

# DVD Audio Formats: Dolby Digital 5.1 Vs DTS 5.1

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**January 16, 2003**

# Terminology

- DVD Video - Video stored on a DVD Disc.
- DVD Sound-track - The Audio tracks which accompany DVD Video tracks.
- DVD Audio - A DVD Disc which usually contains dedicated Audio. DVD Audio is usually of a much higher quality than Audio that accompanies DVD Video.
- Channel - A single monaural audio stream. Supports a full range of frequencies.
- Subchannel - A channel dedicated to part of a channel thus cannot act as a whole channel.

# What?

- What are Dolby Digital and DTS?
  - Audio Codecs
  - Lossy Compression
  - Multiple tracks
  - Surround Sound Codecs

# Where?

- Where are Dolby Digital and DTS Used?
  - Used on DVDs for audio tracks of DVD Video
  - Used on DVDs for audio tracks for DVD Audio (DVD-A)
  - Used in Home Theater and Cinema
  - Audio Installations for Art (Computer Music)

# Surround Sound

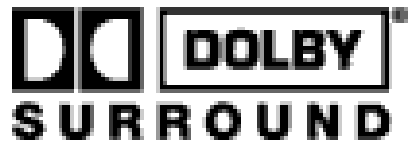
- What makes Surround Sound?
  - 6 Channels commonly referred to as "5.1"
  - Center, Front Left, Front Right, Back Right, Back Left and LFE channel.
  - LFE (Low Frequency Effects) is not a full channel ; it is dedicated to sound from 3hz (sub-sonic) to 120hz (audible).
  - Surround Sound vendors want you to suspend belief that you are in a theater or a living room. They have coined the term "Immersive Technology".



Figure 1: Example Surround Sound Layout [5]

# DVD Sound-tracks and Audio

- DVD Sound-tracks and Audio Formats Support:
  - Sampling Rate: 32kHz, 48kHz, 96kHz, 192kHz
  - Channels: 1, 2, 4, 5, 5.1
  - Sample Sizes: 16 bits, 20 bits, 24 bits.
  - DVD Sound-tracks: Usually Lossy, 48kHz, 5.1 Channels and 16 bit Audio
  - DVD Audio: Usually Lossy, 96kHz, 5.1 Channels and 16 to 24 bit audio (newer discs usually are 24 bit). (There is an uncompressed DVD Audio Format but most discs do not support that format).



# Dolby Digital Pt 1



- What is Dolby Digital (AC3)?
  - Dolby Digital is an audio codec which allows for encoding and representation of monaural, stereo, quadrophonic or surround sound.
  - Dolby Digital DOES NOT mean 5.1 channels.
  - Bandwidth of usually 384 kbit/sec to 448 kbit/sec (general range for DVD Video Audio)
  - Dolby Digital is part of the HDTV standard.





# Dolby Digital Pt 2



- **Dolby Digital Facts**

- Dolby Digital is an actual part of the DVD Video standard. To support DVD Video one must also support Dolby Digital 5.1.
- Many DVDs come with Dolby Digital 5.1 sound-tracks.
- Supports samples of 16 bits to 24 bits in size.
- Supports up to 48kHz Sampling Rate
- You can download and use the Dolby Encoder [3].
- Dolby Digital requires a DVD player with Dolby Digital decoding or a receiver or pre-amplifier with Dolby Digital decoding.



## DTS Pt 1



- What is DTS?
  - DTS is an acronym for Digital Theater Surround.
  - DTS supports monaural, stereo, quadrophonic and surround sound.
  - DTS DOES NOT mean 5.1 channels.
  - Bandwidth of usually 754 Kbit/sec to 1.5 Mbit/sec (general range for DVD Video Audio)
  - THX approved.



## DTS Pt 2



- DTS Facts.
  - DTS is often used on DVD Audio Discs
  - Supports samples of 16 bits to 24 bits in size.
  - Supports up to 96kHz Sampling Rate
  - DTS is pretty tip lipped about their encoder [3].
  - DTS requires either a DVD player with DTS decoding or a digital receiver or pre-amplifier with DTS decoding.

# DTS vs Dolby

Category	Dolby Digital	DTS
Sampling Rate	32kHz to 48kHz	32kHz to 96kHz
Sample Size	16bits to 24bits	16bits to 24bits
Channels	1 to 5.1	1 to 5.1
Bandwidth	384 to 448 kbit/sec	754 Kbit/sec to 1.5 Mbit/sec
DVD Video	Yes (In the standard)	Yes (optional)
DVD Adoption	Most Popular	Less titles than Dolby
DVD Audio	Yes	Yes (preferred)
Performance	Sounds Worse than DTS	Sound Better than Dolby
Encoder Quality	Good	Spotty

Table 1: DTS vs Dolby

# Conclusions pt 1

- DTS sounds better! Dolby is more Economical
  - Most Critics agree DTS sound better (Dolby engineers don't).
  - DTS Supports higher sampling rate.
  - DTS Supports higher bandwidth.
  - DTS is actually preferred in DVD Audio.
  - Dolby allows for longer movies on one disk.
  - Dolby uses the less bandwidth to achieve similar quality.
  - Dolby is part of the standard.

# Conclusions pt 2

- Don't get ripped off!
  - Dolby Digital DOES NOT MEAN 5.1
  - DTS DOES NOT MEAN 5.1

# Appendix 1: THX

- THX is not an audio format! THX is a set of standards for used for licensing the THX logo and certifying theaters and equipment are of a quality worthy of THX.

THX deals with:

- Outside noise (from the lobby or other auditoriums)
- Inside noise (from the projector or air conditioning)
- Audio distortion
- Obstructed or uncomfortable viewing angles
- Reverberation in the auditorium
- Insufficiently bright images
- Unequalized or poor audio

[4]

## Appendix 2: SDDS

- SDDS is a 7.1 format. It attempts to transmit information without the use of analog means till the very end.
  - Sony Dynamic Digital Sound
  - Expensive
  - Extra channels are Surround Left and Surround right (center left and center right).
  - Digital Connections need extra equipment.
  - SDDS is carried optically in strips along the sides of film
  - Designed for movie theaters only.
  - Dolby Digital Ex and DTS Ex are extensions to DTS and Dolby to allow for 7.1



## References

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