Make Me a Small [*m*]Peg

By Neil Sadwelkar

Time was when after an edit was complete, one had to make a tape dump and go home. These days, after an edit is over and done with, one needs to make tape dumps, EDLs, graphic layers, and an mpeg for approval. Busy executives either in India or overseas, need to see the film at the earliest and often e-mailing the film is the only option. So I get asked, even in the wee hours… "Make me a small mpeg".

Sometimes, there is an AD who rushes out to another studio, just to make the mpeg. There are even studios that actually charge separately for this service.

So just what is this mpeg, and can anyone make an mpeg. Or does it require a special permit or qualifications? And does one need to be over 18 to make one? So here's the de-jargonized, lo-cal gyaan on mpegs.

Firstly, what is mpeg? Examples of mpeg are VCDs, DVDs and MP3 files. Mpeg is basically a form of storing video and audio but not quite like movie file formats like QuickTime, or AVI, or Real media or even Windows media. In fact mpegs don't even need a computer and an operating system or software, to view or hear them. That's why even standalone systems like small VCD Players, DVD players, or tiny MP3 players all play mpegs.

For the curious, and the technically inclined, and the not-easily-bored, and for those who have trouble getting sleep, a slightly detailed description of mpegs. MPEG stands for Motion Picture Experts Group. A set of individuals [*humans*] whose job it is to pore over movies and sound and figure out just how much can you degrade a movie or sound, and how small can you make it before the "average" human looks away. The idea being, make the maximum use of storage and transmission bandwidth.

To make it simple, here's how mpeg compression works. It starts off with a frame, say the first frame. Compress that mildly and store that. Then take the next frame, compare that with the first frame. And store the differences only. Keep doing that till a major change occurs. Like the shot changes. Then again store a frame. Then differences. And so on. In any average video, not too much changes between successive frames. So this nifty idea allows you to make a rather good movie without having to store frames that are redundant.

Of course, because of this scheme of things, when things change drastically, like during a dissolve, or hand-held moves, the compressor just can't find like frames and has to then store all the frames, but heavily compressed. So things start looking "blocky" or "pixilated" during such scenes.

This basic mechanism is common to all mpegs. MPEG-1, MPEG-2 etc. But what do these numbers mean?

MPEG-1 or MPEG-2, or 4 or 7 or 21?

MPEG-1 was released in 1993. Main objective - to produce an "acceptable" image quality with modest storage and bandwidth requirements. In numbers, MPEG-1 stores video at 352x288 pixels at 25 fps in PAL [*352x240 at 30 fps for NTSC*] Audio as stereo 44.1 kHz. The overall bandwidth is 1 to 1.5 Mbit/sec. Audio can go up to 224 kbit/sec.

With this data rate, even a 2x CD-ROM can play mpeg-1 in the form of VCD [*the practical use of mpeg-1*]. And one CD with a 700 MB capacity holds over 70 mins. of video. When mpeg-1 or VCD is played out to a TV set, this 352x288 gets "blown up" to full frame PAL 720x576. Which is why VCDs look so terrible.

MPEG-2 has been in existence since 1995. Its basic structure is the same as that of MPEG-1, but it can handle data rates up to 100 MBit/s. MPEG-2 also allows much higher resolutions from 720x576 full frame PAL right up to 1920x1080 full frame HD. Sound in mpeg-2 can be 48 kHz stereo and more right up to 6-track Dolby 5.1. mpeg-2 is used widely in DVDs. Even with a data rate of 4-5 Mbit/sec it provides near-Betacam quality picture and sound. Mpeg-2 also provides for variable data rates so that complex images can be faithfully compressed with fewer artifacts. Meaning less "blockies" that you see in VCDs.

