Video Formats

Table 1 shows a number of video data stream formats. This list is not comprehensive, but rather reflects what I found from multiple manufacturers as I shopped for video capture hardware. Notice there are several standard resolutions, encoding schemes, and bit rates that keep showing up, but also notice that some names mean different things when used in context of different companies' products.

Table #1. Video Formats

Company / Product	Name	Format	Resolution	Bit rate, avg → max (Mbps)	File Size (MB/min)
Plextor M402U	DVD HQ	MPEG-2	F-D1	6.0 → 9.8	46.7
CyberLink PP2	DVD HQ	MPEG-2	F-D1	3.4 → 8.3	57.5
Plextor M402U	DVD GQ	MPEG-2	F-D1	4.5 → 9.8	
Plextor M402U	DVD SP	MPEG-2	1/2-D1	3.0 → 9.8	15-77.0
CyberLink PP2	DVD SP	MPEG-2	1/2-D1	3.4 → 6.8	27.0
PVR-Plus	DVD	MPEG-2	F-D1	4.0	30.0
PVR-Plus	MPEG-2	MPEG-2	640 x 480	4.0	
CyberLink PP2	DVD LP	MEPG-2	SIF	1.8 → 3.5	15.2
Plextor M402U	DVD LP	MPEG-2	1/2-D1	2.0 → 6.0	16.7
Plextor M402U	DVD EP	MPEG-2	SIF	2.0 → 6.0	16.7
CyberLink PP2	SVCD	MPEG-2	480 x 480	→ 2.4	18.4, 21.7
PVR-Plus	SVCD	MPEG-2	480 x 480	2.3	
Plextor M402U	VCD	MPEG-1	SIF	1.15 → 1.5	10.3
PVR-Plus	VCD	MPEG-1	SIF	1.15	10.0
CyberLink PP2	VCD	MPEG-1	SIF	1.15	10.1
ADS USBAU701	VCD	MPEG-1	SIF	1.15	10.8
Plextor M402U	HQ	MPEG-4	F-D1	4.0 → 6.0	31.7
Plextor M402U	Good	MPEG-4	F-D1	3.0 → 6.0	24.2
Plextor M402U	SP	MPEG-4	F-D1	2.0 → 4.0	16.0
Plextor M402U	LP	MPEG-4	SIF	1.5 → 4.0	12.2
Plextor M402U	EP	MPEG-4	SIF	0.7 → 4.0	6.2
Plextor M402U	Home Theate	DivX	F-D1	4.0 → 6.0	31.7
PVR-Plus	MPEG-4	DivX	selectable	selectable	< 1.0 +
Plextor M402U	LP	DivX	F-D1	2.0 → 6.0	16.7
Plextor M402U	Portable	DivX	SIF	0.77 → 4.0	6.7

Although I didn't use Plextor hardware in the preparation of this article, I included a number of their formats in the table because they offer free sample video clips for comparison, available at http://www.plextor.com/english/products/ConvertX2advancedtechspec.htm.

Distinguishing between the format and the encoding sometimes gets blurry. If you refer to a "DVD format", 99% of the time you're implying MPEG-2 encoding (there is room in the official

specification for MPEG-1). The reverse isn't true. Only some combinations of MPEG-2 play successfully on DVD players. You can go up to about 9 Mbps and still be "legal" for DVD players, but if you average much above 5 Mbps, a standard length movie won't fit on a single DVD disk. Some MPEG-2 resolutions are optimized for computer display, such as the 640 x 480 resolution listed in the table. If you'd like a technical overload of what each term means, visit http://www.afterdawn.com/glossary.

Standardized resolutions are SIF (352 x 240) , F-D1 (720 x 480), ½-D1 (352 x 480). For perspective, all NTSC televisions use 525 display lines, with horizontal resolution specified at several hundred up to a thousand dots per line. Unlike computer screens, the pixel resolution of a video format doesn't imply the aspect ratio. You can think of it this way: video formats often use non-square pixels. What's really going on is that video isn't naturally pixels – it's just a changing voltage that can be digitized at fast rates to get many horizontal pixes, or slower rates to get less horizontal pixels. A digitized video file can declare internally what aspect ratio is to be displayed, or your video player makes the choice. Common ones are 4:3 for TV, and 16:9 for DVDs. I found a decent technical tutorial at http://members.aol.com/ajaynejr/vidres.htm.

Audio tracks are pretty standardized on MEPG-1 Level 2 encoding at 44.1 KHz or 48 KHz sample rate, although older stand-alone DVD players may require LPCM compression. Valid audio bit rates for non-PC play maxes out at 448 kbps on the DVD format, but most optical disk video uses less.

Lastly, standardized disk sizes set some of the norms. For example, fitting 120 minutes on a 4700 MB DVD requires 39 MB/min or less, so most DVD MPEG-2 recordings are found in this range. Most authoring programs will convert your files, if necessary, before burning to disk. SVCD and VCD formats mimic DVD behavior, although the "legal" combination of video parameters gives you slightly lower quality for these formats. Run times are about 30-40 minutes for SVCDs and 60 minutes for VCD. I have found no way to record DVD-quality short clips on a CD for a non-PC player. If you'd like to adventure off and try non-standard combinations of video and/or audio, http://www.afterdark.com/guides will help get you started.