MOST

Media **O**riented **S**ystems **T**ransport

Multimedia and Control Networking Technology

MOST Specification for Stream Transmission MOST50 Adaptation Rev. 3.0 07/2010

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Table of Contents

Document History

Initial version

Change Ref.	Section	Changes
3v0_001	-	– Initial version, adapted from Stream Transmission Specification Rev. 3.0.

Bibliography

Category	Document		Revision
CDDA	[1]	Compact Disc Digital Audio System Description (Red Book)	May 1999
Video CD	[2]	Video CD Specification (White Book)	Version 2.0 April 1995
Super Video CD	[3]	Super Video CD Specification	Version 1.0 May 1999
DVD-Video	[4]	DVD Specifications for Read-Only Disc, Part 3, Video Specifications	Version 1.1 September 1999
DVD-Audio	[5]	DVD Specifications for Read-Only Disc, Part 4, Audio Specifications	Version 1.2 March 2001
MPEG	[6]	ISO/IEC 11172-1 for MPEG1 System	
	[7]	ISO/IEC 11172-2 for MPEG1 Video	
	[8]	ISO/IEC 11172-3 for MPEG1 Audio	
	[9]	ISO/IEC 13818-1 for MPEG2 Systems	
	[10]	ISO/IEC 13818-2 for MPEG2 Video	
	[11]	ISO/IEC 13818-3 for MPEG2 Audio	
	[12]	ISO/IEC 13818-7, Advanced Audio Coding (AAC)	
	[13]	ISO/IEC 14495 for MPEG4 standards	
	[14]	ISO/IEC 14496-1, Coding of audio-visual objects—Systems	
	[15]	ISO/IEC 14496-2, MPEG4 compression for visual data	
	[16]	ISO/IEC 14496-3, MPEG4 audio	
	[17]	ISO/IEC 14496-10, MPEG4 advanced video coding	
AC3/Dolby Digital	[18]	Document A/52B. Digital Audio Compression Standard (AC-3, E-AC-3) revision B	June 2005
S/PDIF	[19]	IEC 60958-3, Digital Audio Interface – Part 3: consumer applications	June 2006
DTCP	[20]	5C Digital Transmission Content Protection Specification Volume 1	Rev. 1.4 February 2005
	[21]	DTCP Volume 1 supplement B, mapping DTCP to MOST, rev 1.1	Rev. 1.1
	[22]	DTCP Volume 1 supplement E, mapping DTCP to IP	
MOST Content Protection	[23]	MOST Content Security Specification	Rev. 1.0
	[24]	MOST Content Protection Scheme DTCP Implementation	Rev. 3.0
	[25]	MOST Content Protection Scheme DTCP-IP Implementation	Rev. 1.0
MOST	[26]	MOST Specification	Rev. 3.0
	[27]	MOST FBlock Template General FBlock	Rev. 3.0.2
ISRC	[28]	ISO 3901:2001 ISRC, International Standard Recording Code	
Blu-ray	[29]	Refer to Blu-ray disc association license office www.blu-raydisc.info. 8 disc formats currently defined (status October 2007).	

Category	Document		Revision
AVCHD	[30]	AVCHD format specification www.avchd-info.org	Version 1.0 July 2006
AACS	[31]	Advanced Access Content System (AACS), Blu-ray disc pre-recorded book. Revision 0.92, December 5th, 2007.	Rev. 0.92 2007-12-05
	[32]	Advanced Access Content System (AACS), HD-DVD and DVD pre-recorded book.	Rev. 0.912 2006-08-15

1 Introduction and Overview

1.1 Purpose

This document describes the stream format for the transmission of audiovisual data over the MOST50 network.

1.2 Abbreviations

Abbreviation	Description
AC3	Audio Coding 3, the compression scheme used by Dolby Digital now called Dolby Digital
CBR	Constant Bit Rate
CD	Compact Disc
DD	Dolby Digital
DTS	Digital Theatre Sound
DVD	Digital Versatile Disc
FS	Sample Rate
ISO	International Standardization Organization
LPCM	Linear Pulse Code Modulation
MDP	MOST Data Packets

Abbreviation	Description
MOST	Media Oriented Systems Transport
MPEG	Motion Picture Experts Group
SACD	Super AudioCD
SDDS	Sony Dynamic Digital Sound
S/PDIF	Sony/Philips Digital Interface Format
SVCD	Super VideoCD
VBR	Variable Bit Rate
VCD	VideoCD

Table 1-1: Abbreviations

2 Introduction to MOST Stream Transmission

This document specifies the transmission of audiovisual data over the MOST network.
Two transmission classes are defined: SYNCHRONOUS and ASYNCHRONOUS.

While MOST supports synchronous transmission by nature, isochronous transmission is realized as a protocol extension based on a synchronous channel. A Stream Associated Data channel (SAD) is defined for this purpose.

Further, data streams can be distinguished by their structure. Discrete frame type streams as well as packetized data streams are considered by this specification.
A typical example of discrete frame type streams are PCM audio samples, for example, from an audio CD. The data's timing is characterized by a constant sample rate (e.g., 48 kHz).
Typical applications for packetized data are MPEG streams. Here, the data often has no further timing requirements other than that the data should arrive in time to fulfill the appropriate buffer model of the application.

Transmission of stereo and multi-channel signals as well as low sampling rates or small bandwidth special stream formats are defined.
Further, transmission of MPEG1 SystemStream, MPEG2 ProgramStreams, MPEG2 TransportStream, and MPEG4 is described. The MPEG4 data is encapsulated in the MPEG2 system layer. This enables the transmission of VideoCD or DVD streams, the distribution of digital television programs, or the streaming of Internet content over the MOST network.

A special focus is directed also to copy-protected data, which requires an encrypted transmission. In this context the application of the IEC958 Serial Copy Management (S/PDIF SCM) and the Digital Transmission Content Protection Scheme (DTCP) is described. In order to enable these content protection schemes for a synchronous data transmission, a Stream Associated Data channel (SAD) is defined.

3 Available Bit Rates on MOST

By allocating synchronous channels, bandwidth can be provided in multiples of the MOST network sample rate (FS).

Bit rate/kbps = FS/kHz * BlockWidth/bytes * 8

The following table lists different bitrates for the recommended 48.0 kHz sample rate. Apart from that, some examples of popular applications and the required bandwidth are given. The table below is for information only; it does not define requirements for actual implementations.

