

Encapsulation of Dirac in ISO/IEC 13818-1

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Contents		Page
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Identification of Elementary Streams containing Dirac	2
4.1	Stream type	2
4.2	Registration Descriptor	2
5	Encapsulation of Dirac in Packetised Elementary Streams	3
5.1	Definition of a PES packet containing Dirac	3
5.1.1	PES packet length	3
5.1.2	Timestamps (PTS & DTS)	3
5.1.3	Stream ID	3

Tables

Table 1	— Syntax for registration_descriptor()	2
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Foreword

The British Broadcasting Corporation is a public service broadcaster based in the United Kingdom. Its network includes several TV and radio channels as well as a popular internet web site.

The BBC's research department (formerly BBC Research & Development) has invented a video compression system called Dirac that is well suited to a large range of applications; from low bitrates (e.g. web streaming) to high and very high bitrates (e.g. broadcasting and video production).

A constrained profile of Dirac aimed at video production applications is being standardised by the SMPTE as (S2042) VC-2.

Further information on the activities of the BBC's research department are presented at: <http://www.bbc.co.uk/rd/>

Introduction

This document addresses the need to store Dirac coded bytestreams in ISO/IEC 13818-1 transport streams.

Encapsulation of Dirac in ISO/IEC 13818-1

1 Scope

This specification defines the semantics required to reliably encapsulate Dirac coded bytestreams in ISO/IEC 13818-1 transport streams.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Encapsulation of Dirac in ISO/IEC 13818-1. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this Encapsulation of Dirac in ISO/IEC 13818-1 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 13818-1:2000, *Information technology – Generic coding of moving pictures and associated audio information – Part 1: Systems*

ISO/IEC 13818-1:2000/Amd.2, *Information technology – Generic coding of moving pictures and associated audio information – Part 1: Systems*

Dirac Video Specification, <<http://www.diracvideo.org/specification>>

3 Terms and definitions

3.1

Data Unit

An object in a Dirac bytestream

3.2 Abbreviations

3.2.1 Mnemonics

uimsbf Unsigned integer, most significant bit first.

4 Identification of Elementary Streams containing Dirac

The presence of MPEG-2 Elementary Streams carrying Dirac video data shall be signaled in a Program Map Table as defined in ISO/IEC 13818-1.

4.1 Stream type

The **stream_type** value in the Transport Stream Program Map Table (PMT) describing a Dirac video elementary stream should be set to 0xD1. This value has been taken from the range reserved in ISO/IEC 13818-1 for the carriage of private data streams.

4.2 Registration Descriptor

At least one MPEG-2 **registration_descriptor()** shall be present in the inner descriptor loop of the MPEG-2 Program Element listed in the **TS_program_map_section()** corresponding to the Dirac video elementary stream.

The syntax and semantics for this descriptor appears in Table 1 and the subsequent text.

Table 1 – Syntax for **registration_descriptor()**

Syntax	No. of bits	Mnemonic
registration_descriptor() {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
format_identifier	32	uimsbf
}		

descriptor_tag shall take the value 0x05 to identify this descriptor as an MPEG-2 registration descriptor.

descriptor_length specifies the number of bytes of the descriptor immediately following the **descriptor_length** field.

format_identifier shall be 0x64726163, which is the hexadecimal representation of the ASCII values for the string 'drac'

5 Encapsulation of Dirac in Packetised Elementary Streams

This clause specifies the structure used to store Dirac bytestreams inside ISO/IEC 13818-1 transport streams.

5.1 Definition of a PES packet containing Dirac

The unit of muxing in ISO/IEC 13818-1 is the PES packet; a PES packet of Dirac shall contain:

- zero or more non-picture Dirac data units

followed by a single:

- Dirac picture data unit

OR — Dirac end-of-sequence data unit

NOTE 1 It follows that no Dirac data unit shall span multiple PES packets.

NOTE 2 It follows that all PES packets containing Dirac shall commence with a Dirac data unit

5.1.1 PES packet length

The semantics of ISO/IEC 13818-1 associated with a **PES_packet_length** field of 0 shall be extended to Dirac video elementary streams.

5.1.2 Timestamps (PTS & DTS)

The PTS and DTS (if coded) refer to the timestamps associated with the first picture packet that begins within the first access unit that starts in the payload of the PES packet.

5.1.3 Stream ID

Dirac video streams encapsulated in PES packets use the **stream_id_extension** to provide unambiguous identification of Dirac content:

- the value for **stream_id** shall be set to 0xFD to indicate the use of the stream_id_extension mechanism described in ISO/IEC 13818-1:200x/Amd.2.
- the **stream_id_extension_flag** field shall have any value in the range 0x60 to 0x6F. These values are defined within the allowed private range.
- the **PES_extension_flag** field shall be set to '1' to indicate the insertion of extensions in the PES packet header.
- the **PES_extension_flag_2** field shall be set to '1' to indicate the insertion of the second group of extensions in the PES packet header.
- the **stream_id_extension_flag** field shall be set to '0' to indicate the insertion of a valid **stream_id_extension** field.