Digital Cinema in 2008

By Michael Karagosian, MKPE

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Progress in digital cinema technology continues to advance in 2008, with the count of digital cinema installations at approximately 5,000 screens at the time of this writing (June 2008). This report reviews the progress in standards and technology-related areas, as well as the business challenges that affect the rollout of this technology.

Twenty-three SMPTE digital cinema standards were in publication by the end of 2007, with more documents in various stages of progress in committee. The majority of the completed work addresses distribution, packaging, security, and projection standards. As requirements firm up for message interchange in operations, additional work comes into view. SMPTE D-Cinema standards are also gaining international adoption. To date, 12 SMPTE D-Cinema standards have been approved by the International Organization for Standardization (ISO), with another 11 submitted for ballot.

The majority of D-Cinema standards are divided among the 428 D-Cinema Distribution Master (DCDM) series, the 429 D-Cinema Packaging (DCP) series, and the 430 D-Cinema Operations series. Highlights of the latest work include subtitles, stereoscopic track files, and security log messages. In progress, but yet to be completed at the time of this writing, is the full suite of D-Cinema packaging standards. Current work in this area includes packaging constraints, audio formats, and closed captions. (Note: In motion pictures, the term “closed caption” refers to a means of caption viewing accessible only to specially equipped members of the audience.)

While standards work moves forward, implementation is racing to catch up. An ad hoc interoperability effort has enabled the interchange of digital motion picture distributions before the implementation of published standards. But this is only a short-term solution intended to support early adopters. An industry-wide transition to SMPTE-compliant distribution is targeted for April 2009. This will be a major change for early adopters, and will likely require a lengthy crossover period before the transition is complete.

At the committee level, the 21DC Digital Cinema Technology Committee (formerly named DC28) welcomed Dave Schnuelle of Dolby Laboratories as its new chairperson at the beginning of the year. Wendy Aylsworth of Warner Bros, who chaired DC28 from 2004 to the end of 2007, moved on to the demanding role of SMPTE Engineering Vice President. Although 2008 has been a year of change for SMPTE’s Technology Committees, with the exception of new committee numbers, the Digital Cinema Technology Committee remains largely unchanged.

SMPTE is the primary organization for the development of D-Cinema standards, but it is not the only organization releasing documents for digital cinema. In 2008, several significant documents were also released by other industry bodies: Digital Cinema Initiatives (DCI) released its v1.2 Digital Cinema System Specification (DCSS), incorporating the 100 errata issued, following the release of v1.1 in April 2007, and the National Association of Theatre owners (NATO) released v2.0 of its Digital Cinema System Requirements document. The two documents are complementary and together form a well-rounded set of requirements for digital cinema systems. In late 2007, DCI also released its DCSS Compliance Test Plan, with a core of 400 pages. The Test Plan is a significant step toward distribution and security compliance testing. But at the time of this writing, a compliance test program has yet to be announced.

Creating a new technology foundation for the motion picture industry has proved to be no small task. In spite of the volume of work accomplished, critical technology is still needed for smooth, large-scale operation of digital cinema. More work is needed to fulfill the need for open security key management at an enterprise level. Two important standard message types, the Key Delivery Message (KDM) and Facility List Message (FLM), have either been published or are near publication. But higher level message types are needed to interoperably carry these messages between theaters and competitive service providers. Further standards work is needed.

Additional work is also needed for data communications inside the projection booth. As a new class of software evolves, called the Theater Management System (TMS), interoperability between the TMS and the digital cinema servers within the complex has increasingly become a requirement of theater owners. NATO's v2.0 System Requirements document goes into some detail to describe the baseline capabilities of these systems.

While work races forward on the technology side, the market uptake of digital cinema technology remains slow. To the disappointment of many manufacturers, the anticipated growth in purchase orders did not appear in early 2008. In my 2007 SMPTE annual report, I pointed out that the industry was headed for a "chasm." Not only did the sales cycle slow down as projected, but the tightening of the credit market in late 2007 further complicated the financing of digital cinema systems.