BlockWidth	MOST Network @ 48 kHz		
Bytes	kBps	Mbps	Type
1	48	0.384	IP-Radio
2	96	0.768	Microphone, Mono, Dolby Digital @ 640 kbps
3	144	1.152	
4	192	1.536	CD Audio, Video CD, DVB-T Program, DTS @ typ. 1.5 Mbps
5	240	1.920	
6	288	2.304	
7	336	2.688	
8	384	3.072	Super Video CD
9	432	3.456	
10	480	3.840	
12	576	4.608	6 Channel Audio 16bit
14	672	5.376	DVB-S Program typical @ 5 Mbps
16	768	6.144	DVB-T Bouquet @ 6 Mbps
18	864	6.912	6 Channel Audio 24bit
26	1248	9.984	MLP(DVD-Audio) @ 9.6 Mbps
27	1296	10.368	DVD @10.08 Mbps
32	1536	12.288	AVCHD (Camera 720p) @ 12 Mbps
40	1920	15.360	AVCHD (Camera 1080i) @ 15 Mbps
49	2352	18.816	MLP(Blu-ray) @ 18.6 Mbps
105	5040	40.320	DVB-S Bouquet @ 40 Mbps
117	5616	44.928	Maximum bitrate for MOST50

Table 3-1: Available Constant Bit Rates (1-117 Bytes Socket BlockWidth)

The maximum Blockwidth for MOST50 is 117. In a 48 kHz network, for example, this results in a bit rate of 5616 kBps.

4 Transmisson classes

4.1 Synchronous

The frame structure of the data is directly locked to the physical frame structure of the MOST network. This is the straightforward real-time streaming method MOST offers. Typically the sources and sinks are driven by the unique MOST network clock. The complete system runs synchronously using the same clock domain.

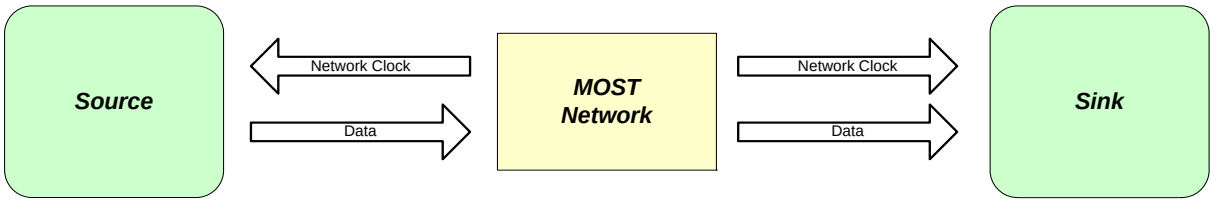


Figure 4-1: Synchronous Data Transmission

4.1.1 Isochronous transmission using the synchronous Transmission Class

Data, which cannot be easily synchronized to the MOST system clock before distribution over the MOST network, is called isochronous data. The timing of the data is typically not locked to the physical frame structure of the MOST network and it is even not required that the data is organized in frames. To distribute such data over the MOST network, it is packetized by the source before transmission and a special protocol is used to realize the transmission of these packets over a synchronous channel of the MOST network. Please see chapter 7 Appendix A: The Stream Associated Data Channel (SAD) on details of this protocol.

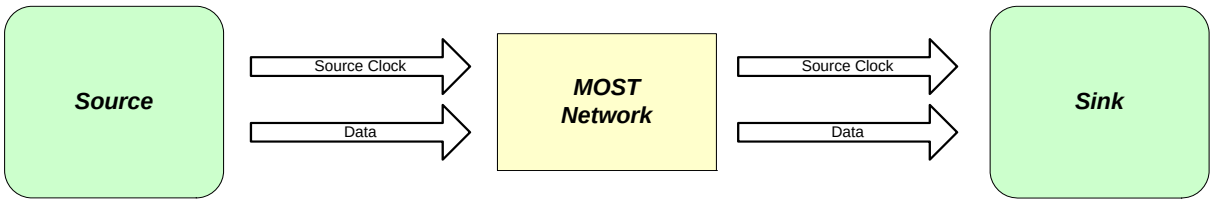


Figure 4-2: Iochronous transmission using synchronous Transmission Class

4.2 Asynchronous

Bandwidth is shared among all devices in the MOST network. A fair arbitration mechanism is used to grant several sources access over time. As it is the case with any shared bandwidth, QoS cannot be guaranteed.
Typically, this TransmissionClass is used by default for MOST Data Packets (MDP).

MOST Data Packets (MDP) are native MOST data packets as defined for the MOST High protocol.

5 Sequence of Stream Data on MOST

The sequence of data for streams on MOST is ordered with the following priorities:

1. Sampling time
2. Bit order

5.1 Sampling Time Sort Criteria

For isochronous streams, the sequence of data is 'byte by byte in ascending order'. For synchronous streams of different sampling frequency, the data samples are ordered by their sampling time.

Example:
Data of synchronous stream A is sampled with 1x FS
Data of synchronous stream B is sampled with 2x FS
Data of synchronous stream C is sampled with 4x FS

