
**Information technology — High
efficiency coding and media delivery
in heterogeneous environments —**

**Part 13:
MMT implementation guidance**

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/IEC TR 23008-13:2020](https://standards.itih.ai/catalog/standards/iso/08e5ccba-0501-4bfc-bac7-c5f1e0f6c0bf/iso-iec-tr-23008-13-2020)

<https://standards.itih.ai/catalog/standards/iso/08e5ccba-0501-4bfc-bac7-c5f1e0f6c0bf/iso-iec-tr-23008-13-2020>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC TR 23008-13:2020

<https://standards.iteh.ai/catalog/standards/iso/08e5ccba-0501-4bfc-bac7-c5f1e0f6c0bf/iso-iec-tr-23008-13-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	vii
Introduction	ix
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General overview of MPEG media transport	1
4.1 System overview	1
4.2 Tools specified in ISO/IEC 23008-1	2
5 MMT function deployments	3
5.1 General	3
5.2 Object reconstruction	3
5.2.1 General	3
5.2.2 Recovery in MPU mode	4
5.2.3 Recovery in GFD mode	6
5.3 Default assets	6
5.4 Low-delay live streaming	7
5.5 Parallel processing in MMT sending and receiving entities	9
5.5.1 Processing in MMT sending entity	9
5.5.2 Processing in MMT receiving entity	11
5.6 MPU streaming for live services	13
5.6.1 MPU packetization	13
5.6.2 Sending of MPU and signalling message	16
5.6.3 MPU generation for SHVC-encoded video in real-time streaming	17
5.7 Fast MMT session acquisition	19
5.8 Referencing and processing non-timed data	20
5.8.1 General	20
5.8.2 Resource grouping and referencing	20
5.8.3 Receiver handling	21
5.9 Media adaptation for quality control in MMTP	21
5.9.1 General	21
5.9.2 Parameters for media adaptation	21
5.9.3 Adaptation operation of MMT entity	21
5.10 Hybrid delivery in MMT	22
5.10.1 General	22
5.10.2 Classification of hybrid delivery	22
5.10.3 Technical elements for hybrid delivery	23
5.11 Example of detailed implementation of MMT	24
5.11.1 Use case: Combination of MMT and MPEG-2 TS for synchronized presentation	24
5.11.2 Use case: Combination of MMT and HTTP streaming for synchronized decoding	24
5.11.3 Use case: Content request in advance for synchronized play-out	25
5.12 HRBM signalling for hybrid delivery	26
5.12.1 Hybrid delivery from the single MMT sending entity	26
5.12.2 Hybrid delivery from the multiple MMT sending entities	27
5.13 Error resilience in MMT protocol	29
5.14 Delay constrained ARQ	30
5.14.1 General	30
5.14.2 Delivery-time constrained ARQ	30
5.14.3 Arrival-deadline constrained ARQ	31
5.15 Delivery of encrypted MPUs	33
5.16 HRBM message updating	33
5.16.1 General	33

5.16.2	HRBM message sending schedule.....	34
5.16.3	Use case.....	34
5.16.4	HRBM buffer operation in unicast environment.....	35
5.17	MMTP packet with padded data.....	37
5.18	Constraints on signalling splicing points	39
5.18.1	General.....	39
5.18.2	Constraints on Case 1 – Asset change at the start of MPU.....	39
5.18.3	Constraints on Case 2 – Asset change at a point in MPU.....	39
5.18.4	Signal the splicing point for target assets in Case 1 and Case 2.....	40
6	Use cases for MMT deployment.....	40
6.1	General.....	40
6.2	Delivery of DASH presentations using MMT.....	40
6.2.1	General.....	40
6.2.2	Delivery of the MPD.....	41
6.2.3	Delivery of the data segments.....	41
6.3	Client operation for DASH service delivered through MMT protocol.....	42
6.3.1	Delivery of MPD with MMTP.....	42
6.3.2	Delivery and consumption of DASH segments with MMTP.....	42
6.4	Hybrid of MMT and DASH over heterogeneous network.....	44
6.5	MMT caching for effective bandwidth utilization.....	45
6.5.1	Overview of MMT caching middlebox architecture.....	45
6.5.2	Content-based caching of MMT media.....	46
6.5.3	MPU sync protocol between server and caching middlebox.....	48
6.5.4	MMT cache manifest.....	53
6.6	Usage of ADC signalling message.....	55
6.6.1	General.....	55
6.6.2	Operation in MMT sending entity.....	55
6.6.3	Operation in MANE router.....	55
6.6.4	Example operation in MMT-receiving entities.....	55
6.6.5	QoE multiplexing gain and bottleneck coordination.....	55
6.7	MMT deployment in Japanese broadcasting systems.....	58
6.7.1	General.....	58
6.7.2	Broadcasting systems using MMT.....	59
6.7.3	Media transport protocol.....	61
6.7.4	Signalling information.....	66
6.7.5	Start-up procedure of broadcasting service.....	74
6.7.6	Actual packet structure.....	77
6.8	MMT deployment in ATSC 3.0 systems.....	79
6.9	Implementation of MMT based on D-TMB in China.....	81
6.9.1	Background.....	81
6.9.2	MMT over legacy DTMB infrastructure.....	81
6.9.3	Use cases.....	81
6.10	Conversion of MMTP stream to MPEG-2 TS.....	83
6.10.1	Overview of conversion operation.....	83
6.10.2	Restrictions to MMTP packets.....	83
6.10.3	Calculation of PTS, DTS.....	83
6.10.4	Restriction related to MPEG-2 T-STD.....	84
6.10.5	Packet field conversion rule.....	85
6.10.6	PSI Conversion rule.....	86
6.11	MMT service provisioning at conventional broadcast environment.....	87
6.12	Usage of multimedia configuration for interface switching management.....	89
6.13	MMT signalling for multiple timed text assets.....	89
6.13.1	Multiple timed text assets within an MMT presentation.....	89
6.13.2	Selective spatial assignment for multiple timed text assets.....	90
6.13.3	Example of multiple timed text assets signalling in MMT.....	92
6.13.4	Carriage of TTML based timed text in MMT.....	92
6.14	Viewport-dependent baseline media profile with packed streaming for VR.....	94

