

Digital Cinema: A Beginning

By Michael Karagosian, President, MKPE Consulting

After years of experimentation with trial systems and hesitation over financing plans, the stars have aligned and digital cinema systems are being installed today. Behind the alignment is the significant work of Digital Cinema Initiatives with the release in July 2005 of version 1.0 of its Digital Cinema System Specification, the February 2006 release by the National Association of Theatre Owners of its Digital Cinema Systems Requirements, and, last but not least, the tireless work of the many who are behind the forthcoming standards of the SMPTE DC28 Technology Committee for digital cinema.

I call this a beginning to emphasize that while we're off the ground and running, there's more work to be done. DCI is pursuing a test plan for its system specification. NATO is pursuing standards per its system requirements. The industry is calling for comprehensive equipment certification to underwrite the investments

made by both users and manufacturers. As we gain more field experience, there will likely be further work to add to that already in DC28, as well as to future testing and certification.

The reports written by our authors, Russ Wintner, President and COO of AccessIT Digital Media, and Tim Partridge, SVP of Dolby Laboratories, discuss the real-world issues encountered as this new technology is introduced into the theatrical business environment. Today and in the future, as we watch pristine images in our neighborhood cinema on day 19 after the movie has been released, we have the efforts of these gentlemen and their companies, their competitors, the many technology providers and manufacturers, and the organizations behind the requirements, specifications, and standards on which this work is based, to thank and remember.

Time to get out and enjoy the (digital) movie!

Transition to Digital Cinema: A First Look

By Russ Wintner, President and COO, AccessIT Digital Media

After years of activity, including several initial attempts to begin a meaningful rollout, digital cinema is finally here. The DCI Technical Specification, published in July 2005, gave the industry a stable foundation upon which to begin the implementation of digital cinema in a planned way. The rollout of commercial systems backed by the major studios and using equipment with long-term serviceability began when AccessIT and Christie Digital Systems formed a strategic partnership, Christie/AIX, around the same time as the DCI Specification was being completed. By the end of January 2006, Christie/AIX had completed installation of the first 150 screens of their 4,000-screen rollout, which is scheduled to be completed by the end of 2007. What these initial installations demonstrated is that the fundamentals defined in the DCI Specification are indeed viable, but the real learning from this experience is just beginning. Digital cinema will inevitably continue to evolve. A benefit of new technology over the mature

100-year legacy of 35mm film is that the industry is at the base of a new maturation curve that has yet to see the many benefits that will come from creative content providers and talented technical developers using this new and exciting platform of digital technology.

Of course, there comes a time in every new technology when planning and anticipation inevitably yield to the forces of commerce. DCI has done a remarkable job of providing a forward-looking specification that will ensure a high level of performance, coupled with the capacity for ongoing developments. SMPTE has been hard at work codifying the immense and formidable quantity of technical specifications that are designed to ensure interoperability and dependability. But it is in the movie theaters where pioneers will discover the meeting point between what makes sense economically and what can be done technologically, and from which point the industry can continue successfully to realize the full promise of the age of digital cinema.

At the time of this writing, Christie/AIX has completed installations in over 425 screens at more than 55 locations across 18 states. By the end of 2006 there should be more than 1,800 digital screens in operation from Christie/AIX. What Christie/AIX has learned, and what the industry can benefit from, is the essence of this article.

The Christie/AIX installed systems comprise the following major building blocks:

- A central library server with centralized multiple interoperable ingest ports connected to every screen via multiple path Ethernet.
- The private and secure in-theater LAN that supports control information and the transfer of content between screens.
- At each screen, a Christie CP2000 2K DLP-Cinema projector and a Doremi DCP2000 JPEG-2000 media player.
- AccessIT's Theatre Command Center acting as the Theatre Management System at the central server and at each screen.

To the extent possible today, the systems conform to DCI and SMPTE specifications. And therein lies the first major challenge: many of these standards are still being finalized. Christie/AIX recognized that the systems being installed would have to be field-upgradeable and any parts that may need to be replaced as standards continued to evolve would have to be replaced by Christie/AIX within a price that had to be fixed before a rollout ever began. It was in this planning that engineering wish lists gave way to economic practicalities and the Christie/AIX digital system was born. This approach is simply recognition of the nature of digital technology itself. Every day we turn on our computers and read our e-mail and access the internet—but every day there are new updates and upgrades automatically being downloaded to our operating systems. Occasionally, we also add a new hardware component. This is why Christie/AIX has provided ten-year parts coverage along with its service program—to take the uncertainty out of the equation for the exhibitor. So far it is working and working well. The current deployment is exceeding a 99.8% reliability factor in its first few months of operation, and that number is getting better as installation crews gain some experience, training programs improve from experience, and users become more competent, as can only happen through experience.