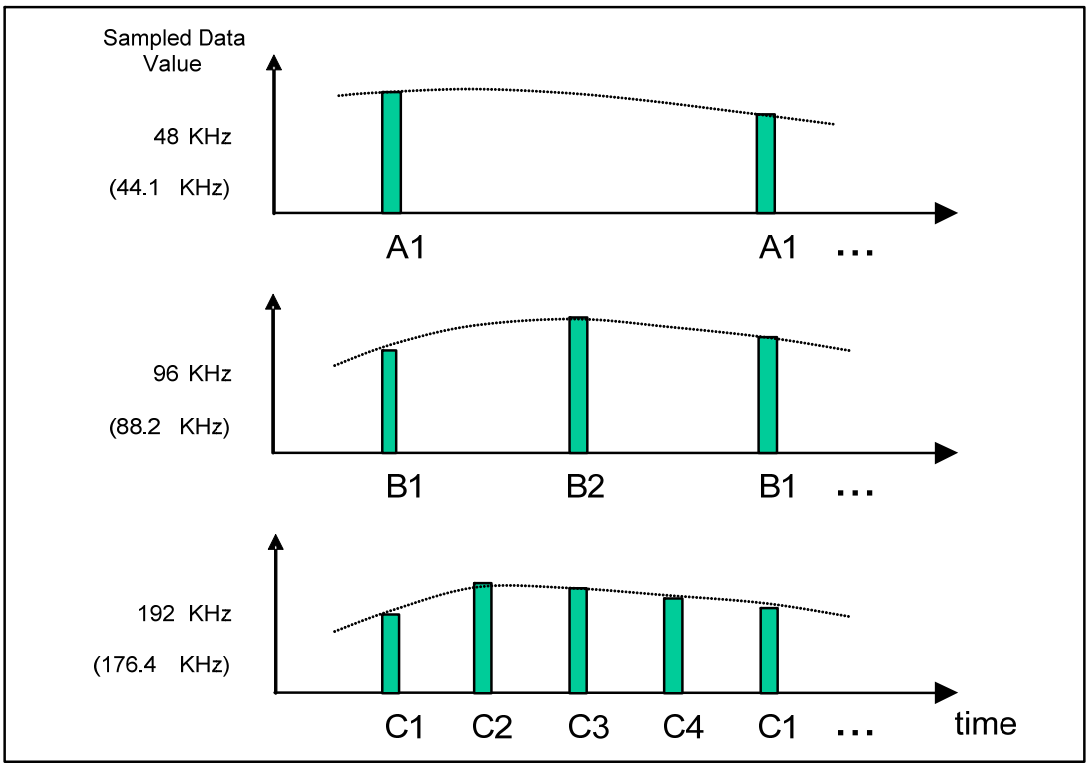


Figure 5-1: Three Channels with Different FS

The samples A1, B1, and C1 are taken at the same time. The same applies to the samples B2 and C3.

The resulting sequence of data for the transmission of all three channels with different FS according to Figure 5-1 via MOST would be:

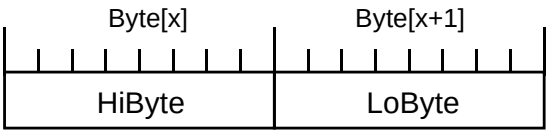
Frame 0: {A1, B1, C1}, C2, {B2, C3}, C4
Frame 1: {A1, B1, C1}, C2, {B2, C3}, C4
Frame 2: {A1, B1, C1}, C2, {B2, C3}, C4
Frame 3: …

5.2 Bit Order Sort Criteria

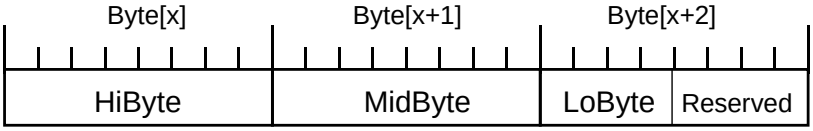
The samples of a channel are ordered for transmission via MOST as follows:

- HiByte down to LoByte
- Bits are aligned MSB first
- Data is left-adjusted
- Unused bits are set to “0b”

16bits/sample

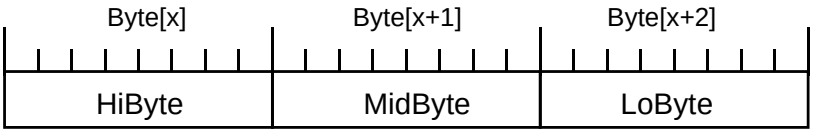


20bits/sample



Please note:
Reserved bits must be set to “0b”

24bits/sample



Example:
Given are the audio signals from section 5.1 with the following resolutions:

Stream A: 24bits/sample
Stream B: 24bits/sample
Stream C: 16bits/sample

The resulting sequence of data for the transmission via MOST would be:

Frame 0: $\{A1_{Hi\text{-}Mid\text{-}Lo}, B1_{Hi\text{-}Mid\text{-}Lo}, C1_{Hi\text{-}Lo}\}, C2_{Hi\text{-}Lo}, \{B2_{Hi\text{-}Mid\text{-}Lo}, C3_{Hi\text{-}Lo}\}, C4_{Hi\text{-}Lo}$
Frame 1: $\{A1_{Hi\text{-}Mid\text{-}Lo}, B1_{Hi\text{-}Mid\text{-}Lo}, C1_{Hi\text{-}Lo}\}, C2_{Hi\text{-}Lo}, \{B2_{Hi\text{-}Mid\text{-}Lo}, C3_{Hi\text{-}Lo}\}, C4_{Hi\text{-}Lo}$
Frame 2: $\{A1_{Hi\text{-}Mid\text{-}Lo}, B1_{Hi\text{-}Mid\text{-}Lo}, C1_{Hi\text{-}Lo}\}, C2_{Hi\text{-}Lo}, \{B2_{Hi\text{-}Mid\text{-}Lo}, C3_{Hi\text{-}Lo}\}, C4_{Hi\text{-}Lo}$
Frame 3: …

5.3 Discrete Frame Streams

General rule:
Discrete Frame streams must be synchronized to the MOST FS before transmitting over MOST.

The SourceInfo property features the parameter 'ContentType' to describe the synchronous streams in the table below.

Code (1 Byte)	Description
0x00	Audio
0x01	Reserved
0x02	S/PDIF
0x08	SAD
0x0F	Phase Information (optional)
0x10	GenericPCM
0x11	GenericPCM protected by DTCP

Table 5-1: DataType definitions for Discrete Frame streams

5.3.1 Audio

This data type is also known as PCM or StereoPCM. For audio transmissions, the following rules apply:

- Audio-NF will be transported CD-DA compatible (Compact Disk Digital Audio)
- The sequence of channels is: Front left, front right, rear left, rear right.
- The most significant byte is transmitted first.

ContentDescription := { AudioChannels, Resolution }

AudioChannels
Specifies the number of the audio channels, for example, 1 for mono, 2 for stereo etc.
Basic Data Type: Unsigned Byte

Resolution
Specifies the resolution of the audio samples in bytes
Basic Data Type: Unsigned Byte

Example 1:
16 Bit Stereo: AudioChannels = 0x02, Resolution = 0x02

Sequence of data:
Channel0: Left channel, 16 Bit Word
Channel1: Right channel, 16 Bit Word

Sequence of data:
MSB left, LSB left, MSB right, LSB right

Ch. 0 (Left) HiByte	Ch. 0 (Left) LoByte	Ch. 1 (Right) HiByte	Ch. 1(Right) LoByte	...

Figure 5-2: Sequence of CD-Audio Samples

Example 2:
24 Bit Stereo: AudioChannels = 0x02, Resolution = 0x03

Sequence of data:
MSB left, Central Byte left, LSB left, MSB right, Central Byte right, LSB right

Ch.0 HiByte	Ch.0 MidByte	Ch.0 LoByte	Ch.1 HiByte	Ch.1 MidByte	Ch.1 LoByte	...

