meeting.

SNHC elements

Mr. Scheirer gave an example of the MPEG-4 composition model by way of an audio demonstration. This combined 16 kb/s speech with synthetic music and structured audio processing tools using the BIFS node tools of MPEG-4.

Audio BIFS nodes include source, switch, delay, transform, location and spatial transform. There are still some elements needed by MPEG-4 that are not covered by VRML, such as handling stereo, mono, and multichannel in correct conjunction. These matters are being addressed within Structured Audio.

Systems issues

Mr. Brandenburg queried the division between Systems issues and Audio issues and whether we have to define the interactions of objects or whether this is an issue for Systems. The demonstration by Mr. Scheirer, reported above, Section 241011, partially answers Mr. Brandenburg's question, but the transmission and reception stages still needed resolution.

The timing issues relating to the systems clock are a matter of concern to Audio but are being addressed with Systems by Messrs Coleman and Scheirer. A task group was established under Mr. Spille to concentrate attention on the areas of concern. The means of handling scalability, synchronisation, and buffer management issues within Systems also needed to be raised.

A joint meeting was held with Systems to address these issues. The Object descriptor gives ample space for object related data. Scalability will be handled by the BIFS node via the object descriptor to a base data stream and enhancement 1 and enhancement 2 etc.. The question of multiple objects in one stream is under discussion. Audio synchronisation is by padding to obtain byte alignment. This and fast/slow replay are under discussion. Following further discussion, Audio prepared a specification of the synchronisation requirements and audio systems transport issues, which is given in document WG11/N1772, and established an ad-hoc group to continue the discussions.

MPEG-4 Player

This was reported and demonstrated in Plenary as combining facial animation with AAC stereo sound. This has an appropriate allocation of bitrate between audio and video, namely 1 kb for the face and 64 kb for the stereo sound.

Of the various 'Players' demonstrated in Plenary, only Mr. Coleman's complied with all aspects of MPEG-4. Others used non-MPEG-4 audio coders or exhibited questionable systems performance.

Error Resilience

Ms. Miki presented M2569 outlining the need for error resilience tools within MPEG-4 Audio. Initial proposals of how to make the provision are outlined: questions relating to the overhead of these proposals and other matters are raised and initial answers are given. Some of the proposals raise issue of backwards compatibility with AAC. Mr. Quackenbush queried the issue of backwards compatibility and pointed out that there were check bits available to provide error resilience with backwards compatibility: these should be studied first. This will be pursued by way of an ad-hoc group.

IPR and content protection

The Audio Subgroup expressed interest in the protection of audio. Members monitored the Requirements and IPR meetings and reported back as appropriate. Audio Subgroup expressed concern that the issue of watermarking of audio is a very difficult and contentious matter. Many proposals have been made over the years, and all had been found wanting, either in terms of audio quality or in terms of the robustness of the watermark. The IPR Group were advised of the Audio Subgroup's concerns.

SNHC (Structured audio and TTS)

The issue of TTS was addressed Mr. Hahn in documents M2449 and M2450. The TTS interface syntax issues have been addressed by those working on TTS packages and have been agreed between them. The TTS interface syntax is already incorporated in the WD but is subject to review.

Mr. Huopaniemi reviewed his paper, M2355, on sound space auralisation and compositing. Though based on large room parameters, it is claimed to give reasonable simulation of smaller rooms.

Mr. Scheirer presented the work of his Task Group. Audio BIFS nodes have been integrated. Resampling filters are needed for sound mixing. Different presentation formats, e.g. 2/0 v 3/2, may have to be mapped together during mixing and then may need to be format changed to match the output. The Subgroup decided that MPEG-4 Phase 2 functionalities would include spatial auralisations, material properties, spatial sources.

Testing options

Pre-screening results

These were reviewed in Task Group and gave rise to proposals for new core experiments.

Core experiments

Task Group findings

The task group reviewed the MPEG-4 Audio technical descriptions and core experiment results, with consideration of the criterion established for decision, namely delay, quality, complexity, additional functionality and commonality with the VM.

Low delay speech coding core experiment M1630

M2494 (Technical description for Harmony-1)

Discussion: variable rate, delay calculation

M2515 (independent implementation)

Different interpretation of requirements for independent implementation (see M1630), needs further review and discussion.

M2473 (Technical description for Sony proposal for low delay speech coding profile)

Discussion: "improvement by simplification"

M2441 (independent implementation and test results by Matsushita)

Sony proposal significantly better than Philips proposal

M2440 (test results from NEC)

Sony proposal significantly better than Philips proposal

M2477 (test results from Sony)

Sony proposal significantly better than Philips proposal

M2575 (test results from TI)

No significant difference.

Conclusion: Accept Sony low delay HVXC proposal

*New core experiment proposals***M2327 (NTT 8 kHz - 6 kbit/s t/f)**

Complete proposal (including audio demonstration) for extension of existing modules.

Accepted without check phase. Source code for encoder, decoder and tables will be uploaded the week after this meeting. Integration to WD was completed during the meeting.

M2328 (NTT improved scaleable t/f)

Complete proposal (including audio demonstration) for replacement of existing modules. Overlap with ongoing CE M2058.

Check phase and integration with M2058 to be done until next meeting. Source code will be made available.

Check sites: Nokia, Samsung

M2346 (Matra scaleable audio and speech coder)

Complete proposal for addition of two new tools (filter bank and VQ). Check phase to be performed. Source code will be made available. Check sites: Matsushita, ?

M2360 (performance of G.723.1 as a core coder)

Not to be treated as a core experiment

M2379 (changes to structured audio)

To be discussed later.

M2380 (audio sample format for structured audio)

To be discussed later.

M2442 (use of CELP LSP quantization in parametric speech core)

Complete proposal for replacement of existing module by module existing in CELP core.

Accepted without check phase. Source code for encoder and decoder is available, tables will be uploaded the week after this meeting. Integration to WD was completed during the meeting.

M2461 (perceptual noise substitution for T/F)

Complete proposal (including audio demonstration) for addition of a new module.

Check phase for AAC and additional integration to TWIN-VQ. Source code for encoder and decoder will be made available (to NTT within one month after this meeting). Check sites: Dolby, AT&T, NTT

M2469 (bandwidth control for T/F)

Complete proposal (including audio demonstration) for addition of a new module.

No check phase required. Source code for encoder and decoder will be made available within one month after this meeting. Integration to WD was completed during the meeting.

M2379 (changes for Structured Audio)

Complete proposal for modification of existing modules.

No check phase required. Integration to WD and VM completed.

M2380 (audio sample format for SA)

Complete proposal for addition of a new module.

Check phase and integration until next meeting.

M2480 (harmonic plus noise plus individual lines for parametric core)

Complete proposal (including audio demonstration) for addition of new modules.

Check phase to be performed until next meeting. Source code will be made available to check sites as soon as required. Check sites: Sony, Philips

M2481 (integration of parametric speech and audio tools)

Complete proposal for small syntax change.

No check phase required. Source code will be made available within one month. Integration to WD will be completed during this meeting.

M2486 (extension of narrow-band CELP to a bandwidth scaleable CELP coder)

Complete proposal (including audio demonstration) for addition of a new module.

Check phase to be performed until next meeting. Possible integration with wideband CELP still to be discussed.

Check sites: under discussion.

M2495 (lossless coding for CELP)

Complete proposal (including audio demonstration) for addition of a new module.

Check phase to be performed until next meeting. Check sites: University of Hannover, MATRA

M2506 (low delay for parametric speech coder)

Proposal for encoder modification. Inclusion in informative part to be discussed in the context of profile definitions.

