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Digital Video Subcommittee

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SCTE 53 2019 (R2024)

Methods for Asynchronous Data Services Transport

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Document Tags

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Note: Standards that are released multiple times in the same year use: a, b, c, etc. to indicate normative balloted updates and/or r1, r2, r3, etc. to indicate editorial changes to a released document after the year.

This document is identical to SCTE 53 2019 except for informative components which may have been updated such as the title page, NOTICE text, headers and footers. No normative changes have been made to this document

Contents

1. Introduction

1.1 Purpose

This document is identical to SCTE 53 2019 except for informative components which may have been updated such as the title page, NOTICE text, headers and footers. No normative changes have been made to this document.

This proposal represents transmission format for the carriage of asynchronous data services, compatible with digital multiplex bitstreams constructed in accordance with ISO/IEC 13818-1 (MPEG-2 Systems). Bit rates for the data services extend from 300 bps to 288 kbps including some common high speed modem rates of 115200 bps and 230400 bps. The proposal also covers the entire set of rates specified by the ITU-T Series-V Recommendations (V.22, V.23, V.26, V.27 ter, V.29, V.32, V.32 bis, V.32 ter and V.34).

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below:

- *ITU-T Rec. H. 222.0 | ISO/IEC 13818-1:2007*, Information Technology—Coding of moving pictures and associated audio—Part 1: Systems.

3. Asynchronous Data Service Specification

The decoder will output one start bit (low) followed by 8 data bits followed by one stop bit (high) for each byte of asynchronous data received in the bitstream. The decoder will continue output of the stop bit when its has no data to output.

3.1 Asynchronous Data Rate Specification

The data rate of an asynchronous data service shall not change during the duration of the service.

3.2 Asynchronous Data Bitstream Syntax

Asynchronous data is carried in MPEG private section syntax, in private streams as specified in ISO/IEC 13818-1. Asynchronous data private sections specify the asynchronous data rate and asynchronous data. The syntax supports rates between 300 bps and 288,000 bps, as specified in section 3.3.3. A compliant decoder must support at least 1200, 2400, 4800, 9600 and 19200 bps.

3.2.1 Message Structure

This section describes the protocol for extracting complete framed asynchronous data messages (MPEG private sections) from a packet stream.

3.2.1.1 Message Transport

Messages carrying asynchronous data conformant to this standard are carried in non-PES Packet Identifier (PID) streams, conforming to the packet syntax described in *ISO/IEC 13818-1,* Section 2.4.4 (Program Specific Information). Messages may be variable in length. The beginning of a message is indicated by a one-octet pointer_field in the Transport Stream packet payload.

3.2.2 Asynchronous Data Message

The asynchronous data message is specified to be compatible with SI messages to provide the opportunity for a common design for decoder processing of these messages. The message type specified for asynchronous data messages is 0xFE; asynchronous data messages may be multiplexed on the same PID with messages of different types. Under no circumstances may more than one asynchronous data message commence in a transport packet. Note the asynchronous_header_reserved field of n bits is specified as an integer number of bytes which is byte aligned with the preceding bytes of the message. Also note the asynchronous_data field of n bits is also specified as an integer number of bytes which is byte aligned with the preceding bytes of the message. Therefore, each asynchronous data message is byte aligned with the transport packets in which it is conveyed. The syntax of the asynchronous data message is specified in Figure 3–1.

	Bits	Octets	Bit Number / Description
asynchronous_data_message () {			
message_type	8	1	uimsbf value 0xFE
always_zero	6	2	bslbf value “000000”
message_length	10		uimsbf (L) value 5-1021
always_zero	5	1	bslbf value “00000”
header_length	3		uimsbf (H) value 1-7
asynchronous_data_rate ()	8	1	
reserved	8*(H-1)	(H-1)	bslbf
asynchronous_data	8*(L-(H+5))	(L-(H+5))	bslbf
CRC_32	32	4	rpchof
}			

Figure 3–1. Asynchronous Data Message Format.

3.2.3 Asynchronous Data Rate

The syntax of the asynchronous data rate is specified in Figure 3–2.