Figure 5-3: Sequence of 24 bit PCM Samples

5.3.2 GenericPCM

GenericPCM can carry multiple channels of audio. Each of them can have a different resolution and additional position information.

ContentDescription := {AudioChannels, AudioChannelList}

AudioChannels
Number of audio channels (e.g., 6 stands for 6-channel audio)
Please note that 5.1 audio results in 6-channel audio.
Basic Data Type: Unsigned Byte

AudioChannelList
Describes every audio channel in the multi-channel audio signal. The number of audio channels is given by the parameter AudioChannels.

AudioChannelList := <AudioChannelName>, <BitsPerSample> {, <AudioChannelName>, <BitsPerSample>}

AudioChannelName
This parameter specifies the intended playback location of this group of channels. Several external standards define parts of the following master channel layout. Please find the mapping for common multi channel signals in the next paragraph.
Basic Data Type: Enum (1 Byte)

Enum	Position	Abbreviation
0x00	Channel currently not in use	-
0x01	Front Left	FL
0x02	Front Right	FR
0x03	Front Center	FC
0x04	Low Frequency	LF
0x05	Back Left	BL
0x06	Back Right	BR
0x07	Front Left of Center	FLC
0x08	Front Right of Center	FRC
0x09	Back Center	BC
0x0A	Side Left	SL
0x0B	Side Right	SR
0x0C	Top Center	TC
0x0D	Top Front Left	TFL
0x0E	Top Front Center	TFC

Enum	Position	Abbreviation
0x0F	Top Front Right	TFR
0x10	Top Back Left	TBL
0x11	Top Back Center	TBC
0x12	Top Back Right	TBR
0x13	Back Left of Center	BLC
0x14	Back Right of Center	BRC

Table 5-2: AudioChannelName

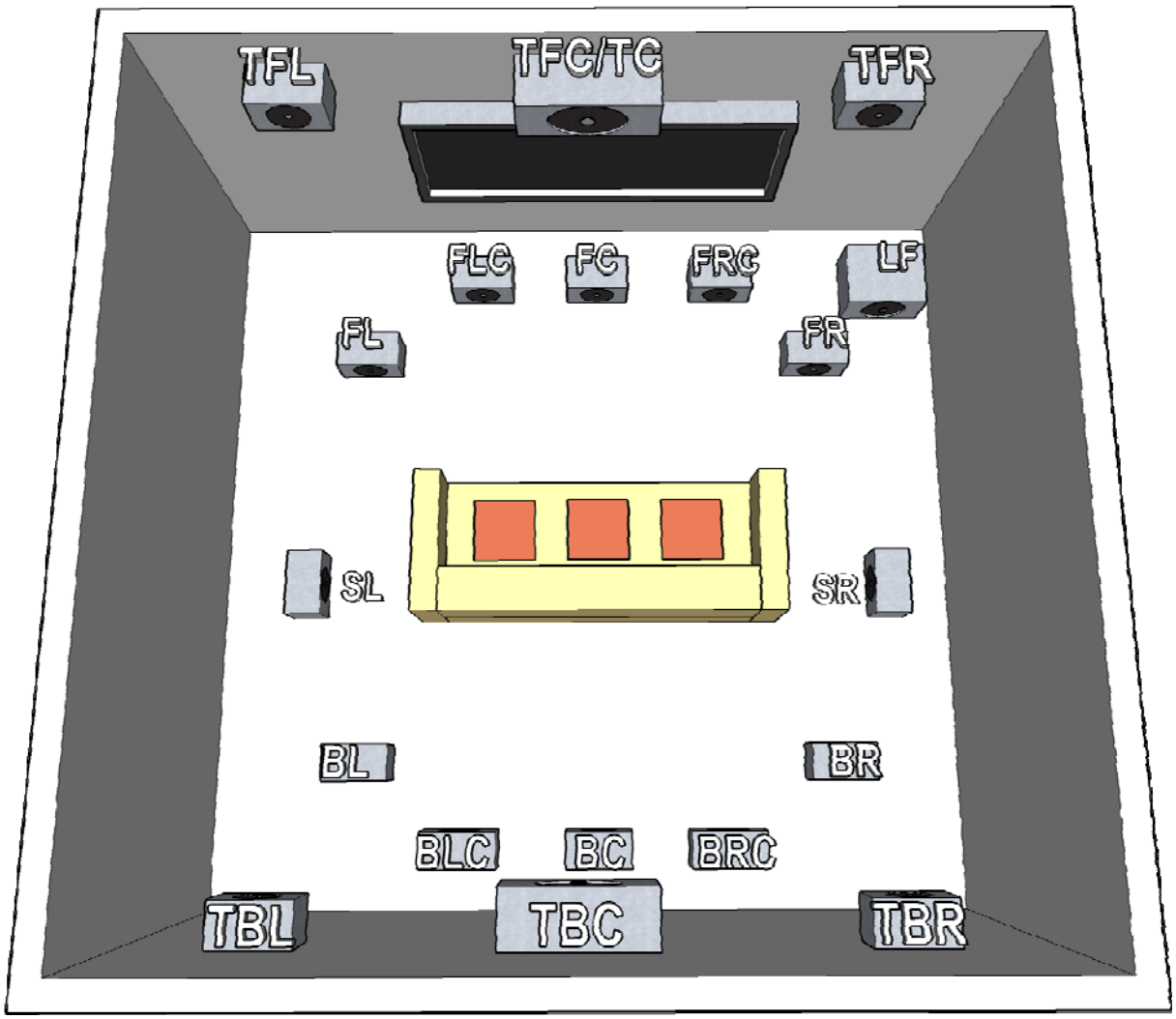


Figure 5-4: Mapping AudioChannelName

BitsPerSample
Specifies the number of bits per PCM sample (e.g., 24 stands for 24 bits resolution).

5.3.2.1 Mapping and Usage of the GenericPCM Datatype

The following tables define how common multi channel signals are mapped to multiple GenericPCM streams to be used on MOST.

