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Agenda

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- Digital Theater Systems (DTS)
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- Pros and Cons of Dolby Digital/DTS
WHAT'S DOLBY DIGITAL?
WHAT'S DTS?

ANSWER:
THEY ARE FORMATS OF "SURROUND SOUND SYSTEM"
Surround Sound

- Surround sound encompasses a range of techniques for enriching the sound reproduction quality of an audio source with audio channels reproduced via additional, discrete speakers.

Formats:
- Dolby Digital
- DTS
- THX
Dolby Digital

Dolby Digital is the name for data and audio compression technologies developed by Dolby Laboratories.

Dolby Digital

- Dolby Digital is common version.
- Delivering high-quality digital audio for up to 5.1 discrete channels.
  - five speaker channels
  - one Low-Frequency Effects channel

Dolby Digital EX

- Similar in practice to Dolby’s earlier Pro-Logic format.
- Adding a center channel and single rear surround channel to stereo soundtracks.
- Creating 6.1 or 7.1 channel output.
**Dolby Digital Surround EX**
- Cinema Version of Dolby Digital EX.
- Providing economical and backwards-compatible means for 5.1 soundtracks.
- Carrying a sixth, center back surround channel for improved localization of effects.

**Dolby Digital Live**
- Dolby Digital Live (DDL) is a real-time encoding technology for interactive media such as video games.
- Converting any audio signals into a 5.1-channel 16-bit/48 KHz Dolby Digital format at 640 kbps.

**Dolby Digital Plus**
- Dolby Digital Plus extends the capabilities of Dolby Digital, optimizing sound quality and efficiency.
Dolby Digital Plus

- Increasing bitrates (up to 6.144 Mbit/s)
- More audio channels (up to 13.1)
- Reducing compression artifacts.

Dolby TrueHD

- Dolby TrueHD is the next-generation lossless technology developed for high-definition disc-based media.
- Mandatory for HD DVD and is optional for Blu-ray Disc hardware.
- Supporting 24-bit, 96 kHz audio channels at up to 18 Mbit/s over 14 channels.

Channel Configurations

- Mono (Center only)
- 2-channel stereo (Left + Right)
- 3-channel stereo (Left, Center, Right)
- 2-channel stereo with mono surround (Left, Right, Surround)
- 3-channel stereo with mono surround (Left, Center, Right, Surround)
- 4-channel quadraphonic (Left, Right, Left Surround, Right Surround)
- 5-channel surround (Left, Center, Right, Left Surround, Right Surround)
Applications

- Cinema soundtracks
- DVD Video
- Home cinema
- Digital TV
- PC game
- Etc.

Digital Theater System (DTS)

- DTS is a series of multichannel audio technologies owned by DTS, Inc.
- A company specializing in digital surround sound formats.
**Digital Theater System (DTS)**
- Common version is 5.1-channel system.
- Also supporting numerous channel combinations, and stereo, four-channel, and four-channel+LFE soundtracks that have been released on DVD, CD, and Laserdisc.

**DTS Variant**
- Standard 5.1-channel DTS Surround codec
  - DTS 70 mm
  - DTS-ES
  - DTS Neo:6
  - DTS 96/24
  - DTS-HD High Resolution Audio
  - DTS-HD Master Audio
  - DTS Connect.

**DTS 70 mm**
- DTS 70 mm is process designed for playback in motion picture theaters equipped with 70mm projection and 6-track surround sound.
DTS-ES

- DTS-ES (DTS Extended Surround) includes two variants, DTS-ES Matrix and DTS-ES Discrete.
  - DTS-ES Matrix provides 5.1 discrete channels, with a matrixed center-surround audio channel.
  - DTS-ES Discrete provides 6.1 discrete channels, with a discretely recorded (nonmatrixed) center-surround channel.

DTS Neo:6

- DTS Neo:6 converts the sound into 5.1 or 6.1 channel format.

DTS 96/24

- DTS 96/24 allows the delivery of 5.1 channels of 24-bit, 96 kHz audio and high quality video on the DVD-Video format.
  - Being placed in the video zone on DVD-Audio discs.
**DTS-HD High Resolution Audio**

- DTS-HD High Resolution Audio, along with DTS-HD Master Audio, compose the DTS-HD extension to the original DTS audio format.
- Delivering up to 7.1 channels at a 96 kHz sampling frequency and 24-bit depth resolution.

**DTS-HD Master Audio**

- DTS-HD Master Audio, previously known as DTS++, is the second of two DTS-HD audio formats.

**DTS-HD Master Audio**

- Supporting virtually unlimited number of surround sound channels.
- Down mixing to 5.1 and two-channel.
- Deliver audio quality at bit rates up to lossless.
DTS Connect

- DTS Connect is a blanket name for a two-part system used on the computer platform only.
- Converting PC audio into the DTS format.
- The two components of the system:
  - DTS Interactive is a real-time DTS stream encoder.
  - DTS Neo:PC is a technology based on the DTS Neo:6.

Pros and Cons of Dolby Digital/DTS

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<thead>
<tr>
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<th>Dolby Digital (DD)</th>
<th>Digital Theatre Systems (DTS)</th>
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<tbody>
<tr>
<td>Pros</td>
<td>Cons</td>
<td>Pros</td>
</tr>
<tr>
<td>#1</td>
<td>Good to Very Good sound for movies.</td>
<td>No Audio CD’s.</td>
</tr>
<tr>
<td>#2</td>
<td>Industry standard.</td>
<td>Dolby and Meridian licensing forcing consumers to purchase new hardware for multi-channel audio discs.</td>
</tr>
<tr>
<td>#3</td>
<td>Limited to 48kHz sampling.</td>
<td>Limited to 48kHz sampling.</td>
</tr>
<tr>
<td>#4</td>
<td>ES mode with added rear center channel. Added rear center channel is matrixed and not discrete.</td>
<td>ES mode with added discrete rear center channel.</td>
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# Dolby Digital (DD) vs. Digital Theatre Systems (DTS)

<table>
<thead>
<tr>
<th>Pros</th>
<th>Con's</th>
<th>Pros</th>
<th>Con's</th>
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<tr>
<td>Channel levels are usually very accurately transferred to disc.</td>
<td>Dynamics are sometimes lacking due to too much compression.</td>
<td>Rear channels are sometimes too loud and must be attenuated on some discs.</td>
<td></td>
</tr>
<tr>
<td>Edless software options for DVD concert videos.</td>
<td>Most of these videos suffer from substandard audio quality due to too much compression.</td>
<td>Excellent sounding music DVDs and concert videos.</td>
<td>No Genesis Concert DVD.</td>
</tr>
<tr>
<td>DVD software readily accessible.</td>
<td>DVD Software becoming more available.</td>
<td>Not quite as much as DD.</td>
<td></td>
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## References

**References from conference proceedings**


**References from journal**


**References from web site**

- [http://www.dolbydigital.com](http://www.dolbydigital.com)
- [http://www.dtsonline.com](http://www.dtsonline.com)
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