

EDCF / UNIC Working Group on SMPTE Standard Digital Cinema Packages

An Interim Report on Progress

May 2016

In the era of Digital Cinema movies and associated content like trailers, notices and advertisements are distributed to theatres as a Digital Cinema Package (DCP). The DCP is a set of encrypted files that contain the images, sound, captions, sub-titles and even special effects commands.

In the beginning the definition of the content was mainly focussed on the technical attributes of the playback equipment rather than the precise formatting of the package itself. In order to bring order to the process a format was developed (INTEROP) to act as interim scheme while the precise details of an Industry Standard were being determined by the Society of Motion Picture and Television Engineers (SMPTE). SMPTE has formalised the majority of standards used in theatrical exhibition of movie film for a number of years covering such things as the shape of the sprocket holes in film to the level of brightness on the screen.

It took around ten years for the development of the original Digital Cinema Initiatives (DCI) requirements specification documents into a SMPTE Standard recognised by the International Standards Organisation. During this time practitioners developed the 'Interop DCP' format which is still in use today.

The SMPTE DCP Standard is now ready for deployment even though it is being continuously updated to cope with new capability and features. The 'Interop' format has been patched along its journey to cope with such things as 3D and higher frame rates, but is now creaking under the strain of its original limitations.

Theatre owners and operators must now ensure their systems (projectors, servers and theatre management systems) are compliant with the new standard as studios and distributors convert to the new system.

This is a complex task and one requiring a great deal of care and planning – hence the formation of this cross industry working group to aid the process.

Fixing the Standard

One of the group's first resolutions was to plant a stake in the ground of a Standard that was constantly evolving. The group determined a feature set that would offer benefits to creators, distributors and exhibitors alike. It would also contain capability to enable release of the majority of feature film releases using the format. Other and more advanced features such as extended colour space and variable frame rates would be the subject of future developments. For now it was decided that the conversion would a feature set that would be tested as a minimum on all installed equipment in Europe.

The features included would be:

CPL Markers

Encrypted Sub Titles

WTF Sound Format (5.1 and 7.1)

Dolby ATMOS sound option

2D and 3D Features

24 and 25P Frame Rate

Test Content

We felt that it was important to be able to have exact knowledge about the test environment and that we should commission test software that would test the chosen feature set as thoroughly as possible.

Test content would be required for two distinct communities :

Manufacturers to verify their compliance

Exhibitors (and Integrators) to test their complete systems from TMS to screen.

The test content would need to be simple to use and enable unambiguous reporting.

The first phase of the test content has been produced (thanks to the generosity of Deluxe Technicolor Digital Cinema) and successfully deployed.

Test Markets

The team felt that we should deploy the test software under controlled conditions where we already had three things:

- 1) Knowledge of the installed base of systems.
- 2) Single local organisation who could coordinate the testing process with local language support.
- 3) Electronic Delivery Infrastructure that could remediate problems quickly.
- 4) Common Network Operation Centre.

The markets chosen were Norway using Film und Kino with Unique Cinema Systems and the Netherlands with Gofilex . We were in effect field testing the test software.

The Test Process

The process would be to run the test software to find any problems of compatibility and then report back results confidentially to the relevant manufacturers.

The second step was to secure a full feature film release using a SMPTE DCP to test the systems with real content.

So far this has been done with 2D test material and 2D sub-title files that were not burned in to the image files.

We also tested 3D content where the Sub-titles were burned in to the image.

The Results

We found a few early servers that were not able to play SMPTE content and were not upgradeable. Theatres are in the process of upgrading to compliant equipment. These were very early installations and the manufacturer already knew that these systems would not be SMPTE DCP capable.

Some systems needed firmware upgrades that were identified by the test content software.

Some equipment needed to be configured to run SMPTE DCPs (they were capable but needed setting up for that case). The manufacturer resolved this issue.

Some special systems needed manufacturer support – in this case a twin projector 3D system.

In Norway there were only 13 screens with issues related to SMPTE DCP out of a total 439 screens tested. All these issues were minor, and were solved immediately.

In the Netherlands the number of cinemas with all screens tested OK and ready to go was 195 (799 screens).

More recently the test programme was expanded into Finland where 120 cinemas produced a result of 111 theatres OK (225 screens) and only 9 screens with problems.

Major Lessons Learned

Most systems could handle the encrypted 2D SMPTE DCP files.

A majority of systems were compliant once the systems were upgraded to the latest firmware.

We originally planned to test Theatre Key Retrieval (TKR) capability in servers but our tests found that the capabilities were still under development both as a standard and consequently in equipment capability. So this capability was removed from the Test Software.

The test software did its job well.

Manufacturers are now verifying their equipment with the test software. No feedback yet.

The plan to have a feature film with Interop versions for fast remediation worked well. This has been done successfully in the USA too but is aided by a constrained release.

Manufacturer response meant that most cases of non-compliance were quickly fixed so the SMPTE DCP could be run. There were very few uses of the Interop backup.

Moving on to 3D

We know that TI Series one based projectors cannot be upgraded to render separate 3D sub-tiles. A solution is to configure the system so that sub-titles are rendered within the server into the image.

SMPTE Sub Title Standards allow a sub-title to be placed at any position in the perceptual Z axis dimension of the movie. It further allows a programmer to define z axis motion for a given sub-title instance on the screen. This allows the required optical fixation point to coincide with the anticipated fixation point of the image to minimise eye strain or conflicting depth cues.

At this time this feature has not been implemented by manufacturers so they must use discrete sub titles instances to change the convergence point (z-position).

It is unclear how the industry will adapt to this situation and this is currently holding up our testing process. If 3D Sub Titles are burned in to the image the issues of rendering them live will not be a requirement. Watch this space.

Studio Releases in SMPTE DCP

Studios are reluctant to produce major features in SMPTE DCP format until the landscape is better defined. Twin releases are expensive and potentially prone to errors on untested systems.

More releases are needed to provide more real test content.

Some studios are though pushing for more releases so this conversion can be made more quickly.

Information

Information about SMPTE DCP is available on the following web site

http://www.edcf.net/smppte_dcp_migration.html

Advice for Exhibitors

- 1. Ensure your databases contain firmware revision level for all equipment Projector, Server, TMS.**
- 2. Plan on regular upgrades as part of the maintenance process.**
- 3. Run the test software as soon as convenient. ????**