M2520 (error resilience for AAC)

Complete proposal (including audio demonstration) for addition of a new module. Discussed in audio plenary under the discussion of error resilience. Ad hoc activity was established.

M2528 (low delay filter bank)

Complete proposal for extension of existing module.

Check phase required. Source code will be made available. Check sites: Samsung, Philips

M2226 (improved integration of core coder into T/F)

Proposal of core experiment withdrawn. Fixes to syntax remaining were edited in the WD during the meeting. Integration into VM within one month after this meeting..

Audio Subgroup discussions

In the context of lower delay speech codecs, it was noted that additional memory was required by the HVXC approach compared to the Philips Harmony coder. The facts were noted that the HVXC coder could operate at a fixed bit rate of 2 kb/s versus a statistical average of 2 kb/s (7 kb/s max.) for the Harmony coder, that it appeared to demonstrate equal or better quality, and that it did not require expansion of the tool set to accommodate the low delay speech profile. This led the group to the consensus that the lower delay modified VM low bitrate HVXC coder (2-4 kb/s) be used for the lower delay speech profile.

Mr. Grill presented M2360, describing the evaluation of G723.1 in combination with AAC in a scaleable form. This shows that, for a given bitrate, the scaleable version gives better results than a simulcast arrangement. The penalty is a small increase in complexity. Audio members agreed that this was a useful option for MPEG-4: implementation is a Systems issue and they were advised of this requirement.

It was agreed that the future core experiments relating to Version 1 of MPEG-4 would be restricted to those issues that can be described as optimisation or amalgamation of existing tools, with the proviso that they should deliver finished results **and** be amalgamated into the WD/CD by the end of the October 1997 meeting. Those ideas which cannot comply with this requirement can be considered under Version 2 MPEG-4 work. At this time, the list of items under consideration for Version 2 is as follows:

1. API based structured audio
2. acoustic environments (spatial auralisation)
3. low delay high quality audio
4. speech/audio algorithm @,=20kb/s
5. error resilience (Version 1 target)

The core experiment test methodology was reviewed and is updated, in respect of the new test items, in document WG11/N1748. The status of the core experiments is summarised in document WG11/N1747.

Verification tests

An initial discussion of the future MPEG-4 verification tests was conducted in a task group. Their findings are presented in document WG11/N1749.

VM and encoder development

All of the decoder software is already available. Most of the encoder elements are available. The missing parts of the AAC encoder are:

Element	To be provided by
TNS	Chuck Lueck
Prediction	Available but needs integration (Lueck)

ISO copyright release is needed on a number of encoder modules, but all VM decoder software already has the ISO copyright release header included.

WD

The ISO template had only just arrived at this meeting and has caused significant additional effort to be required in the drafting work; the previous version of the MPEG-4 Audio WD being already 800 pages long. However, attempts were made to comply as far as was reasonable at this time. The newly added Structured Audio and TTS sections will require the most revision to agree with the approved ISO format. Newly approved core experiments elements were integrated into the WD. The Working Draft is given in document WG11/N1745.

An overview of the complexity of the MPEG-4 Natural Audio Coding Algorithms was prepared as follows:-

Complexity	AAC	AAC- LC	Twin VQ	IL	HVXC	LD- HVXC	NB- CELP	WB- CELP
Memory Requirements for 1 Audio Channel and Minimum Word Length								
RAM (Words)	4256	2232	4240	2000	1900	1900	650	830
ROM (Words)	3545	3545	43000	2000	14000	7700	2300	1000
min. Word Length	>=20	>=20	>=20	16	16	16	16	24 (16)
Computational Complexity calculated for a Sampling Rate of								
kHz	48	48	48	8	8	8	8	16
MOPS/ MIPS	5	2.5	3	2	5.1	5.1	1.5	3

The above numbers relate to a decoder for one audio channel. For a multi-channel system, the numbers given for the RAM size and the computational complexity have to be multiplied by the number of audio channels to get a first estimation. The figures given for AAC have been calculated during the MPEG-2 AAC standardisation process. The Wide-Band CELP figures are derived from an implementation on a Motorola DSP 56002. The figures given for the computational complexity may have been calculated with different methods, and may therefore not be directly comparable, but only give a first impression. Also, all the figures are not guaranteed to be the absolute maximum.

MPEG-7 Audio

Documents M2338 and M2433 were presented by Mr. Lindsay. These propose elements essential to the enabling of search engines and build on the Visual requirements previously available. Also included is an outline of the applications that would be enabled. The magnitude of Audio Subgroup's workload during this meeting prevented extensive discussion from taking place, but representatives made contributions in the appropriate sections of the Requirements meeting.

Promotion of MPEG Audio

FAQ

FAQs were collected during the meeting and were discussed in Audio plenary. Mr. Thom collated the FAQs and

the approved answers are given in document WG11/N1751. These will be made available on the MPEG web pages.

Audio Web Site and Content

The Task Group on the options for a Web site recommended that it should be designed to contain MPEG players, FAQs, interesting papers, source coded material (SQAM disc), links to main and other home pages, press releases and public documents. The Players should be designed to run in real-time under Windows environments with information on constraints/requirements etc. Hannover will provide space and help maintain the site. HTML will be used as the given language. Included in the pages will be references to MPEG products e.g. better quality players. A statement of qualification of the performance of players will be included, if necessary. These details and options are given in document WG11/N1752.

Preparation of a press statement

A contribution to the press statement was prepared by Mr. Meares and approved by the Audio Subgroup. It is included in the overall press statement in document WG11/N1720.

Liaison matters

Document M2197 refers to a request from ITU-T SG9 for an exchange of information on error performance of MPEG-1, MPEG-2, AAC and MPEG-4 audio for ATM type applications. A supportive response was prepared. Document M2576 is a response from DAVIC on their choice of 13818-3.2 as a scaleable audio profile for DAVIC multimedia. Their understanding of scalability is noted to be different in part to that in MPEG. A response was suggested, but the Liaison meeting advised that it would probably be fruitless.

Document M2535 is a request for co-operation from AES on compression and Internet audio with a view to exchanging documentation. A response was prepared.

The liaison issue on VRML raised in document M2571 is of significant interest to Audio and an input was made into the Liaison debate on the matter. There are no VRML proprietary inclusions in the Audio WD.

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 document was 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/N1753 - Coleman/Thom/Lueck
- Ad-Hoc Group on MPEG-2 AAC stereo verification tests, WG11/N1754 - S-W Kim/Contin
- Ad-Hoc Group on MPEG-4 Audio WD and Reference Software preparation, WG11/N1755 - Grill/Purnhagen
- Ad-Hoc Group on MPEG-4 Structured Audio WD and VM, WG11/N1756 - Scheirer
- Ad-Hoc Group on MPEG-4 Audio Core Experiments (including bitstream exchange tests), WG11/N1757 - Brandenburg/Moriya
- Ad-Hoc Group on MPEG-4 verification test preparations, WG11/N1758 - Edler/Contin
- Ad-Hoc group on MPEG Audio web site, WG11/N1759 - Thom/Purnhagen
- Ad-hoc group on Audio/Systems transport issues, WG11/N1760 - Teichmann/Herpel
- Ad-hoc group on MPEG-4 Audio error resilience, WG11/N1761 - Dietz /Miki
- Ad-hoc group on MPEG-4 Conformance, WG11/N1762 - Oomen/Edler

Agenda for next meeting

The agenda for the MPEG Audio Subgroup meeting in October 1997 in Fribourg, Switzerland 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-I40th MPEG/Audio Stockholm Meeting Participant List (July 1997)

