Master delivery – what next?

The fate of the 8mm Exabyte drive favoured by the mastering fraternity has rung alarm bells among those involved in the business of delivering masters. PETER SELF argues that the development offers the industry a rare opportunity to decide something for itself.

THE THORNY QUESTION OF MASTER delivery raises its ugly head yet again with the news earlier this year that the Exabyte Corporation is no longer supplying the 8mm drives preferred by our mastering industry nor officially supporting them. This prompts the thought: 'The king is dead! – God save the king!' But which king? Yet again the audio industry, and in particular the part of it concerned with replicating optical discs (CDs and DVDs), is thrown into turmoil by having a master and someone who wants it but no standardised way of delivering it.

In the early days of vinyl the situation was simple – the producer would OK the final mixes and running order before signing the job off. The tape was sent to be cut – usually by someone who had more of the air of a dentist to them than that of an audio engineer and who's job it was to faithfully transfer the audio to grooves in shellac. Latterly and quite rightly, mastering became an art in itself – rooms and companies sprang up whose purpose in part was to sweeten the end product and to act as an independent quality control between the very different mixing and manufacturing environments. The cut done, the lacquers would be sealed in a tin and sent to the galvanics department of the plant pressing the discs next to see the light of day in a suitably sterile environment.

The introduction of CDs brought about a revolution whereby the original mix was either made direct to, or copied to, a digital format and the subsequent Umatic tape was sent to the plant from where it was used directly as the source for the LBR (Laser Beam Recorder). Any sweetening would be done prior and the replication plant would treat the master as data rather than audio. Sony's vice-like grip on the mastering hardware meant that there were no alternatives to the costly and cumbersome Umatic/1630 combination – the LBR had to use a Umatic and anything that arrived in any other format had to be converted to it.

One of the most serious disadvantages of using Umatic to drive the LBR directly was that it could only ever be a real-time operation, which resulted in glass mastering being the bottleneck in an otherwise greater than real-time operation. This is where DCA (Doug Carson Associates) stepped in – it developed a Disc Description Protocol (now known simply as DDP) format that converted the audio to a data stream that could be output to the LBR from a PC at any rate that the laser could operate. The format also contained all the TOC and other information that the LBR required to format the CD. At the same time, input systems were developed to control the front end of the LBR that would work directly from a DDP format master and so get around the need for a Umatic tape altogether.

Despite some ongoing rumblings regarding sonic differences (a whole article in itself!) the concept was accepted and Exabyte 8mm tape was adopted as the primary physical carrier for DDP formatted masters. The newly developed input systems were also able internally to generate a DDP master from an audio CD and a secondary master delivery method evolved whereby a CD-R burnt DAO (Disc at Once) as a CD-DA would constitute the 'master'. This has led to workstation developers offering the ability to master to CD instead of, or as well as, Exabyte – the drives and media are cheaper and the master can be played and error checked to verify its integrity.

By contrast, Exabyte seems a black art. You can't easily play it, verify it or get data from it and it is based on, after all, the very thing we should be striving to get away from – tape based storage. With Exabyte, the last time the producer hears the product before replication is from the output of a workstation playing from the hard drive, which is not an ideal state of affairs.

So here we are now, well into the 21st Century, using an obsolete tape-based format to deliver our product. We need to decide once and for all how we make this delivery. Maybe when we are all connected to low-cost ultrasuperfast links we can consider using the web, or alternatively, companies such as WAM!NET as our couriers. WAM!NET's service provides a facility for sending audio and video masters electronically across a worldwide independent high-speed network. It works well for the likes of WEA and Universal but the overhead is high for the smaller facility with only a few masters a month to dispatch. We still need to be able to deliver physical product using regular delivery services.

There are six major issues involved in master delivery. We want security of data in terms of it arriving uncorrupted. It needs to be protected from physical damage. It should be sealed in such a way that it can't be played (or at least protected if it is). It needs to have sufficient capacity, it should be affordable, and it needs to be standardised.

Enter the DDP Fileset. Although not originally intended for the purpose, we can see that we possibly have our master delivery format already so lets look at it in more detail.

Such is the mysticism surrounding DDP, it is often thought that DDP and Exabyte are forever and irretrievably intertwined – this is not the case. A DDP master is simply a collection of files that describe the disc that should be made from it as well as carrying the actual content as one or more data streams. It has historically always been stored on an 8mm Exabyte cartridge (or DLT tape) but it need not be so. From this point on, I would like to use the term 'DDP Fileset' to describe a DDP master on any physical format (hard drive, CD-ROM, DVD-RAM, etc) as opposed to 'DDP' on Exabyte.

The number of files in a DDP Fileset can vary from a minimum of three upwards. There will always be at least one image file, a DDPID file and a DDPMS file. There may also be a DDPPQ or SD file together with various other mastering/authoring application-specific files. The audio image can be one contiguous file with pointers to track IDs based on frame number or a number of files representing each individual audio track. All the additional information (TOC and subcode data, etc.) required to cut the glass master is contained in the remaining 'descriptor' files. For E-CDs and more complex discs (either CD or DVD) the basic format is the same – there are image files and descriptor files. The descriptor files combine to 'describe' the CD and the image files contain the content.

