Workshop Mediaformats for the Eminent mediaplayers

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Manual

Workshop mediaformats

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1.0 Introduction

When you have bought a product from Eminent (like a mediaplayer) where you regularly play media, then it is always good to know which media formats can be played and to get an understanding how the system Works. This document is a workshop about all video and audio elements that the mediaplayer has to offer.

HD is an abbreviation and stands for 'High Definition'. Since the availability of HD-ready and Full HD televisions you will here the term more often. A device can only name itself HD when it supports the minimal resolution of 720P.

2.0 Supported resolutions

Products like de mediaplayer are so-called Full HD players. At this point they can handle the highest resolution for consumer devices and video material that is offered in these resolutions.

2.1 Common HD information

To get an impression which benefits Full HD has, please study the image below:
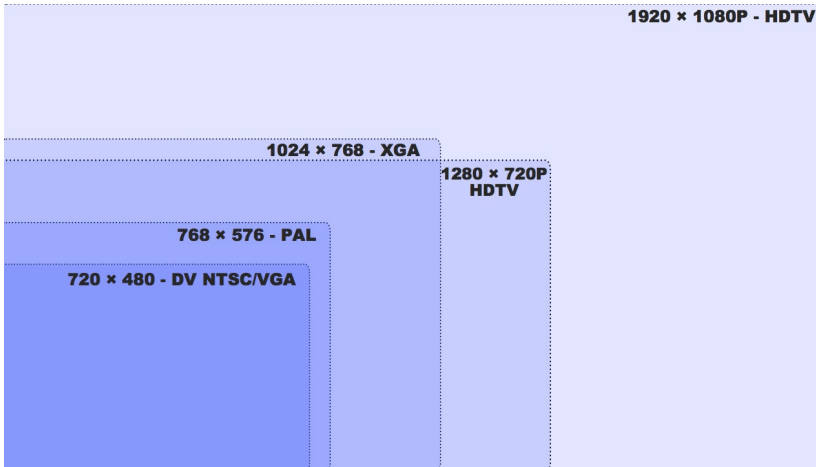
Video formats:
FULL HD: being used for Blu-Ray, a maximum resolution of 1920x1080P
HD Ready: a resolution of 1280x720P
XGA: 1024x768, this resolution is often used for computer monitors.
DVD format: 768x576 in PAL systems (Europe). In America this is NTSC 720x480

Not enough image lines ? The film industry already recorded on 2000 image lines. Because of this you can view your old films on Blu-Ray even sharper. Since a while they are already recording on 4000 image lines, so that you can view a good picture on your ultra mega 208cm 'TV'.

2.2 How does the mediaplayer handle HD?

As noticed in chapter 2.1, there are a number of image material in multiple resolutions available. To still be able to view the old material the mediaplayer has an internal chip that scales the image, the so-called 'Scaler' chip.
This chip can upscale lower resolutions to a 1920x1080 resolution without much loss of quality. This chip has nothing to do with the processor and is a worthy hardware scaler with enough bandwidth to scale all material.

2.3 What if I have a HD-Ready TV?

HD-Ready televisions are not 'Full HD'. This means that they cannot display a 1920x1080 resolution, but a maximum of 1280x720. The internal 'scaler' of the mediaplayer can also downscale and play Full-HD material on a HD-Ready television.

Due to the downscaling certain image information must be left aside. This has the effect that the image will appear less sharp then on a Full-HD television.

3.0 Video files

The mediaplayer can work with a large number of video file types in different formats and codecs. The resolution does not really matter like stated in the last chapter. What does matter in which coding the video and audio is made and in what type of file (MKV, AVI, MP4) the coding is packed.

3.1 Codecs

We need to understand the difference between files and codecs. Just because a file has the extension 'AVI', does not mean that it is a DivX video file or that it contains 'MP3' audio.

A codec, is a coder & decoder. (co – dec).
There are a big variety of codecs, and almost all codecs are supported by the mediaplayer. Below a short table of the most renown Video- and Audiocodecs.

Videocodecs:
MPEG-1-video : Used on VCD's (philips, old format.) and older game consoles.
MPEG-2-video : Used on DVD's and for digital TV through cable or satellite.
H.264 / MPEG4 / AVC: Used for BLU-RAY and HD-TV through cable or satellite.
VC-1 : Used for HD-DVD(end-of-life) and Windows platform/Xbox360.
DivX : Known hack-codec that uses MPEG-4v3(Microsoft) SD resolutions
XviD : The open source version of DivX.

