ISO/IEC 23003-1:2007-02 (E)

Information technology - MPEG audio technologies - Part 1: MPEG Surround

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Normative references 1

3 Terms and definitions 1
3.1 Definitions 1
3.2 Notation 4
3.3 Operations 5
3.4 Constants 5
3.5 Variables 6

4 MPEG Surround overview 9
4.1 Introduction 9
4.2 Basic structure 10
4.3 Tools and functionality 11
4.4 Inter-connection of MPEG Surround with audio coders 15
4.5 Delay and synchronization 15
4.6 Downmix gain 17
4.7 MPEG Surround Profiles and Levels 17

5 Syntax 20
5.1 Payloads for Spatial Audio Coding 20
5.2 Definition 39

6 Decoding process 56
6.1 Compressed data stream decoding and de-quantization 56
6.2 Enhanced Matrix Mode of MPEG Surround 78
6.3 Time / frequency transforms 81
6.4 MPEG Surround processing overview 84
6.5 Calculation of pre-matrix M1, mix-matrix M2 and post-matrix M3 109
6.6 Decorrelators 133
6.7 Subband Domain Temporal Processing (STP) 137
6.8 Guided Envelope Shaping (GES) 143
6.9 Residual coding 148
6.10 Low Power MPEG Surround decoding 161
6.11 MPEG Surround Binaural coder 174

7 Transport of Spatial Audio Side Information 194
7.1 Overview 194
7.2 Transport and Signalling in an MPEG Environment 194
7.3 Transport of MPEG Surround over PCM channels 198

Annex A (normative) Tables 204

A.1 Huffman Tables 204
A.2 Miscellaneous Tables 225

Annex B (normative) HRTF filter conversion (multi-slot) 243

B.1 Determination of a multi-slot QMF representation of the time domain HRTF filters 243

Annex C (informative) HRTF filter conversion (single-slot) 246

C.1 Determination of single slot (parametric) QMF representation of the HRTF filters 246

Annex D (informative) Reverberation 248

Annex E (informative) HRTF filter complexity reduction 249

Annex F (informative) Encoder 250

F.1 Overview 250
F.2 Time-frequency transform 250
F.3 Framing 250
F.4 Two channels to one channel module (R-OTT) 251
F.5 Three channels to two channels module (R-TTT) 252
F.6 Residual coding 254
F.7 Parameter quantization and Coding 255
F.8 Additional features 255
F.9 MPEG Surround over PCM channels encoding 259

Annex G (informative) Guidelines for transport in non-MPEG environments 261

G.1 Transport in conjunction with existing transmission systems 261
G.2 Self-synchronizing spatial audio bitstream 261
G.3 Usage of S3AC transport format 262

Annex H (informative) Scalable Channel Decoding for Reduced Speaker Configurations 263

H.1 Introduction 263
H.2 Scalable Channel Decoding for Arbitrary Tree Structure 263
H.3 Scalable Channel Decoding for Existing Tree Structure 268

Annex I (informative) Multichannel Visualization Tools for MPEG Surround 276

I.1 Overview 276
I.2 Visual object estimation 276

Annex J (informative) Patent statement 280