

AV1 Codec / DAV1D / ...



(Lizenzkostenfrei)

AV1 löst VP9 ab und steht in Konkurrenz zu HEVC/H.265.

Container: MP4 oder MKV bzw. WebM mit Opus Audio-Codec.

Messungen mit der finalen Version (2018) ergaben, dass AV1 vor allem bei Videos in 4K-/UHD-Auflösung bis zu 20-30 Prozent höhere Kompressionsraten bietet als VP9 sowie HEVC.

Level	MaxHSize (Samples)	MaxVSize (Samples)	MainMbps (Mbits/sec)	HighMbps (Mbits/sec)	Min Comp Basis	Max Tile s	Max Tile Cols	Example
2.0	2048	1152	1.5	-	2	8	4	426x240@30fps
2.1	2816	1584	3.0	-	2	8	4	640x360@30fps
3.0	4352	2448	6.0	-	2	16	6	854x480@30fps
3.1	5504	3096	10.0	-	2	16	6	1280x720@30fps
4.0	6144	3456	12.0	30.0	4	32	8	1920x1080@30fps
4.1	6144	3456	20.0	50.0	4	32	8	1920x1080@60fps
5.0	8192	4352	30.0	100.0	6	64	8	3840x2160@30fps
5.1	8192	4352	40.0	160.0	8	64	8	3840x2160@60fps
5.2	8192	4352	60.0	240.0	8	64	8	3840x2160@120fps
5.3	8192	4352	60.0	240.0	8	64	8	3840x2160@120fps
6.0	16384	8704	60.0	240.0	8	128	16	7680x4320@30fps
6.1	16384	8704	100.0	480.0	8	128	16	7680x4320@60fps
6.2	16384	8704	160.0	800.0	8	128	16	7680x4320@120fps
6.3	16384	8704	160.0	800.0	8	128	16	7680x4320@120fps

Abb. Levels, Quelle: Wikipedia

	Main (0) 8 or 10-bit	High (1) 8 or 10-bit	Professional (2) 8, 10 & 12 bit
Chroma subsampling 4:0:0	Yes	Yes	Yes
Chroma subsampling 4:2:0	Yes	Yes	Yes
Chroma subsampling 4:2:2	No	No	Yes
Chroma subsampling 4:4:4	No	Yes	Yes

Abb. Feature comparison between AV1 profiles. Quelle: Wikipedia

Anmerkung: Das Bildformat AVIF wird ab Windows 10 19H1-Build unterstützt. Das Format basiert auf AV1. AVIF-Dateien entsprechen der HEIC-Spezifikation (HEIF-Dateiformat) und beherrschen unter anderem High Dynamic Range (HDR) sowie Wide Color Gamut (WCG).

<https://people.xiph.org/~negge/AVIF2018.pdf>

<https://github.com/AOMediaCodec/av1-avif/tree/master/testFiles/Microsoft>

Browser-Support:

AV1 wird ein Internet-Standard (Internet Engineering Task Force (IETF)).

Mozilla Firefox, Opera/Vivaldi, Google Chrome und andere unterstützen das direkte Abspielen.

<https://hacks.mozilla.org/2018/06/av1-next-generation-video-the-constrained-directional-enhancement-filter/>

Decoder

dav1d (Dav1d is an **AV1 Decoder** und schneller als der Referenzdecoder (C, Assembler) und AVX2 Support)

(8- und 10 Bit) [Jean-Baptiste Kempf]

<https://code.videolan.org/videolan/dav1d>

<http://www.ibkempf.com/blog/tag/dav1d>

<http://www.ibkempf.com/blog/post/2018/Introducing-dav1d>

CPU basierte Encoder

Scalable Video Technology for AV1 Encoder (SVT-AV1 Encoder)

<https://github.com/OpenVisualCloud/SVT-AV1>

<https://trello.com/b/g0ID2bIK/svt-av1>

https://github.com/OpenVisualCloud/SVT-AV1/blob/master/Docs/svt-av1_encoder_user_guide.md

Intel Encoder - Scalable Video Technology for HEVC Encoder (SVT-HEVC Encoder)

<https://github.com/intel/SVT-HEVC>

<https://trello.com/b/0xqT4xeY/svt-hevc>

Weitere Informationen:

<https://aomedia.org/the-alliance-for-open-media-kickstarts-video-innovation-era-with-av1-release/>

<https://en.wikipedia.org/wiki/AV1>

https://de.wikipedia.org/wiki/AOMedia_Video_1

AV1 Image File Format (AVIF)

<https://aomediacodec.github.io/av1-avif/>

<https://github.com/AOMediaCodec/av1-avif>

Alliance for Open Media (AOM)

<https://aomedia.org/>

Siehe auch: Xiph/Mozillas „Daala“ / Cisco „Thor“

SVT-AV1 Encoder

\\Video\files\Intel SVT-AV1 encoder

SvtAV1EncApp.exe -i [in.yuv] -w [width] -h [height] -b [out.ivf].

Sample application supports reading from pipe. E.g.

ffmpeg -i [input.mp4] -nostdin -f rawvideo -pix_fmt yuv420p - | SvtAv1EncApp.exe -i stdin -n [number_of_frames_to_encode] -w [width] -h [height].

