Stream Data Formats

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About This Manual

This is the Runtime Library Release 2.4 version of the *Stream Data Formats* manual.

It describes the audio stream format, IPU stream format and PlayStation stream formats.

Changes Since Last Release

None

Related Documentation

Note: the Developer Support Web site posts current developments regarding the Libraries and also provides notice of future documentation releases and upgrades.

Typographic Conventions

Certain Typographic Conventions are used throughout this manual to clarify the meaning of the text:

Convention	Meaning
`courier`	Indicates literal program code.
italic	Indicates names of arguments and structure members (in structure/function definitions only).
medium bold	Indicates data types and structure/function names (in structure/function definitions only).
blue	Indicates a hyperlink.

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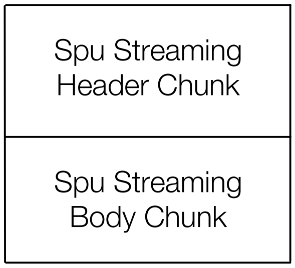
Audio Stream Format (ADS)

ADS is a common format for handling VAG, PCM, and other audio as streaming data. The ADS structure has a header before the audio data that indicates the type of data format.

ADS Structure

ADS has a structure in which two chunks are arranged as follows.

Figure 1



Spu Streaming Header Chunk

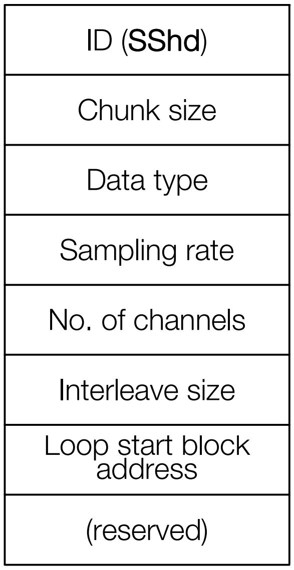
Spu Streaming Body Chunk

Contents of Header Chunk

The Spu Streaming Header Chunk indicates the data format of the Spu Streaming Body Chunk that follows it.

The structure and contents are shown below.

Figure 2



ID (SShd)

Chunk size

Data type

Sampling rate

No. of channels

Interleave size

Loop start block address

(reserved)

Table 1

Offset	Size	Contents
0	4 bytes	ID (='SShd')
4	4 bytes	Chunk size (32)
8	4 bytes	Audio data type
		0 PCM big
		1 PCM little
		16 ADPCM
12	4 bytes	Sampling rate
16	4 bytes	Number of channels
20	4 bytes	Interleave size
24	4 bytes	Loop starting block address
28	4 bytes	Loop ending block address

Contents of Body Chunk

The Spu Streaming Body Chunk maintains the audio data.

The structure and contents are shown below.

Figure 3

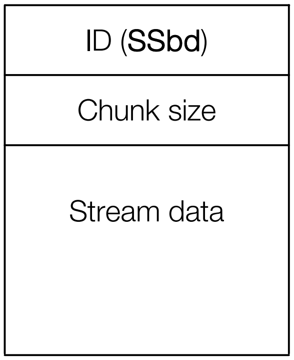


Table 2

Offset	Size	Contents
0	4 bytes	ID (='SSbd')
4	4 bytes	Chunk size (number of bytes)
8	(Arbitrary)	Stream data

Stream data is audio data having the format that is indicated by the data type of the header chunk. When the data type is ADPCM, the stream data has a format similar to that of VAG data within a BD file.

IPU Stream Format

The IPU stream format is a video format that can be directly handled by the IPU.

The IPU stream format obtains a picture quality and compression rate that are equivalent to those of a stream consisting only of MPEG2 I-Pictures. Although the data size will increase if the same picture quality is obtained as a normal MPEG2 stream that contains P-Pictures or B-Pictures, there is less overhead during decoding when compared to an MPEG2 stream. Therefore, this is a convenient format to use when decoding is performed in parallel with other processing.

Overall Structure

The overall structure of the IPU stream format is shown below.

