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Technical Specification

PVA File and Stream Format

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Document History

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## Content

PVA File and Stream Format

Description of PVA file and stream format as used by TechnoTrend's (and compatible) TI TMS320AV711x based DVB PCI boards for harddisk recording of DVB (MPEG-2) TV and radio broadcasts.

1   Introduction

The PVA format is near to the TMS320AV7110's on-chip MPEG-2 video and audio decoder input buffer format. Therefore PVA is not a MPEG standard format, like transport stream (TS) or program stream (PS), but it's based on the same elementary streams (ES). So, a conversion to MPEG-2 standard formats is possible. This conversion is necessary to achieve compatibility to other software and hardware products (VOD systems, streaming, DVD, …).

2   PVA file structure

A PVA file consists of a sequence of audio and video packets (AV packets). There is no file header or file trailer. There are no gaps or stuffing between two consecutive AV packets. The size of AV packets is not constant and may be different from packet to packet. For Video AV packets, the size always is "DWORD"-aligned (multiple of four bytes). There is no order in the arrangement of audio and video packets defined. At present only one Video ES and one Audio PES per PVA file/stream are supported.

AV packet	AV packet	AV packet		AV packet	AV packet
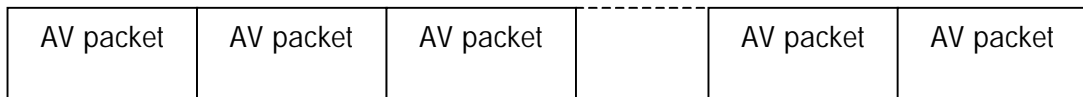
3   AV packet

An AV packet consists of the AV header following the AV payload.

AV header	AV Payload

4   AV header

The AV header always has a length of 8 bytes.

SyncWord 2 Byte	StreamID 1 Byte	Counter 1 Byte	Reserved 1Byte	Flags 1 Byte	Length 2 Byte

4.1   SyncWord

The SyncWord has a length of two bytes containing the values 0x41 and 0x56 (ASCII: „AV").

4.2   StreamID

The StreamID allows to assign the packet to an elementary stream and defines the stream type. The following values are defined for StreamID:

StreamID	Elementary stream	Remarks
0x01	VideoStream	The AV packet payload contains Video ES data.
0x02	MainAudioStream	The AV packet payload contains Audio PES data.

Other values for StreamID are not defined and the correspondig AV packets will be ignored.

4.3   Counter

The Counter is a modulo-256 counter incremented each packet. Each stream has its own counter.

4.4   Reserved

This field is reserved for future additions. At present its value is set to 0x55.

4.5   Flags

The field Flags is used to identify the Presentation Time Stamps (PTS) inside the Video ES.

Reserved 3 bit	PTS_Flag 1 bit	PostBytes 2 bit	PreBytes 2 bit

4.5.1   Reserved

These three bits are not used and set to 0.

4.5.2 PTS_Flag

For Video ES (StreamID == 0x01), PTS_Flag indicates the presence of Presentation Time Stamp (PTS) inside the AV payload:

> 0 – No PTS
> 1 – PTS field follows immediately the AV header

For Audio PES (StreamID == 0x02), PTS_Flag indicates the start of a new PES packet immediately to the AV header (comparable to the payload_unit_start_indicator in TS header):

> 0 – No start of a new Audio PES packet
> 1 – The AV payload starts with a new PES packet

(For Audio PES, the PTS_Flag doesn't indicate the presence of a PTS inside the AV payload!)

4.5.3 PostBytes and PreBytes fields

The PostBytes and PreBytes fields allow a byte-accurate positioning of PTS's inside the Video ES.
The PostBytes field „announces" the value of the PreBytes field in the next following Video AV packet. For Audio AV packets this field is set to 0.
The PreBytes field indicates how many bytes of the Video ES are following the PTS, but should be appear before the PTS. For Video AV packets, when PTS_Flag == 0, and for Audio AV packets generally, this field is set to 0.
For a Video AV packet n, following rule is applicable when PTS_Flag(n) == 1 :

> PostBytes(n-1) = PreBytes(n)

