Frame of Reference

www.avid.com

Avid DNxHD Project Specifications

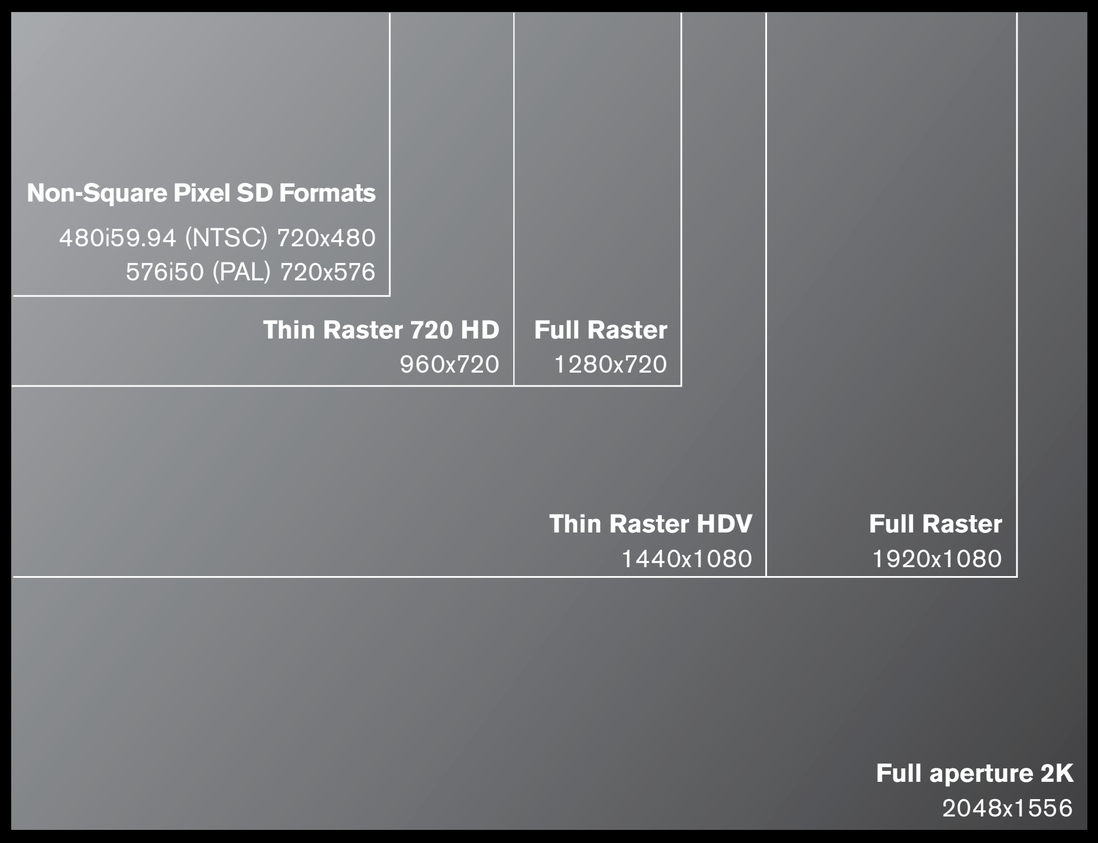
Project Type	Avid® DNxHD	Bits per Sample	Raster Size	Frames per Sec	Sampling Ratio	GB per Hour
720p23.976	Avid DNxHD60	8	1280x720	23.976	4:2:2	26
	Avid DNxHD90	8	1280x720	23.976	4:2:2	40
	Avid DNxHD90x	10	1280x720	23.976	4:2:2	40
720p50	Avid DNxHD115	8	1280x720	50	4:2:2	51
	Avid DNxHD175	8	1280x720	50	4:2:2	77
	Avid DNxHD175x	10	1280x720	50	4:2:2	77
720p59.94	Avid DNxHD145	8	1280x720	59.94	4:2:2	64
	Avid DNxHD220	8	1280x720	59.94	4:2:2	97
	Avid DNxHD220x	10	1280x720	59.94	4:2:2	97
1080p23.976	Avid DNxHD36	8	1920x1080	23.976	4:2:2	16
	Avid DNxHD115	8	1920x1080	23.976	4:2:2	51
	Avid DNxHD175	8	1920x1080	23.976	4:2:2	77
	Avid DNxHD175x	10	1920x1080	23.976	4:2:2	77
1080p24	Avid DNxHD36	8	1920x1080	24	4:2:2	16
	Avid DNxHD115	8	1920x1080	24	4:2:2	51
	Avid DNxHD175	8	1920x1080	24	4:2:2	77
	Avid DNxHD175x	10	1920x1080	24	4:2:2	77
1080p25	Avid DNxHD120	8	1920x1080	25	4:2:2	53
	Avid DNxHD185	8	1920x1080	25	4:2:2	81
	Avid DNxHD185x	10	1920x1080	25	4:2:2	81
1080i50	Avid DNxHD120	8	1920x1080	25	4:2:2	53
	Avid DNxHD185	8	1920x1080	25	4:2:2	81
	Avid DNxHD185x	10	1920x1080	25	4:2:2	81
1080i59.94	Avid DNxHD145	8	1920x1080	29.97	4:2:2	64
	Avid DNxHD220	8	1920x1080	29.97	4:2:2	97
	Avid DNxHD220x	10	1920x1080	29.97	4:2:2	97