Audiocodecs:
MP2 : Used on VCD's and older game consoles.
MP3 : A standard for distributable audio files and in DivX/Xvid as audio.
AC3: On of the first 5.1/7.1 audio formats from Dolby Laboratories
DTS: 5.1 format, from DTS inc.

4.0 Container formats

A film contains image and sound. Sometimes subtitles are required and people want to see a menu for choosing those subtitles.

For a computer or media player it is easy to read it as one segment. Also rewinding and searching while playing the file is an option then.

For this reason audio, video and sometimes subtitles are packed in one file. The best way to compare it with is a Zip file, containing audio/video/subtitles.

4.1 DVD Rips / DivX / XviD - AVI container

When the DVD was still 'new', already the files were ripped to DivX en XviD. By compression the size of the DVD can be brought back to 1/10. Ergo, 8GB download became 800MB download.

The original video track (MPEG-2) is converted to a MPEG-4 file.
The original audio-track is usually converted to multi-channel MP3 or sometime AC3 5.1. This as a whole is packed in one file with the extension "AVI".

Therefore this extension can be used for other types of audio/video tracks!

File Type/(Ext Name)	Video Type	Audio Type	Details
MP4, MOV (.mp4, .mov, .xvid)	DIVX 3/4/5/6	LPCM, uLaw, aLaw	**DivX :** up to 1920x1080@30p
	Motion JPEG	MPEG-AUDIO	**M-JPEG:** 1920x1080@30p
	MPEG-4 SP/ASP(XviD)	HE-AAC ,LC-AAC	**MPEG4 SP/ASP:** up to 1920x1080@30p
	MPEG-4 AVC (H.264)	AC3, Dolby Digital Plus	**H.264 :** Main and High Profile @ Level 4.1,
	AVS	Vorbis	Baseline profile @ Level 4.1
		MS-ADPCM	**AVS:** Jizhum profile @ level 2.0/ 4.0/ 4.2/ 6.0/ 6.2
AVI (.avi, .divx)	MPEG-1	LPCM, uLaw, aLaw	**MPEG-1:** up to 1920x1080@30p
	DIVX 3/4/5/6	MPEG-AUDIO	**DivX:**tot 1920x1080@30p
	Motion JPEG	HE-AAC, LC-AAC	**M-JPEG :** 1920x1080@30p
	MPEG-4 SP/ASP(XviD)	AC3, Dolby Digital Plus	
	MPEG-4 AVC (H.264)	DTS	**MPEG4 SP/ASP:** up to 1920x1080@30p
	VC-1	Vorbis	**H.264 :** Main and High Profile @ Level 4.1,
		MS-ADPCM	Baseline profile @ Level 4.1
		WMA, WMA Pro	**VC-1:** SP, MP, AP@

4.2 HD-DVD, Blu-Ray, Matroska (MKV) container

When HD-DVD and Blu-Ray came, the size of the discs increased significantly. A Blu-Ray can contain up to 50GB audio/video. Despite the fact that fast internet is available on almost every location, is downloading 50GB for the average consumer a big job. The other problem is that for playing such material a heavy computer is necessary and empty BD-R are still expensive. A MKV file of a Blu-Ray is 8-10GB.

Because material with a high resolution is not suitable for decoding DivX of Xvid codecs efficiently, an alternative was invented: Matroska Video.

Matroska is simply an open developed container which contains audio, video, data, subtitles, support for multiple audio/videotracks and a lot more. The current MKV rips that you fin don the internet nowadays are usually build like this:

  - MPEG-4/H.264 Videostream (in HD format, for example 1920x1080P)
  - DTS Audiostream
  - AC3 Audiostream
  - 4-5 Subtitle files (NL/DE/FR/ES/IT for example)

The container is set up so 'widely', that for example you can make the following setup:

  - DivX Videostream (in SD format, 768x576 for example)
  - DTS audiostream
  - SRT subtitle in NL

The example does something that is impossible with a standard AVI container: A DTS audiostream is being used, which is not possible when using an AVI container in combination with a loose SRT subtitle.

The mediaplayer supports these container formats. This still depends on the audio- or videocodec. However, right now such a wide spectrum of codecs is supported that 99% will be displayed.

4.3 The M2TS container

On a Blu-ray the video and audio is packed in a M2TS container. Menu's are normally scripted in Java (BD-J) or assembly and highly advanced. (These menu's are separate from the film/audiostream, and run separately in the internal memory of a real Blu-Ray player.)

Because the mediaplayer does not have a license of Sony, it cannot function as a Blu-Ray player. Therefore there are no menu's shown while opening a folder with a Blu-Ray or choosing a Blu-Ray ISO file.