Figure 4

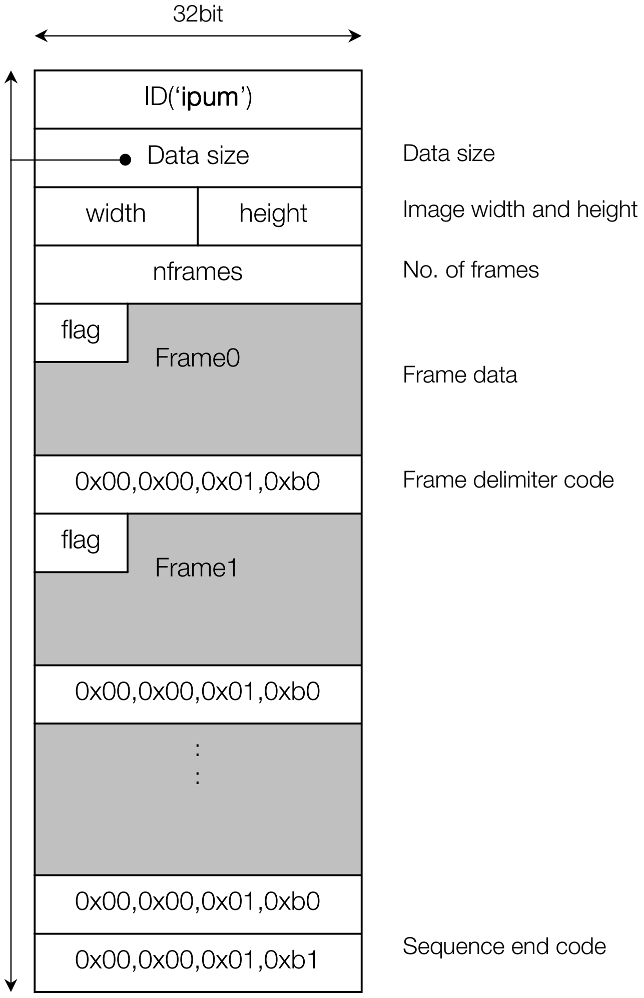


Table 3

Offset	Size	Contents
0	4 bytes	ID (='ipum')
4	4 bytes	Data size (number of bytes)
8	2 bytes	Image width (number of pixels)
10	2 bytes	Image height (number of pixels)
12	4 bytes	Number of frames
16	1 byte	Flag (details described later)
17	(Arbitrary)	Frame 0
--	4 bytes	Frame delimiter code (Flag + data + frame delimiter are repeated for the number of frames)
--	4 bytes	Sequence end code

All numeric values such as the data size are little endian values.

Frame Data

A 4-byte frame delimiter code (0x00,0x00,0x01,0xb0) is interposed between each set of frame data within the IPU stream format. There is no correlation relationship between two sets of frame data. Each set of data represents an independent one-frame image.

This frame data has been converted to facilitate the decoding of the MPEG2 I-Picture bit stream by the IPU. The biggest difference from the I-Picture bit stream is that the entire frame consists of one large, continuous slice. Also, it does not contain the attribute information that is appended to the slice such as the quantizer_scale_code, which is placed at the beginning of the slice by MPEG2.

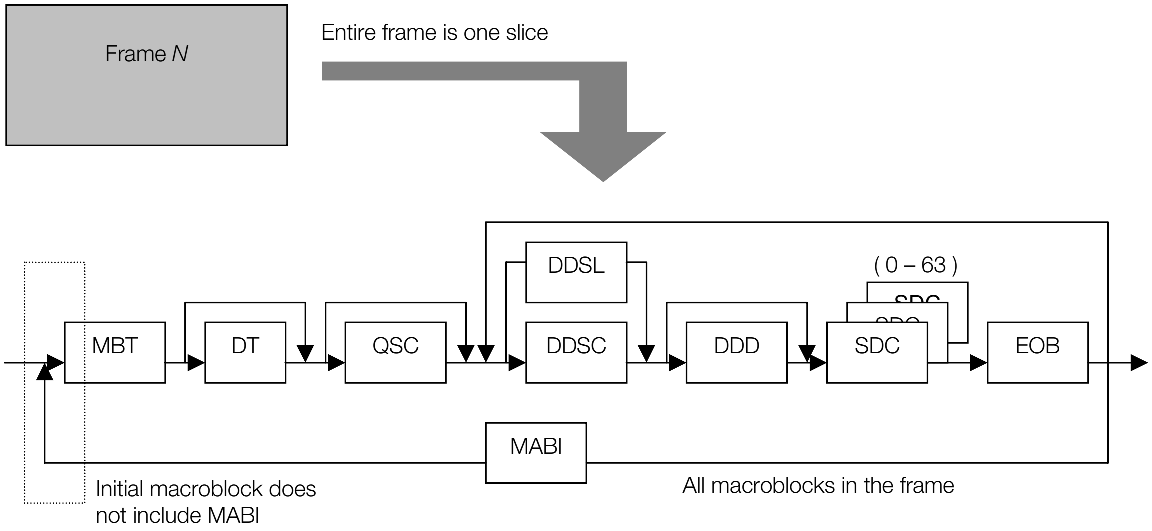
A 1-byte flag is placed at the beginning of the frame data. The contents of the flag are shown below.

