

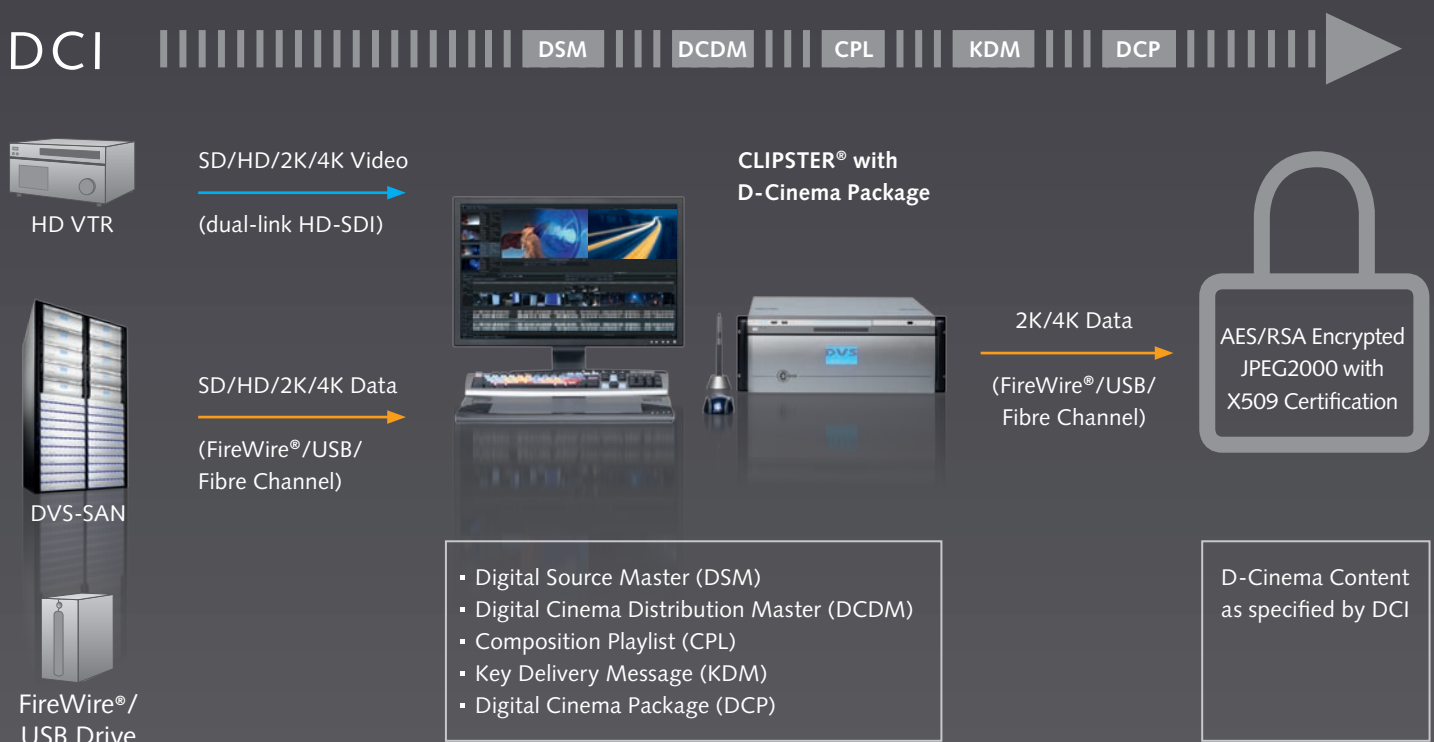
CLIPSTER® & DCI Mastering

EASY, FAST AND SECURE

OVERVIEW

For CLIPSTER® DVS has developed the option of a full DCI set to create digital content comfortably in one system following the specifications of the Digital Cinema Initiative (DCI). With the additional CLIPSTER® JPEG2000 accelerator board CLIPSTER® is able to create JPEG2000 12-bit X'Y'Z' file sequences in real time. All the necessary DCI steps from DSM, DCDM, CPL over KDM to DCP can be created in a single box with an easy to use graphical user interface.