Statistics & Specifications

SD	Data Rate (Mb/s)	Sampling Ratio	Bits per Sample	GB per Hour
720x486 1:1 NTSC	200	(4:2:2)	10	88
720x576 1:1 PAL	198	(4:2:2)	10	87
Sony MPEG IMX	50	(4:2:2)	8	22
Panasonic DVC PRO 50	50	(4:2:2)	8	22
DV NTSC	25	(4:1:1)	8	11
DV PAL	25	(4:2:0)	8	11

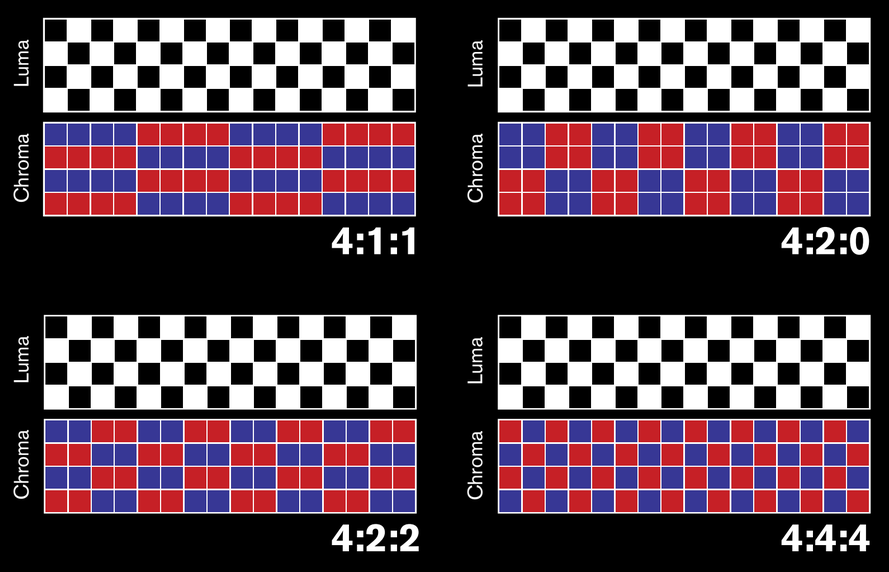
HD	Data Rate (Mb/s)	Sampling Ratio	Bits per Sample	GB per Hour
DVC PRO HD	100	(4:2:2)	8	44
XDCAM HD422 (50)	50	(4:2:2)	8	22
XDCAM HD 35	35	(4:2:0)	8	15
XDCAM HD 25	25	(4:2:0)	8	11
XDCAM EX 35	35	(4:2:0)	8	15
P2 AVC-INTRA 50	50	(4:2:0)	10	22
P2 AVC-INTRA 100	100	(4:2:2)	10	44
1920x1080i HD - 25 fps	1483	(4:4:4)	10	652
1920x1080i HD - 29.97 fps	1185	(4:2:2)	10	521
1920x1080p HD - 23.98 fps	948	(4:2:2)	10	417
1280x720p HD - 25 fps	439	(4:2:2)	10	193
1280x720p HD - 50 fps	879	(4:2:2)	10	386
1280x720p HD - 59.94 fps	1054	(4:2:2)	10	463
1280x720p HD - 29.97 fps	421	(4:2:2)	8	185
HDV	25	(4:2:0)	8	11
2K - 24 fps	2188	(4:4:4)	10	962

