ISDCF Timeline for Implementation of Accessibility Features in Digital Cinema

11 November 2009

March 2009

- Final standards for SMPTE DCP published. The complete suite of SMPTE DCP standards include support for access audio and closed captions. See attached sheets for document names.

July 2009

- Protocol for communicating captions from digital cinema server to a 3rd party closed caption system goes to standards ballot within SMPTE. The future standards that describe the protocol are Content Synchronization Protocol (CSP) and Resource Presentation List (RPL). Interoperability testing utilizing draft protocol documents is in progress among several manufacturers. See attached sheets for document names.

December 2009

- Formal publication of the SMPTE CSP/RPL standards.

March 2010

- ISDCF demo of working systems compatible with SMPTE DCP (software and hardware) and SMPTE CSP/RPL. Open subtitles, open captions, closed captions, support for hearing impaired and narrative audio, and redirection of access audio channels at media block outputs will be included in the demonstration.

April 2010

- All new digital cinema equipment sold will support SMPTE DCP and CSP/RPL.
- Upgrade of legacy equipment to SMPTE DCP and CSP/RPL to begin.
- Backwards compatibility with pre-SMPTE DCP distributions to be maintained on all systems.
- SMPTE DCP distributions containing closed captions may be delivered to compliant systems per exhibitor request.

October 2010

- 50% of all digital cinema systems in North America are compliant with SMPTE DCP and CSP/RPL.

April 2011

- 100% of all digital cinema systems in North America are compliant with SMPTE DCP and CSP/RPL.

SMPTE DCP

The SMPTE DCP stage reflects the set of published SMPTE specifications as summarized and constrained by SMPTE S429-2-2009, D-Cinema Packaging – DCP Operational Constraints. SMPTE DCPs, KDMs, and Certificates follow the specifications in the table below. This table may not be a complete representation of all SMPTE DCP requirements, and is intended only for comparison to the Transitional 1 table. Note that due to changes in the XML namespace, none of the SMPTE DCP XML files are compatible with Transitional 1 players. And due to changes to partitions and ULs, none of the SMPTE DCP MXF files are compatible with Transitional 1 players. In addition, there are new requirements for content, KDM and Certificate validation. Software updates will be needed to support this SMPTE DCP. In addition to the specifications below, it is generally accepted that adoption of SMPTE DCPs will coincide with deployment of DCI-compliant players. Note that there are additional requirements on both the DCP and on playback imposed by the DCI requirements, which are not contained in the SMPTE standards.

Specification	Document	Comments
Sound & Picture Track File	SMPTE 429-3	Three partitions required.
Track File Encryption	SMPTE 429-6	Similar to JPEG Interop but uses correct encrypted essence key and MIC value.
Constraints	SMPTE 429-2	Additional contstraints such as: - All Reels must have picture and sound - Picture size constraints. - Timed text rate - Hash element is required for encrypted track
Key Delivery Message	SMPTE 430-1	All elements required by the SMPTE spec. and DCI must be present and validated for playback to take place.
Certificate	SMPTE 430-2	DCI requirements must be met.
Extra-theater messages	SMPTE 430-3	
Asset Map	SMPTE 429-9	Filename is ASSETMAP.xml
Composition Playlist	SMPTE 429-7	Uses SMPTE namespace.
Subtitles	SMPTE 429-5 and SMPTE 428-7	Change to XML source format. Subtitle track file is now an MXF file that encapsulates XML source and aux data and supports encryption. No special packaging directory structure needed.
Sound	SMPTE 382M	ChannelAssignment label allows multiple channel assignments to be used.
JPEG 2000 Wrapping	SMPTE 422M	JPEG subdescriptor UL is now correct.
JPEG 2000 D-Cinema Application	SMPTE 429-4	
Packing List	SMPTE 429-8	The GroupID element was added to support delivery of “Asset Packages”.
Stereoscopic Picture Track File	SMPTE 429-10	
Closed Captions	SMPTE 429-12 and SMPTE 428-10	Closed captions not available in Transition 1

SMPTE DCP Hardware Requirements

1. 16 discrete audio outputs shall be provided from the media block. (DCI)

2. The container audio channel configuration prescribed in SMPTE 429-2 Annex A requires re-assignment of channels in the playback device to unique audio outputs. This is necessary to prevent wrong audio in assistive listening systems and in auditorium speakers configured to support multiple audio formats.

   The manufacturer has the choice of offering user configuration of audio output assignment, or employing a non-user-configurable assignment as shown in the chart below:

	SMPTE 429-2 Container Channel Configuration			Output Channel Assignment		
Channel	*5.1*	*6.1*	*7.1*	*5.1*	*6.1*	*7.1*
L	1	1	1	1	1	1
R	2	2	2	2	2	2
C	3	3	3	3	3	3
LFE	4	4	4	4	4	4
Ls	5	5	5	5	5	5
Rs	6	6	6	6	6	6
Lc			7			7
Rc			8			8
Cs		7			9	
-		8			10	
HI	7	9	9	15	15	15
VI-N	8	10	10	16	16	16

SMPTE Closed Caption System Protocol

"SMPTE CC Output" Standards:

430-10 Digital Cinema Operations:
Auxiliary Content Synchronization Protocol (CSP)

430-11 Digital Cinema Operations:
Auxiliary Resource Presentation List (RPL)

Transitional 1, or JPEG Interop or Interop DCP (Legacy Format)

The Interop DCP stage represents current practice as of June 2009. Interop DCPs, KDMs and Certificates shall follow the specifications in the table below, found at ftp://ftp.digicine.com/Document Release 2.0, or from the SMPTE. Note that that "mpeg_ii" stands for MPEG Interop Initiative, the name of the effort that led to Interop DCP. Also note that the Interop DCP stage does not include projector configuration (PCF) files.

Specification	Document	Comment
Sound & Picture Track File	mpeg_ii_track.doc (v2.7)	Some ULs are not listed in any Registry. Only two partitions allowed. Undocumented change from MPEG to JPEG encoding.
Track File Encryption	mpeg_ii_track_file_encryption.doc (v5)	Key indicating encrypted essence in KLV triplet is not registered. Files may not have proper MIC value.
Constraints	mpeg_ii_pack_constraints.doc (v2.6)	
Key Delivery Message	SMPTE 430-1	Some fields required by DCI are not populated or are ignored upon playback.
Certificate	SMPTE 430-2	Certificate rules may not be enforced.
Extra-theater messages	SMPTE 430-3	
Asset Map	mpeg_ii_am_spec.doc (v3.4)	Filename is ASSETMAP
Composition Playlist	mpeg_ii_cpl_spec.doc (v2.4)	
Subtitles	TI_sub-titling_2504760b.pdf	Subtitle track file is an XML file that cannot be encrypted. Requires special directory structure to deliver.
Sound	S382M-GC-aesbwf-20040808.zip	Supports only a single, fixed, 6-channel mapping
JPEG 2000 Wrapping	MXF J2K-v3e 200509231.doc	JPEG Subdescriptor UL is not registered.
JPEG 2000 D-Cinema Constraints	MXF JPEG 2000 Application for D-Cinema (SMPTE3285B)	Very similar to final SMPTE specification.
Packing List	mpeg_ii_pkl_spec.doc (v2.4)	
Stereoscopic Picture Track File	3D_Interop_Single_File_2007_18_05_v1_5.doc	Similar to SMPTE 429-10, but uses Digicine namespace for CPL and uses unregistered JPEG subdescriptor UL.