MPEG-4 is the latest of the mpegs. Mpeg-4 is meant to provide high quality images at very low data rates. Like between 10 KBit/s and 1 MBit/s. mpeg-4 is also optimized for efficient transmission via the Internet unlike mpeg-1 and 2. So seeing live events and even live TV via Internet is possible and in fact more efficient via mpeg-4. For the past two years I've been

watching Steve Jobs' MacWorld address live via QuickTime mpeg-4.

MPEG-7 is still "under construction" It is meant to be a standard to describe multimedia data. From what I understand, it will make even more efficient transmission of rich multimedia and interactive content. Sort of like what Flash does to animation vis-à-vis "flat" movie formats.

Making the Mpeg

From theory to practice. To create an mpeg.

First, you need a movie file. You can export your edit from your NLE as a movie, preferably using the same compression that your original media was in. Or, if the stuff you need an mpeg of, is on a tape, you can capture that to your NLE preferably using the best compression you have. This movie file exported or captured, is then compressed or encoded in software created for this purpose.

On a PC if you work with any Avid software like Media Composer, or XPress or XPressDV, you can export your sequence as an .avi using the Avid codec, set for the AVR or compression [*Meridian or ABVB as applicable*] that clips in your sequence use. This export is quite fast. For XPDV, you can use DV as the compressor. Some of these software actually let you export Mpeg-1 directly from the timeline, I prefer exporting the movie in .avi or .mov and then use a their-party encoding software to make Mpeg-1 out of it.

If you work with Premiere, then you can use a plug-in that enables you to compress as mpeg directly from within Premiere. Examples of such plug-ins are Ligos, Darim, Heuris and others. If you don't have plug-ins you can "make movie" in Premiere to further compress into mpeg.

If you work with Liquid, then too you can export as an avi again using the same compression as your sequence. Liquid Edition Pro even allows you to make a VCD or DVD straight from the timeline without recourse to a separate compress process.

Incidentally if you're working with clips captured into your NLE with a compression, then exporting them as uncompressed or a higher resolution won't give you better mileage.

So you have an avi of your edit. Now, with this avi you proceed to make an mpeg - a process called encoding. There is software for this that can be downloaded and even bought off the net. And the software is. [*either of the following, among others*]…

TMPGEnc lite. This is free for download and can be used for making general-purpose mpegs. It's up at www.tmpgenc.net

AVI2MPG used to be a good old compressor. And was free. In quality terms, many of today's encoders surpass AVI2MPG, but it's still a very simple and easy to use compressor. Check it out at
http://www.ziffen.net/packages/system/

CleanerXL. This is a discreet product. It's a very fast encoder and has tons of options - enough to merit an article of its own. Cleaner is also a bit pricey, at $ 550, but if you are deeply into making mpegs Cleaner is a good buy.

Canopus ProCoder Express. I've used this software only once. It's fast and produces clean mpegs of any specification. And best of all it costs just $ 60 and can be downloaded as a demo.

On a Mac. Things get a bit simpler. You can make a reference movie. This is a small movie that doesn't contain the actual frames, just addresses to them. And these export real fast. Final Cut Pro, Premiere or even some Avid products let you export as reference movie. And here too, exporting in a higher resolution won't give you a better picture.

So with this movie, you can then import it into one of many compression software.

And the softwares are…

For MPEG-1 and VCD formats, you can use Toast Titanium 6. This is actually a CD burning software that also encodes to mpeg-1. It can take in reference movies and make a complete VCD out of it. Toast can also do mpeg-2 and DVDs out of it. In fact Toast can even connect to a DV camera, and capture video to convert directly to a VCD or DVD.

If making DVDs is what you want, then Apple's own free software iDVD can make a DVD directly from a QuickTime movie.

There is also Cleaner for the Mac, which costs $ 550 for the Mac too.

An if you are loath to paying so much, you can check out ffmpegX. This can do mpeg-1, mpeg-2 VCD and DVD ready files, and even DviX. FfmpegX is free to try but $15 if you wish to use it. You can check it out at http://homepage.mac.com/major4

Mpeg-4 can be made from QuickTime 6 and above.