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

- | | | |
|---------|---|--|
| 1. | Opening of the meeting | |
| 2. | Approval of agenda | |
| 3. | Bristol meeting report | |
| 4. | Allocation of contributions | |
| 5. | Communications from the Chair | |
| 5.1. | Joint meetings | |
| 6. | Report of ad hoc group activities | 2253, 2413, 2414, 2452,
2483, 2507 |
| 7. | Resolution of National Body Comments | (2390), 2492, 2498, |
| 8. | Temporary task group formation | |
| 9. | MPEG-2 BC | |
| 9.1. | PDAM/1 IS 13818-5 | |
| 9.2. | MPEG-2 audio quality update | |
| 9.3. | Bitstream tests | |
| 10. | MPEG-2 AAC | |
| 10.1. | Technical report PDAM/1 | 2321, 2352, 2492, |
| 10.2. | Conformance PDAM/1 | 2492 |
| 10.3. | Verification tests | 2464, |
| 11. | MPEG-4 | |
| 11.1. | Overview | 2208, |
| 11.2. | Requirements | (2189), (2345), 2505, |
| 11.2.1. | Profiles | (2224), (2304), (2311), 2334,
(2540) |
| 11.2.2. | SNHC elements | |
| 11.3. | Systems issues | (2203), (2217), (2566),
(2567), (2262), (2286),
(2372), (2364), (2308) |
| 11.3.1. | MPEG-4 Player | |
| 11.3.2. | Error resilience | 2197, 2569, |
| 11.3.3. | IPR and content protection | (2233), (2248), (2333), 2303 |
| 11.4. | SNHC (Structured audio and TTS) | 2449, 2450, 2550, 2379, 2380 |
| 11.5. | Testing options | (2254), (2255) |
| 11.5.1. | Pre-screening results | 2327, 2328, 2360, 2461,
2469, 2480, 2486, 2515,
2520, 2525, 2528, |
| 11.5.2. | Core experiments | 2320, 2436, 2439, 2440,
2441, 2462, 2463, 2465,
2466, 2468, 2477, 2517,
2518, 2519, 2526, 2527,
2575, 2577 |
| 11.6. | VM development | 2226, 2347, 2442, 2472,
2494, 2495, 2497 |
| 11.7. | WD (including object profiles) | 2206, 2571 |
| 11.8. | Other developments | 2346, 2473, 2481, 2506, |
| 12. | MPEG-7 | (2207), (2209), (2210),
(2282), (2290), (2338),
(2356) |
| 13. | MPEG Audio FAQ | |
| 14. | Preparation of a press statement | 2188 |
| 15. | Liaison matters | 2193, 2197, 2214, 2535,
2571, 2576, 2213, (2236),
(2260) |
| 16. | Discussion of unallocated Contributions | |

17. Recommendations for final plenary
18. Establishment of new Ad-hoc Groups
19. Agenda for next meeting
20. A.O.B.
21. Closing of the meeting

Annex A-III
Agenda for the 41st MPEG/Audio Subgroup Meeting
in Fribourg, 27 to 31 October 1997

1. Opening of the meeting
2. Approval of agenda
3. Stockholm meeting report
4. Allocation of contributions
5. Communications from the Chair
 - 5.1. Joint meetings
6. Report of ad hoc group activities
7. Resolution of National Body Comments
8. Temporary task group formation
9. MPEG-2 BC
 - 9.1. IS 13818-5/FPDAM 1
 - 9.2. MPEG-2 audio quality update
10. MPEG-2 AAC
 - 10.1. Technical report FPDAM 1
 - 10.2. Conformance FPDAM 1
 - 10.3. Verification tests
 - 10.3.1. Stereo
 - 10.3.2. Mono
11. MPEG-4
 - 11.1. Overview
 - 11.2. Requirements
 - 11.2.1. Profiles
 - 11.3. Systems issues
 - 11.3.1. Simulation software
 - 11.3.2. Error resilience
 - 11.3.3. Systems audio transport
 - 11.3.4. Scene description
 - 11.3.4.1. Composition
 - 11.4. Testing
 - 11.4.1. Core experiments
 - 11.4.2. Verification tests
 - 11.5. Reference software development
 - 11.6. WD (including object profiles)
 - 11.7. Other developments
12. MPEG Audio FAQ and Web site
13. Preparation of a press statement
14. Liaison matters
15. Discussion of unallocated Contributions
16. Recommendations for final plenary
17. Establishment of new Ad-hoc Groups
18. Agenda for next meeting
19. A.O.B.
20. Closing of the meeting

Annex A-V

Audio Task Groups

1. MPEG Audio FAQ - Spille/Schreiner
2. MPEG Audio Web Page - Thom
3. MPEG Audio - Preparation of press statement - Meares
4. MPEG-2 AAC Technical Report - Kerkhof/Coleman
5. MPEG-2 AAC Conformance - Lueck
6. MPEG-2 & -4 stereo/mono verification tests - Watanabe/Taori
7. MPEG-4 Structured Audio (including audio BIFS) - Scheirer
8. MPEG-4 Core Experiments - Brandenburg
9. MPEG-4 WD editing, Functionalities and Tools - Grill
10. MPEG-4 Player - Coleman
11. MPEG-4 Overview - Edler
12. MPEG-4 Requirements and Profiles - Moriya
13. MPEG-4 Audio/Systems timing issues - Spille

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
2226	B. Grill, B. Teichmann	Improved Integration of a Core Coder into a T/F Coder
2320	Naoki Iwakami, Takehiro Moriya	Results of the core experiment on Nokia long term prediction proposal
2321	Kenzo Akagiri, Yasuhiro Toguri, Yoshiaki Oikawa	The technical report for the MPEG-2 AAC SSR profile
2327	Takehiro Moriya, Naoki Iwakami, Akio Jin, Kazunaga Ikeda, Takeshi Mori, Satoshi Miki	Proposal of the core experiment of 6 kbit/s (8 kHz sample) t/f coder
2328	Akio Jin, Naoki Iwakami, Takehiro Moriya, Satoshi Miki, Kazunaga Ikeda, Takeshi Mori	Proposal of the core-experiment on improvement of t/f scaleable coder.
2346	Gael RICHARD, Ariane LE DORE, Carlo MURGIA, Claire LACAS, Philip LOCKWOOD	A Scaleable Audio and Speech Coder based on a Core Coder
2347	Kenzo Akagiri, Yasuhiro Toguri	The encoder source codes of the AAC SSR profile for the MPEG-4 VM
2352	Tadashi Araki, Tatsuya Okada, Itaru Kaneko	Source code for psychoacoustic model of AAC encoder
2360	Bodo Teichmann, Bernhard Grill, Jean Bernard Rault, Luca Cellario	Report on a performance test of the ITU G.723.1 standard as a core coder in MPEG-4 Audio
2379	Eric Scheirer	Proposed changes to Structured Audio
2380	Brian Link	Proposal for Audio Sample Format for Structured Audio
2413	Mike Coleman, David Thom	Report of Ad-Hoc Group on AAC Conformance and Technical Report
2414	Mike Coleman	Report of Ad-Hoc Group for MPEG-4 Player
2436	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa	Results of core experiment on Samsung scaleable coder(m2088)
2439	Toshiyuki Nomura	Core experiment test results for the NTT's proposal on 6 kbits/s T/F coder
2440	Toshiyuki Nomura	A core experiment report for the low delay speech profile
2441	Naoya Tanaka	Results of the core experiment on low delay speech profile
2442	Naoya Tanaka	Application of the LSP quantization tool of CELP VM to parametric VM
2449	Minsoo Hahn, Jung-Chul Lee, Hang-Seop Lee	Comments on the MPEG-4 TTS
2450	YoungKweon Lim, Minsoo Hahn, Jung-Chul Lee, Hang-Seop Lee	Synchronisation of MPEG-4 TTS with Moving Picture
2452	Jens Spille	Report of the Ad Hoc Group on Audio FAQ for the MPEG Home Page.
2461	Juergen Herre	Low-Complexity Tool for Perceptual Noise Substitution in the MPEG-4 T/F Coder
2462	A. Ehret, J. Herre, Y.-B. Thomas Kim, S.-W. Kim	Result of Core Experiment with M2088 Noiseless Coding Core
2463	Takeshi Norimatsu, Mineo Tsushima, Tomokazu Ishikawa	Additional report on core experiment of Matsushita scaleable coder
2465	S.-W. Kim, S.-H. Park, Y.-B. Thomas Kim	Listening test results of Matsushita bitrate scalability tool core experiment check phase
2466	S.-W. Kim, S.-H. Park, Y.-B. Thomas Kim	Core experiment results on Matsushita' bitrate scalability tool by NTT, Matsushita and Samsung
2468	Y.B. Thomas Kim, S.H. Park, S.W. Kim	Listening test results of Samsung fine granule Scalability tool(BSAC) core experiment check phase
2469	Naoki Iwakami, Takehiro Moriya	Proposal for a core experiment on bandwidth control in T/F coder
2472	Lin Yin,, Mikko Suonio,, Mauri Vaananen	Complexity Analysis of Nokia Backward Predictor in MPEG-4 Audio
2473	Masayuki Nishiguchi, Kazuyuki Iijima, Jun Matsumoto	Technical description of Sony's proposal for low delay speech profile
2477	Masayuki Nishiguchi, Jun Matsumoto, Kazuyuki Iijima	Test results of the core experiment on low delay speech profile
2480	Heiko Purnhagen, Bernd Edler, Charalampos Ferekidis	Proposal of a Core Experiment for extended "Harmonic and Individual Lines plus Noise" Tools for the Parametric

