Note: This document assumes the DP600 includes the optional file-based audio coding package.

Dolby DP600 and DP600-C Program Optimizer Overview for Broadcast and Ad Insertion

Summary

The Dolby® DP600 Program Optimizer is an innovative and flexible system offering intelligent file-based audio loudness analysis and correction compatible with many of the broadcast and video-on-demand (VOD) media file formats in use today. Expanding upon the technology developed for the award-winning Dolby LM100 Broadcast Loudness Meter with Dialogue Intelligence™, the Dolby DP600 enables cable and IPTV broadcasters to automatically normalize the loudness of all file-based programming and commercials without impacting the original dynamic range.[1]

For compressed audio formats that include metadata (Dolby E, Dolby Digital, and Dolby Digital Plus, for example), the Dolby DP600 can automatically set the dialnorm parameter and automatically correct a previously set dialnorm parameter.

The DP600-C version additionally offers faster-than-real-time file-based encoding and decoding of Dolby Digital, Dolby Digital Plus, and Dolby E content, and enables transcoding between Dolby E and Dolby Digital or Dolby Digital Plus formats.

Taking advantage of the features of Dolby Digital Plus, the DP600-C can perform high-quality, single-step transcoding of Dolby Digital to Dolby Digital Plus without having to decode and reencode.

To ensure the highest possible work-flow integration and efficiency, the DP600 offers open access (via Web Services) to Dolby's unique audio processing engines as well as coding technologies traditionally found only in real-time hardware.

For example, the DP600 feature set complements several types of third-party applications and products, including the following:

- Archiving
- Automation
- Content conversion
- Content transport
- Distribution
- Media asset management
- Production

[1] In very rare cases involving extreme loudness corrections, "soft clipping" can occur.

A Quick Look Under the Hood

The DP600 includes a number of audio and media file processing engines for utilization in many applications, as shown in Figure 1.

DP600 Processing Engines and Supported Media File Types

Media File Types Supported
- MPEG-2 Transport Stream
- MPEG-2 Program Stream
- GXF (SMPTE 360M)
- WAV and Broadcast WAV
- Dolby E
- Dolby Digital (AC-3)
- Dolby Digital Plus (E-AC-3)

Loudness Analysis and Correction
- Dolby E
- Dolby Digital
- MPEG-1 LII
- LPCM via WAV and Broadcast WAV

Direct Transcoding
- Dolby Digital to Dolby Digital Plus

Audio Encoders *
- Dolby E
- Dolby Digital
- Dolby Digital Plus
- MPEG-1 LII

Audio Decoders *
- Dolby E
- Dolby Digital
- Dolby Digital Plus
- MPEG-1 LII

* DP600-C only.

Figure 1 DP600 Processing Engines and Supported Media File Types

DP600 and DP600-C for Broadcast and Ad Insertion

The DP600 Program Optimizer can be utilized in a number of broadcast and ad insertion applications:

- Automated ingest file analysis and loudness correction
- Automated ingest file transcoding
  - MPEG-1 LII to Dolby Digital (AC-3)
  - Dolby E to Dolby Digital
- Automated digital program insertion (DPI) file analysis and loudness correction
- Automated broadcast media file (GXF, others) audio transcoding
  - Dolby E to Dolby Digital
- Automated broadcast media file QC and loudness correction

Newly ingested content can be routed through the DP600 for loudness analysis and correction, encoding, decoding, or transcoding processes before being moved to your media storage library or play-out server.

Newly ingested ad content can be passed directly to the DP600 for loudness analysis and correction before it's placed in your storage archive or ad server.

Additionally, the Dolby DP600 platform facilitates archiving, automated QC, content conversion, and media asset management, and it offers considerable potential for integration with third-party systems through a Web Services interface. Three control methods help meet specific user requirements:

- Manual control—Users can set up and initiate "processing jobs" on an individual basis from a simple-to-use Web browser interface.
- Third-party control via Web Services—The DP600's processing engines are also available as a set of Web Services. Manufacturers can directly integrate these engines, at any level, into their work flow to create a seamless user experience without impacting day-to-day operations.
- Automatic hot-folder ingest process—Users can create "hot folders" and predefine a work-order profile for each one. The profile governs the DP600's behavior with specific broadcast media types. All media files moved to a hot folder are automatically processed based on the folder's profile and delivered to a user-defined folder upon completion. Hot folders are easy to set up and use and can greatly speed integration time within some facilities.

