ISO/IEC 23008-1:2023-01 (E)

Information technology - High efficiency coding and media delivery in heterogeneous environments - Part 1: MPEG media transport (MMT)

Contents

Page

Foreword vii

Introduction viii

1 Scope 1

2 Normative references 1

3 Terms, definitions and abbreviated terms 1
3.1 Terms and definitions 1
3.2 Abbreviated terms 4

4 Conventions 6

5 Overview 6

6 MMT data model 9
6.1 General 9
6.2 Package 9
6.3 Asset 10
6.4 Media processing unit (MPU) 11
6.5 Asset delivery characteristics 12
6.5.1 General 12
6.5.2 ADC descriptors 12
6.5.3 Syntax 13
6.5.4 Semantics 14
6.6 Bundle delivery characteristics 15
6.6.1 General 15
6.6.2 BDC descriptors 15
6.6.3 Syntax 15
6.6.4 Semantics 16

7 ISOBMFF-based MPU 17
7.1 General 17
7.2 MPU brand definition 18
7.3 MPU box 19
7.3.1 Definition 19
7.3.2 Syntax 19
7.3.3 Semantics 20

8 MMT hint track 20
8.1 General 20
8.2 Sample description format 21
8.2.1 Definition 21
8.2.2 Syntax 21
8.2.3 Semantics 21
8.3 Sample format 21
8.3.1 Definition 21
8.3.2 Syntax 21
8.3.3 Semantics 22

9 Packetized delivery of Package 23
9.1 General 23
9.2 MMT protocol 23
9.2.1 General 23
9.2.2 Structure of an MMTP packet 24
9.2.3 Semantics 25
9.2.4 MMTP session description information 29
9.3 MMTP payload 29
9.3.1 General 29
9.3.2 MPU mode 30
9.3.3 Generic file delivery mode 32
9.3.4 Signalling message mode 36
9.4 MMTP operation 37
9.4.1 General 37
9.4.2 Delivering MPUs 38
9.4.3 Delivering generic objects 40
9.4.4 Header compression for MMTP packet 43

10 Signalling 45
10.1 General 45
10.2 Signalling message format 45
10.2.1 General 45
10.2.2 Syntax 45
10.2.3 Semantics 46
10.3 Signalling messages for Package consumption 46
10.3.1 General 46
10.3.2 PA message 47
10.3.3 MPI message 48
10.3.4 MPT message 49
10.3.5 CRI message 50
10.3.6 DCI message 51
10.3.7 PA table 52
10.3.8 MPI table 53
10.3.9 MP table 56
10.3.10 CRI table 59
10.3.11 DCI table 60
10.3.12 Layout Configuration Table 61
10.3.13 SSWR message 63
10.3.14 LS message 64
10.3.15 LR message 65
10.3.16 SI table 66
10.4 Signalling messages for Package delivery 70
10.4.1 Hypothetical receiver buffer model (HRBM) message 70
10.4.2 Measurement configuration (MC) message 71
10.4.3 ARQ configuration (AC) message 73
10.4.4 ARQ feedback (AF) message 74
10.4.5 Reception quality feedback (RQF) message 77
10.4.6 NAM feedback (NAMF) message 79
10.4.7 Low delay consumption (LDC) message 81
10.4.8 Hypothetical receiver buffer model (HRBM) removal message 82
10.4.9 ADC message 84
10.4.10 NAT_Keepalive (NK) message 87
10.4.11 Media Resource Identification (MRI) message 88
10.4.12 Consumption reporting (CR) message 90
10.4.13 Distributed Resource Identification (DRI) message 91
10.4.14 Distributed Signaling Information (DSI) message 94
10.4.15 Bandwidth Probing reQuest (BPQ) message 97
10.4.16 Bandwidth Probing Response (BPR) message 98
10.4.17 Pacing Buffer Removal Rate (PRR) message 100
10.4.18 Pacing Buffer Status Feedback (PSF) message 101
10.4.19 Cell congestion information messages 102