Common to all these softwares are settings and standards.

For mpeg-1 frame sizes up to 352x288 pixels 25 fps for PAL Audio at 44.1 kHz stereo. Audio data rate under 224 kbit/sec and video data rate under 1200 kbit/sec.

For mpeg-2 frame sizes 720x576 at 25 fps for PAL. Audio at 48 kHz stereo. Audio data rate variable from 128 kbit/sec up to 448 kbit/sec. Video data rate variable from about 2 Mbit/sec up to 8 Mbit/sec. If it's higher that 8, some DVD players may not play the DVD. But for non DVD applications where higher quality is needed you can go right up to 15 Mbit/sec

For mpeg-4 there are some nice presets that make settings easy. Just stick to the presets and you'll have great looking movies at really small file sizes.

To get an idea of file sizes, I did trials with a 45 sec short film that had a mix of moving and static scenes with music and silent portions in audio. The original file was 159 MB and was a QuickTime at DV PAL.

When encoded as MPEG-1 VCD standard, I got a file that was 6.5 MB in size. Looked quite good till you looked close.

When encoded MPEG-2 at the minimum DVD data rate, I got a file 17 MB in size but very near the original in quality.

MPEG-2 at a high bit rate of 8 Mbit/sec, made a file of 37 MB that looked almost exactly as the original. This is a great way to store masters of your films to show people off your computer.

When encoded at MPEG-4 at the minimum preset I got a file 1.9 MB is size and pretty sad quality. But it encoded really fast and would be just great for emailing.

MPEG-4 at VCD-like data rates of under 1 Mbit/sec produced a 6 MB file that looked better then VCD and was full frame 720x576.

MPEG-4 at the best quality produced a seriously good looking movie of just under 12 MB.

Remember that these files were created from a 159 MB original that was itself a compressed QuickTime. The actual uncompressed original would have been around 800 MB.

Mpeg to VCD or DVD

The Mpeg made in the above softwares, are small movie files that can easily be e-mailed or burnt to CDs. But just placing an mpeg on a CD or DVD doesn't make it a VCD or DVD. It's still a computer file format that only a computer can read through software like QuickTime movie player or Windows media player. To make a VCD or DVD, they have to be "authored". Meaning the mpeg file has to be converted to a format and stored in a way that a standalone VCD or DVD player can read it in real-time. And there can be menus, pictures, buttons, and other interactive objects.

Authoring a VCD from mpeg is done by specialized software. Like Nero, and others on a PC and Toast on a Mac.

DVDs are authored with Encore, MyDVD, DVDit and others on a PC and on a Mac you use Toast, iDVD and DVD Studio pro etc.

Bottom line

Mpeg making is not terribly difficult. You need the right software, some trial and error. A healthy amount of note-taking for recording settings. If possible a stopwatch to measure encode times on sample 1-2 min movies. And soon you'll be mpeg-ing away with minimum fuss…

About Neil Sadwelkar

Neil Sadwelkar has little formal training, so he just about makes a living in the film & TV industry in India. His profession is a higher form of meditation through which one can deny hunger and sleep - it's called editing. In his spare time thinks hard and writes stuff like this piece above. And in whatever time is left over, he does his own accounts and chases clients for money. As you must have noticed by now, he is also shamelessly besotted with Macintosh machines and considers them as God-sent gifts to man kind!

He builds and tinkers with computers, so some people get conned into believing that he knows a lot about computers and editing software, so they even pay him as a consultant. Really! If you love what he's written you can drop him a line at neil@misenscene.net and tell him he's the greatest. He even has a web site dedicated to Final Cut Pro where you can take in more of his writings.

If you're a budding editor you can make him feel good by asking for advice. But if you're looking for work, don't bother because he doesn't have contacts. And if you really hate his writings, write to him and give him some work, so he has no time to write stuff like this. But don't make him chase you for money; else he'll go back to writing.