As the rollout began, the first challenges were filling the supply chain, finding and training installers, and keeping up with necessary upgrades. Despite planning, a shortage of parts caused by starting over a Christmas holiday period as much as anything else, and the inertia that had to be overcome in getting the entire supply chain filled, caused some interruptions in the installation schedule. The shortages were quickly corrected as parts suppliers learned to trust the business plan and see that this time it was more than an idle promise to install so many systems at such a rapid rate. Manufacturers, some of whom continued to push MPEG solutions until very recently, are now coming around with new JPEG servers that promise to complement the supply chain later this summer. Also, the exhibitors that have decided that digital cinema is ready for them and signed up with Christie/AIX have embraced the transition and developed their respective technical and operations programs to facilitate the installation scheduling.

The labor force is responding as well, and shortages here are also disappearing. The excitement of what is happening is drawing the attention of young interested installers who are being hired and trained in an ever-improved training program, specifically for digital cinema in movie theaters. Those with the skills, or a willingness to learn, are finding new opportunities in the transition to digital cinema.

The continuing challenge, however, has been dealing with a progressive and accelerating rollout while standards are being defined. The DCI Specification defines content preparation and content presentation in the theater, but it left the link of content delivery for the free market to finalize. Christie/AIX, in its leading role, has worked cooperatively with the studios and the other third-party delivery services providers. This process is proving effective at revealing the holes that need to be filled to move digital cinema forward in a planned, orderly, and controlled rollout where the full dynamics of the industry's own ecosystem can have their full and intended effect on the new systems. And it is working.

Despite a lot of sweat and effort, the operation of digital systems is quickly reaching its 99.9+% reliability factor. Interoperability is being tested, and the expectation from the studios and from exhibitors not to miss shows is pushing everyone to do better every day. New working groups are being created to discuss interoperability issues. Competitors have been forced to collaborate on

software so that one's own definition of DCI defined terms do not conflict with another's. The need for methods by which competing vendors can access secure and private in-theater systems is now being addressed because it has become a real issue where the existing standards and specifications have remained somewhat mute on the topic. Despite the obvious and important need for companies to remain competitive and differentiate themselves as each competes for its share of the market, there is still ample opportunity for dialog. The entire industry benefits from this type of open interaction, and even more is needed.

The original plan called for two major upgrades, with some expectation of hot patches and minor enhancements along the way. The first upgrade planned for May/June was to come closer to DCI specifications by including the first phase of CineLink 2 and forensic watermarking. The second planned upgrade, targeted later in 2006, will be for FIPS compliance, the more secure and final implementation of CineLink 2 and other security issues are yet to be formally standardized. To date, there have been a number of interim patches and upgrades required to maintain interoperability while individual companies decide how they will interpret requirements and flex the system for its own objectives, and system limitations are determined. Upgrading systems

can be a challenge in any environment, but in an accelerating rollout such as this, managing upgrades so that everything still works is daunting. Multiple studios and vendors have to be coordinated so that the right version of content and keys is married to the right version of software in the field. Upgrading 450+ systems cannot happen instantly, yet movies play all day, seven days a week, at every theater. There is nothing easy about it and yet it is happening with fairly little sacrifice as witnessed by the very small number of lost shows. This a testament to the people in this industry who have invested themselves and their companies in the effort. Although the problems have forced people to come together to work out solutions and even more interaction is required, the fact is that everyone is coming together. The new working groups are solving the last of the issues, and the transition is moving forward determinably, inevitably, and successfully.

At this year's NAB Convention, John Fithian said optimistically of digital cinema that what we have today is "beautiful chaos." Someone else once said, "From chaos comes order." If we look at where we are today, and at what everyone is doing, it is clear that order is coming—and with it the benefits of digital cinema for all participants.

Making Digital Cinema Happen

By Tim Partridge, Senior Vice-President and General Manager, Prof. Div., Dolby Laboratories

Digital cinema is playing movies throughout the world today. Although widespread adoption will happen in the future, our early installations have taught us valuable lessons. By improving the technology and installation process, we can plan for the long-term business of digital cinema. With more than 160 Dolby digital cinema systems throughout 12 different countries, Dolby has had a unique opportunity to survey this transition of the technology as well as the transition of traditional film business processes to support digital cinema.

In looking toward a massive rollout worldwide, the industry was concerned about cinema installers who work with film technology being capable of handling the

integration of new digital systems. From Dolby's experience, the existing cinema installers are perfectly capable of installing our Dolby Digital Cinema systems with the related technology. As common practice for introducing new technologies, Dolby provided training courses to ensure installers were able to do all the preparatory work and much of the installation. Since this was the first time for many installing digital cinema equipment, a Dolby engineer visited each site and worked with the team of two or three installers to help with the integration. Also, given the urgency of the first major digital cinema rollout to get screens ready for the release of *Chicken Little* in digital 3-D on 84 screens, it