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 dynamique sur HTTP (DASH) —

Partie 3: Lignes directrices de mise en oeuvre

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

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

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions, and abbreviated terms **1**

4 General **2**
4.1 System overview 2
4.2 Normative parts 2
4.3 Main design principles 3
4.3.1 Common timeline 3
4.3.2 Data model 3
4.3.3 Segments 4
4.3.4 Segment types 5
4.3.5 Segment addressing schemes 5
4.3.6 Stream access points 6
4.3.7 Remote elements 6
4.3.8 Events 7
4.3.9 General-purpose descriptors 7
4.4 Background on DASH profile concept 8
4.5 Dynamic aspects 8

5 Guidelines for content generation **10**
5.1 General guidelines 10
5.1.1 Video content generation 10
5.1.2 Audio content generation 12
5.1.3 Content preparation for live streaming 14
5.1.4 Guidelines for generation of segment file names 14
5.2 Guidelines for ISO-BMFF content generation 17
5.2.1 On-demand streaming 17
5.2.2 Live streaming 21
5.2.3 Enabling trick modes 23
5.2.4 Support for SubRepresentations 24
5.2.5 Enabling delivery format to storage file format conversion 26
5.3 Guidelines for MPEG-2 TS content generation 30
5.3.1 General recommendations 30
5.3.2 Live streaming 31
5.3.3 On demand streaming 32
5.4 Guidelines for Advertisement Insertion 33
5.4.1 Use cases 33
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 37
5.5.2 Service Offering Requirements and Guidelines 38
5.5.3 Client requirements and guidelines 41
5.6 Guidelines for low latency live service 43
5.6.1 Use case 43
5.6.2 General Approach: Chunked transfer 43
5.6.3 MPD generation 43

6 Client implementation guidelines **44**
6.1 General 44
6.2 Client architecture overview 44
6.3 Example of client operation 45

6.4 Timing model for live streaming ... 45
6.4.1 General ... 45
6.4.2 MPD information ... 45
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 retrieval ... 48
6.6 Segment 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 ... 51
6.6.4 Media segment list restrictions ... 51
6.7 Rate adaptation ... 52
6.8 Seeking ... 53
6.9 Support for trick modes ... 53
6.10 Stream switching ... 54
6.11 Client support for dependent representations ... 54
6.11.1 General ... 54
6.11.2 Client trick-mode support using SubRepresentations ... 55
6.12 Events ... 55
6.12.1 General processing ... 56
6.12.2 Inband events ... 56

7 Extending DASH ... 56
7.1 Extension of MPD Schema in external namespace ... 56
7.1.1 General ... 56
7.1.2 Example ... 56

Bibliography ... 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 JTC 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;

— guidelines for deployment of systems designed based on the ISO/IEC 23009 series.

