
Audio for Video – does Audio matter?



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Video formats and related data rates

	TV (ITUR-601)	HDTV	HDTV
Pixels per line	720	1280	1920
Number of lines	576/480	720	1080
Frame rate	25/30	50/60	24/25/30
Components	YUV	YUV	YUV
Bit/component	8 (10)	8 (10)	8 (10)
<i>Data rate [Mbit/s] (4:2:2)</i>	165	< 885	< 995



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VideoCD Standard

1992 MPEG-1

- Sub-Broadcast-Quality @ 1.5 MBit/s (Video-CD)

Digital TV / DVB/ DVD Standard

1994 MPEG-2

- ~ 4 MBit/s for TV resolution
- ~ 25 MBit/s for HDTV

Videokommunika- tionsstandard

1996-1998 MPEG-4 / H.263

- ca. 3.2 MBit/s for TV resolution, 1 MBit/s for reasonable full screen (DivX)
- > 64 kbit/s for video communication

DVB / HD-DVD / 3GPP / 3GPP2 DSL-Streaming

2003 ITU-T H.264 / MPEG AVC

- > 500 kbit/s for reasonable full screen
- < 2 MBit/s for TV resolution
- ~ 10-12 MBit/s for HDTV



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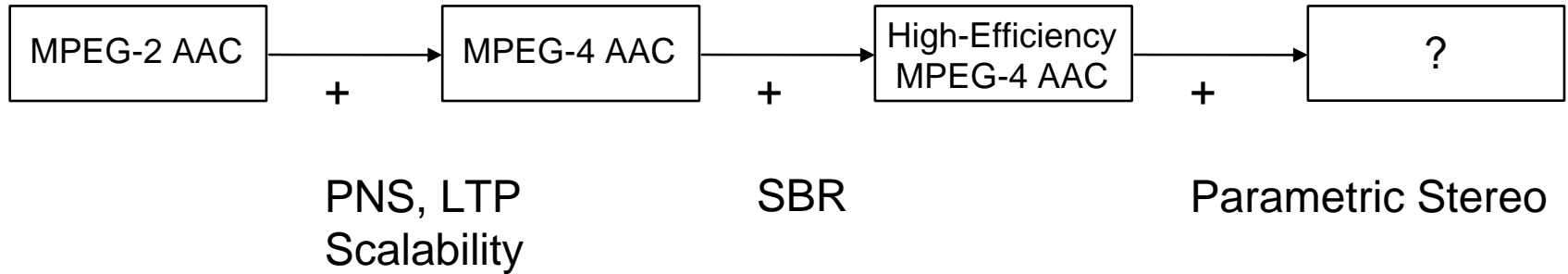
Audio formats and related data rates

	Stereo	5-Kanal Surround	5/6/7-Kanal Surround
fs	44.1 kHz	48 kHz	96 kHz
Bits/sample	16 Bit	16 Bit	24 Bit
Channels	2	5	5-7
Data rate	~ 1.4 MBit/s	~ 4 MBit/s	~ 17 MBit/s
File Size, 2h	1.3 GByte	3.5 GByte	14.5 GByte



MPEG-2/4 AAC

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Audio quality level	MPEG-2 AAC	MPEG-4 AAC	MPEG-4 HE-AAC (V2)	HE-AAC + Spatial Audio
Transparent (Stereo, kbit/s)	128	128	128	128
Hifi 16 kHz (Stereo, kbit/s)	88	64	48	< 32?
Transparent (5.1 Surr., kbit/s)	300	300	300	300
Hifi 16 kHz (5.1 Surr., kbit/s)	224	160	120	<64?



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		uncompressed	MPEG-2 AC3 2.0/5.1	H.264/AVC AAC 2.0 + 5.1 + 7.1	H264/AVC/AAC „good quality“
File size / 2 hours	TV	72 GByte	4 GByte	<2 Gbyte	0.7 GByte
	HDTV	430 GByte	25 GByte	<12 Gbyte	~ 4 GByte
Transmission time @ 2 Mbit/s	TV	80 h	4.5 h	2 h	45 min
	HDTV	480 h	27 h	12 h	4.5 h
Transmission time @ 5 MBit/s	TV	32 h	1.8 h	0.8 h	18 min
	HDTV	192 h	11 h	5 h	1.8 h
Transmission time @ 30 Mbit/s	TV	5 h	20 min	8 min	3 min
	HDTV	30 h	1.8 h	48 min	18 min