4.6   Length

The Length field (2 bytes, network byte order) indicates the length of the AV payload in bytes (6136 at maximum). So an AV packet (header+payload) has a length of 6Kbyte (6144 bytes) at maximum.
The size of Audio AV packets must not exceed 2Kbyte (2048 bytes), while the size of a Video AV packet must not exceed 6Kbyte (6144 bytes).
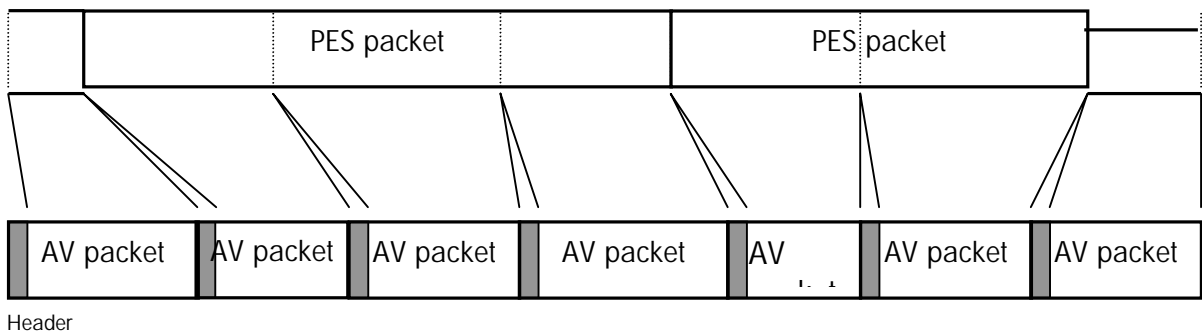
5   Payload

General, the Payload contains ES data, but in different formats for Video and Audio as described below.

5.1   Audio Payload (StreamID == 0x02)

The Audio payload stream is a Packetized Elementary Stream (PES) according the MPEG-2 standard, in other words, a sequence of PES packets as contained also in the payload of DVB transport streams.

Audio AV packets contain portions of the Audio PES. This portions are synchronized to the PES packets of the audio stream (the PTS are inside the PES header). To extract the Audio PES from a PVA file, the payload of the Audio AV packets have to be joined to one stream.

PES packet		PES packet	

AV packet	AV packet	AV packet	AV packet	AV	AV packet	AV packet

Header

5.2   Video Payload (StreamID == 0x01)

The PVA Video payload stream is not a PES, but a pure Elementary Stream according the MPEG-2 Standard (Part 2: Video). To synchronize the Audio to the Video, additional PTS information are inserted.

Video AV packets contain portions of the Video ES. When a PTS occurs in the ES, it will be inserted at the beginning of the Video AV packet. This allows to synchronize the AV packets to the Video ES.

AV Header	PTS 4 Byte	Padding 0..3 Byte	

Flags
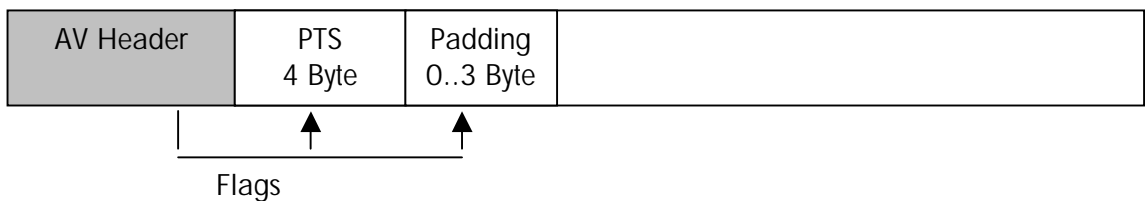
When the PTS_Flag is set to 0, the Video AV payload contains only a portion of the Video ES. When the PTS_Flag is set to 1, the payload contains also a PTS (32bit, MSB first). 0 to 3 bytes may follow the PTS, but in real they have to appear before the PTS. The number of these bytes is indicated by the PreBytes field in the AV packet header. This kind of padding is used to „DWORD"-align the AV packets. The PTS is valid for the following packets, comparable to the PTS of a PES packet.

Contrary to the MPEG-2 PTS, the PTS in PVA is only 32bit wide (instead of 33bit). The MSB is omitted.

To convert the video part of PVA files into a standard MPEG2 format, the PVA Video ES has to be packetized into PES packets as follows:

1. Extraction of Video ES from the AV packets
2. Assembling of PES packets of a certain size
3. When a PTS appears in an AV packet, a new PES packet must be start and the PTS has to be inserted into the PES header, considering the PreBytes field.