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SUBTITLING METHODS FOR BROADCAST CABLE

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140 Philips Road
Exton, PA 19341

TABLE OF CONTENTS

1	Scope	1
1.1	Purpose	1
1.2	Organization	1
2	Compliance notation.....	1
2.1	Terms, Acronyms and Abbreviations	2
2.1.1	Terms	2
2.1.2	Acronyms and Abbreviations	2
2.2	Stream Type for Subtitling Messages	3
2.3	Section and Data Structure Syntax Notation	3
3	References	3
3.1	Normative References	3
3.2	Informative References	4
4	Overview of Subtitle System Design	4
4.1	Bitmapped Subtitles	4
4.2	Coordinate System.....	4
4.3	Bitmaps and Frames	4
4.4	Outlines and Drop Shadows	5
4.5	Display Standards	6
4.6	Decoder Processing Model	6
5	Subtitle Message Format	7
5.1	Reserved Fields	7
5.2	Protocol Extensibility	7
5.3	Subtitle Transmission Format	8
5.4	Table ID Assignment.....	9
5.5	Message Length.....	10
5.6	Segmentation Option	10
5.6.1	Overview	10
5.6.2	Stuffing Descriptor	11
5.6.3	Segmentation Overlay	11
5.6.4	Example	12
5.7	Protocol Version Field	13
5.8	ISO 639 Languages	13
5.9	Display Modes.....	14
5.10	Display Standards	14
5.11	In-Cue Time	14
5.12	Out-Cue Time	15
5.13	Subtitle Format	15
5.14	Subtitle Color	16
5.15	Display Duration	16
5.16	Block Length.....	17
5.17	Bitmapped Subtitle	17
5.17.1	Bitmap Colors	18
5.17.2	Bitmap Position	18
5.17.3	Frame Position.....	19
5.17.4	Outline Thickness	19
5.17.5	Drop Shadow Definition	19
5.17.6	Compressed Bitmap	19
5.18	Error Protection and Detection	22

LIST OF FIGURES

Figure 4.1. Placement of Bitmaps and Frames	5
Figure 4.2. Example Drop Shadow	5
Figure 4.3. Example Outline.....	6
Figure 4.4. Subtitle Decoder Processing Model.....	6
Figure 5.1. Message Segmentation and Reassembly	13

LIST OF TABLES

Table 2.1 Example	3
Table 5.1. Subtitle Message Format	9
Table 5.2. Subtitle Message Format with message_body() Delineated	10
Table 5.3. Stuffing Descriptor Format	11
Table 5.4. Display Standards	14
Table 5.5. Subtitle Type	16
Table 5.6. Color Vector Formatting	16
Table 5.7. Simple Bitmap Format	18
Table 5.9. Compressed Bitmap	21

1 SCOPE

1.1 Purpose

This document defines a standard for a transmission protocol supporting multilingual subtitling services to augment video and audio within MPEG-2 multiplexes.

1.2 Organization

The sections of this document are organized as follows:

Section 1 — Presents the scope.

Section 2 — Lists compliance notation and terms.

Section 3 – Lists applicable documents

Section 4 — Provides an overview of subtitling system design.

Section 5 — Specifies the subtitle message format.

2 COMPLIANCE NOTATION

“SHALL”	This word or the adjective “REQUIRED” means that the item is an absolute requirement of this specification.
“SHALL NOT”	This phrase means that the item is an absolute prohibition of this specification.
“SHOULD”	This word or the adjective “RECOMMENDED” means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
“SHOULD NOT”	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
“MAY”	This word or the adjective “OPTIONAL” means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

2.1 Terms, Acronyms and Abbreviations

2.1.1 Terms

The following terms are used throughout this document:

message: A sequence of bytes comprising a data structure defined in this Standard. All messages begin with the **table_ID** and end with the **CRC_32** field. Messages are carried in non-PES streams; their starting points within a packet payload is indicated by the **pointer_field** mechanism defined in the *ISO/IEC 13818-1 Systems* document.

section: A message comprising a portion of an *ISO/IEC 13818-1*-defined table, such as the Program Association Table (PAT), Conditional Access Table (CAT), or Program Map Table (PMT). The term conforms to MPEG terminology, but since it applies primarily to the delivery of table structures, the more appropriate term "message" is used to refer to non-table oriented data structures such as, for example, the subtitle message.

program element: A generic term for one of the elementary streams or other data streams that may be included in a program.

program: A collection of program elements. Program elements may be elementary streams. Program elements need not have any defined time base; those that do have a common time base and are intended for synchronized presentation. The term "program" is also used in the context of a "television program" such as a scheduled daily news broadcast. The distinction between the two usages should be understood by context.

service: *ISO/IEC 13818-1* uses the term "program" to refer to a collection of program elements without regard to time. In this Standard, the term "service" is used in this same context to denote a collection of elementary components. Usage of the term *service* clarifies certain discussions which also involve the notion of the term *program* in its traditional meaning (in, for example, the statement "A video service carries a series of programs").

stream: An ordered series of bytes. The usual context for the term "stream" involves specification of a particular PID (such as the "Program Map PID stream"), in which case the term indicates a series of bytes extracted from the packet multiplex from packets with the indicated PID value.

