



DTS POSITION ON “DOLBY EVALUATES DTS”

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Dolby Laboratories has recently published a brief paper describing their evaluation of the DTS CD/DVD encoder/decoder set. The paper, as might be expected, asserts the superiority of Dolby Digital over the DTS Digital Surround system. Such a finding from a principal competitor is suspect on its face. It appears that the paper is being appropriately discounted by informed observers, making a response from DTS perhaps superfluous; nevertheless, there are a number of points that need correction. Sentences in quotes are Dolby's.

1. **“Based on the recent availability of the DTS CAE-4 encoder and CAD-4 decoder -- five years after the launch of DTS for laserdisc and three years after DVD-V -- it is now, for the first time, possible to conduct a legitimate series of tests on DTS.”** The appearance of a DTS encoder for sale arguably does mark the first time such a test has been conveniently available to Dolby Laboratories. But to any recording engineer, journalist, or other interested party, the DTS encoder has always been available for evaluation.

For example, as early as August 1994, the DTS encoder was provided to Tom Jung for evaluation at his premises; likewise in October 1994, to Tom Norton at *Stereophile*. Bypass switching and time alignment (latency compensation) were provided to encourage the most rigorous possible comparisons with unencoded original material. There have been many other independent evaluations since, and to this day, any qualified person wishing to audition or make measurements of any sort could and can do so for the asking.

2a. **“...at the 754 kbps data rate,... [DTS] maxes out at 15 kHz...”** For 48 kHz sampling, DTS has response to 24 kHz at 1.5 Mbit/s and response to 19 kHz at 754 kbit/s.

2b. **“Dolby Digital maintains full 20 kHz bandwidth at 448 kbps and achieves an 18 kHz bandwidth at 384 kbps.”** Correct, and Dolby Digital combines channels above 15 kHz at 448 kbit/s, and down to 10 kHz at 384 kbit/s. The DTS CAE-4 does not combine channels at any frequency at either data rate.

The success of a codec at lower bit rates depends on how data reduction techniques are balanced, which we are pleased for others to evaluate by ear.

3. **“...the [DTS] LFE channel response gently rolls off 1 dB at 50 Hz and 3 dB at 90 Hz.”** The response of the CAE-4 encoder is: flat to 100 Hz, -3 dB at 116 Hz, -6 dB at 125 Hz. All CDs and DVDs encoded with the CAE-4 exhibit this characteristic.

4. **“The DTS CAE-4 encoder is a nearly featureless product -- it does not support downmixing and dynamic range control, two important features that DTS claims to support.”** DTS considers the audio quality of the CAE-4 its primary “feature.” The coder has a minimum of controls *by design*, because it is intended *not* to modify the sound of the original master.

Downmixing and dynamic range control are part of the DTS specification and are implemented in many decoders. They are not included in the CAE-4 encoder, which is specifically for DVD and CD use; encoders purposed for other applications can implement these features as needed. The DTS track on DVD-V is available for those who wish to hear the full original soundtrack with no processing applied.

5. **Studio listening tests.** Dolby describes listening tests at three unnamed studios, on unnamed material, by unnamed listeners, with setups and procedures not described, conducted by a competitor with a strong interest in the outcome. This proves nothing.

If Dolby wishes to assert that DTS at 1.5 Mbit/s is perceptibly different from the unencoded original, it would behoove them to prove it. Arrange a blind test using the standard protocols, administered by a disinterested third party, comparing the DTS encoder/decoder with a bypass. Obtain a statistically significant result.

There would be no reason to include Dolby Digital in the test, since its lack of transparency is a matter of scientific record (cf. Soulodre, et al., *Journal of the Audio Engineering Society*, Vol. 46, #3).

6. **Dialog normalization.** Dolby notes that dialog normalization typically reduces Dolby Digital tracks by 4 dB on motion picture material. Naturally, any comparison of the codecs should be done at matched levels, correcting for this. Note two things: (1) the DTS level matches the level of the original master; (2) if the

DIALNORM attenuation is done in the digital domain, as it often is with Dolby Digital implementations, the performance of the D/A converters is compromised by the amount of the attenuation.