- Authoring DCI content in one box – easy, fast and secure
- Hardware accelerated high-speed JPEG2000 encoding
- Compatible with all other DCI players
- Quality control of a DCP directly in CLIPSTER®
- Future-proof for subtitling and other DCI demands



- **Hardware accelerated JPEG2000 generation on a normal Windows XP with its open NTFS file system and FC connection to a SAN**
- **Comfortable conforming of a project to a Digital Source Master (DSM) in every file and video format**
- **Converting a DSM to a Digital Cinema Distribution Master (DCDM) in TIFF 16 bit X'Y'Z' in real time**
- **Defining the Composition Playlist (CPL) directly in the timeline by setting reel markers**

- **High-speed encoding of JPEG2000 file sequences in 12 bit X'Y'Z' up to 2K**
- **Key Delivery Message (KDM) by using AES (128 bit) and RSA (2048 bit) encryption**
- **Support of X509 certification**
- **MXF wrapping into a final and secured Digital Cinema Package (DCP) with JPC - X'Y'Z' 12-bit files**
- **All DCI formats are supported**

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CLIPSTER® DCI MASTERING

DCDM DIGITAL CINEMA DISTRIBUTION MASTER

The powerful conforming feature of CLIPSTER® creates high-resolution projects out of digital film data. Normally 2K or 4K DPX file sequences will be used for this. With such a project in the timeline you can easily create a DCDM from it by generating 2K or 4K TIFF 16-bit X'Y'Z' files. In CLIPSTER® this will be performed in real time.

- Conforming will create a DSM (Digital Source Master)
- Each project can be converted into a DCDM
- 2K/4K TIFF 16-bit X'Y'Z' files can be created in real time

JPEG2000 ACCELERATOR HIGH-SPEED ENCODING

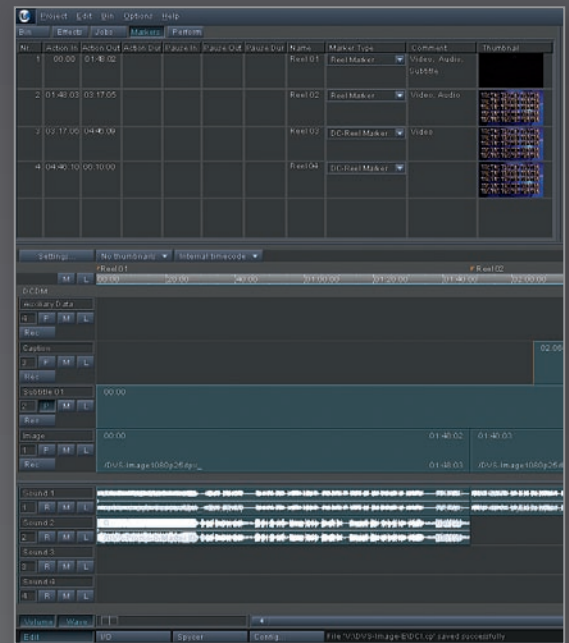
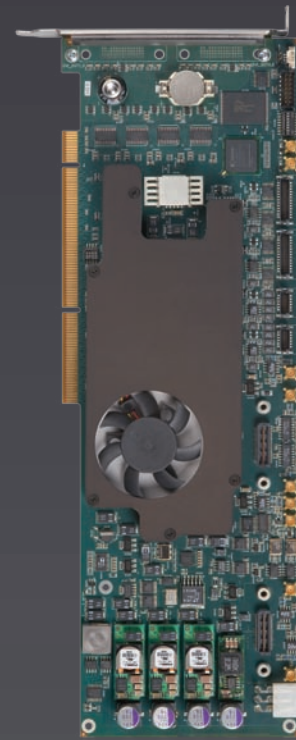
With CLIPSTER® and its DCI option it is possible to encode to JPEG2000 formats specified by the DCI like 2048 x 858 or 1998 x 1080 in 12 bit X'Y'Z'. Usually JPEG2000 file sequences are using the file extension JPC or JP2. JPC files contain the code stream (image) only while JP2 files possess additional metadata header information. With an efficient maximum quality variable bit rate (VBR) the TIFF 16-bit files of the DCDM will be encoded with a maximum of 250 Mb/s in high speed by using a special hardware accelerator board designed by DVS.