Dolby Digital - AC3

AC3 Channel name	MOST AudioChannelName
L (Left)	FL
R (Right)	FR
C (Center)	FC
S (Surround)	BC
SL (Left surround)	BL
SR (Right surround)	BR
Mo	FC
Mo1	M1
Mo2	M2
LFE	LF

Table 5-3: Mapping of Dolby Digital – AC3

Dolby Digital Plus - DD+, Dolby True HD – TrueHD

Dolby Digital Channel name	MOST AudioChannelName
L (Left)	FL
R (Right)	FR
C (Center)	FC
Ls (Left surround)	BL
Rs (Right surround)	BR
Lb (Left back)	BLC
Rb (Right back)	BRC
LFE	LF

Table 5-4: Mapping of Dolby Digital Plus, Dolby True HD – DD+, TrueHD for a standard 7.1 channel set

DTS, DTS ES, DTS NEO:6

DTS Channel name	MOST AudioChannelName
Left channel	FL
Right channel	FR
Center channel	FC
Left surround	BL
Right surround	BR
Center surround	BC
Sub woofer	LF

Table 5-5: Mapping of DTS, DTS ES, DTS NEO:6

DTS HD

DTS Channel name	MOST AudioChannelName
L (Left)	FL
R (Right)	FR
C (Center)	FC
Ls (Left surround)	BL
Rs (Right surround)	BR
Lb (Left back)	BLC
Rb (Right back)	BRC
LFE	LF

Table 5-6: Mapping of DTS HD for a standard 7.1 channel set

MPEG2 Audio

MPEG2 Audio Channel name	MOST AudioChannelName
L (Left)	FL
R (Right)	FR
C (Center)	FC
LS (Left surround)	BL
RS (Right surround)	BR
LFE	LF

Table 5-7: Mapping of MPEG2 Audio

DVD-Audio

DVD-Audio Channel name	MOST AudioChannelName
L (Left)	FL
R (Right)	FR
Lf (Left front)	FL
Rf (Right front)	FR
S (Surround)	BC
Ls (Left surround)	BL
Rs (Right surround)	BR
C (Center)	FC
LFE (Low Frequency Effect)	LF

Table 5-8: Mapping of DVD-Audio

SACD

SACD Channel name	MOST AudioChannelName
Left	FL
Right	FR
Center	FC
Left surround	BL
Right surround	BR
LFE	LF

Table 5-9: Mapping of SACD

5.3.3 IEC60958 (S/PDIF)

To implement a transparent IEC60958 transmission, VUCP bits and a preamble are transferred in addition to the raw audio samples in a separate byte.

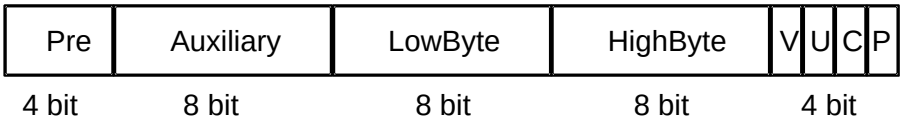


Figure 5-5: IEC60958 (S/PDIF) Sequence

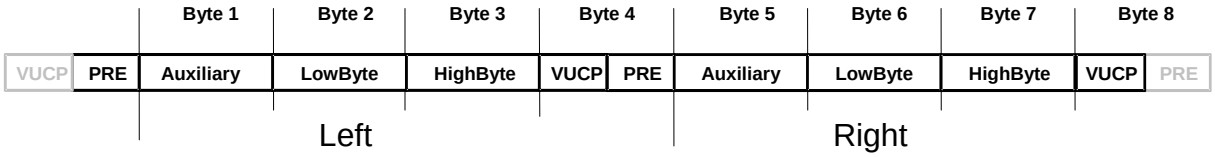


Figure 5-6: Mapping of IEC60958 Data on MOST

ContentDescription := { SpeedFactor}

SpeedFactor
SpeedFactor defines the speed factor of the content with respect to the transmission.
Basic Data Type: Unsigned Byte

5.4 Packetized Streams

The SourceInfo property features the parameter 'DataType' to describe the packetized streams in the table below.

Code (1 Byte)	Description
0x20	MPEG1_SystemStream
0x21	MPEG2_ProgramStream
0x22	MPEG2_TransportStream
0x40	Reserved
0x41	Reserved
0x42	Reserved

Table 5-10: DataType definitions for Packetized Streams

The 'MPEG System Layer' is defined by the ISO/IEC standard:

ISO/IEC 11172-1 for MPEG1 system (i.e., MPEG1 SystemStream)
ISO/IEC 13818-1 for MPEG2 systems (i.e., MPEG2 ProgramStream / TransportStream)

For transmission of MPEG4 streams over the MOST network, the MPEG2 System Layer shall be used. Please refer to Amendment 7 of the MPEG2 Systems specification (ISO/IEC 13818-1 / FDAM7, January 2000) for encapsulation of MPEG4 (ISO/IEC14496) compliant streams inside MPEG2 SystemStreams. The availability of all known MPEG4 features is given without any restrictions.

5.4.1 MPEG1_SystemStream (ISO/IEC 11172-1)

This generic format consists of a multiplex of multiple MPEG1 packetized elementary streams. A constrained form of the MPEG1 SystemStream can be found embedded in the CD-ROM/XA sectors of a Video CD.

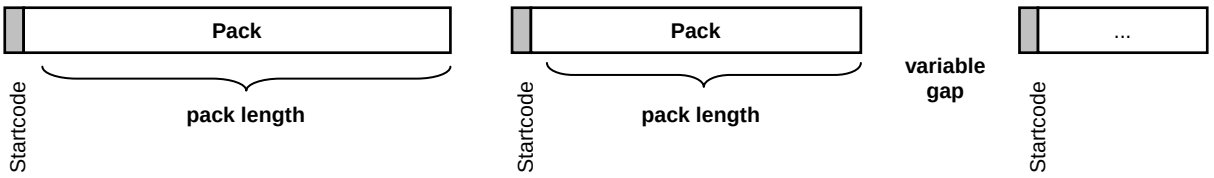


Figure 5-7: Data Type Definition for MPEG1_SystemStream

ContentDescription := { }

5.4.2 MPEG2_ProgramStream (ISO/IEC 13818-1)

The generic MPEG2 ProgramStream is similar to the MPEG1 SystemStream but uses a modified syntax and new functions. However, the compatibility with the MPEG1 SystemStream is provided. Therefore, MPEG2 decoders can be also used to decode MPEG1 SystemStreams.
The MPEG2 ProgramStream is used by DVD-Video standard applications.

One MPEG2 ProgramStream Pack may consist of multiple packets and can be variable in length.

