

<title>Introduction</title>

<section id="requisites">

<title>What you need to know</title>

<para>The reader of this document is required to have some knowledge in the area of digital video broadcasting (DVB) and should be familiar with part I of the MPEG2 specification ISO/IEC 13818 (aka ITU-T H.222), i.e. you should know what a program/transport stream (PS/TS) is and what is meant by a packetized elementary stream (PES) or an I-frame.</para>

<para>Various DVB standards documents are available from

<ulink url="http://www.dvb.org" /> and/or

<ulink url="http://www.etsi.org" />.</para>

<para>It is also necessary to know how to access unix/linux devices and how to use ioctl calls. This also includes the knowledge of C or C++.

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<section id="history">

<title>History</title>

<para>The first API for DVB cards we used at Convergence in late 1999 was an extension of the Video4Linux API which was primarily developed for frame grabber cards. As such it was not really well suited to be used for DVB cards and their new features like recording MPEG streams and filtering several section and PES data streams at the same time.</para>

<para>In early 2000, we were approached by Nokia with a proposal for a new standard Linux DVB API. As a commitment to the development of terminals based on open standards, Nokia and Convergence made it available to all Linux developers and published it on

<ulink url="http://www.linuxtv.org/" /> in September 2000.

Convergence is the maintainer of the Linux DVB API. Together with the LinuxTV community (i.e. you, the reader of this document), the Linux DVB API will be constantly reviewed and improved. With the Linux driver for the Siemens/Hauppauge DVB PCI card Convergence provides a first implementation of the Linux DVB API.</para>

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<section id="overview">

<title>Overview</title>

<figure id="stb_components">

<title>Components of a DVB card/STB</title>

<mediaobject>

<imageobject>

<imagedata fileref="dvbstb.pdf" format="PS" />

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<imagedata fileref="dvbstb.png" format="PNG" />

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</mediaobject>

</figure>

<para>A DVB PCI card or DVB set-top-box (STB) usually consists of the following main hardware components: </para>

<itemizedlist>
<listitem>

<para>Frontend consisting of tuner and DVB demodulator</para>

<para>Here the raw signal reaches the DVB hardware from a satellite dish or antenna or directly from cable. The frontend down-converts and demodulates this signal into an MPEG transport stream (TS). In case of a satellite frontend, this includes a facility for satellite equipment control (SEC), which allows control of LNB polarization, multi feed switches or dish rotors.</para>

</listitem>
<listitem>

<para>Conditional Access (CA) hardware like CI adapters and smartcard slots</para>

<para>The complete TS is passed through the CA hardware. Programs to which the user has access (controlled by the smart card) are decoded in real time and re-inserted into the TS.</para>

</listitem>
<listitem>

<para>Demultiplexer which filters the incoming DVB stream</para>

<para>The demultiplexer splits the TS into its components like audio and video streams. Besides usually several of such audio and video streams it also contains data streams with information about the programs offered in this or other streams of the same provider.</para>

</listitem>
<listitem>

<para>MPEG2 audio and video decoder</para>

<para>The main targets of the demultiplexer are the MPEG2 audio and video decoders. After decoding they pass on the uncompressed audio and video to the computer screen or (through a PAL/NTSC encoder) to a TV set.</para>

</listitem>
</itemizedlist>

<para><xref linkend="stb_components" /> shows a crude schematic of the control and data flow between those components.</para>

<para>On a DVB PCI card not all of these have to be present since some functionality can be provided by the main CPU of the PC (e.g. MPEG picture and sound decoding) or is not needed (e.g. for data-only uses

like [internet over satellite](#)). Also not every card or STB provides conditional access hardware.

Linux DVB Devices

The Linux DVB API lets you control these hardware components through currently six Unix-style character devices for video, audio, frontend, demux, CA and IP-over-DVB networking. The video and audio devices control the MPEG2 decoder hardware, the frontend device the tuner and the DVB demodulator. The demux device gives you control over the PES and section filters of the hardware. If the hardware does not support filtering these filters can be implemented in software. Finally, the CA device controls all the conditional access capabilities of the hardware. It can depend on the individual security requirements of the platform, if and how many of the CA functions are made available to the application through this device.

All devices can be found in the `/dev` tree under `/dev/dvb`. The individual devices are called:

`/dev/dvb/adapterN/audioM`,

`/dev/dvb/adapterN/videoM`,

`/dev/dvb/adapterN/frontendM`,

`/dev/dvb/adapterN/netM`,

`/dev/dvb/adapterN/demuxM`,

`/dev/dvb/adapterN/caM`,

where N enumerates the DVB PCI cards in a system starting from 0, and M enumerates the devices of each type within each adapter, starting from 0, too. We will omit the `/dev/dvb/adapterN` in the further discussion of these devices. The naming scheme for the devices is the same whether devfs is used or not.

More details about the data structures and function calls of all

intro.xml.txt

the devices are described in the following chapters.</para>

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<section id="include_files">

<title>API include files</title>

<para>For each of the DVB devices a corresponding include file exists. The DVB API include files should be included in application sources with a partial path like:</para>

<programlisting>

#include <linux/dvb/frontend.h>

</programlisting>

<para>To enable applications to support different API version, an additional include file <emphasis role="tt">linux/dvb/version.h</emphasis> exists, which defines the constant <emphasis role="tt">DVB_API_VERSION</emphasis>. This document describes <emphasis role="tt">DVB_API_VERSION 3</emphasis>.</para>

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