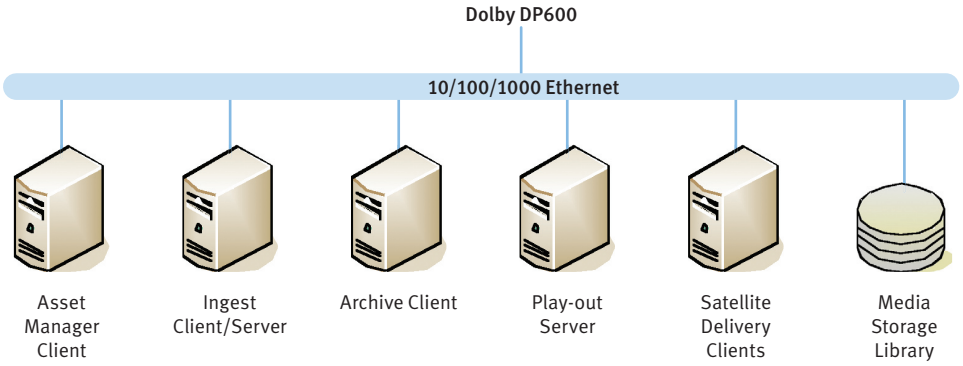

Figure 2 DP600 Integration Overview

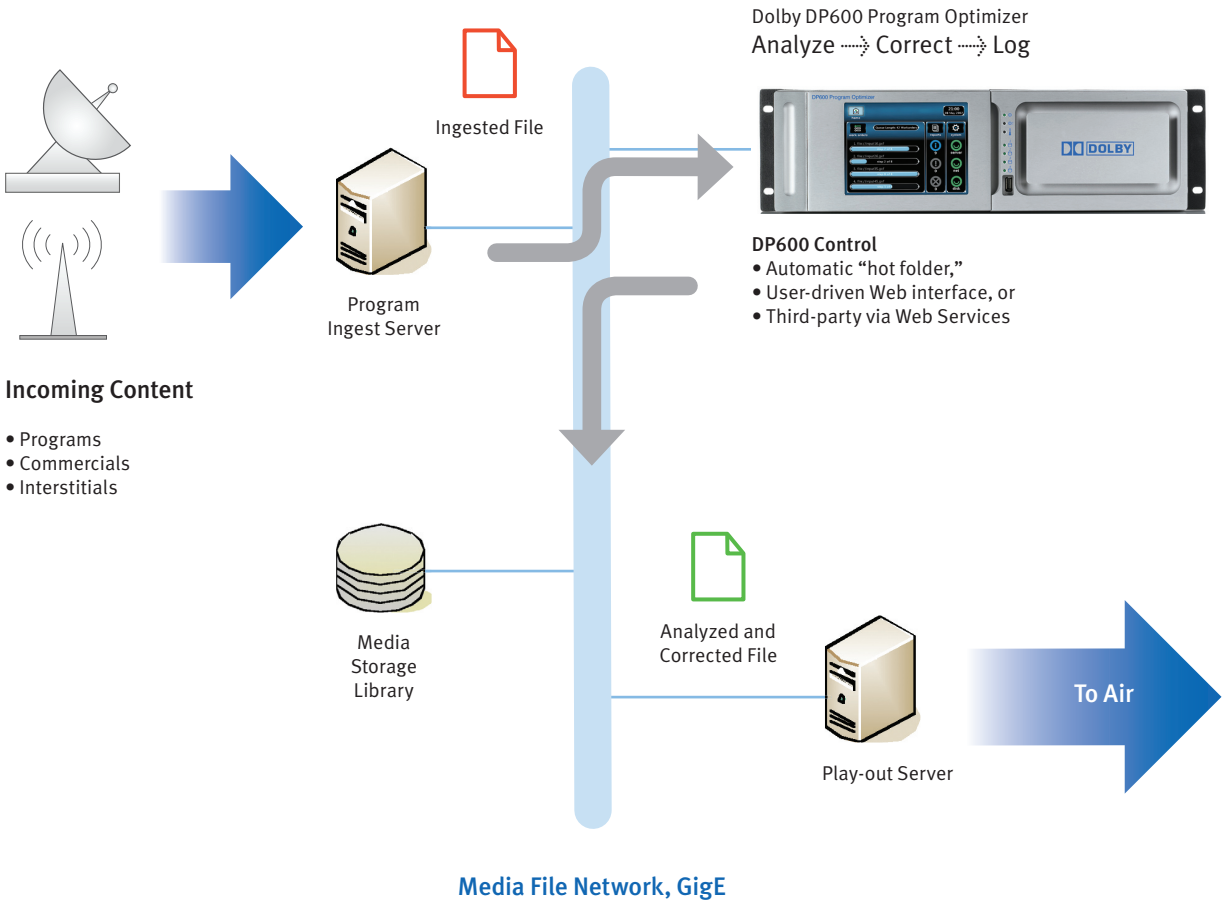

Figure 3 Example of Media File Work Flow (Loudness Analysis and Correction)

Integration and Control

The DP600 integrates easily into an existing file-based network infrastructure. Once connected and configured, the DP600 becomes an intelligent processing node that can be readily adapted to day-to-day operations and work flow (see Figure 2), including:

- Ad insertion—New ingested ad content can be passed directly to the DP600 for loudness analysis and correction before being placed in your storage archive or ad server.
- Program ingest, audio transcoding, and QC—Newly ingested content can be routed through the DP600-C for loudness analysis and correction as well as transcoding from/to audio formats such as Dolby E, Dolby Digital, Dolby Digital Plus, and MPEG-1 LII before being moved to your media storage library or play-out server.
- Media archive processing—Previously ingested content stored in your media archive can be analyzed, logged, and, if necessary, corrected in faster than real time before being placed back into your media archive. In addition, the DP600-C can transcode your archived media file audio format to/from Dolby E, Dolby Digital, Dolby Digital Plus, or MPEG-1 LII.

Intelligent Loudness Normalization Process

The DP600 expands upon the technology developed for the award-winning Dolby LM100 Broadcast Loudness Meter with Dialogue Intelligence. The DP600 intelligently closes the loop on the measurement and correction process and gives users the ability to automatically normalize the loudness of all their file-based content without impacting dynamic range and in a faster-than-real-time manner.

This unique process guarantees that important metadata parameters such as dialnorm are set properly for every file (program) without user intervention, and without the time-consuming measurement and correction that were previously done in real time.

For example, for coded audio data types that include metadata, such as Dolby E and Dolby Digital, loudness normalization is achieved by automatically analyzing the audio bitstream and then comparing this analysis with the stream's metadata. If a mismatch is detected, the DP600 will automatically correct the metadata values without having to decode and reencode the audio stream (see Figure 4).

The DP600 can also correct coded and/or linear audio data types that do not include metadata, such as MPEG-1 LII and LPCM. For these audio data types, loudness normalization is achieved by automatically analyzing the audio bitstream and then comparing this analysis with a user-defined target loudness value. If a mismatch is detected, the DP600 will automatically scale the loudness to match the target value (see Figure 5).

