SCHNUELLE

HURST

# Digital Cinema Applications (21DC)

## Chair: Dave Schnuelle
## Co-chair: John Hurst

The charter of 21DC is to develop the standards for digital cinema as it applies to the application of mastered essence to theatrical digital distribution and exhibition, including compression, encryption, wrapping, marking, packaging, media, logging, playout, projection, reproduction, and related topics. 21DC is organized into two broad-based working groups and several more narrowly focused ad hoc groups. The working groups are Mastering, which covers preparing the distribution master, and Exhibition, which covers those aspects inside the cinema, including projection and security. Within the past year, a third working group on Distribution was closed down, its work being nearly complete, and its remaining tasks were assumed by the Packaging ad hoc group.

Over the past year more standards for D-Cinema were published, primarily in the security area, while many more systems were installed throughout the world. Keeping in mind that D-Cinema is an entirely new application of technology, the lack of interoperability issues in the ongoing deployments is remarkable. We continue to see active participation in the standards-setting process by at least ten playback server manufacturers and four projector manufacturers, as well as many end users representing exhibitors and content owners. It is this active participation by the manufacturers and end users that is indispensable to making standards that work.

In the previous progress report, the publication of the initial core standards for creating and distributing a D-Cinema program was described. Those standards are listed here in *italics*. Over the past year those standards have been extended to include a set of security and key management standards, and ancillary standards including a packaging track file for 3-D stereoscopic content. Those standards have been added to the list below.

### Series 428—D-Cinema Distribution Master

*Part 1 – STD Image Characteristics*
*Part 2 – STD Audio Characteristics*
*Part 3 – STD Audio Channel Mapping*
Part 6 – RP Digital Leader
*Part 7 – STD Subtitle Characteristics*
Part 9 – STD Serial Digital Interface Signal Formatting

### Series 429—D-Cinema Packaging

*Part 3 – STD Sound and Picture Track File*
*Part 4 – RP MXF JPEG 2000 Application*
Part 5 – STD Timed Text (Subtitles) Track File
*Part 6 – STD Track File Essence Encryption*
*Part 7 – STD Composition Playlist*
*Part 8 – STD Packing List*
*Part 9 – STD Asset Mapping*
Part 10 – STD Stereoscopic Picture Track File

### Series 430—D-Cinema Operations

*Part 1 – STD Key Delivery Message*
*Part 2 – STD Digital Certificates*
*Part 3 – STD Extra Theater Messaging*
*Part 3 – Amendment 1, Extra Theater Messaging*
Part 4 – STD Log Record Format Specification
Part 5 – STD Security Log Constraints

Part 6 – STD Auditorium Security Messages
Part 9 – STD Key Delivery Bundle

### Series 431—D-Cinema Quality

*Part 1 – STD Screen Luminance Level, Chromaticity, and Uniformity*
*Part 2 – RP - Cinema Reference Projector*

### Series 432—Digital Source Processing

*Part 1—EG Color Processing*
*Part 2—EG Audio LFE Characteristics*

### Standalone Documents

**433**—STD XML Data Types

### Registered Disclosure Documents

**RDD15**—Software Scripting Language for Color Transformations

With these basic documents being proven in field implementations, 21DC has started looking at extensions and enhancements to the main standards. Studies and development are under way, especially in the area of additional frame rates, and tools for exhibition operations and management. And answering the call of our exhibition colleagues, 21DC is currently working on closed caption standards for D-Cinema presentations.

Considering that D-Cinema technology is still in its infancy, the basic goal of the standards is to ensure interoperability in digital cinema presentations, with the key tenet that a single distribution method can be exhibited in any theater, just as in film exhibition. Realizing the technology may change, we consider it our responsibility to provide a stable set of standards that can be built upon, with critical attention to backward compatibility: new standards or revisions of standards must provide the desired new features, but not make thousands of units in the field obsolete.

In its transition from DC28 to 21DC in the new technology committee structure, the Technology Committee on Digital Cinema Applications will continue to provide standards and recommendations to ensure interoperability, compatibility, performance, and support for future innovation in the D-Cinema industry.

**DAVE SCHNUELLE** represents Dolby Laboratories as senior director, image technology, and is responsible for guidance in Dolby's efforts in the television, cinema, and consumer imaging areas. He began his television-engineering career in 1969 as an engineer on television outside broadcasts while attending Purdue University. Schnuelle later held chief engineer and director of engineering positions at various post-production facilities such as Image Transform and Modern VideoFilm in Los Angeles.

Working with Lucasfilm's THX Division beginning in 1991, Schnuelle was responsible for founding the THX Digital Mastering Program for quality assurance of home video masters and duplicated software. As director of technology for THX, he directed research efforts into new technology for cinemas. During that period he directly supervised the international digital cinema exhibition of the new Star Wars movies—Episode 1 (1999) and Episode 2 (2002).

Schnuelle holds four patents on imaging and audio technology and has been deeply involved with film and television standards activities for 30 years, publishing and presenting many papers over that period. Schnuelle is a Fellow of SMPTE.

**JOHN HURST** is co-founder and chief technology officer of CineCert, LLC, an internationally recognized developer of digital cinema technology, where he is currently engaged in the development of the D-Cinema Comprehensive Test Plan for Digital Cinema Initiatives (DCI). Hurst has been an active participant in the SMPTE DC28 Technology Committee, and has served as editor of several of the standards published by that committee. He has over 25 years of experience in sound recording and post-production, including the design and construction of well-known recording studios and post-production sound facilities in the Los Angeles area, and has technical responsibility for many location recordings and live-to-air broadcasts. Hurst is a member of the Audio Engineering Society and an active radio amateur and community volunteer.