Frame Sizes

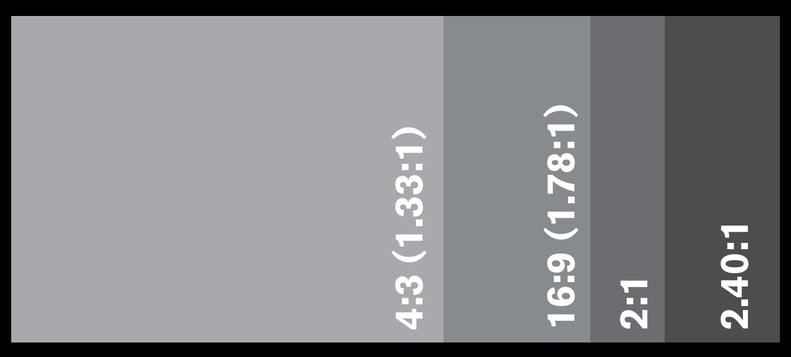


Chroma Subsampling

Thanks to the fact that the human eye is worse at seeing differences between shades of colors than degrees of lightness, one very effective way of making digital video files smaller is to remove some of the color information. This is expressed as a ratio such as 4:2:0, 4:1:1 etc. As video is comprised of a Luma carrier and a Chroma carrier, they can be treated differently, allowing us to keep the degrees of lightness but cut back on color.



Aspect Ratios

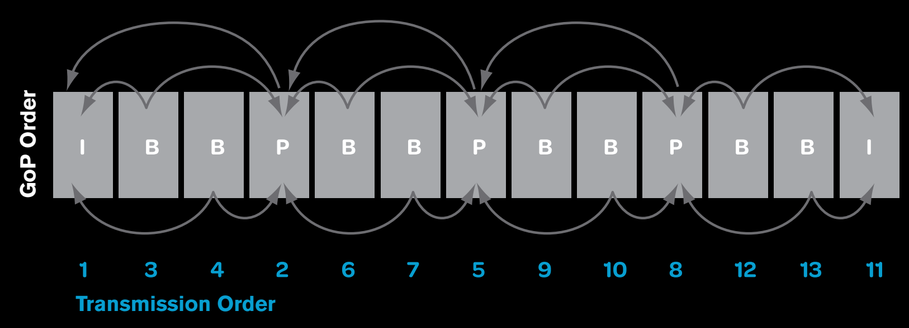


Time/Footage at 24 fps

	1 min	5 min	10 min
16mm	36 feet	180 feet	360 feet
35mm	90 feet	450 feet	900 feet

GoP Compression

Group of Pictures A popular method of compressing video information over time exploiting a concept known as "Temporal Redundancy" by calculating the contents of some frames based of the images contained in others. This can save a lot of storage by reusing frame information that does not change over time, rather than storing full information for every frame. The trade off is that it is more processor intensive due to having to read several frames to build the one it needs. I.E. HDV and XDCAM



I-Frames Intra-Coded Frames
Full frames which are independent of the other frame types and used as a fixed reference for P and B frames.

B-Frames Bi-Directional Frames
Calculate the contents of themselves based on images both before and after themselves.

P-Frames Predicted Frames
Use Motion Compensation to predict how they look based on this information from nearby I and P frames.