2481	Heiko Purnhagen, Bernd Edler, Yuji Maeda, Kazuyuki Iijima, Masayuki Nishiguchi	Audio Coder Core Proposal for the Integration of Parametric Speech and Audio Coding Tools based on an Automatic Speech/Music Classification Tool
2483	Heiko Purnhagen, Bernhard Grill	Report of the Ad-hoc Group on MPEG-4 Audio Working Draft editing and Verification Model software implementation
2486	Toshiyuki Nomura, Masahiro Serizawa, Masahiro Iwadare, Kazunori Ozawa	An extension of the narrow-band CELP VM coder to a bandwidth scaleable CELP coder
2492	Yasuhiro Toguri	Japanese national body comments related to the ballot of 13818-4/PDAM1 and 13818-5/PDAM1
2494	Rakesh Taori, Werner Oomen, Leon van de Kerkhof	Description of Harmony-1 Low Delay speech coding system
2495	Andy Gerrits, Rakesh Taori	Proposal for lossless coding in the CELP core of the audio VM
2497	Lin Yin, Mauri Vaananen	Report on Nokia Long Term Predictor for MPEG-4 Audio
2498	The National Body of Japan	Comments on the core experiment for low delay speech profile
2505	Takehiro Moriya, Naoki Iwakami, Akio Jin, Kazunaga Ikeda, Takeshi Mori, Satoshi Miki	Requirements of low bit rate audio transmission system
2506	Masayuki Nishiguchi, Kazuyuki Iijima, Jun Matsumoto	Tool proposal for reduced delay version of 2.0-4.0 kbps parametric coder core of the VM
2507	Karlheinz Brandenburg	Report of the Ad-hoc Group on MPEG-4 Audio Core Experiments
2515	Rakesh Taori	Independent implementation of the Harmony-1 Low delay speech coding system
2517	Uwe Gbur, Martin Dietz, Andreas Ehret, Mauri Vaananen, Lin Yin	FhG Check Phase Results of the Core Experiment on Backward Prediction and the Core Experiment on Long Term Prediction both proposed by Nokia Research Centre
2518	Uwe Gbur, Juergen Herre, Martin Dietz	FhG Check Phase Results on Samsung's Scaleable Codec
2519	Uwe Gbur, Martin Dietz	FhG Quality Assessment of the Matsushita Scaleable Codec
2520	Martin Dietz, Andreas Ehret, Ralph Sperschneider, Uwe Gbur	Proposal for a Core Experiment on Error Resilience for MPEG-2-AAC
2525	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results on AAC with different predictors (m1830 and m2032)
2526	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results on core experiment m1509
2527	Mauri Vaananen, Juha Ojanpera, Lin Yin, Mikko Suonio	Nokia listening test results on TwinVQ+LTP vs. TwinVQ+AAC predictor (m2032)
2528	Gerald Schuller, Bernd Edler	Proposal of Core Experiment on Low Delay Filter Banks for MPEG-4
2569	Sanae Hotani, Toshio Miki	Proposal of error resilience tools for MPEG-4 AAC

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

Number	Group	Section	Source	Title
2188	Chairman	General	Rob Koenen	Renewed Proposal for MPEG Press Release Procedure
2206	All	General	ISO Central Secretariat	ISO Template and Model Document (Version 1.8) for the Preparation and Formatting of Draft Standards (SC 29 N 1970)
2208	MPEG-4	General	Rob Koenen	Draft revision of "MPEG-4 Overview"
2290	MPEG-7	General	Yong Rui, Thomas S. Huang, Sharad Mehrotra	MARS and Its Applications to MPEG-7
2571	MPEG-4	General	SC 24 and VRML	Joint Statement from JTC 1/SC 24 and the VRML Consortium to SC 29 on MPEG-4 Working Draft (SC 29 N 2135)
2193	All	Liaison	INFORNOVA	SC 29 N 2048: Statement from MARS to MPEG and MHEG
2197	Chairman	Liaison	ITU-T SG 9	Liaison Statement from ITU-T SG 9: Request for info about the decoder function under error and cell loss conditions
2205	MPEG-4	Liaison	SC 24 Chairman	Liaison Statement from SC 24 to SC 29 on MPEG-4 and

