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Part 6: DASH with server push and WebSockets

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Partie 6: DASH avec serveur de poussée et protocoles WebSocket



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Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms, definitions, abbreviated terms and conventions ... **1**
3.1 Terms and definitions ... 1
3.2 Conventions ... 2

4 Background ... **2**

5 Specification structure ... **3**

6 Definitions ... **3**
6.1 Data type definitions ... 3
6.1.1 General ... 3
6.1.2 PushType ... 4
6.1.3 PushDirective ... 5
6.1.4 PushAck ... 5
6.1.5 URLList ... 5
6.1.6 URLTemplate ... 5
6.1.7 FastStartParams ... 6
6.2 Push strategy definitions ... 7

7 DASH server push over HTTP/2 ... **9**
7.1 PushDirective binding ... 9
7.2 PushAck binding ... 9
7.3 Push cancel ... 9

8 DASH server push over WebSocket ... **9**
8.1 Message flow over WebSocket ... 9
8.2 WebSocket sub-protocol for MPEG-DASH ... 10
8.2.1 MPEG-DASH WebSocket frame format and semantics ... 10
8.2.2 Definition of WebSocket streams ... 11
8.3 WebSocket message codes ... 12
8.4 WebSocket message definitions ... 12
8.4.1 MPD request (client → server) ... 12
8.4.2 Segment request (client → server) ... 13
8.4.3 MPD received (server → client) ... 14
8.4.4 Segment received (server → client) ... 16
8.4.5 End of stream (EOS) (server → client) ... 17
8.4.6 Segment cancel (client → server) ... 18
8.5 MPEG-DASH sub-protocol registration ... 19

Annex A (informative) **Considered use cases** ... **20**

Annex B (informative) **System architecture for HTTP/2** ... **21**

Annex C (informative) **Examples of HTTP/2 client/server behaviour** ... **23**

Annex D (informative) **Examples of WebSocket client/server behaviour** ... **27**

Annex E (informative) **Protocol upgrade and fallback procedure for WebSocket** ... **29**

Annex F (informative) **Examples of URL list and URL template** ... **30**

Annex G (informative) **Examples of fast start** ... **32**

Annex H (informative) **Use of DASH server push with the switching element** ... **34**

Bibliography ... **35**

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Foreword

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Introduction

Dynamic Adaptive Streaming over HTTP (DASH) is intended to support a media-streaming model for delivery of media content in which the control lies exclusively with the client.

This document specifies carriage of MPEG DASH media presentations over full duplex HTTP-compatible protocols, particularly HTTP/2 (version 2 of the HTTP protocol as defined by the IETF in Reference [8]) and WebSocket (WebSocket protocol as defined by the IETF in RFC 6455). This carriage takes advantage of the capabilities of these protocols to optimize delivery of MPEG DASH media presentations.

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

Part 6: DASH with server push and WebSockets

1 Scope

This document specifies carriage of MPEG-DASH media presentations over full duplex HTTP-compatible protocols, particularly HTTP/2 and WebSocket. This carriage takes advantage of the features these protocols support over HTTP/1.1 to improve delivery performance, while still maintaining backwards compatibility, particularly for the delivery of low latency live video.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEEE 1003.1-2008, *IEEE Standard for Information Technology — Portable Operating System Interface (POSIX), Base Specifications, Issue 7*

IETF RFC 3986, *Uniform Resource Identifiers (URI): Generic Syntax, January 2005*

IETF RFC 6455, *The WebSocket Protocol, December 2011*

IETF RFC 7158, *The JavaScript Object Notation (JSON) Data Interchange Format, March 2013*

IETF RFC 7231, *Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content, June 2014*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the following terms, definitions, abbreviated terms and conventions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
push acknowledgement
Push Ack
response modifier, sent from a server to a client, which enables a server to state the *push strategy* (3.1.3) used when processing a request

3.1.2
push directive
request modifier, sent from a client to a server, which enables a client to express its expectations regarding the server's *push strategy* (3.1.3) for processing a request

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3.1.3
push strategy
segment transmission strategy, that defines the ways in which segments may be pushed from a server to a client

3.1.4
DASH server push
push
transmission of a segment from server to client based on a *push strategy* (3.1.3), as opposed to directly in response to a client request

3.2 Conventions

NOTE In this document, data formats are described using the ABNF method as described in RFC 5234.

STRING = 1* VCHAR

INTEGER = 1* DIGIT

PPCHAR= `%x21 / %x23-7E`

SQUOTE= `%x27`

UCHAR= `%x21 / %x23-7A / %x7C / %x7E`

4 Background

The basic mechanisms of MPEG-DASH over HTTP/1.1 can be augmented by utilizing the new features and capabilities that are provided by the more recent Internet protocols such as HTTP/2 and WebSocket; see Annex A for several illustrative use cases. While HTTP/2 and WebSocket are quite different in details, they both allow server-initiated and client-initiated transactions, data request cancelation and multiplexing of multiple data responses.

While in the case of HTTP/2 it is possible to carry DASH presentations without additional support, these new capabilities can be used to reduce the transmission delay (latency). Also, both HTTP/2 and WebSocket are designed to interoperate with existing HTTP/1.1 infrastructure, allowing for graceful fallback to HTTP/1.1 when the more recent protocol is not available.

The overall workflow of MPEG-DASH over these protocols is shown in Figure 1. The client and server first initiate a media channel, where the server can actively push data to the other (enabled by HTTP/2 server push or WebSocket messaging). The media channel may be established via the HTTP/1.1 protocol upgrade mechanism or by some other means. After the connection is established, the DASH client requests the media or the MPD from the server, with a URI and a push strategy. This strategy informs the server about how the client would like media delivery to occur (initiated by the server or initiated by the client). Once the server receives the request, it responds with the requested data and initializes the push cycle as defined in the push strategy. Annex B shows a typical end-to-end video streaming system over HTTP/2 that can benefit from signalling and messages defined in this document.

Figure 1 shows an example DASH session wherein the client requests the MPD first and then the media segments with a push strategy. Initialization data are pushed in response to a push strategy associated to the MPD request. After receiving the requested MPD, the client starts requesting video segments from the server with the respective DASH segment URL and a segment push strategy. Then, the server responds with the requested video segment, followed by the push cycles as indicated by the segment push strategy. Typically, the client starts playing back the video after a minimum amount of data is received and then the aforementioned process repeats until the end of the media streaming session.

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