When forecasting sales, the 500-lb gorilla in the room is economics. While digital 3-D projection has generated excitement and support from both content creators and exhibitors, the value proposition of 2-D digital cinema has been weak. Although equipment costs have decreased over the years, the cost of digital cinema projection equipment is still too high for wide-scale adoption of this technology around the world.

The chart in **Fig. 1** compares the factors affecting cost of ownership for both film and digital equipment. Depending on the cost of capital and any discounts on equipment that one assumes, further analysis reveals that the net-present-value of combined CapEx and OpEx over a 25-year period is 190% to 300% higher for digital systems than that for film systems. This analysis assumes that the exhibitor is subsidized 80% on the first purchase of equipment.

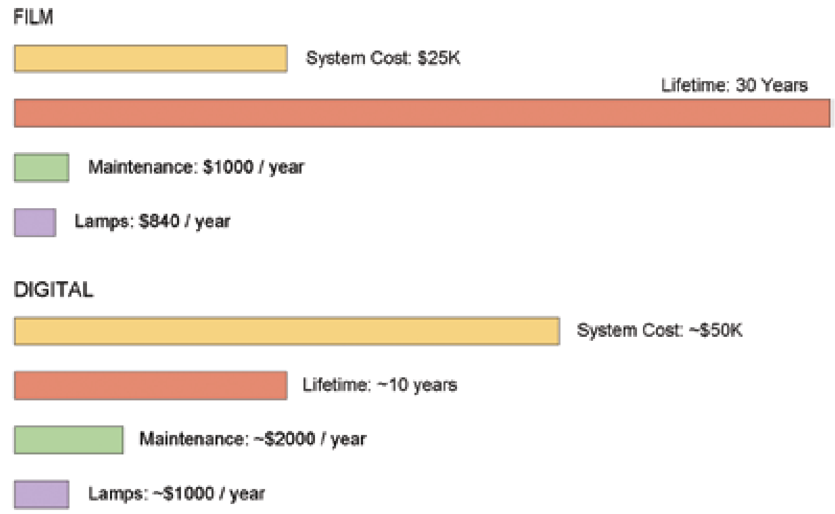

Figure 1. Cost of ownership comparison.

As stated earlier, the value proposition for digital cinema has been the introduction of quality 3-D projection. Digital cinema projectors, when equipped with the appropriate 3-D add-on technology, can display higher quality 3-D movies than possible, with ordinary 35mm projectors. The resulting interest in 3-D has been phenomenal. 2009 will be the first year in the history of cinema in which at least eleven 3-D productions will be released. Recognizing the opportunity to offer a unique form of entertainment, content producers have taken to the medium, producing 3-D animation, live action, and music productions. Moviegoers demonstrate a preference for 3-D screenings over 2-D versions and have been willing to pay extra for the privilege, as well. The 2009 release schedule and the positive response of consumers has encouraged exhibitors to install or plan to install 3-D. To date, the combined count of installed systems and announcements of future installations total over 4,000 digital 3-D screens.

But conversion of a limited number of theaters to digital 3-D projection does not produce the result that studios seek—to reduce the cost of distribution for all motion pictures. To encourage adoption of digital cinema technology, major studios support a financing mechanism for the first purchase of digital projection equipment through third-party integrators called "virtual print fee." Virtual print fee financing is based on the concept of steering the savings accrued through digital distribution toward the cost of equipment.

An equipment subsidy, though, can impose unintended consequences. When providing financial assistance for equipment, studios naturally want it applied to high-quality gear. The demand for the highest quality limits competition, however, and keeps prices high. As a result, the majority of cinemas in the world, having screen widths of 8 m or less, cannot justify the expense. Ironically, it is possible that lower cost equipment will not appear on the market until virtual print fee financing is no longer available, and a more natural market emerges.

Looking into the crystal ball for digital cinema, one must remember that the motion picture industry is content-driven, not technology driven. If studios are attracted by the economics of digital distribution, and exhibitors are keen on installing digital projectors for 3-D, one might bet on more 3-D movies to come.

Hmmm, anyone see my 3-D glasses?