- High-speed encoding in JPC and JP2 file sequences
- DCI format support in 12 bit X'Y'Z' 4:4:4 and 4:2:2
- Maximum quality variable bit rate up to 250 Mb/s
- Support of constant quality variable bit rate up to 250 Mb/s

CPL COMPOSITION PLAYLIST

CLIPSTER® precisely follows the DCI specifications, enabling to create digital content divided into reels. Each DCI reel will be an MXF file of its own in the DCP. To make sure that all reels of the digital movie will be displayed in the correct sequence in the theater a Composition Playlist will take care of that. The CPL is an additional XML file which will be created in CLIPSTER® during the wrapping of the JPEG2000 files into MXF files.

- Define each DCI reel directly in the timeline of the DCDM with a single click
- CLIPSTER DCI reel markers can be generated automatically in the timeline
- The CPL will be generated as an XML following the specification of the DCI



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KDM

KEY DELIVERY MESSAGE

The key handling as described by the DCI typically assumes that a content provider creates, encrypts and signs the material. In addition to the encrypted video and audio a so-called KDM is created. Among other information the KDM holds the key to decrypt the material, but this key itself is encrypted. This encrypted key can be decrypted only by the recipient. Additionally the KDM holds a signature to prove the validity of the package. The quality of the encrypted and signed material and the KDM can be directly controlled on CLIPSTER®. After that, the material will be sent to the cinema. The cinema player verifies the signature, decrypts and then plays out the material.

- Creation of single or multiple KDMs for the same material
- X509 certificates with RSA keys to encrypt the AES key in the KDM
- KDMs will be signed with a programmable certificate
- Quality control of the final DCP
- Real-time play-out of encrypted and compressed 2K material

DCP

DIGITAL CINEMA PACKAGE

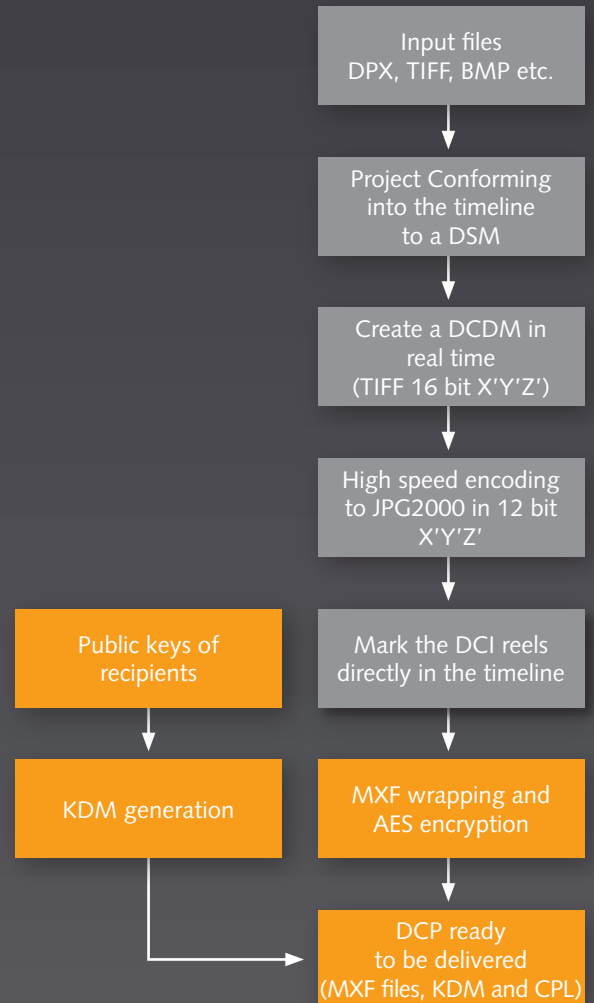
The final step for creating digital content as specified by the DCI will be the wrapping of all encrypted JPEG2000 files into MXF files. Each DCI reel will have its own MXF file. Together with the audio wave files, the CPL and the KDM a full DCP is ready to be delivered. This DCP can be played back on every D-Cinema player following the specification of the DCI.