	Bits	Octets	Bit Number / Description
asynchronous_data_rate () {			
reserved	2	1	bslbf
async_base_rate	2		uimsbf {300, 2400, 19200, reserved}
async_rate_multiplier	4		uimsbf range 0-15
}			

Figure 3–2. Asynchronous Data Rate Format

3.3 Asynchronous Data Bitstream Semantics

3.3.1 Reserved Fields

***reserved*—**Fields in this standard marked “*reserved*” are reserved for future use. Decoders shall disregard reserved fields for which no definition exists that is known to the unit. Fields marked “*reserved*” shall be set to a value of zero until such time as they are defined and supported.

3.3.2 Asynchronous Data Message

message_type—Defines the type and structure of data carried in the body of the message. Must have the value of 0xFE. Messages with different types may be received on the same PID as asynchronous data messages.

message_length—The length in bytes of all the fields following this field itself, up to and including the CRC_32 field. This 10 bit field constrains the length of asynchronous data messages to 1024 bytes.

header_length—A 3 bit field specifying the number of bytes in the fields following the header_length up to and including the *reserved* field. The value of this field must be in the range of 1 to 7, inclusive.

asynchronous_data—An n-bit field of bytes containing the asynchronous data which the decoder will present (output), starting with the first (left) bit followed by the second bit, etc.

CRC_32—A 32 bit polynomial given by the equation:

$$x^{32}+x^{26}+x^{23}+x^{22}+x^{16}+x^{12}+x^{11}+x^{10}+x^{8}+x^{7}+x^{5}+x^{4}+x^{2}+x+1.$$

The asynchronous data message to be error checked is processed with the check polynomial by dividing the message data by CRC_32, starting with the message_type field and ending with the last byte of the asynchronous_data field, inclusive. The initial vector for the Cyclic Redundancy Check (CRC) computation will be 0xFFFFFFFF. The resulting 32 bit remainder is placed directly into the CRC_32 field.

3.3.3 Asynchronous Data Rate

async_base_rate -- A 2-bit enumerated type field that defines the asynchronous data base rate used in calculating the rate at which the decoder is to output the asynchronous_data content of this message. The decoder shall not attempt to support an asynchronous data service when the value of this field is reserved. For rates which are expressible by more than one combination of async_base_rate and async_rate_multiplier, the encoder shall express the rate using the combination which requires the largest value of asynchronous data base rate[1]. The following C statement defines the coding:

```
enum async_base_rate {300 bps, 2400 bps, 19200 bps, reserved};
```

async_rate_multiplier -- This is an unsigned integer used in calculating the rate at which the decoder is to output the asynchronous_data content of this message. The decoder shall not attempt to support an asynchronous data service when the value of this field is ’0000’.

The asynchronous data rate may be calculated as follows:

asynchronous data rate = async_rate_multiplier * asynchronous data base rate

3.4 Stream Type Assignment

The stream type code for asynchronous data conforming to this specification shall be 0xC3.

[1]Note that future extensions of this syntax may result in values of `async_base_rate` which are larger than those currently defined while the corresponding value of asynchronous data base rate may not necessarily be larger. The specification is that the encoder use the largest value of asynchronous data base rate, not the largest value of `async_base_rate`.

4. Decoder Model

The following decoder model does not specify a required architecture for the asynchronous data decoder. It is used to ensure that data streams are constructed with similar minimum buffer parameters in order to ensure interoperability between devices. The model is similar to the one used in the construction of MPEG 2 streams detailed in *ITU-T Rec. H. 222.0 | ISO/IEC 13818-1.*

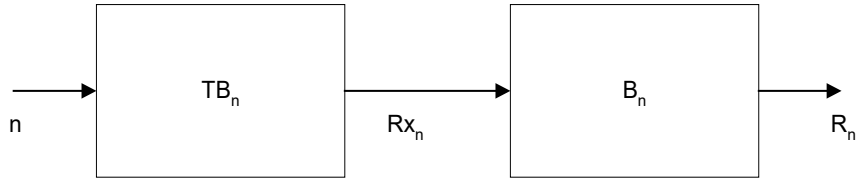

Figure 4-1 **- Decoder Buffer Model**

Parameter	Name	Value
n	nth stream from a transport multiplex	
TB_n	Transport Buffer size	512 bytes
Rx_n	Transport Buffer Leak Rate	1 Mbps
B_n	Data Buffer	512 bytes
R_n	Removal Rate	1.01 * rate specified in service