				VRML (SC 29 N 2089)
2214	All	Liaison	ITU-T SG 12	Liaison Statement from ITU-T SG 12 to ISO/IEC JTC 1/SC 29/WG 11 on Subjective and Objective Quality Assessment (SC 29 N 2095)
2259	All	Liaison	AGICOA	Request for Establishment of Liaison between AGICOA and SC 29/WG 11 (SC 29 N 2124)
2535	MPEG-4	Liaison	Karlheinz Brandenburg	Collaboration of AES SC-06-04 and MPEG Audio
2189	MPEG-4	Requirements	Rob Koenen	Report of AHG on MPEG-4 Requirements
2207	MPEG-7	Requirements	R. Koenen	Draft revision of "MPEG-7: Context and Objectives"
2209	MPEG-7	Requirements	Fernando Pereira	Report of the Ad Hoc Group on MPEG-7 Requirements
2210	MPEG-7	Requirements	Fernando Pereira	Proposal for Second Draft of MPEG-7 Requirements
2233	MPEG-4	Requirements	Amy Reibman, Jack Lacy, David P. Maher, James H Synder	Proposal for the identification and protection of content in MPEG-4
2248	MPEG-4	Requirements	Keith Hill	Proposed Revision of N1680 (IPR management)
2274	MPEG-4	Requirements	Jean-Claude Dufourd	Interaction with a Multimedia Database Profile
2282	MPEG-7	Requirements	Fernando Pereira	Proposal for First Draft of MPEG-7 Applications
2304	MPEG-4	Requirements	Rob Koenen	MPEG-4 Applications Document
2311	MPEG-4	Requirements	Michael Zeug	MPEG-4 Profile Requirements version 3.1
2333	MPEG-4	Requirements	Itaru Kaneko	A proposal for identification and protection of the content
2334	MPEG-4	Requirements	Rainer Buchta, Karlheinz Brandenburg, Michel Base	Request for a MPEG-4 Audio Profile for Digital AM Broadcasting
2338	MPEG-7	Requirements	Adam Lindsay	Draft of MPEG-7 Requirements Including Audio
2433	MPEG-7	Requirements	Adam Lindsay	Auditory and Advanced Applications for MPEG-7
2540	MPEG-4	Requirements	Pallavi Shah (Sun), Gerard Fernando	MPEG-4 Requirements for Internet Applications
2355	MPEG-4	SNHC	Jyri Huopaniemi, Riitta Vaananen	Aspects in Definition and Implementation of Virtual Acoustic Objects in the MPEG-4 Compositor
2195	MPEG-2	Systems	SC 29 Secretariat	Summary of Voting on ISO/IEC 13818-1/PDAM 5
2196	MPEG-2	Systems	ISO/IEC ITTF	Summary of Voting on ISO/IEC 13818-1/DAM 4
2260	MPEG-2	Systems	ISO/IEC ITTF	Summary of Voting on ISO/IEC 13818-1/DAM 4 (SC 29 N 2123)
2566	MPEG-4	Systems	Jonathan Courtney, Pallavi Shah, Jennifer Webb,, Gerard Fernando, Viswanathan Swaminathan	Adaptive Audio-Visual Session Format
2567	MPEG-4	Systems	Jonathan Courtney, Jennifer Webb	Capabilities of the Adaptive Audio-Visual Session Format
2253	MPEG-4	Test	Martin Dietz, Laura Contin	Report of the ad hoc group on AAC verification test preparation
2254	MPEG-4	Test	Laura Contin	List of video and audio-visual sequences for use by MPEG in audio-visual coding standard development
2255	MPEG-4	Test	Massimo Visca, Laura Contin	New audio-visual sequences for use by MPEG
2464	MPEG-2	Test	S.-W. Kim	Results on collection of new test excerpts for MPEG-2 AAC verification test

Output Documents

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

Number	Author	Title
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Number	Author	Title
N1741	C. Lueck, M. Coleman	Study on the text of Conformance 13818-4/FPDAM 1(covering 13818-7 AAC)
N1742	L. vd Kerkhof, C. Lueck, M. Coleman	Study on the text of Technical Report 13818-5/FPDAM 1 (covering both 13818-3 Second Edition and 13818-7 AAC)
N1743	C. Lueck, M. Coleman	Schedule of activities for AAC technical report development`
N1744	K. Watanabe, L. Contin, D. Thom	Specification of MPEG-2 AAC Verification Stereo Tests
N1745	B. Grill	MPEG-4 Audio Working Draft, version 4.0
N1746	B. Edler	MPEG-4 audio software decoder, version 4.0
N1747	K. Brandenburg	Status of MPEG-4 audio core experiments
N1748	B. Edler, J.Herre, K. Brandenburg	Core experiment methodology for MPEG-4 audio
N1749	K. Watanabe, L.Contin, D. Thom	Test conditions for MPEG-4 audio verification tests
N1750	M. Coleman	Status of MPEG-4 Player Activities
N1751	J. Spille, D. Thom, B. Link, S. Quackenbush, E. Scheirer	<i>MPEG Audio Frequently Asked Questions, Version 4</i>
N1752	D. Thom	Report on concepts for Audio Web Page
N1770	C. Lueck, D. Thom	Work plan for AAC conformance
N1771	R. Taori	Integration of the MPEG-4 audio Narrowband and Wideband CELP core.`
N1772	J. Spille	MPEG-4 Audio/Systems Issues

Annex IX
Report of SNHC Meeting

Source: Peter Doenges, Chair

Stockholm was a point of convergence for SNHC techniques to merge with the Audio, Video, and Systems groups in those areas targeted for the first phase of MPEG-4 with CD in October 1997. Joint meetings ruled the schedule. It was often difficult to attend all the right working meetings at the same time, and SNHC reviews of post-CD work were often subordinated to the joint meeting priorities. The urgent need to focus on completion of details in bitstream syntax and exchange created a distinct split between the reviews and meetings on VM and CE work bound for phase one CD vs. post-CD phase two. Where conflicts in manpower resources were foreseen in pursuit of CD vs. post-CD functionalities, agreements were made to postpone work on some post-CD work items to ensure that CD targets reach adequate maturity by October.

Firm decisions were made about WD/CD inclusions. SNHC-related functionalities will be:

- SNR/resolution-scalable texture based on wavelets
- View-dependent texture with access to available texture coding tools
- 2D static/animated mesh compression with BIFS support and texture manipulation
- 3D mesh as uncompressed binary equivalent of BIFS 3D face node
- Facial animation:
 - Full-featured LBR FAP stream with visemes, expressions
 - Relies on Systems BIFS binary for FDP, FAT, 3D mesh
 - Exploits composition for texture, mesh, TTS, speech audio
- Media integration of text and graphics for layout and temporal composition via BIFS
 - Well-placed in Systems, Audio, Video with confidence
 - International text and fonts remains an SNHC work item
- BIFS nodes corresponding with needed SNHC data types/decoders for mixing media
- Structured Audio with audio composition via BIFS in Systems and in the SA decoder
- Hybrid scalable text-to-speech and LBR speech coder

In CD-driven work areas, contribution and CE reviews concentrated on resolving computational complexity issues, functional verification, comparative performance of competing techniques, subtleties of image quality, correctness of requirements, and integration of decoder output streams with Systems nodes for composition. Based on Bristol and Stockholm work, Systems now supports the required SNHC media object types needed for the functionalities listed above. MPEG-4 Player and IM1 projects have begun to incorporate key Systems capabilities that create an interlock between SNHC decoders and the BIFS internal representation of media objects (e.g. textures, 2D/3D meshes, text, etc.) needed to build real applications around Systems. There were numerous reports on concrete results achieved and demonstrations given to verify the support for SNHC functionalities. The ISG also provided valuable reports and discussion on IC and QoS.

Emphasis was placed on developing SNHC profiling and QoS issues. Contributions and discussions covered SNHC applications, layered profiling from simple to more complex combinations of downloaded and streaming media objects, and the need for a backchannel. Also covered were approaches to QoS, the development of terminal resource metrics and media

complexity metrics to assist in negotiation of push-oriented and pull-oriented sessions that match server and terminal resources, and differences between broadcast and network-interactive modes.

MPEG-4 contributors hold a widely shared commitment to quality of the media experience supported by the standard. This translates to ensuring that real-time delivery of media, including deterministic frame rates where applicable, can be achieved. SNHC-related functionalities in Systems inherently support a range of content and compositional complexity that could defeat delivery guarantees. Also, the variation of rendering performance by graphics APIs and platforms, which process SNHC-related objects in the presentation stage subsequent to Systems composition, is not a normative aspect of the MPEG-4 standard. Content developers must clearly participate in constraining media complexity, but MPEG-4 contributors still want to devise a practical approach for guaranteeing QoS based on benchmarks and scalable media.

Three areas of SNHC profiling were explored with Requirements:

- Face animation / Conversational Services
- Texture (scalable, view-dependent) and 2D mesh tools
- MIT tools & composition / Information Services

The work on SNHC profiling was only a beginning and not adequately developed for proper CD inclusion. This should be an urgent priority for the Fribourg meeting. The further development of profiling, media metrics, and QoS issues is expected by AHGs. The adequacy of DMIF and Mux capabilities (including buffer models, synchronization, media object name referencing to network-based and locally stored objects, and the current absence of a backchannel during the session after negotiation of a connection) came under more scrutiny. Some of these issues are resolved, but a cohesive mature approach to QoS remains incomplete.