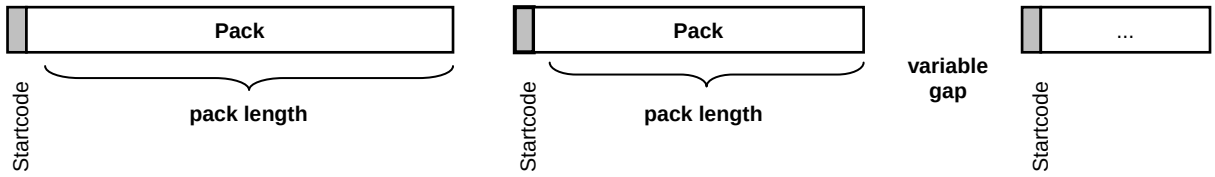


Figure 5-8: Data Type Definition for MPEG2_ProgramStream

ContentDescription := { }

5.4.3 MPEG2_TransportStream (ISO/IEC 13818-1)

The MPEG2 TransportStream is used, for example, by DVB-T standard applications.

An MPEG2 TransportStream consists of fixed-sized packets with a length of 188 bytes
(4 bytes header / 184 bytes payload).

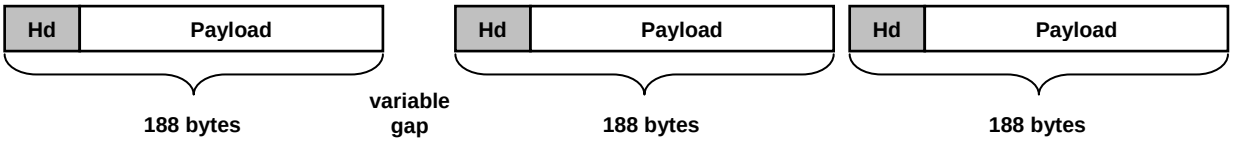


Figure 5-9: Data Type Definition for MPEG2_TransportStream

ContentDescription := { }

5.4.4 Elementary Streams

Definition as given by the ISO/IEC MPEG4 standard:
“A consecutive flow of mono-media data from a single source entity to a single destination entity on the compression layer” (ISO/IEC 14496-1 – 2004).

Elementary streams can be transported on MOST using an isochronous transmission as described in section 4.1.1. No definition is given in this document for specific types of elementary streams.

It is assumed that the receiver device (decoder) will either be able to recognize the kind of stream it receives thanks to in-stream information, or must know it beforehand per specification of the given MOST system.

5.4.4.1 Examples of elementary stream types

Elementary A/V formats defined in the ISO/IEC MPEG1 standard:

- ISO/IEC 11172-2 for MPEG1 Video [7]
- ISO/IEC 11172-3 for MPEG1 Audio (MPEG layer 1, 2, 3 audio codecs) [8]

Elementary A/V formats defined in the ISO/IEC MPEG 2 standard:

- ISO/IEC 13818-2, MPEG2 Video (corresponds to ITU H.262) [10]
- ISO/IEC 13818-3, MPEG2 Audio (multi-channel extension to MPEG 1 audio) [11]
- ISO/IEC 13818-7, Advanced Audio Coding (AAC) [12]

Elementary A/V formats defined in the ISO/IEC MPEG 4 standard:

- ISO/IEC 14496-2, MPEG4 compression for visual data [15]
- ISO/IEC 14496-3, MPEG4 audio [16]
- ISO/IEC 14496-10, MPEG4 advanced video coding (corresponds to ITU H.264) [17]

In addition to the MPEG-defined formats, other types of data formats exist, that can fall in the scope of the MPEG definition (e.g., AC3 or DTS).
(Inside an MPEG2 System multiplex, they are handled as “PrivateStreams”, and the user application is responsible for the correct detection and processing.)

6 Content Protection for Streams on MOST

6.1 IEC958 Serial Copy Management (S/PDIF SCM)

IEC958 compliant streams are transferred through MOST in a transparent manner. Therefore the generic IEC958 serial copy management system (CSS and CPPM compliant) is available.

6.2 Digital Transmission Content Protection (5C DTCP)

Please refer to the

- 'MOST ContentSecurity' specification and
- 'MOST ContentProtectionScheme DTCP' specification

for the definition of the generic 5C DTCP implementation for MOST.

This section defines how the generic MOST-DTCP specification is applied to the specific media/stream application.

6.2.1 Definition of Media Types

MediaType is used for contents which require embedded CCI (copy control information) inside the stream. For all others, the default media type is applied.

Media Types	Value
Not defined (default)	0x00
DVD-Video (MPEG A/V multiplex)	0x10
Video of DVD-Video	0x11
Audio of DVD-Video	0x12
DVD-Audio	0x20
(reserved)	0x21
Audio of DVD-Audio	0x22
SACD	0x30
DVB (MPEG A/V multiplex)	0x40
Video of DVB	0x41
Audio of DVB	0x42
Blu-ray (MPEG A/V multiplex)	0x50
Elementary stream from Blu-ray	0x51
LPCM Audio of Blu-ray	0x52
All other values are reserved.	

Table 6-1: Mapping of Media Types

6.2.2 DVD-Video Parameters (Video/Audio MPEG System Multiplex)

MOST-DTCP mode
Generic MOST-DTCP Packet Format is used to wrap the info bytes and the MPEG data.

Embedded Information
Number of Info bytes: 4

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x03
Info [1]	MediaType	set to 'DVD-Video'
Info [2]	Bits[7..0]	Bits[7..0] of the field 'private_data_byte'[1]
Info [3]	Bits[7..0]	Bits[15..8] of the field 'private_data_byte'[1]

Table 6-2: Embedded Information of DVD-Video Parameters (Video/audio MPEG System Multiplex)

DTCP Encryption Frame Size
192 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length

$$PacketLength = \frac{192 \cdot BW}{BW - 1}$$ (BW = Allocated BlockWidth)

The following BlockWidth settings are available:

BlockWidth (BW)	Number of MOST frames per Packet	Number of payload bytes (BW – SAD0/SAD1)
5	48	3
7	32	5
9	24	7
13	16	11
17	12	15
25	8	22
33	6	31
49	4	47
65	3	63
97	2	95

[1] *The coding of these fields is given in the document 'Digital Transmission Content Protection Specification', Revision 1.2, July 11, 2001: Appendix B, Table 24, Syntax of private_data_byte for DTCP_descriptor.*

6.2.3 DVD-Video Parameters (Decoded LPCM Audio Only)

MOST-DTCP mode
Generic MOST-DTCP Packet Format is used to wrap the info bytes and the audio samples.

