

ISO/IEC 23003-4:2025-03 (E)

Information technology - MPEG audio technologies - Part 4: Dynamic range control

Contents

Page

| | |
|--|----------|
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms, definitions and symbols | 1 |
| 3.1 Terms and definitions | 1 |
| 3.2 Symbols | 3 |
| 4 Mnemonics | 3 |
| 5 Technical overview | 4 |
| 6 DRC decoder | 5 |
| 6.1 DRC decoder configuration | 5 |
| 6.1.1 Overview | 5 |
| 6.1.2 Description of logical blocks | 6 |
| 6.1.3 Derivation of peak and loudness values | 10 |
| 6.2 Dynamic DRC gain payload | 15 |
| 6.3 DRC set selection | 15 |
| 6.3.1 Overview | 15 |
| 6.3.2 Pre-selection based on Signal Properties and Decoder Configuration | 16 |
| 6.3.3 Selection based on requests | 18 |
| 6.3.4 Final selection | 21 |
| 6.3.5 Applying multiple DRC sets | 21 |
| 6.3.6 Album mode | 21 |
| 6.3.7 Ducking and Loudness Leveling | 22 |
| 6.3.8 Precedence | 22 |
| 6.4 Time domain DRC application | 22 |
| 6.4.1 Overview | 22 |
| 6.4.2 Framing | 23 |
| 6.4.3 Time resolution | 23 |
| 6.4.4 Time alignment | 23 |
| 6.4.5 Decoding | 24 |
| 6.4.6 Gain modifications and interpolation | 27 |
| 6.4.7 Spline interpolation | 34 |
| 6.4.8 Look-ahead in decoder | 35 |
| 6.4.9 Node reservoir | 36 |
| 6.4.10 Applying the compression | 37 |
| 6.4.11 Dynamic equalization | 40 |
| 6.4.12 Multi-band DRC filter bank | 42 |
| 6.5 Sub-band domain DRC | 45 |
| 6.6 Generation of DRC gain values at the decoder | 49 |
| 6.6.1 Overview | 49 |
| 6.6.2 Description of logical blocks | 50 |
| 6.6.3 Algorithmic details | 51 |
| 6.6.4 Combining parametric and non-parametric DRCs | 58 |
| 6.7 Loudness equalization support | 58 |
| 6.8 Equalization tool | 59 |
| 6.8.1 Overview | 59 |
| 6.8.2 EQ payloads | 59 |
| 6.8.3 EQ filter elements | 60 |

| | | |
|---------------------|---|------------|
| 6.8.4 | EQ set selection..... | 61 |
| 6.8.5 | Application of EQ set..... | 61 |
| 6.9 | Complexity management..... | 68 |
| 6.9.1 | General..... | 68 |
| 6.9.2 | DRC and downmixing complexity estimation..... | 68 |
| 6.9.3 | EQ complexity estimation..... | 70 |
| 6.10 | Loudness normalization..... | 71 |
| 6.10.1 | Overview..... | 71 |
| 6.10.2 | Loudness normalization based on target loudness..... | 71 |
| 6.10.3 | Loudness Leveling..... | 74 |
| 6.11 | DRC in streaming scenarios..... | 74 |
| 6.11.1 | DRC configuration..... | 74 |
| 6.11.2 | Error handling..... | 75 |
| 6.12 | DRC configuration changes during active processing..... | 75 |
| 7 | Syntax..... | 76 |
| 7.1 | Syntax of DRC payload..... | 76 |
| 7.2 | Syntax of DRC gain payload..... | 76 |
| 7.3 | Syntax of static DRC payload..... | 77 |
| 7.4 | Syntax of DRC gain sequence..... | 102 |
| 7.5 | Syntax of parametric DRC tool..... | 102 |
| 7.6 | Syntax of equalization tools..... | 108 |
| 8 | Reference software..... | 122 |
| 8.1 | Reference software structure..... | 122 |
| 8.1.1 | General..... | 122 |
| 8.2 | Bitstream decoding software..... | 122 |
| 8.2.1 | General..... | 122 |
| 8.2.2 | MPEG-D DRC decoding software..... | 122 |
| 9 | Conformance..... | 122 |
| 9.1 | General..... | 122 |
| 9.2 | Conformance testing..... | 123 |
| 9.2.1 | Conformance test data and test procedure..... | 123 |
| 9.2.2 | Naming conventions..... | 124 |
| 9.2.3 | File format definitions..... | 126 |
| 9.2.4 | Conformance test tools..... | 128 |
| 9.3 | Encoder conformance for MPEG-D DRC bitstreams..... | 129 |
| 9.3.1 | Characteristics and test procedure..... | 129 |
| 9.3.2 | Configuration payload..... | 129 |
| 9.3.3 | Interface payload..... | 144 |
| 9.3.4 | Frame Payload..... | 147 |
| 9.3.5 | Requirements depending on profiles and levels..... | 148 |
| 9.4 | Decoder conformance test categories and conditions..... | 149 |
| 9.4.1 | General..... | 149 |
| 9.4.2 | Conformance test categories..... | 149 |
| 9.4.3 | Conformance test conditions..... | 150 |
| Annex A | (normative) Tables..... | 159 |
| Annex B | (normative) External interface to DRC tool..... | 193 |
| Annex C | (informative) Audio codec specific information..... | 205 |
| Annex D | (informative) DRC gain generation and encoding..... | 210 |
| Annex E | (informative) DRC set selection and adjustment at decoder..... | 221 |
| Annex F | (informative) Loudness normalization..... | 228 |
| Annex G | (informative) Peak limiter..... | 229 |
| Annex H | (informative) Equalization..... | 234 |
| Annex I | (normative) Profiles and levels..... | 236 |
| Annex J | (informative) Reference software disclaimer..... | 244 |
| Annex K | (informative) Reference software..... | 245 |
| Bibliography | | 246 |