Several meetings were jointly held by Systems and SNHC people to examine CE results and WD work in Systems connected with SNHC functionality. Reviews were held about the adequacy of BIFS, buffer models, time stamp conventions, the relative segregation of spatial-temporal composition from elementary streams for increased compositional flexibility and media object reuse, and related topics. In very focused areas like facial animation, the approach to specific BIFS nodes, synchronization, mesh representation and the animation of meshes, FDP/FAT representation, etc. were agreed. This all contributed to small important changes in BIFS and Mux conventions and to the increasing confirmation that Systems has the correct resources and approach to meet SNHC objectives. For example, with small exceptions to be addressed in upcoming work, Systems has effectively absorbed the MITG initiative, and appears to have the correct media object support for 2D/3D meshes, texture, layout and animation modes, etc.

Contribution reviews in SNHC included many issues for CD as well as ongoing work that is planned for renewed attention after CD in phase two of MPEG-4. The total contributions for Systems, Video, Audio, and SNHC related to SNHC requirements were nearly overwhelming, and are not given here in this summary report on the meeting. These have been organized in depth in the various meeting agenda used by the working groups in Stockholm. Although not listed here, many crucial contributions were made concerning BIFS design and inadequacies, with concrete, often sharp criticisms and recommendations about how to repair or improve BIFS. Many of these issues were resolved successfully in the Stockholm meeting. The Systems group appears to have a good grasp of remaining action items to conclude baseline BIFS for CD.

BIFS and Mux are converging on the needed approach to scene composition, synchronization, timing of elementary streams, buffer model, and scene graph processing. BIFS provides a tool box of node types for primitive or elementary streams and scene composition. Facial animation, 2D animated mesh, and the original MITG initiative, for example, now rely beyond the decoder stage on access to combinations of these media object types:

- I-frame DCT texture
- WLT scalable texture
- View-dependent texture
- 2D implicit Delaunay mesh
- 3D regular & general meshes
- Text with layout & animation modes
- Video object sprite
- Video object pane
- AAC object
- SA object (download SAOL, streaming SASL)
- TTS stream (prosodics, gender, language, text streams with timing, phonemes)
- International scalable fonts – not yet

The following is a sample of contributions that were jointly reviewed by the groups or within SNHC, as well as some important contributions made during the meeting:

SNHC AHG Reports:

2220	Horne	Report of the AdHoc Group on SNHC VM Editing
2221	Horne	SNHC Verification Model V4.1
2292	Rajan	Report on the activities of the Ad Hoc group on MITG
2312	Doenges	Report of Ad Hoc Group on FAQs for SNHC
2313	Doenges	SNHC FAQs
2435	Petajan	Report of the Adhoc Group on Face and Body Animation

SNHC + Video – texture coding (TZ1, V1, V2):

2258	Muller	Descriptions of rate control and texture coding core experiments on coding efficiency in MPEG-4 Video
<u>2278</u>	<u>Jordan</u>	<u>Results of CE V1 using wavelets</u>
<u>2279</u>	<u>Jordan</u>	<u>Results of CE V1 using DCT</u>
<u>2296</u>	<u>Tan</u>	<u>Results of Core Experiment V2 using DCT</u>
<u>2316</u>	<u>Ebrahimi</u>	<u>SNHC-Obj ad hoc group report</u>
2317	Ebrahimi	Description of Core Experiments on Visual Texture/Mesh Coding
2325	Aono	Report of Core Experiment V2 & proposal of syntax modification
<u>2329</u>	<u>Wu</u>	<u>Core Experiment Results on TZ1 : Improved Wavelet Coding</u>
2411	Chen	Report on an Implementation of View Dependent Scalability (V1)

2437	Suzuki	<u>The results of CE V2</u>
2514		Moccagatta Status Report of Core Experiment TZ1: Efficient Coding of Texture
2516	Moccagatta	Status Report of Core Experiment V2: Spatial & Quality Scalability
2544	Sodagar	Report of Core Experiment TZ1; Efficient Coding of Textures

2545	Sodagar	<u>Report of Core Experiment V2; Spatial and Quality Scalabilities</u>
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SNHC + Video – regular Z-mesh coding (V3):

2280	Jordan	Results of CE V3
2412	Chen	Mesh Compression Using Video Coding Tools

FBA breakout:

2318	Ostermann	Results of Core Experiment FBA-5 (Animation of Downloaded Face Models)
2319	Ostermann	Results of Core Experiment FBA-2 (FAP Interpretation)
2453	Pandzic	Results of CE FBA2 and CE FBA3 on FAP and FDP interpretation
2563	Chen	Results of FAP Coding Using DCT and PCA
2578	Lande	Results of Core Experiment FBA-5 (FAP interpretation)
2579	Lande	Results of Core Experiment FBA-5 (Animation of downloaded models)

3D mesh (Z3):

2310	Schutz	Results of CE Z3 on mesh coding using PRVQ
2332	Park	Connectivity Compression for 3D object based on adaptive representation of spanning tree's run
2475	Ahn	Results of core experiment Z3: Geometry compression using PRVQ
2476	Ahn	Proposal for modification of bit stream syntax for 3D mesh coding

2D mesh (Z4):

2499	Beek	CE Z4: 2D dynamic mesh compression
2512	Beek	CE G2d: Composition of 2D dynamic meshes (with Systems)

MITG (G2):

2273	Dufourd	Results of SNHC/Systems Core Experiments G2 (with Systems)
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Structured Audio, TTS: (in Audio Group)

2355	Huopaniemi	Aspects in Definition and Implementation of Virtual Acoustic Objects in the MPEG-4 Compositor
2379	Scheirer	Proposed changes to Structured Audio
2449	Hahn	Comments on the MPEG-4 TTS
2450	Hahn	<u>Synchronization of MPEG-4 TTS with Moving Picture</u>

Profiling, QoS, back channel, 3D BIFS:

2315	Ostermann	Ensuring Quality of Service for Downloaded Animated 3D Models
2369	Grimstead	Proposals for extensions to BIFS for more interactive 3D support
2550	Doenges	Some SNHC Profiling Considerations
2592	Ostermann	We Need a Backchannel!
2593	Curet	QoS Parameters Identification

During the SNHC meetings, the VM and WD editors made a critical inventory of the status of CD nominees. In many cases, SNHC-related tools distributed into the main MPEG-4 groups were determined to still lack adequate formal bitstream exchanges involving independent implementations of decoders for each media object type. The firm requirement was asserted for all SNHC work that nothing goes to CD without bitstream exchange, and significant time was spent recruiting, scheduling, and committing to bitstream exchange well before Fribourg.

Several contributors were eager to recommend accelerated transitions of SNHC tool developments to reach CD to make baseline tools more useful and robust. To manage work complexity and to ensure quality results in core SNHC tools, the statement of policy was renewed that any technology which has not made the proper transit through the VM, or in particular does not justify inclusion in WD in Stockholm, is not a candidate for CD. This work will be hosted in SNHC VM and CE activities in phase two of MPEG-4. Several areas of work were designated for phase two in MPEG-4:

- Generalized animated parameter stream compression
- Body animation for 3D avatars with BIFS mesh
- International text & fonts: resolution-scalable glyphs
- Regular gridded Z-mesh compression with texture coding
- General scalable 2D/3D geometry/topology compression
- Progressive 2D/3D mesh coding for Level of Detail

A small useful meeting was held to start the process of SNHC contributions to verification testing. Several points were clarified about how traditional MPEG verification methods might be adapted productively to the subjective and quantitative measurement, comparison, and judgment of synthetic media object types and their coding (e.g. error control and subjective acceptance of distortions in lossy coding of geometric shape). The verification process should use the synthetic model at the encoder input as reference, not the ultimate real-world object that the synthetic object may approximate. An effort should conclude over the next few meetings to define which models are best suited for verification testing, and to agree upon and collect these models.

