TECHNICAL **REPORT**

ISO/IEC TR 23009-3

Second edition 2015-10-15

Information technology — **Dynamic** adaptive streaming over HTTP (DASH) —

Part 3: Implementation guidelines

Technologies de l'information — Diffusion en flux adaptatif Ifo.
ITP (.

Is directrice dynamique sur HTTP (DASH) —

Partie 3: Lignes directrices de mise en oeuvre



Reference number ISO/IEC TR 23009-3:2015(E)



© ISO/IEC 2015, Published in Switzerland

roduced or utilized e te internet or an 'r r ISO's memb All rights reserved. Unless otherwise specified, 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 Ch. de Blandonnet 8 • CP 401 CH-1214 Vernier, Geneva, Switzerland Tel. +41 22 749 01 11 Fax +41 22 749 09 47 copyright@iso.org www.iso.org

Contents				
Fore	eword		v	
Intr	oductio	n	vi	
1	Scop	e	1	
2		native references		
_				
3	Tern	ns, definitions, and abbreviated terms	1	
4	Gene	ral		
	4.1	System overview		
	4.2	Normative parts		
	4.3	Main design principles		
		4.3.1 Common timeline		
		4.3.2 Data model 4.3.3 Segments		
		4.3.4 Segment types		
		4.3.5 Segment addressing schemes		
		4.3.6 Stream access points		
		4.3.7 Remote elements		
		4.3.8 Events		
		4.3.9 General-purpose descriptors	7	
	4.4	Background on DASH profile concept		
	4.5	Dynamic aspects	8	
5	Guid	elines for content generation	10	
J	5.1	General guidelines		
		5.1.1 Video content generation		
		5.1.2 Audio content generation		
		5.1.3 Content preparation for live streaming		
		5.1.4 Guidelines for generation of segment file names		
	5.2	Guidelines for ISO-BMFF content generation		
		5.2.1 On-demand streaming		
		5.2.2 Live streaming		
		5.2.3 Enabling trick modes		
		5.2.4 Support for SubRepresentations		
	5.3	5.2.5 Enabling delivery format to storage file format conversion		
	3.3	5.3.1 General recommendations	30	
		5.3.2 Live streaming		
		5.3.3 On demand streaming	32	
	5.4	Guidelines for Advertisement Insertion	33	
		5.4.1 Use cases		
		5.4.2 Architectures and workflows	34	
		5.4.3 App-driven ad insertion	36	
	5.5	DASH MPD and Segment-based Live Service Offering	37	
		5.5.1 Preliminaries		
		5.5.2 Service Offering Requirements and Guidelines	38	
	F (5.5.3 Client requirements and guidelines	41	
	5.6	Guidelines for low latency live service		
		5.6.1 Use case Seneral Approach: Chunked transfer Seneral Approach		
		5.6.3 MPD generation		
_				
6		it implementation guidelines		
	6.1	General		
	6.2	Client architecture overview		
	6.3	Example of client operation	45	

ISO/IEC TR 23009-3:2015(E)

		g model for live streaming	
	6.4.1	General	
	6.4.2	MPD information	
	6.4.3	MPD times	46
	6.4.4	Context derivation	46
	6.4.5	Derivation of MPD times	47
	6.4.6	Addressing methods	47
	6.4.7	Scheduling playout	48
	6.4.8	Validity of MPD	48
6.5	MPD r	etrieval	48
6.6	Segme	nt list generation	49
	6.6.1	General	49
	6.6.2	Template-based generation of segment list	50
	6.6.3	Playlist-based generation of segment list	
	6.6.4	Media segment list restrictions	
6.7		daptation	
6.8		g	
6.9		rt for trick modes	
6.10		switching	
6.11		support for dependent representations	
0.11	6 11 1	General	54 5 <i>1</i> .
	6.11.2	Client trick-mode support using SubRepresentations	
6.12		Cheffe the recent the	
0.12	6.12.1	General processing	
	6.12.1	Inband events	
		NSH	
7.1		ion of MPD Schema in external namespace	
	7.1.1	General	56
	7.1.2	Example	56
varank		Example	56
ograph			56
ograph			56
ograph			58

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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC ITC 1, Information technology, Subcommittee SC 29, Coding of audio, picture, multimedia and hypermedia information.

This second edition cancels and replaces the first edition (ISO/IEC TR 23009-3:2015), which has been technically revised.

It also incorporates new features from ISO/IEC 23009-1:2014/Amd 1:2015 and ISO/IEC 23009-1:2014/Cor 1:2015.

ISO/IEC TR 23009 consists of the following parts, under the general title *Information technology* — *Dynamic adaptive streaming over HTTP (DASH):*

- Part 1: Media presentation description and segment formats
- Part 2: Conformance and reference software
- Part 3: Implementation guidelines
- Part 4: Segment encryption and authentication

Introduction

This part of ISO/IEC TR 23009 provides guidelines for implementation and deployment of streaming media delivery systems based on the ISO/IEC 23009 series. These guidelines include the following:

- guidelines for streaming content generation;
- guidelines for implementation of streaming clients;
- ng cc
 .mentation
 .ployment of sys. guidelines for deployment of systems designed based on the ISO/IEC 23009 series.

Information technology — Dynamic adaptive streaming over HTTP (DASH) —

Part 3:

Implementation guidelines

1 Scope

This part of ISO/IEC TR 23009 provides technical guidelines for implementing and deploying systems based on ISO/IEC 23009-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 13818-1, Information technology — Generic coding of moving pictures and associated audio information — Part 1: Systems

ISO/IEC 13818-2, Information technology — Generic coding of moving pictures and associated audio information — Part 2: Video

ISO/IEC 14496-2, Information technology — Coding of audio-visual objects — Part 2: Visual

ISO/IEC 14496-3, Information technology — Coding of audio-visual objects — Part 3: Audio

ISO/IEC 23003-1, Information technology — MPEG audio technologies — Part 1: MPEG Surround

ISO/IEC 23003-3, Information technology — MPEG audio technologies — Part 3: Unified speech and audio coding

ISO/IEC 23009-1, Information technology — Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats

ITU-T Rec. H.264 | ISO/IEC 14496-10, Information technology — Coding of audio-visual objects — Part 10: Advanced Video Coding

ITU-T Rec. H.265 | ISO/IEC 23008-2, Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding

3 Terms, definitions, and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO/IEC 23009-1; the video coding terms defined in ISO/IEC 13818-2, ISO/IEC 14496-2, ITU-T Rec. H.264 | ISO/IEC 14496-10 and ITU-T Rec. H.265 | ISO/IEC 23008-2; and the audio coding terms defined in ISO/IEC 13818-1, ISO/IEC 14496-3, ISO/IEC 23003-1 and ISO/IEC 23003-3 apply.