Embedded Information
Number of Info bytes: 8

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x07
Info [1]	MediaType	set to 'Audio of DVD-Video'
Info [2]	Bits[7...6]	CGMS
	Bits[5…0]	reserved, set to 0x00
Info [3]	Reserved	set to 0x00
Info [4]	Reserved	set to 0x00
Info [5]	Reserved	set to 0x00
Info [6]	Reserved	set to 0x00
Info [7]	Reserved	set to 0x00

Table 6-3: Embedded Information of DVD-Video Parameters, Decoded LPCM Audio only

DTCP Encryption Frame Size
8 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length
$PacketLength = 8 \cdot BW$ (BW = Allocated BlockWidth)

6.2.4 DVD-Audio Parameters

MOST-DTCP mode
Generic MOST-DTCP Packet Format is used to wrap the info bytes and the audio samples.

Embedded Information
Number of Info bytes: 8

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x07
Info [1]	MediaType	set to 'Audio of DVD-Audio'
Info [2]	Bits [7...6]	CCI (audio_copy_permission)
	Bits [5..3]	CCI (audio_copy_number)
	Bits [2..1]	CCI (audio_quality)
	Bit [0]	CCI (audio_transaction)
Info [3]	Bits [7..5]	ISRC (ISRC_Status)
	Bits [4..0]	ISRC (UPC_EAN_ISRC_number)
Info [4]	Bits [7..0]	ISRC (UPC_EAN_ISRC_data)
Info [5]	Reserved	set to 0x00
Info [6]	Reserved	set to 0x00
Info [7]	Reserved	set to 0x00

Table 6-4: Embedded Information of DVD-Audio Parameters

Two types of information must be mapped onto the info bytes when transmitting DVD-audio contents:

- Copy Control Information (CCI)
- International Standard Recording Code (ISRC), also known as ISO 3901 standard

Field	No. of bits	Description
audio_copy_permission	2 Bits	Whether copying is permitted or not
audio_copy_number	3 Bits	Permitted times of copying
audio_quality	2 Bits	Permitted audio quality of copying
audio_transaction	1 Bit	Status of the optional access control for audio data
ISRC_Status	3 Bits	Position in a ISRC period
UPC_EAN_ISRC_number	5 Bits	Contents identification data
UPC_EAN_ISRC_data	8 Bits	

Table 6-5: Coding of (Embedded) CCI Field

Note: *The ISRC fields are defined in 'DVD-Audio Specifications Version 1.2'*

DTCP Encryption Frame Size
8 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length

$$PacketLength = 8 \cdot BW$$ (BW = Allocated BlockWidth)

6.2.5 Blu-ray (MPEG multiplex stream)

Embedded Information
Number of Info bytes: 4

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x03
Info [1]	MediaType	set to "Blu-ray (MPEG A/V multiplex)"
Info [2]	Bits[7..0]	Bits[7..0] of the field "private_data_byte" [2]
Info [3]	Bits[7..0]	Bits[15..8] of the field "private_data_byte" [1]

Table 6-6: Embedded Information of Blu-ray Parameters (Video/audio MPEG System Multiplex)

DTCP Encryption Frame Size
192 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length

$$PacketLength = \frac{192 \cdot BW}{BW - 1}$$ (BW = Allocated BlockWidth)

The following BlockWidth settings are available:

BlockWidth (BW)	Number of MOST frames per Packet	Number of payload bytes (BW – SAD0/SAD1)
5	48	3
7	32	5
9	24	7
13	16	11
17	12	15
25	8	22
33	6	31
49	4	47
65	3	63
97	2	95

Note: *It is not clear if the digital only token (DOT) needs to be applied as the adopter license agreement is not finished yet. If the DOT must be transmitted via MOST, the private_data_byte shall be used. If that is not sufficient, the Info bytes will be extended appropriately. Implementers shall take into account that the number of Info bytes and consequently the DTCP encryption frame size may be increased due to future decisions of license adaptor bodies.*

[2] *The coding of these fields is given in the document "Digital Transmission Content Protection Specification", Revision 1.2, July 11, 2001: Appendix B, Table 24, Syntax of private_data_byte for DTCP_descriptor. The setting of these fields is done in accordance with the document "Advanced Access Protection System (AACS) – Blu-ray disk pre-recorded book."*

6.2.6 Blu-ray elementary stream

Embedded Information
Number of Info bytes: 4

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x03
Info [1]	MediaType	set to “Elementary stream of Blu-ray”
Info [2]	Bits[7..0]	Bits[7..0] of the field “private_data_byte”[3]
Info [3]	Bits[7..0]	Bits[15..8] of the field “private_data_byte”[1]

Table 6-7: Embedded Information of Blu-ray Parameters (elementary stream)

DTCP Encryption Frame Size
192 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length

$$PacketLength = \frac{192 \cdot BW}{BW - 1}$$ (BW = Allocated BlockWidth)

The following BlockWidth settings are available:

BlockWidth (BW)	Number of MOST frames per Packet	Number of payload bytes (BW – SAD0/SAD1)
5	48	3
7	32	5
9	24	7
13	16	11
17	12	15
25	8	22
33	6	31
49	4	47
65	3	63
97	2	95

Note: *It is not clear if the digital only token (DOT) needs to be applied as the adopter license agreement is not finished yet. If the DOT must be transmitted via MOST the private_data_byte shall be used. If that is not sufficient, the Info bytes will be extended appropriately. Implementers shall take into account that the number of Info bytes and consequently the DTCP encryption frame size may be increased due to future decisions of license adaptor bodies.*

[3] *The coding of these fields is given in the document “Digital Transmission Content Protection Specification”, Revision 1.2, July 11, 2001: Appendix B, Table 24, Syntax of private_data_byte for DTCP_descriptor. The setting of these fields is done in accordance with the document “Advanced Access Protection System (AACS) – Blu-ray disk pre-recorded book.”*

6.2.7 LPCM audio of Blu-ray

Embedded Information
Number of Info bytes: 8

Field	No. of bits	Description
Info [0]	Number of Info bytes following	set to 0x07
Info [1]	MediaType	set to "LPCM audio of Blu-ray"
Info [2]	Bits[7..0]	Bits[7..0] of the field "private_data_byte"[4]
Info [3]	Bits[7..0]	Bits[15..8] of the field "private_data_byte"[1]
Info [4]	Reserved	Set to 0x00
Info [5]	Reserved	set to 0x00
Info [6]	Reserved	set to 0x00
Info [7]	Reserved	set to 0x00

Table 6-8: Embedded Information of LPCM audio of Blu-ray Parameters

DTCP Encryption Frame Size
8 bytes is the DTCP encryption frame size.