7	Application layer forward error correction (AL-FEC)	97
7.1	FEC decoding method for ssbg_mode2	97
7.1.1	General	97
7.1.2	Source symbol block format for ssbg_mode2	97
7.1.3	Regionalization of source symbol Block for FEC decoding	98
7.1.4	How to choose a proper unit of data for FEC decoding	102
7.2	Usage of two stage FEC coding structure	102
7.2.1	General	102
7.2.2	Use case: Hybrid content delivery	103
7.2.3	Use case: Streaming multicasting (or broadcasting) to two different end-user groups which is under two different channel conditions each other	104
7.3	Usage of layer-aware FEC coding structure	104
7.3.1	General	104
7.3.2	Use case 1: Layered multicast streaming	105
7.3.3	Use case 2: Hybrid delivery	106
7.3.4	Use case 3: Fast zapping with long time interleaving (LA-FEC UI)	107
7.3.5	Use case 4: Prioritized transmission	107
7.4	MPU mapping to source packet block	108
7.4.1	General	108
7.4.2	Aligned MPU mapping method to source packet block	108
7.5	FEC for hybrid service	109
7.6	Usage of rate-adaptive AL-FEC	111
7.6.1	General	111
7.6.2	AL-FEC rate control	112
7.7	FEC scheme for interleaved source symbol block	115
7.7.1	General	115
7.7.2	Re-order buffer for interleaved source symbol block	115
8	MMT developments in mobile environments	115
8.1	True realtime video streaming over a lossy channel	115
8.1.1	General	115
8.1.2	Main features	115
8.1.3	Ring buffer in the client	116
8.1.4	FEC/deFEC performance and delay	116
8.1.5	Characteristics of UDP based multi-path and multi-session transmitting for true real-time video streaming	116
8.2	Dynamic asset change	119
8.3	Media adaptation for quality control	121
8.3.1	Use cases of QoS management for adaptive video service	121
8.3.2	Advanced adaptation operation of MMT entity: selective transmission	125
8.4	Transition time decision using MTR and MTN	129
8.5	Usage of DRI and DSI message	130
8.5.1	Overview	130
8.5.2	Operation in MMT sending entity or MANE	130
8.5.3	Operation in MMT receiving entity	131
8.6	Usage of dynamic media resource identification information update	131
8.6.1	General	131
8.6.2	Classification of dynamic media resource allocation	131
8.6.3	Operation in MMT sending entity	131
8.6.4	Operation in MMT receiving entity	132
8.6.5	Example operation in MANE proxy	132
8.7	MMT service list	134
8.8	Usage of DNS message for MMT URL resolution	135
8.8.1	General	135
8.8.2	Example on DNS resolution procedure	135
8.9	Usage of guide information for dynamic media resource allocation	137
8.9.1	General	137
8.9.2	Classification of guide information	137
8.9.3	Classification of dynamic media resource allocation	137

8.9.4	Operation in MANEs	138
8.9.5	Operation in MMT sending entity	138
8.9.6	Example of dynamic media resource allocation using guide information	138
8.10	Usage of DARI for supporting DNS in MMT	139
8.10.1	General	139
8.10.2	Classification of DARI proxy	139
8.10.3	Operation in MANE DNS or DNS	140
8.10.4	Operation in DARI proxy	140
8.10.5	Relation between the media resource identification in MMT and DNS message	140
Bibliography		142

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/IEC TR 23008-13:2020](https://standards.iteh.ai/catalog/standards/iso/08e5ccba-0501-4bfc-bac7-c5f1e0f6c0bf/iso-iec-tr-23008-13-2020)

<https://standards.iteh.ai/catalog/standards/iso/08e5ccba-0501-4bfc-bac7-c5f1e0f6c0bf/iso-iec-tr-23008-13-2020>

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This third edition cancels and replaces the second edition (ISO/IEC 23008-13:2017), which has been technically revised. The main changes compared to the previous edition are as follows:

- Guidance added to show how the MMT protocol can transmit media streams adaptively to environment changes such as network congestions, while also minimizing service quality degradation.
- Guidance added to describe the scenario in which MMT and MPEG-2 TS are used as transport schemes in broadband networks and broadcast channels, respectively.
- Guidance added for constraints on signalling splicing points that are specified for changing points or splicing points on MMT assets.
- Application Layer Forward Error Correction (AL-FEC) guidance added to describe the usage of Rate-Adaptive AL-FEC, Layer-Aware (LA) FEC coding structure and FEC scheme for interleaved source symbol block.
- Broadcasting MMT deployment guidance added to describe the implementation of MMT based on D-TMB in China and MMT Deployment in ATSC 3.0 systems.
- MMT deployment guidance added to show the usage of MMT signalling for multiple timed text assets and for the viewport-dependent baseline media profile with packed streaming for VR.
- MMT developments in mobile environments guidance added to describe the usage of true real time video streaming over lossy channels, dynamic asset change, and media adaptation for quality control.
- MMT developments in mobile environments guidance added to describe the usage of signalling messages for supporting Package retransmission and dynamic media resource allocation.