Clearly, a DDP Fileset is as close to a master as we are going to get prior to the LBR in a logical sense. What we now have to take control of is how we physically deliver it. Remember that these are data files pure and simple – there is no timing involved – issues such as jitter don't come into the equation. There are those who say they can hear sonic differences between the same file played from different hard drives and I can accept the technical reasons for that possibly being the case, but until you actually 'clock' the data stream from the storage media it's only 1s and 0s.

How you transport that data will not effect the sound – if you delivered a DDP Fileset on punched cards, you may need a truck to move it, but it would sound the same. What this means is that we do not have to be locked into a specific format for delivery. Services such as WAM!NET work for the larger concerns but smaller labels and independent mastering facilities cannot afford nor want to use such a system – they still want to be able to send physical media. Also, the idea of being able to 'play the master' is still appealing – the last point at which sonic QC takes place before the discs are replicated.

So, the answer to the 'Which king?' question is really one of practicality. When moving moderately small amounts of general computer data around we

instinctively use whatever suits the situation: network, intranet or Internet connections for immediate remote delivery; memory sticks for small files in the same physical environment; data CD-R, DVD-R or DVD-RAM for larger files while things like Zip drives fill the gaps. The list is endless and growing as technology develops. What we in the mastering community must do is use whatever is suitable and available at the time as the physical transporter but keep the concept of what is being transported (i.e. our DDP Fileset) as defined and separate. Sony's attempt to persuade us to replace the Umatic/1630 combination with the PCM9000 was doomed as the industry would not be held to ransom again by one manufacturer as it had been with Umatic. It was a pity in some ways as the PCM9000 was technically good and provided many useful features.

Among workstation developers, SADiE is taking a lead and in now offering the option of mastering a DDP Fileset to optical disc. DVD-RAM is the obvious choice on many counts as the drives and media are relatively inexpensive, they feature very robust error correction, and there is sufficient capacity to carry all the required data for all but the very fullest DVD masters. Also, the discs can be transported in a jewel box type tray or can be written and retained in a caddy – back to the original concept of a tin sealed with tape.

DVD-RAM is here to stay, is proven and is supported by all the major hardware and media manufactures. An added bonus is that, being random access, it is possible to play the master in real-time and verify at high speed. Tools are coming to market to treat a DDP Fileset as though it were the disc that it is describing – an area that my own company is actively involved in. Playing a track or checking ISRC codes is similar to working from a CD and the removal of linear tape from the equation means near instantaneous access times – the DDP Fileset 'becomes' the CD.

Manual editing of DDP Filesets is possible but definitely not to be recommended. It is an area fraught with danger – they are extremely complex and errors at best result in extra time (and hence cost) being incurred correcting them at the glass mastering stage. At worst it can result in a replicated disc having play errors. A small amount of editing of Exabyte-based DDP masters has been allowed – for example, adding or changing ISRC codes – but even this apparently simple operation can upset some LBR input systems. You should definitely not tamper with the files, tempting though it might seem.

Although not yet implemented in the DDP protocol, a checksum could be generated that would ensure that no editing of the files has taken place and this would also serve as a check for transfer integrity. This along with other changes may well occur as the format matures and is an area for investigation and discussion.

If we ignore the delivery issue we will end up with a short-term fix by way of another hardware format foist upon us by the replicators or equipment manufacturers. We have an opportunity to decide something for ourselves here. I have no commercial interest in DVD-RAM – it does however seem to me, in terms of physical delivery, to be an excellent solution while retaining the underlying flexibility of the DDP Fileset format.

We are now up to Version 2 of DDP – there may well be further revisions but the point to remember is that DDP is here to stay as a way of controlling the LBR. Obviously, co-operation is required by workstation developers, the replicators, and input system developers such as Eclipse, Media Morphics and DCA but it is in all their interests for a standard to be agreed upon.

Two final points. First, CD-R duplicator developers are starting to offer the ability to burn from DDP Filesets – what better way of ensuring that prerelease versions match the replicated CD? Second, a DDP Fileset, being in conventional file format, means that any carrier of it can also store additional files – artwork and label information could be sent alongside the data. At least one major label is regularly doing this using WAM!NET as the carrier – no reason why it can't be done using DVD-RAM. Maybe we have finally reached a point where true master interchange is viable at all levels of the industry. ■

DVD-RAM specification in relation to master delivery

- **Sufficient capacity? Currently 4.7Gb single sided, 9.4Gb double sided.**
- **Vulnerability of data? Exceptionally high level of error correction.**
- **Data protection? Could be password protected – not yet implemented.**
- **Physical protection? Bare disc or shock-resistant/shock-tolerant cartridge.**
- **User access to disc? Cartridge type – Sealed (Type I) or Accessible (Type II).**
- **Rewritable? Yes.**
- **Available drives? Panasonic, Pioneer, Sony, Teac, Hitachi, Toshiba, and others.**
- **Availability of media? Maxell, TDK, Verbatim, Kodak, and others.**
- **Shipping costs? Same as CD in Jewel Box.**
- **Longevity? Developed for long-term storage – has high archival integrity.**
- **Wear? Designed for in excess of 100,000 rewrites.**
- **System integration? IDE or USB – shows as rewritable drive on PCs and Macs.**
- **Media cost? Currently sub UK£4.00 for 4.7Gb and UK£9.00 for 9.4Gb.**
- **Drive cost? Currently UK£120-£200.**

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Lacking a new accepted 'standard' for delivery, the master for Now That's What I Call Steaming Rubbish Vol.46 is delivered on punched cards.