MOST-DTCP Packet Length
$PacketLength = 8 \cdot BW$ (BW = Allocated BlockWidth)

Note: *It is not clear if the digital only token (DOT) needs to be applied, as the adopter license agreement is not finished yet. If the DOT must be transmitted via MOST the private_data_byte or if that is not sufficient the reserved Info bytes shall be used. If that is not sufficient, the Info bytes will be extended appropriately. Implementers shall take into account that the number of Info bytes and consequently the DTCP encryption frame size may be increased due to future decisions of license adaptor bodies.*

[4] *The coding of these fields is given in the document "Digital Transmission Content Protection Specification", Revision 1.2, July 11, 2001: Appendix B, Table 24, Syntax of private_data_byte for DTCP_descriptor. The setting of these fields is done in accordance with the document "Advanced Access Protection System (AACS) – Blu-ray disk pre-recorded book."*

7 Appendix A: The Stream Associated Data Channel (SAD)

The stream associated data channel is a generic synchronous stream that is used to deliver additional information of other streams on MOST with a direct timing relation on frame basis.

The Stream Associated Data Channel is part of the same synchronous connection as the actual data. No additional synchronous connections need to be established.

7.1 Isochronous transmission protocol

The isochronous payload is packetized into fixed sized chunks with a maximum size of 256 bytes.
For transmission over a synchronous channel of the MOST network, a Stream Associated Data channel (SAD) is applied.
This SAD is dedicated as a signaling channel to mark the start of a packet. A four byte header including two unique sync-bytes (0x3C, 0xB2) and two reserved bytes are leading a packet. See the picture below for the alignment.

While the packet length is fixed, the gap between two packets can be variable. Packets always start at the first byte position in the frame, but depending on the packet size, are not required to end exactly at the last position of the frame.

Adjusting the packet size to an exact multiple of the Blockwidth (n*BW) and with a gap of zero length between the packets, a synchronous MOST channel can be virtually ‘packetized’. MOST-DTCP uses that scheme to signal the single DTCP packets in the synchronous stream.

Frame	SAD	Byte [0]	Byte [1]	Byte [2]	Byte [3]
1	0x3C				
2	0xB2				
3	reserved				
4	reserved				
5		Data [0]	Data [1]	Data [2]	Data [3]
6		Data [4]	Data [5]	Data [6]	Data [7]
7		Data [8]	Data [9]	Data [10]	Data [11]
8		Data [12]	Data [13]	Data [14]	Data [15]
9		Data [16]	Data [17]	Data [18]	Data [19]
10		Data [20]	Data [21]	Data [22]	Data [23]
11		Data [24]	Data [25]	Data [26]	Data [27]
12		Data [28]	Data [29]	Data [30]	Data [31]
13					
14					
15					
16	0x3C				
17	0xB2				
18	reserved				
19	reserved				
20		Data [0]	Data [1]	Data [2]	Data [3]
21		Data [4]	Data [5]	Data [6]	Data [7]
22		Data [8]	Data [9]	Data [10]	Data [11]
23		Data [12]	Data [13]	Data [14]	Data [15]
24		Data [16]	Data [17]	Data [18]	Data [19]
25	0x3C	Data [20]	Data [21]	Data [22]	Data [23]
26	0xB2	Data [24]	Data [25]	Data [26]	Data [27]
27	reserved	Data [28]	Data [29]	Data [30]	Data [31]
28	reserved				
29		Data [0]	Data [1]	Data [2]	Data [3]
30		Data [4]	Data [5]	Data [6]	Data [7]
31		Data [8]	Data [9]	Data [10]	Data [11]
32		Data [12]	Data [13]	Data [14]	Data [15]
33		Data [16]	Data [17]	Data [18]	Data [19]
34		Data [20]	Data [21]	Data [22]	Data [23]
35		Data [24]	Data [25]	Data [26]	Data [27]
36		Data [28]	Data [29]	Data [30]	Data [31]
37					
38					

Figure 7-1: Example for a packetized isochronous transmission (BW = 5)

7.2 Embedded Info Area for GenericMOST-DTCP

An SAD channel called ‘Info’ is added to the raw data. This embedded info area is needed by the Generic MOST-DTCP. These info bytes carry stream information, which is not available inside the raw content. Examples are the ‘Embedded CCI’ or the ‘ISRC data’ sections for Generic MOST-DTCP.

7.3 IEC958 (S/PDIF)

To implement a transparent IEC958 transmission, the VUCP bits and the Preamble are transferred in addition to the raw audio samples / stream bytes in a separate SAD channel.

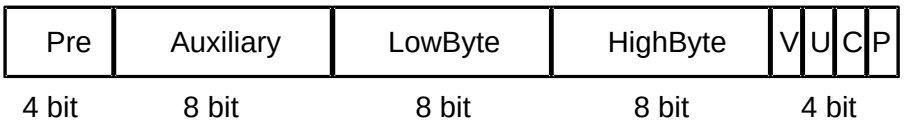


Figure 7-2: IEC958 (S/PDIF) Sequence

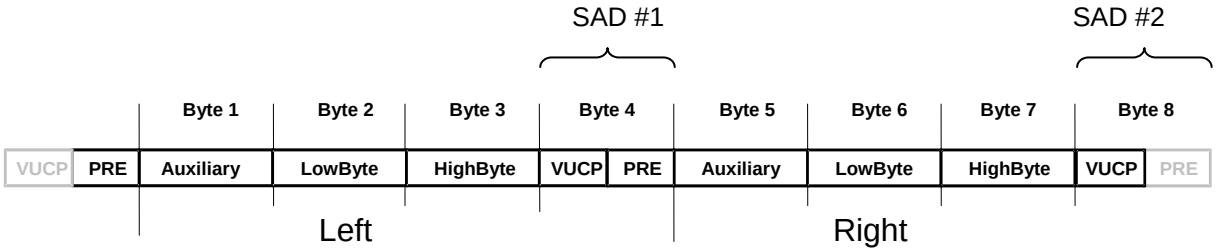


Figure 7-3: Transmission of IEC958 Data Using two SAD Channels

8 Appendix B: List of Figures

9 Appendix C: List of Tables