2.1.2 Acronyms and Abbreviations

The following acronyms and abbreviations are used within this specification:

bslbf	bit string, left bit first
CRC	Cyclic Redundancy Check
IRD	Integrated Receiver-Decoder
ISO	International Standards Organization
MPEG	Moving Picture Experts Group
PCR	Program Clock Reference
PES	Packetized Elementary Stream
PID	Packet Identifier
PMT	Program Map Table
PTS	Presentation Time Stamp
rpchof	remainder polynomial coefficients, highest order first
TS	Transport Stream
uimsbf	unsigned integer, most significant bit first

2.2 Stream Type for Subtitling Messages

Stream type 0x82 shall be used for program subtitles defined in this Standard.

2.3 Section and Data Structure Syntax Notation

This document contains symbolic references to syntactic elements. These references are typographically distinguished by the use of a different font (e.g., **restricted**), may contain the underscore character (e.g., **sequence_end_code**) and may consist of character strings that are not English words (e.g., **dynrng**).

The formats of sections and data structures in this document are described using a C-like notational method employed in *ISO/IEC 13818-1*. An extension to this method is described below.

Each data structure is described in a table format wherein the size in bits of each variable within that section is listed in a column labeled "Bits." The column adjacent to the bits column is labeled "Bytes" and indicates the size of the item in bytes. For convenience, several bits within a particular byte or multi-byte variable may be aggregated for the count. An example follows:

Table 2.1 Example

Syntax	Bits	Bytes	Mnemonic / Description
for_section(){ table_ID section_syntax_indicator ... if (section_syntax_indicator) { ISO_reserved table_extension } version_number current_next_indicator ... }	8 1 2 16 5 1	1 (1) (2) 	uimbsf bslbf bslbf uimbsf uimbsf bslbf {next, current}

In the byte count column, items that are conditional (because they are within a loop or conditional statement) are parenthesized. Nested parentheses are used if the loops or conditions are nested.

3 REFERENCES

3.1 Normative References

1. ISO/IEC 13818-1:2007 Information Technology — Generic coding of moving pictures and associated audio - Part 1: Systems.
2. ISO: "ISO 639.2, Code for the Representation of Names of Languages — Part 2: alpha-3 code,"

as

maintained by the ISO 639/Joint Advisory Committee (ISO 639/JAC),
<http://www.loc.gov/standards/iso639-2/iso639jac.html>.

3.2 Informative References

3. EBU Tech. 3264-E, Specification of the EBU Subtitling Data Exchange Format, European Broadcasting Union, February 1991.

4 OVERVIEW OF SUBTITLE SYSTEM DESIGN

This section provides an overview of systems concepts involved in this Standard.

4.1 Bitmapped Subtitles

The transmission format for subtitles consists of one or more compressed bitmap images, along with optional rectangular backdrops for each. With the bitmap method, any language can be supported, as opposed to those supported within the memory of the Decoder and, the author of the subtitle stream has complete control over the appearance of the characters: the font (size and serif or sans-serif, for example), and kerning. In addition, characters and symbols which are not a part of any standard ROM-based character set can be transmitted and displayed, such as those characters in ideographic languages which represent proper names.

4.2 Coordinate System

In the horizontal axis, the coordinate system used to locate characters and bitmaps for this Standard is based on the number of pixels available horizontally in the display grid for the target video format. Standard definition digital formats include modes up to 720 pixels horizontally, clocked at a 13.5 MHz rate; HDTV formats include modes with up to 1920 pixels horizontally.

Vertical coordinates are specified by raster lines. For consistency, raster lines are counted after interlace; the counting method therefore does not correspond with the usual way of counting lines in interlaced NTSC.

The *target* display format is defined in each subtitle message, and defines frame rate and the horizontal and vertical dimensions of the active display grid.

The origin of the coordinate system is the upper left corner of the display grid, whose coordinates are given by (**origin_H_coordinate**, **origin_V_coordinate**) = (0, 0).

4.3 Bitmaps and Frames

Bitmaps and frames are positioned on the display screen referenced to the same pixel-level coordinate system as described above (see Figure 4.1).

Bitmaps are located on the display grid by the upper left pixel, whose coordinates are given by (**bitmap_top_H_coordinate**, **bitmap_top_V_coordinate**) = (BTH, BTV).

The lower right corner of the bitmap is provided to define an enclosing rectangle prior to bitmap decompression. The enclosing rectangle may be used to compute memory requirements for the decompressed bitmap, or to define the screen area affected when the bitmap is to be erased. The lower right coordinates are given by (**bitmap_bottom_H_coordinate**, **bitmap_bottom_V_coordinate**) = (BBH, BBV).