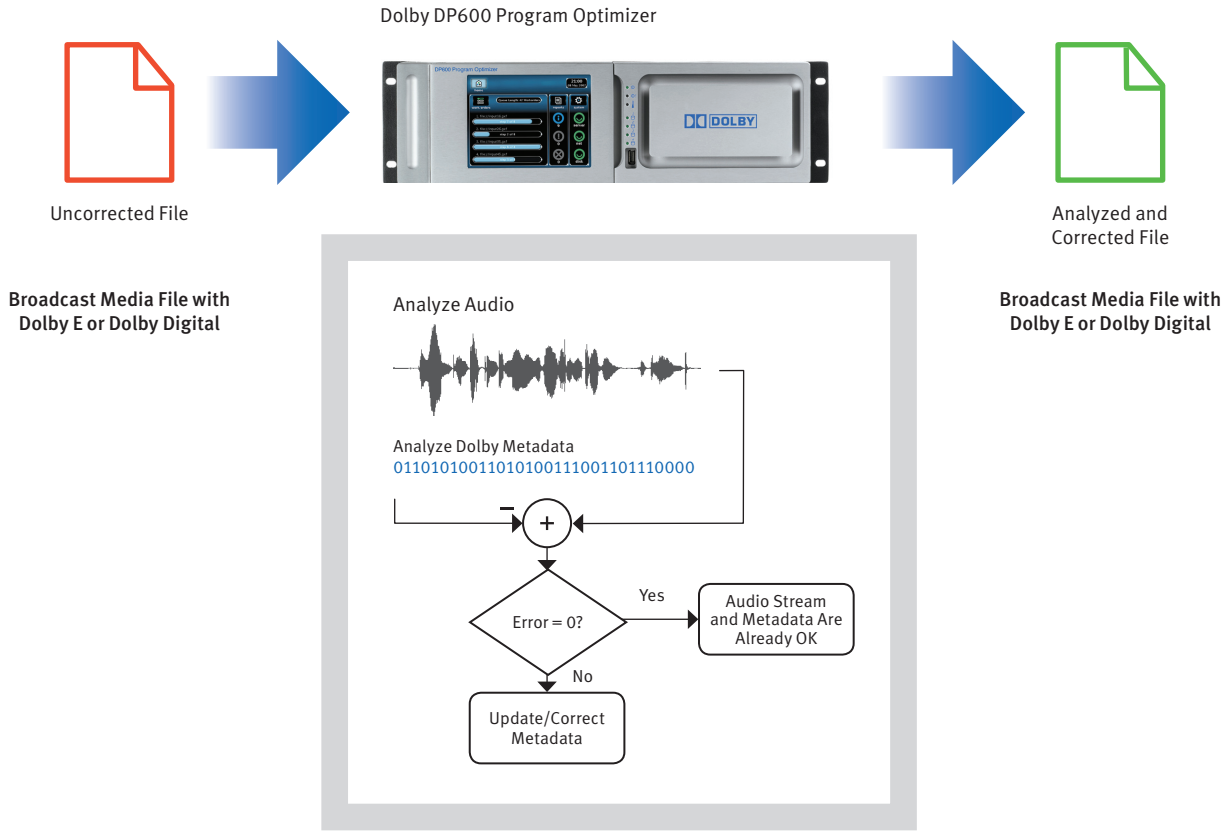

Figure 4 Coded Audio with Metadata Analysis and Correction

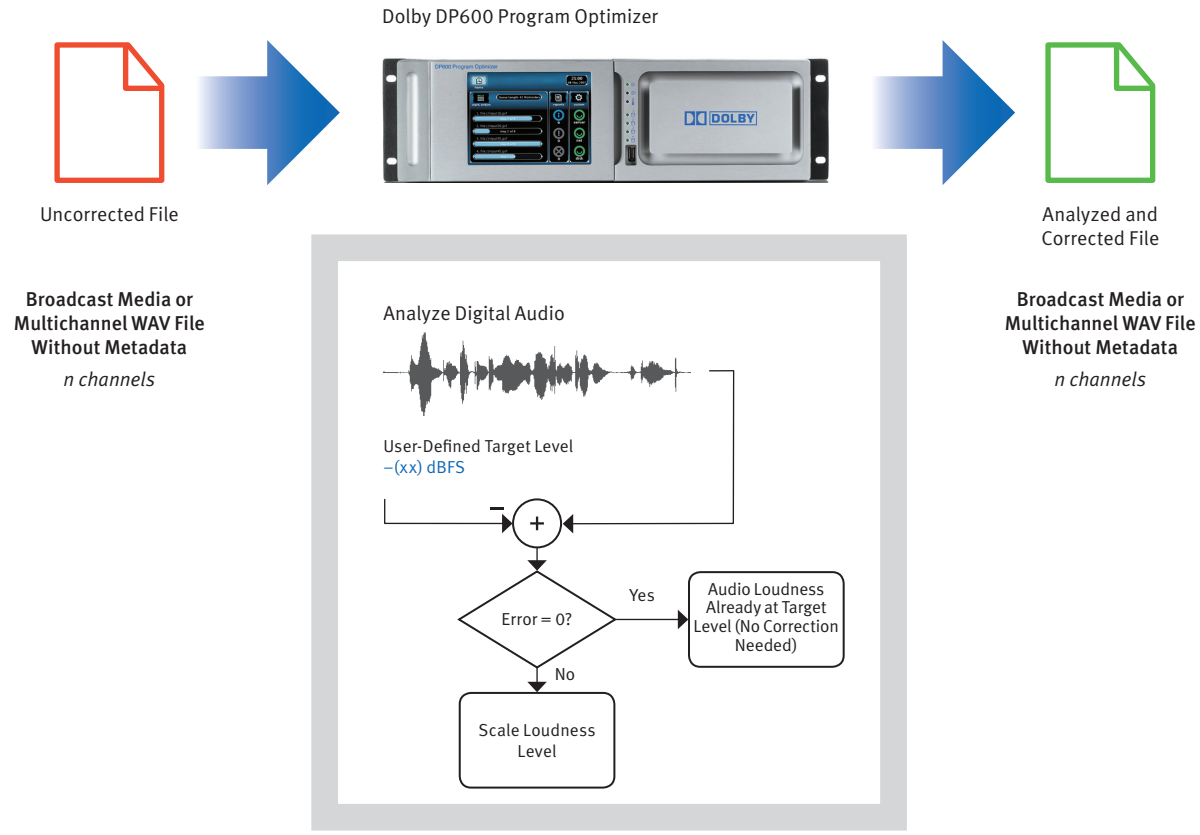

Figure 5 Audio Analysis and Correction for Audio Types Without Metadata

File-Based Encoding and Decoding

The DP600-C additionally offers direct access to Dolby technologies typically found in real-time hardware. These include:

- Dolby E
- Dolby Digital
- Dolby Digital Plus

These processes can be easily combined with each other or with our intelligent loudness analysis and correction engine to adapt to a wide range of content needs, including file-based transcoding of content stored in Dolby E format to Dolby Digital or Dolby Digital Plus.

The Dolby audio decoder engines generate a multichannel and/or multiprogram Broadcast WAV file with a Dolby audio metadata "chunk."[2] The audio encoder engines accept multichannel and/or multiprogram WAV files (including Broadcast WAV and multichannel WAV formats) with or without a Dolby audio metadata chunk.