Considerable thought and discussion occurred on the developing liaison with the VRML community. Of particular concern to SNHC is how to engage in a productive process which does not over-constrain MPEG-4 with inappropriate links to other standards, if they are focused on different requirements, and yet maximize common areas of standardization to maximize content exchange. The output document N1786 with amendments accurately reflects the desired process.

A press relief draft about SNHC developments was provided to Rob Koenen, who found the draft inadequate. This was therefore not used, with insufficient time available to repair it.

A software inventory on the SNHC VM, WD transfer was provided to Mike Colman:

Software Inventory
MPEG-4 WD and SNHC VM
40th WG11 Meeting
24-Jul-97

<u>Functionality</u>	<u>Contributor</u>	<u>Where</u>
<i>Facial Animation (polygon)</i>	<i>MIRALab/LIG</i>	<i>A</i>
Facial Animation (wire face)	Lucent	A
<i>Facial Animation (decoder/encoder)</i>	<i>Rockwell</i>	<i>A</i>
Facial Animation (FDP/FAT)	AT&T Research	A
MITG	ENST	<i>See Systems</i>
Texture coding:		
View-dependent texture	EPFL	A & B
SNR/resolution-scalable	Sarnoff	A
SNR/resolution-scalable	TI	A
2D mesh coding:		
<i>Animation/compression</i>	<i>U. of Rochester</i>	<i>A</i>
<i>3D mesh coding:</i>		
<i>Geometry compression</i>	<i>ETRI</i>	<i>B</i>
<i>Topology compression</i>	<i>EPFL</i>	<i>B</i>
Structured Audio	M.I.T.	<i>See Audio</i>
Text-to-Speech	ETRI	<i>See Audio</i>
FTP SITES:		
<i>A: ftp.es.com</i>	<i>sc29wg11</i>	<i>SaltyDog</i>
<i>B: ltshp1.epfl.ch</i>	<i>wg11</i>	<i>wg11mpeg</i>

Additional work is needed to define the subset of this evolving software that will be treated as the reference software within the MPEG-4 CD.

Annex X
Report of Test Meeting

Source: **Laura Contin, Chair**

Introduction

At the 40th meeting of WG11, in Stockholm, the following test items were addressed:

1. Results of July '97 competition tests
2. AAC verification tests
3. MPEG-4 Audio verification tests
4. MPEG-4 Video verification tests
5. Video and audiovisual sequences

Results of July '97 competition tests

Following a public call for proposals, issued in November '96, two video compression algorithms were evaluated, by formal subjective tests, against the Verification Model.

The test was carried out in Rome, at Fondazione Ugo Bordoni laboratories, from the 2nd to the 4th of July '97. The only functionality tested was coding efficiency. Test conditions were grouped according to the class of sequences (A, B and C) and bitrate (ranging from 10 up to 1024 kbit/s).

Details about test conditions, test methodologies and test results can be found in document WG11/N1766.

The results showed that overall there was no significant difference between the performance of the VM and the performance of either of the two submitted proposals.

AAC verification tests

At the previous meeting, in Bristol, it was proposed to carry out verification tests of AAC both on mono and stereo material. Considering the amount of work and the resources available, in Stockholm it was decided to limit this test to stereo material. Further tests of AAC on mono material could be taken into account in the future.

Considering the library to be used to select critical stereo items, it was decided to take into account, beside the old test items s1-s8 and items recently provided by NTT, also items previously used for MPEG-1.

Details about test conditions, test methods and the test plan can be found in document WG11/N1744.

Volunteers are available for all the tasks, a part from the statistical analysis of the results. Moreover at least a further test site would be required.

This test should be concluded by the end of 1997.

MPEG-4 Audio Verification tests

A first discussion about test conditions to be considered in MPEG-4 audio verification tests was conducted. It was proposed to organise a first round of tests including evaluation of coding efficiency and scalability on mono material. In a second round of test further types of material (e.g. stereo) and functionalities could be taken into account.

A preliminary proposal for the first round of tests is described in document WG11/N1749.

In this proposal, test conditions are grouped according to the input signal type (i.e. speech / music) and sampling rates and the two functionalities considered are evaluated together.

For each combination of signal type and sampling rate, a number of existing standards to be used as anchor conditions have been identified. In order to prevent possible problems related to the outcomes of this comparison between MPEG-4 and other existing standards, the Convenor suggested to send a liaison to all the relevant standardisation bodies to inform them about our intention and ask them whether they are interested in participating to this test.

The results of this test should be available by March '98.

MPEG-4 Video verification tests

It was agreed that the first MPEG-4 video verification tests will address error robustness.

A preliminary specification of the test conditions to be used for this test is provided in document WG11/N1829. It includes, for now, only conditions representative of wireless networks. The TransMux will be ITU's mobile multiplexing standard, H.223/Mobile.

Conditions representative of Internet applications could also be included, but a clearer understanding about which could be a suitable TransMux is needed.

These tests should be completed by March '98.

Further MPEG-4 video verification tests, addressing other functionalities, will be planned after this date.

Video and audiovisual sequences

Document WG11/N1740 lists all the video and audiovisual sequences that can be used by MPEG not only for verification tests, but also for demonstrations and Core Experiments. In this document for each sequence also a contact point is given.

Telefonica, AT&T, University of Bristol and RAI have provided new sequences, listed in the table below:

Name of Sequence	Company (contact point)	Source format (*)	Duration (sec)	Type of sequence	Language	AV correlation	Class	# of mask available
Artists	University of Bristol	50 Hz	2 hours	Audiovisual	Music	partially correlated	B	(●)
Violin	AT&T	60 Hz	?	Audiovisual	Speech and music	correlated	A	(●)
Barruget	Telefonica	50 Hz	600	Audiovisual	Catalan	partially correlated	E	-
Linda	RAI	50 Hz	280	Audiovisual	English	correlated	A	(●)
Sports	RAI	50 Hz	70	Video	-	-	C	-

(●) Sequences with blue background

List of ad hoc groups

- Ad-Hoc Group on MPEG-2 AAC stereo verification tests, WG11/N1754 - S-W Kim/Contin
- Ad-Hoc Group on MPEG-4 verification test preparations, WG11/N1758 - Edler/Contin
- Ad-Hoc Group on video error robustness, WG11/N1812 - Jim Brailean

Annex XI
ISG meeting report

Source: Paul Fellows, Chair

Technical support to other groups

Video Group

- 1/4 Pel
This technique was found to be more expensive than the VM. The expense is bit stream dependent and for worse case, up to 3.3 times more memory bandwidth will be required. The group recommended that to justify inclusion in Working Draft it must offer significant quality gains over a wide range of input material. A request was made to Video Group to supply frequency of occurrence statistics if they wish to pursue this technique further. The technique was said to improve image quality by up to 30% for "some" sequences. (sometimes no improvement)
- Still image scalability - Wavelet & DCT
Both proposed schemes added a significant increase in complexity (Wavelet and iDCT). For silicon acceleration this implied an increase in silicon real estate as both schemes would need extra Silicon even though the iDCT scheme could share existing iDCT hardware. S/W implementations would suffer from instruction cache thrashing with other video tools running concurrently for smaller cache machines. Need to complete a more in-depth study to be more specific.
- BBM
This technique was evaluated by the group. After some discussions the proposing company agreed to carry out some analysis between the 40th and 41st meetings.