7a. **“Until recently, DTS encoders added 0.6 dB gain to broadband audio program content, even though they measured 0 dB gain for 1 kHz calibration tones.... This encoding characteristic has recently been removed from the CAE-4....”** The CAE-4 has not been changed. Dolby themselves note that prior to the CAE-4, they had no opportunity for testing a DTS encoder. Therefore this statement contradicts both the facts and itself.

7b. **“Most listeners would not detect this small gain as an increase in loudness, but would describe the louder sound as having more ‘punch’ or dynamics....”** Dolby did, at an earlier time, claim that cumulative measurement indicated a fractional gain in a DTS-encoded signal over time. Such an integration may show long-term gain or loss of overall level from one codec or piece of material to another, based on whether coding errors are additive or subtractive. This measurement is irrelevant and would have no correlation with instantaneous perception of “punch” or anything else.

8. **“DTS and Dolby Digital versions of a DVD are often released at different times. In these cases, a different master is often used, which can cause significant sonic differences between the two soundtracks.”** Certainly encodings from different masters would not be the basis for a valid comparison. But if such differences accounted for listener preferences, one would expect that DTS and Dolby Digital would randomly benefit from better or worse masters and preferences would therefore divide 50/50. Yet DTS is typically preferred.

9. **“Dolby Digital soundtracks are sometimes changed during mastering -- some, most notably *Saving Private Ryan* and other Dreamworks titles, have had portions of the LFE signal redirected to other channels to help improve compatibility for stereo listeners.”** Since Dolby is apparently offering this fact to explain listener preference for DTS, they must believe that such alterations compromise sound quality in 5.1. DTS recommends against such alterations to the 5.1 track. Since a downmixed track is also a compromise for the stereo listener, DTS recommends including a separate, handmade stereo track; this preserves the full artistic intent in both 5.1 and stereo listening.

10. **“DTS soundtracks are also changed sometimes. For example, in the case of *Jurassic Park*, the soundtrack on the original DTS laserdisc differs considerably from the later version released on DVD.”** The laserdisc was encoded by DTS from a master tape supplied by Universal. The DVD was encoded some years later by Universal themselves. As Dolby noted above, projects done at different times might involve different masters, often not by design. The key point is that DTS has not “changed” the masters, as seems to be the implication.

11a. **“It has been found that some music recordings released on DTS have been sweetened prior to encoding, whereas the Dolby Digital version usually has not. One example of this practice is Steely Dan’s *Two Against Nature* DVD.”** According to Image Entertainment, there was no “sweetening” of the DTS track on *Two Against Nature*. The Dolby Digital and DTS tracks were encoded directly from the same master by Buena Vista Sound.

11b. **“And in the case of Dave Grusin’s *West Side Story* DVD, an LFE channel was added to the DTS version.”** The LFE track for *West Side Story* was provided at the request of N2K Records. While DTS has no desire, or right, to make mastering changes on our own, we do respond to occasional specific requests from artists and producers.

12a. **“The Dolby Digital version of *The Haunting* DVD was the original Surround EX soundtrack, while the later DVD with DTS-ES was a new mix to add the separate ES channel.”** The Dolby Digital Surround EX format, which adds a back channel to 5.1, is compromised by the fact that the back channel is not discrete, but rather matrixed into the left and right surround channels. DTS, in contrast, is able to deliver the back channel as fully discrete. If a discrete 6.1 master has not been archived for a particular title, it is necessary to restore such a master prior to encoding. Note that this task does not involve making subjective changes to the “mix”, and it is always done under the direction and with the approval of the original mixing engineers, the task being simply to provide optimum separation without disturbing artistic intent.

12b. **“*Terminator 2* was also substantially remixed to add Surround EX for the later special edition DVD compared to the earlier DVDs and laserdiscs.”** This applies to both the Dolby Digital and DTS tracks.

[continued]

Conclusion. Dolby urges that studio professionals perform their own comparative tests. DTS also urges such comparisons -- preferably without the interference of interested parties. The pertinent comparison is not DTS versus Dolby Digital, but either coder versus the unencoded original master.

DTS would prefer to work in parallel with Dolby in expanding the multichannel market, rather than continue with charges and refutations. In the end, Dolby Digital is a useful technology where space or bandwidth is sufficiently restricted. DTS provides a different path when concerns for artistic and acoustic integrity are paramount.