

Working with m1m4-linvs driver

Linux Media Labs, LLC

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1 LinVS device files

m1m4-linvs driver uses LinVS interface (aka Linux Video Streams, by Linux Media Labs).

LinVS interface specifies following device file structure. Major device number is 194.

Minor numbers and corresponding device files:

0	= /dev/mvideo/status0	Video compression status
1	= /dev/mvideo/stream0	Video stream
2	= /dev/mvideo/frame0	Single compressed frame
3	= /dev/mvideo/rawframe0	Raw uncompressed frame
4	= /dev/mvideo/codec0	Direct codec access
5	= /dev/mvideo/video4linux0	Video4Linux compatibility
16	= /dev/mvideo/status1	Second device
...		
32	= /dev/mvideo/status2	Third device
...		
...		

240 = /dev/mvideo/status15 16th device

lmlm4-linvs implements only first two device files for each card in system - status and stream. Operations allowed with status are open, read, close. Operations allowed with stream are open, ioctl, read, close.

2 lmlm4-linvs driver IOCTL list

For setting device options lmlm4-linvs defines following IOCTLs set (ioctl.h header file):

LINVS_IOC_SBITRATE

LINVS_IOC_GBITLE - set/get video bitrate / maximal bitrate in HBR mode (in KBytes per second)

LINVS_IOC_SMINBITRATE

LINVS_IOC_GMINBITRATE - set/get minimal bitrate in HBR mode (in KBytes per second)

LINVS_IOC_SVIDEOSTREAM

LINVS_IOC_GVIDEOSTREAM - set/get video stream type (D1, HALF_D1, CIF, QCIF)

LINVS_IOC_SCOLORENCODING

LINVS_IOC_GCOLORENCODING - set/get video signal color encoding (NTSC, PAL, SECAM)

LINVS_IOC_SVIDEOSOURCE

LINVS_IOC_GVIDEOSOURCE - set/get video signal source (COMPOSITE, SVIDEO)

LINVS_IOC_STIMEDECIMATION

LINVS_IOC_GTIMEDECIMATION - set/get time decimation

LINVS_IOC_SPIXELFORMAT

LINVS_IOC_GPIXELFORMAT - set/get pixel format (SQUARE, CCIR601)

LINVS_IOC_SBRIGHTNESS

LINVS_IOC_GBRIGHTNESS - set/get brightness

LINVS_IOC_SCONTRAST

LINVS_IOC_GCONTRAST - set/get contrast

LINVS_IOC_SHUE
LINVS_IOC_SHUE - set/get hue
LINVS_IOC_SUSATURATION
LINVS_IOC_GUSATURATION
LINVS_IOC_SVSATURATION
LINVS_IOC_GVSATURATION - set/get U & V saturation
LINVS_IOC_SQUANTISATION
LINVS_IOC_GQUANTISATION - set/get quantisation
LINVS_IOC_SCODECTYPE
LINVS_IOC_GCODECTYPE - set/get video codec type (MPEG4 only working now)
LINVS_IOC_SFRAMETYPE
LINVS_IOC_GFRAMETYPE - set/get frame types in video stream (IP_FRAMES, I_FRAMES_ONLY)
LINVS_IOC_SIFRAMEINTERVAL
LINVS_IOC_GIFRAMEINTERVAL - set/get I-frame interval
LINVS_IOC_SBITRATEMODE
LINVS_IOC_GBITRATEMODE - set/get bitrate mode (VBR, CBR, HBR)
LINVS_IOC_SAUDIOSAMPLING
LINVS_IOC_GAUDIOSAMPLING - set/get audio sampling rate in Hz
LINVS_IOC_SAUDIOCHANNEL
LINVS_IOC_GAUDIOCHANNEL - set/get audio channel (MONO, STEREO)
LINVS_IOC_SAUDIOBITRATE
LINVS_IOC_GAUDIOBITRATE - set/get audio bitrate in Kbit per second
LINVS_IOC_SAUDIOCODEC
LINVS_IOC_GAUDIOCODEC - set/get audio codec (MPEG1 Layer II, uLaw PCM, ADPCM)
LINVS_IOC_SMUTE
LINVS_IOC_GMUTE - set/get audio & video mute option