Requirements Group

- Error Resilience
An interesting proposal on error resilience was reviewed. Initial feeling was that the techniques proposed could actually ease implementation complexity, particularly for software based solutions. Further analysis is required.
- Interlaced mode
A request to study the impact of supporting interlaced operation was requested. It was difficult to provide an impartial result on this issue, other than to say it adds to complexity. There was insufficient notice or time to precisely quantify the increase. Many ISG companies have a market base for MPEG-2 that drives interlaced devices. It is therefore difficult to use complexity as a decision point, as the market requirements are the real issue.

Computational Graceful Degradation.

- Review of contributions
A number of contribution documents pertaining to this subject were reviewed
 1. m2223.doc : Implementation of Computational Graceful Degradation
 2. m2230.doc : Some results of core experiment on CGD: methods to measure bit stream video decoding complexity for CGD implementation.
 3. m2231.doc: Proposal for a MPEG-4 syntax supporting CGD
 4. m2232.doc: Report of the ad-hoc group on Computational Graceful Degradation.
 5. m2247.doc: Results of ISG core experiment on CGD
- Specification of syntax elements for inclusion in the Video and Systems working draft (N1824) was made. Further discussions with Video and Systems will be required between the 40th and 41st meetings.
- An AdHoc was re-established to finalise this work for the CD. (N1823).

Complexity Profile Analysis

It may be difficult if not impossible to define complexity profiles and levels in absolute terms. Objects vary in size, shape and motion during their existence. Composition and Rendering of multiple objects further complicates the problem. It may be better to think of objects in terms of number of macro blocks per second or some other measure. This would be more meaningful than traditional frame sizes for MPEG-4 video objects. Further work is required here.

Real Time Decoder issues.

A half day meeting was held to discuss if it is possible to guarantee accurate synchronized decoding for MPEG-4 systems. The objective being to identify the problems and potential techniques to overcome them. Issues identified were :-

1. Identify the need for and if required to propose a definition of QoS/Service-levels relevant to decoding bit streams (as opposed to transmission)
2. Do we need guidelines?
3. Do we need quantitative metrics?
4. Benchmarks :-
 Content (“Representative and Evil”)
 Functionality (Number and combination of objects...)

An AdHoc group was established to understand and prescribe solutions to the very challenging problems identified (N1822).

Conclusion

The group played a very positive role during the meeting both reactively and pro-actively. The standard of expertise present during the meeting was very high which indicates that industry is starting to get very serious about MPEG-4 and is keen to assist in the standardisation effort so that affordable systems can be deployed at the earliest opportunity.

Annex XII
Report of Liaison Meeting

Source: Barry Haskell, Chair

The Liaison group in Stockholm considered the following subjects and input documents:

DAVIC, DSM-CC and DMIF

- SC29/2007** DAVIC 8th call for proposals on home networks and 2-way satellite
- SC29/2146 (M2576)** DAVIC chooses MPEG-2 BC audio
- SC29/2048 (M2193)** MARS Liaison on Small Office/Home Office using DAVIC and DSM for Multimedia server and client implementation
- SC29/2013** ITU-SG16 on DMIF initiative

AUDIO

- (M2535)** AESSC SC-06-04 Liaison statement on audio activities
- SC29/2075 (M2197)** Request from ITU-T SG9 for error resilience data for MPEG audio

IPR

- SC29/2067** IEC TC 100 Liaison statement on multimedia equipment activities, including IPR/copyright, compression and interconnect.
- SC29/2096 (M2215)** ISO/TC 46/SC 9 liaison on ISAN activities
- SC29/2097 (M2216)** ISO/TC 46 liaison on DIS for country codes
- SC29/2124 (M2259)** AGICOA request for liaison on ISAN activities
- N1816** Information: SC27 works on encryption.

INTERACTIVE TELEVISION and CONTENT LABELING

- Doc 11/109** ITU-R SG 11 TG 11/5 notice of study on interactive TV
- TM 1886** DVB 23rd Meeting Report, including interactive TV, HDTV and MPEG-4.
- Doc 11C/40-E** ITU-T SG9 WP 1/9 Rec. J.110 on Principles for ITV
- JTC1 N4361** SC14 notification of workshop on Metadata
- Doc 11/75(Rev.1)-E** ITU-R WPs 10&11 notice of work on Metadata for TV production

BROADCAST TV

- SC29/2090 (M2211)** ITU-R WP11A Draft Rec. BT 11A/AW on colorimetry for TV and imaging

SC29/2091 (M2212) ITU-R WP11A Draft Rec. BT 709-2 on HDTV production

AUDIO/VIDEO QUALITY MEASURE

SC29/2095 (M2214) ITU-T SG 12 Liaison on subjective and objective quality assessment

VRML OBJECTIONS

SC29/2089 (M2205) Liaison from SC24 on VRML. IS in Oct. 1997.

SC29/2135 (M2571) Complaint from SC24 on copyright violations in Systems WD 4.0. Attached Cooperative Agreement between JTC1 and VRML Consortium.

Email various

SC29/244 JTAG 2 on SC24's proposal for Image Team

JAVA

N1813 ISO/IEC JTC1 on new business team concept

JTC1 N4732 SC24 proposal for Imaging Business Team for PAS fast track.

SC29/2005 Application by SUN to become a PAS provider

Responses from National Bodies

(M2543) Sun Microsystems information on licensing and standardization of JAVA

The following output liaison documents were produced:

WG11/N1777 Liaison statement to ITU-T SG16 explaining details of MPEG-4 DMIF..

WG11/N1778 Liaison statement to AESSC accepting Karlheinz Brandenburg as Liaison.

WG11/N1779 Liaison statement to ITU-T SG9 indicating our acceptance of their request for information on error resilience of MPEG AAC and MPEG-4 audio, when available.

WG11/N1780 Liaison statement to IEC TC 100 describing our activities, including multimedia systems, IPR protection and compression. Attached copy of MPEG-4 Overview..

WG11/N1781 Liaison statement to Technical Module of DVB to correct their impression of MPEG-4 Broadcast quality at 1 Mbs. Attached copy of MPEG-4 Overview

WG11/N1782 Liaison statement to SMPTE on activities of MPEG-4 and MPEG-7 on the standardization of multimedia content description, also known as Metadata.

WG11/N1783 Liaison statement to ITU-R WPs 10 & 11A on activities of MPEG-4 and MPEG-7 on the standardization of multimedia content description, also known as Metadata.

WG11/N1784 Liaison statement to ITU-T SG12 on our willingness, assuming copyright owners agree, to make available audiovisual material and test results.

WG11/N1785 Liaison statement to SC24 and VRML on our mutual collaboration and cooperation. Also, announcement and invitation to the Systems ad hoc meeting in September and

the next MPEG meeting in October..

WG11/N1786 MPEG-4 Systems Methodology and Work Plan for Scene Description

WG11/N1787 Liaison statement to MIDI on our audio activities in MPEG-4.

WG11/N1788 Liaison statement to MUSE on our activities in MPEG-4 for IPR protection.

WG11/N1789 Liaison statement to DVD Consortium on our activities in MPEG-4 for IPR protection.

WG11/N1790 Liaison statement to IETF explaining details of MPEG-4 DMIF.

WG11/N1769 Liaison statement to ITU-T SG 16/SG 12 (Audio tests)

WG11/N1826 Liaison statement to FS1017 (Audio tests)

WG11/N1830 Liaison statement to ETSI (Audio tests)

WG11/N1831 Liaison statement to ITU-T SG 16/SG 12 (Video tests)