TOKEN	DESCRIPTION	INPUT TYPE
-nch	NumberOfChannels	Single input
-i	InputFile	Single input
-b	StreamFile	Single input
-errlog	ErrorFile	Single input
-o	ReconFile	Single input
-qp-file	QpFile	Single input
-interlaced-video	InterlacedVideo	Single input
-separate-fields	SeperateFields	Single input
-w	SourceWidth	Single input
-h	SourceHeight	Single input
-n	FrameToBeEncoded	Single input
-nb	BufferedInput	Single input
-base-layer-switch-mode	BaseLayerSwitchMode	Single input
-enc-mode	EncoderMode	Single input
-intra-period	IntraPeriod	Single input
-irefresh-type	IntraRefreshType	Single input
-fps	FrameRate	Single input
-fps-num	FrameRateNumerator	Single input
-fps-denom	FrameRateDenominator	Single input
-bit-depth	EncoderBitDepth	Single input
-compressed-ten-bit-format	CompressedTenBitFormat	Single input
-hierarchical-levels	HierarchicalLevels	Single input
-pred-struct	PredStructure	Single input
-scd	SceneChangeDetection	Single input
-q	QP	Single input
-use-q-file	UseQpFile	Single input
-rc	RateControlMode	Single input
-lad	LookAheadDistance	Single input
-tbr	TargetBitRate	Single input
-max-qp	MaxQpAllowed	Single input
-min-qp	MinQpAllowed	Single input
-dlf	LoopFilterDisable	Single input
-local-warp	LocalWarpedMotion	Single input
-use-default-me-hme	UseDefaultMeHme	Single input
-hme	HME	Single input
-hme-l0	HMELevel0	Single input
-hme-l1	HMELevel1	Single input
-hme-l2	HMELevel2	Single input
-ext-block	ExtBlockFlag	Single input
-in-loop-me	InLoopMeFlag	Single input
-search-w	SearchAreaWidth	Single input
-search-h	SearchAreaHeight	Single input
-num-hme-w	number_hme_search_region_in_width	","
-num-hme-h	NumberHmeSearchRegionInHeight	Single input
-hme-tot-l0-w	HmeLevel0TotalSearchAreaWidth	Single input
-hme-tot-l0-h	HmeLevel0TotalSearchAreaHeight	Single input
-constrd-intra	ConstrainedIntra	Single input
-ss	TargetSocket	Single input
-sharp	ImproveSharpness	Single input
-hdr	HighDynamicRangeInput	Single input
-ua-delim	AccessUnitDelimiter	Single input
-pbuf	BufferingPeriod	Single input
-tpic	PictureTiming	Single input
-reg-user-data	RegisteredUserData	Single input
-unreg-user-data	UnregisteredUserData	Single input
-recovery-point	RecoveryPoint	Single input
-temporal-id	TemporalId	Single input
-inj	Injector	Single input
-inj-frm-rt	InjectorFrameRate	Single input

-speed-ctrl	SpeedControlFlag	Single input
-profile	Profile	Single input
-tier	Tier	Single input
-level	Level	Single input
-latency-mode	LatencyMode	Single input
-asm	AsmType	Single input
-hme-10-w	HmeLevel0SearchAreaInWidth	Array input
-hme-10-h	HmeLevel0SearchAreaInHeight	Array input
-hme-11-w	HmeLevel1SearchAreaInWidth	Array input
-hme-11-h	HmeLevel1SearchAreaInHeight	Array input
-hme-12-w	HmeLevel2SearchAreaInWidth	Array input
-hme-12-h	HmeLevel2SearchAreaInHeight	Array input

```
# SvtAV1EncApp.exe -i YUYV.avi -w 1920 -h 1080 -b out.ivf
```

```
-----  
SVT-AV1 Encoder
```

```
SVT [version]: SVT-AV1 Encoder Lib v0.4.0
```

```
SVT [build] : Visual Studio 2017 64 bit
```

```
LIB Build date: Feb 4 2019 20:37:51  
-----
```

```
Number of logical cores available: 64
```

```
Number of PPCS 62  
-----
```

```
SVT [config]: Main Profile      Tier (auto)      Level (auto)
```

```
SVT [config]: EncoderMode                                           : 3
```

```
SVT [config]: EncoderBitDepth / CompressedTenBitFormat             : 8 / 0
```

```
SVT [config]: SourceWidth / SourceHeight                           : 1920 / 1080
```

```
SVT [config]: FrameRate / Gop Size                                 : 30 / 64
```

```
SVT [config]: HierarchicalLevels / BaseLayerSwitchMode / PredStructure : 3 / 0 / 2
```

```
SVT [config]: BRC Mode / QP / LookaheadDistance / SceneChange      : CQP / 50 / 17 / 0  
-----
```

```
Encoding
```

```
frame= 59 fps= 20 q=-0.0 lsize= 179212kB time=00:00:02.36 bitrate=622080.0kbits/s speed=0.808x speed=0.0168x  
video:179212kB audio:0kB subtitle:0kB other streams:0kB global headers:0kB muxing overhead: 0.000000%
```