Table 4

Symbol	Pos.	Width	Contents
mp1	7	1 bit	Mpeg1 bit stream 0 mpeg2 1 mpeg1
qst	6	1 bit	Q scale type 0 Linear step 1 Non-linear step
ivf	5	1 bit	Intra VLC format 0 mpeg1-compatible 2D VLC table 1 Intra macroblock dedicated 2D VLC table
as	4	1 bit	Alternate scan 0 Zig-zag scan 1 Alternate scan
dtd	2	1 bit	DCT type decode 0 DCT type is not decoded 1 DCT type is decode
idp	1-0	2 bits	Intra DC precision 00 8 bits 01 9 bits 10 10 bits 11 (reserved)

The following frame data is placed after the flag.

Figure 5



Entire frame is one slice

Initial macroblock does not include MABI

All macroblocks in the frame

Table 5

Symbol	Name
MBAI	Macroblock Address Increment
MBT	Macroblock Type
DT	DCT Type
QSC	Quantizer Scale Code
DDSL	DCT DC Size Luminance
DDSC	DCT DC Size Chrominance
DDD	DCT DC Differential
SDC	Subsequent DCT Coefficients
EOB	End Of Block

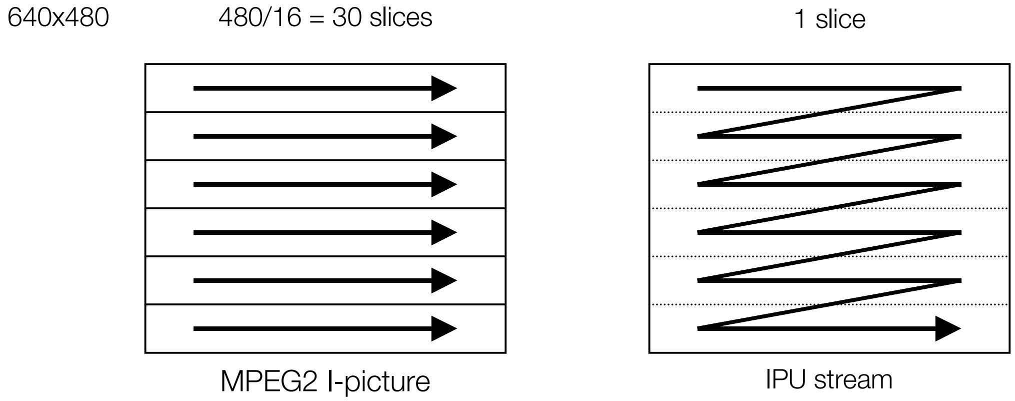
Conversion from an MPEG2 Bit Stream

An IPU stream is created by converting an MPEG2 stream that consists only of I-Pictures. The stream converter (ps2str) is provided as a tool for performing this conversion. However, the following method can also be used to independently convert the stream.

Modification of slice configuration

An MPEG2 bit stream represents a 640x480 image, for example, as 30 slices. In contrast, an IPU stream represents each image as one slice. Therefore, when converting from an MPEG2 bit stream to an IPU bit stream, you may have to link together multiple slices that represent a single image into one slice.

Figure 6



dc coefficient

Since the slice configuration is changed, the dc coefficient of the DCT must be carefully considered.

With MPEG2, the predicted value of the dc coefficient is always reset at the beginning of the slice and the macroblock at the beginning of the slice is encoded according to this value. When this is changed to an IPU stream slice configuration, since the macroblock that had been at the beginning of the slice in the MPEG2 stream is located in the middle of the slice and the predicted value is not reset, it cannot be decoded correctly. To convert this correctly, you must add the difference due to the reset to the dc difference value of the macroblock that had been at the beginning of the slice in MPEG2.