10.4.20 MMT Transition Request (MTR) message 103
10.4.21 MMT Transition Notification (MTN) message 105
10.4.22 Asset Change Request (ACR) message 109
10.4.23 CMAF Presentation Description (CPD) Messages 112
10.4.24 Content Selection (CS) Message 113
10.4.25 RTSP message 114
10.4.26 VAST/VMAP Message 115
10.4.27 Service List (SL) information message 117
10.5 Descriptors 119
10.5.1 CRI descriptor 119
10.5.2 MPU timestamp descriptor 119
10.5.3 Dependency descriptor 120
10.5.4 GFDT descriptor 121
10.5.5 SI descriptor 123
10.5.6 MMT Service Descriptor 124
10.5.7 Mobile information descriptor 127
10.5.8 Media quality descriptor 128
10.5.9 MPU Presentation Region Descriptor 129
10.5.10 Asset Group Descriptor 130
10.5.11 Access Network Descriptor 131
10.5.12 Subtitle Change descriptor 132
10.5.13 AT descriptor 135
10.6 Syntax element groups 136
10.6.1 MMT_general_location_info 136
10.6.2 asset_id 139
10.6.3 Identifier mapping 139
10.6.4 MIME type 141
10.7 ID and tags values 141

11 Hypothetical receiver buffer model (HRBM) 144
11.1 General 144
11.2 FEC decoding buffer 144
11.3 De-jitter buffer 145
11.4 MMTP packet decapsulation buffer 145
11.5 Usage of HRBM 146
11.6 Estimation of end-to-end delay and buffer requirement 146
11.7 HRBM signalling 146
11.8 HRBM with pacing buffer 146

12 Cross layer interface (CLI) 147
12.1 General 147
12.2 Cross layer information 147
12.2.1 General 147
12.2.2 Top-down QoS information 147
12.2.3 Bottom-up QoS information 147
12.2.4 Network abstraction for media (NAM) 147
12.2.5 Syntax 148
12.2.6 Semantics 148

13 MMTP Session Setup and Control over Unicast 149
13.1 Session Description for MMTP 149
13.1.1 MMTP Protocol Identifier 150
13.1.2 Object Flow Semantics 150
13.1.3 Object Flow Descriptors 150
13.1.4 SDP Syntax Examples 151
13.2 RTSP 151
13.2.1 General 151
13.2.2 MMT Range Format 152
13.2.3 MMT sub-flow Parameter 152
13.3 WebSockets for MMTP 152
13.3.1 General 152

13.3.2 Upgrade to MMT over WebSocket 152
13.3.3 Framing in the MMT sub-protocol 153
13.3.4 Sub-protocol Registration 154
13.4 Multipath Support in MMTP 154
13.4.1 General 154
13.4.2 Multipath Negotiation 155
13.4.3 Session Modification with Multipath 157
13.4.4 Feedback Message Enhancements 158

14 CDN Support 158
14.1 General 158
14.2 DNS Resolution of MMT URLs 159
14.2.1 General 159
14.2.2 DNS query message for MMT URLs 159
14.2.3 DNS response message for MMT URLs 159
14.2.4 DNS update message of MMT URLs 161
14.2.5 Media Resource Update (MRU) Message 161
14.2.6 MRI Request (MRIR) message 164
14.3 MANE 165
14.3.1 Definition 165
14.3.2 Interface between MMT sending entity and MANE 165
14.3.3 Authentication / Authorization 167
14.3.4 Creation of a MMTP session 168
14.3.5 Creation of MMTP flow 168
14.3.6 MMTP session update 170
14.3.7 MMTP flow update 171
14.3.8 Termination of MMTP session 171
14.3.9 Termination of MMTP flow 172
14.3.10 MMTP session query to MANE 173
14.3.11 MMTP session measurement feedback 173

15 FCAST support in MMT 174
15.1 General 174
15.2 MMT signalling of resources delivered using FCAST 175
15.2.1 General 175
15.2.2 Syntax of FCAST location type 175
15.2.3 Semantics 175
15.3 FCAST over MMTP 176
15.3.1 MMTP packet header for FCAST 176
15.3.2 MMTP payload header for FCAST mode 176
15.3.3 Signalling in MPT for FCAST 177
15.3.4 FCAST descriptor 177
15.3.5 Metadata collection object 178

Annex A (informative) Jitter calculation in MMTP 179

Annex B (normative) XML syntax and MIME type for signalling message 180

Annex C (normative) Application layer forward error correction (AL-FEC) framework for MMT 187

Annex D (informative) QoS management model for MMT 211

Annex E (informative) Operation of downloadable DRM and CAS 213

Annex F (informative) DASH segment over MMTP 214

Annex G (normative) Scheme of MMT URI 217

Annex H (normative) Transactions on Generic Data Carried over MPEG-H 3D Audio 218

Annex I (informative) Session Migration from HTTP 220

Annex J (informative) MBMS Content Ingestion 222

Annex K (informative) Configuration example 225

Annex L (normative) MMT Mapping of CMAF content 229

Annex M (normative) Carriage of EVC 232

Bibliography 233