LINVS_IOC_GFRAMENUMBER - get current frame number (during capture)

LINVS_IOC_SMOTIONDETECTION

LINVS_IOC_GMOTIONDETECTION - set/get motion detection mode

LINVS_IOC_GMDFRAMECOUNT - get motion-detected frames count (Internal motion detection mode)

3 lmlm4-linvs output stream format

In general, lmlm4-linvs generates output streams which include compressed video and audio data. An output stream consists of a sequence of packets of different types. To facilitate data transfer, physical length of each packet is aligned in unit of 512 bytes and all packets should always be read in 512-byte blocks, regardless of the actual packet size. For packets with variable number of information bytes, its length is increased to the next multiple of 512 bytes with trailing garbage, when necessary. For these packets with variable packet sizes, the header in the first block contains the actual packet size, which can be used to determine how many additional blocks should be read and the number of bytes to be truncated from the end of the last block read. There are 4 types of packet as below:

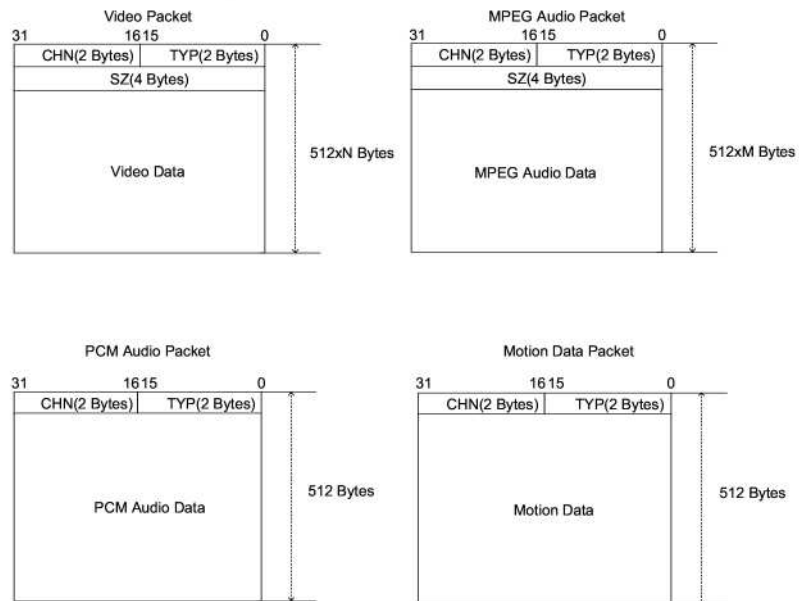
Video Packet: Video packets have variable lengths and are classified into I, P or B picture type. Each video packet includes a header that indicates its picture type, source channel number and actual packet length.

MPEG Audio Packet: Used for transmitting audio data compressed with MPEG-1 Layer 2. The packet has a variable length and includes a header for source channel number, packet type and the packet size.

PCM Audio Packet:Used for transmitting audio data encoded with u-Law or ADPCM. The packet size is fixed to 512 bytes. Each packet includes a header that indicates the data type and source channel number.

Motion Data Packet: Used for exporting motion vector information. The packet size is fixed to 512 bytes. These packets are generated only when the external motion detection mode is selected.

The figure below shows the actual formats for these packet types.



The header fields are explained in following table:

Header Field	Bit Field	Description
CHN	15:0	Channel Identification Number
TYP	15:4	Reserved
	3:0	Packet Type 0000 = I Type Video Packet 0001 = P Type Video Packet 0010 = B Type Video Packet 0011 = Reserved 0100 = MPEG-1 Layer2 Audio Packet 0101 = u-Law PCM Audio Packet 0110 = ADPCM audio Packet 0111 = Reserved 1000 = Motion Data Packet 1001~1111 = Reserved
SZ	31:0	Video frame Size in Byte unit. SZ is the number of bytes from CHN field to the last information byte, not including trailing garbage bytes.