Quantizer scale code

Since the slice configuration is changed, one more quantizer scale code must be carefully considered.

With MPEG2, the quantizer scale code is specified for each slice. Since the entire frame becomes a single slice in an IPU stream, the macroblock that had been at the beginning of the slice in the MPEG2 stream must be converted to a macroblock with an accompanying quantizer scale code (macroblock_type == 0x11), and the quantizer scale code that was specified in terms of original slice units must be specified.

Flag information

Flag information within the frame data can be obtained from the MPEG2 bit stream as follows.

- **mp1**

  mp1 is determined according to whether or not an extension_start_code exists immediately after the first sequence_header of the bit stream. If the extension_start_code exists, mp1=0. If not, mp1=1.

- **qst / ivf / as / idp-**

  For qst, ivf, as, or idp, the corresponding flag information within the picture_coding_extension is specified asis.

- **dtd**

  dtd is derived from the following formula.

  dtd = (picture_structure == "Frame picture")&&

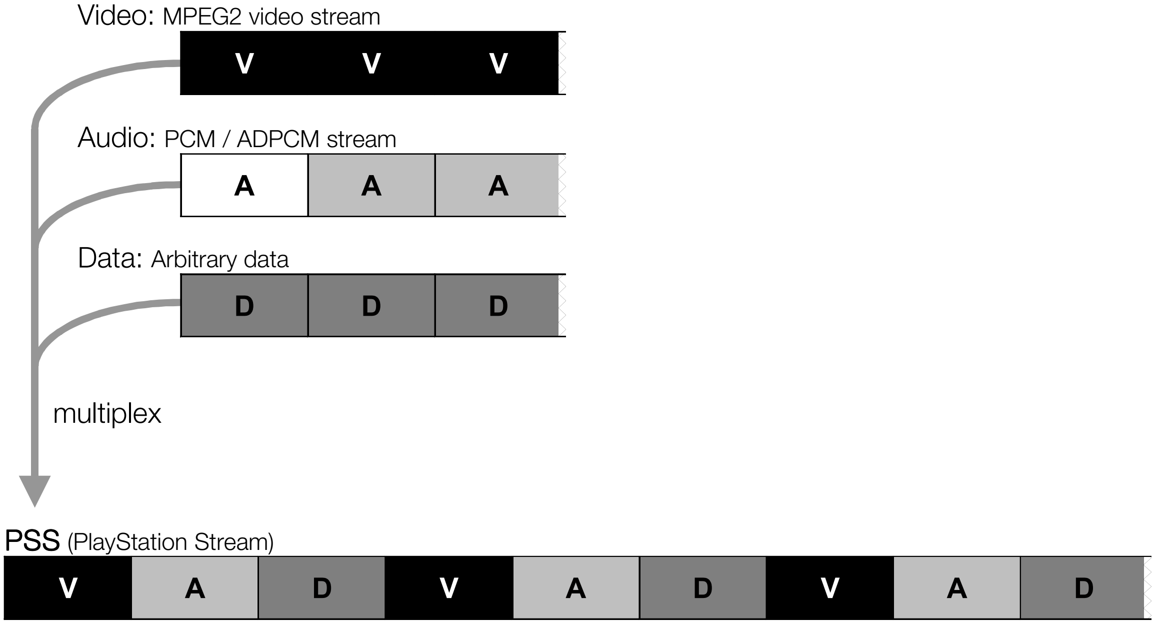
  (frame_pred_frame_dct == 0)

PlayStation Stream Format (PSS)

A PlayStation stream (PSS) is stream data in which the MPEG2 Program Stream framework is used to multiplex video, audio, and other data.

The stream structure is as follows.

Figure 7



Multiplexed Stream

PSS (PlayStation Stream): MPEG2 Program Stream with PlayStation audio or data

PSS: (MPEG2 video) + (ADS) + (DATA)

Each stream within PSS is identified according to a stream type and stream number. The audio or data is recorded as an MPEG2 private stream.

Element Stream

Video: MPEG2 video Extension: m2v, etc., standard MPEG2 video stream

Audio: ADS (Audio Data Stream) PS2 streaming audio

- PCM format Straight PCM 16 bits 48KHz 2ch
- ADPCM format SPU2 ADPCM (same as VAG)

Data: Arbitrary data