- High-speed wrapping of secured encrypted JPEG2000 files into MXF files
- Generating audio wave files per each DCI reel
- The CPL will be generated as an XML following the specification of the DCI
- The whole DCP can be quality controlled on the CLIPSTER® which generated the DCP
- Generate Packing Lists and Asset Maps

SPECIFICATIONS

DCI

- Digital Source Master (DSM) creation on the timeline
- Digital Cinema Distribution Master (DCDM) in TIFF 16 bit X'Y'Z'
- Definition of the Composition Playlist (CPL) directly on the timeline
- JPEG2000 encoding and decoding in real time up to 2K
- Max. quality VBR and constant quality support up to 250 Mb/s
- Key Delivery Message (KDM) by using AES (128 bit) and RSA (2048 bit) encryption
- Encryption in SHA1 and SHA256
- Support of X509 certification
- MXF wrapping into a Digital Cinema Package (DCP) with JPEG2000 X'Y'Z' 12 bit



DCI Formats:

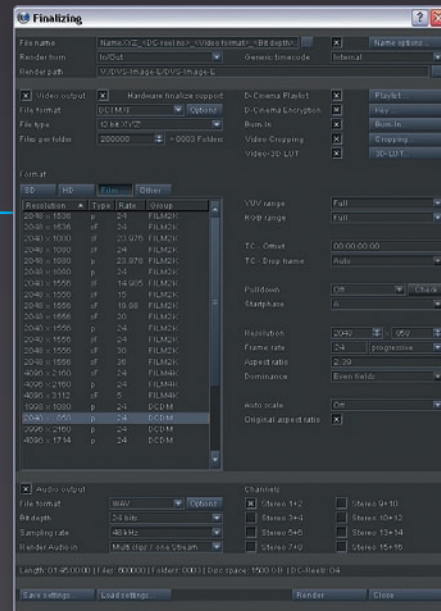
2K /24/48 fps	4K /24 fps
2048 x 858 (2.39)	4096 x 1716 (2.39)
1998 x 1080 (1.85)	3996 x 2160 (1.85)

DCDM Container:

2048 x 1080@24/48 fps and
4096 x 2160@24 fps

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VIDEO FORMATS

SD

525i/59.94	720 x 486 (D1)	960 x 486 (D5)
625i/25	720 x 576 (D1)	960 x 576 (D5)
625i/24	720 x 576 ('Slow PAL')*	

HD

1280 x 720p	/23.98/24/25/29.97/30/50/59.94/60	
1366 x 768p	/50/59.94/60/90*/120*	
1920 x 1035i	/29.97/30	
1920 x 1080i	/23.98/24/25/29.97/30	
1920 x 1080psF	/23.98/24/25/29.97/30	
1920 x 1080p	/23.98/24/25/29.97/30/50*/59.94*/60*	

HSDL

2048 x 1556psF	/14.99/15/19.98/20	
4096 x 3112psF	/5*	

2K

2048 x 1080psF	/23.98/24	
2048 x 1080p	/23.98/24	
2048 x 1556psF	/23.98/24/25/30	
2048 x 1556p	/23.98/24/25/30	

4K

4096 x 3112*	1998 x 1080psF	/23.98*/24*
4096 x 2160*	2048 x 858psF	/23.98*/24*
3860 x 2400*	2048 x 1080	
4096 x 1716*	3996 x 2160*	
	4096 x 1716*	

DCI

- YUV 4:2:2; RGB 4:4:4; X'Y'Z' in 8/10/12*/16* bit
- Support of Variable Frame Rate*
- Export to WMV, QuickTime®, MXF and JPEG2000 (JPC, JP2, J2C)

* available as an option.

KEY FEATURES

- Tools for conforming and editing with multiple video tracks
- Real-time versioning in different formats
- Real-time DCI Mastering
- Secondary color correction with additional 6 vector color grader
- Innovative data management with Spycer®
- SD-/HD-SDI input and output in YUV(A) or RGB(A) 8/10/12 bit (single/dual-link)
- DVI in- and output, analog RGBS/YUV output, DVI connector
- SD down-converted output in PAL/NTSC
- 16 channels of 24 bit digital audio, 48 kHz I/O (AES/EBU and embedded audio)
- 2 analog stereo monitor outputs
- RS-422 input and output
- Internal RAID-5 video/audio storage up to 4.8 TB in one chassis
- Windows® XP 64 bit powered with 2 Quad-Cores

AUDIO

- 16 audio channels
- Audio sampling frequency: 48 kHz
- Sample rate conversion
- Unlimited audio tracks for editing
- Sample and frame based editing
- Supports WAV, AIFF and QuickTime®