File-Based Dolby Digital to Dolby Digital Plus Transcoder

The DP600-C also supports a unique, quality-preserving Dolby Digital to Dolby Digital Plus transcoder. This transcoding can provide a simple migration path for next-generation services utilizing existing file-based content. For example, VOD files that currently include a multichannel Dolby Digital audio elementary stream can be processed by the DP600-C to add a Dolby Digital Plus audio elementary stream without having to demux, decode, reencode, and remux the files.

[2] For more information on the Dolby audio metadata chunk, please contact us.

Supported File Formats

The DP600 supports several of the most common broadcast media file formats and audio types found today.

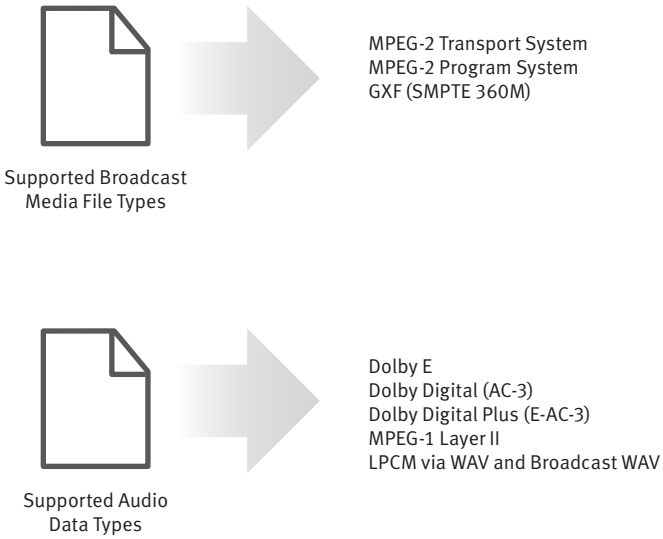

Figure 6 DP600 Supported File Formats and Audio Data Types

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