4.4 But it does play M2TS files?

Only the M2TS can be opened and usually contain MPEG-4/AVC video and Dolby Digital/DTS/PCM audio tracks in multiple languages. The mediaplayer decode these files.

The fact that a Blu-ray takes up so much space (50GB) is determined by the size of the files. If you deleted all extra audio/languages/menu's and options, often there is about 10GB usable material left.

This is run through a h264-recoder or re-muxer and because of that you can rip a Blu-Ray to your computer. All you need to do is pack the videostream and audiostream again in a MKV container.

4.5 WMV HD

This container format is preferably used for the Xbox-360.

If you have read the informatie about the container files, you will understand the following:

  - WMV HD is 720P minimum, 1080P maximum, Microsoft Standard
  - VC-1 videostream
  - WMA audiostream (5.1 of 7.1)

Different content in tracks is not allowed. You cannot embed DTS audio in a WMV container!
This is not a 'wide' container and changing the standard is almost impossible.

5.0 What about DTS audio?

The DTS audiostream can be send to a DTS licensed amplifier through an Optical (toslink) cable. That amplifier will do the decoding.

The Mediaplayer does support native DTS. This means that the mediaplayer can decode DTS 5.1 en 7.1 to 2-channel stereo itself.
If you would connect the mediaplayer to a (stereo) TV this would be a waste, it is advisable to connect the mediaplayer to an amplifier with multiple speakers to get the real theatre experience.

6.0 HDMI compatibility

HDMI is a digital standard to transport decoded video- and audio.
For this roughly. ~10 gigabit/sec (HDMI 1.1) and ~20 gigabit (HDMI1.3a) is available.

The EM7070 is HDMI 1.1 compliant. This type (1.1) is not suitable for DTS-HD and Dolby TrueHD transport, because the bandwidth for this is missing.

HDMI-versie	1.0	1.1	1.2 1.2a	1.3	1.3a 1.3b 1.3b1 1.3c	1.4 1.4a
Releasedatum	29 december 2002			22 juni 2006		28 mei 2009
Maximale kloksnelheid (MHz)	165			340		340
Maximale TMDS-overdracht per kanaal (Gbit/s) inclusief 8b/10b-overhead	1,65			3,40		3,40
Maximale totale TMDS-overdracht (Gbit/s) inclusief 8b/10b-overhead	4,95			10,2		10,2
Maximale overdracht (Gbit/s) zonder 8b/10b-overhead	3,96			8,16		8,16
Maximale audio-overdracht (Mbit/s)	36,86			36,86		36,86
Maximale kleurdiepte (bit/px)	24			48		48
Maximale resolutie over single link op 24 bit/px	1920×1200p60			2560×1600p75		4096×2160p24
Maximale resolutie over single link op 30 bit/px	n.v.t.			2560×1600p60		4096×2160p24
Maximale resolutie over single link op 36 bit/px	n.v.t.			1920×1200p75		4096×2160p24
Maximale resolutie over single link op 48 bit/px	n.v.t.			1920×1200p60		1920×1200p60
sRGB	Ja	Ja	Ja	Ja	Ja	Ja
YCbCr	Ja	Ja	Ja	Ja	Ja	Ja
8 channel-LPCM, 192 kHz, 24 bit-audio-capability	Ja	Ja	Ja	Ja	Ja	Ja
Blu-raydisk- en hd-dvd-video en -audio op volle resolutie	Ja	Ja	Ja	Ja	Ja	Ja
Consumer Electronic Control (CEC)	Ja	Ja	Ja	Ja	Ja	Ja
Dvd-audio-support	Nee	Ja	Ja	Ja	Ja	Ja
Sacd (DSD)-support	Nee	Nee	Ja	Ja	Ja	Ja
Deep Color	Nee	Nee	Nee	Ja	Ja	Ja
xvYCC	Nee	Nee	Nee	Ja	Ja	Ja
Auto lip-sync	Nee	Nee	Nee	Ja	Ja	Ja
Dolby TrueHD-bitstream-capable	Nee	Nee	Nee	Ja	Ja	Ja
DTS-HD Master Audio-bitstream-capable	Nee	Nee	Nee	Ja	Ja	Ja
Updated list of CEC-commands	Nee	Nee	Nee	Ja	Ja	Ja
Ethernetkanaal	Nee	Nee	Nee	Nee	Nee	Ja
Audio return channel (ARC)	Nee	Nee	Nee	Nee	Nee	Ja
4K × 2K Resolution Support	Nee	Nee	Nee	Nee	Nee	Ja
3D over HDMI	Nee	Nee	Nee	Nee	Nee	Ja

Like shown in the table, Dolby TrueHD and DTS-HD support is available from HDMI 1.3.

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