User Guide

Version 3.0.1.0

February 2018

Information in this document is subject to change without notice and does not represent a commitment on the part of Qube Cinema Technologies Pvt. Ltd. The software described in this document is furnished under a license agreement and may be used or copied only in accordance with the terms of the agreement. It is against the law to copy the software on any medium except as specifically allowed in the license agreement.

No portion of this document, including the drawings, may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose, without express written permission from Qube Cinema Technologies Pvt. Ltd.

Specifications of the products in this manual are subject to change without prior notice.

Qube is the trademark of Qube Cinema Technologies Pvt. Ltd. All other products, technologies and trademarks mentioned herein are properties of their respective owners.

QubeMaster Xpress 3.0 User Guide

Introduction

Thank you for using QubeMaster Xpress 3, the easy-to-use solution for creating standards compliant Digital Cinema Packages (DCPs).

Qube Cinema has an entire suite of products required for a practical, commercially viable, end-to-end implementation of Digital Cinema and is committed to creating a seamless world of Digital Cinema with products that are innovative, powerful, reliable and cost-effective.

We thank you for allowing us to partner with you in this journey through the Digital Cinema domain.

With the release of version 3.0, QubeMaster Xpress moves to a new free-to-use model – with the only requirement being a mandatory registration and login to www.qubewire.com. There is no charge for registration or login to www.qubewire.com. Being logged-in to QubeWire ensures that DCPs created through QubeMaster Xpress can be encrypted (if required) and distributed through www.QubeWire.com.

Installation Procedure

QubeMaster Xpress can be installed on any Windows™ pc with a minimum system configuration of:

- Intel dual-core processor (or better)
- 4GB RAM (minimum)
- Windows 10 Professional (32 or 64 bit)
  or Windows 8.1 Enterprise/Pro

► Double-click "**QubeMasterXpress.3.0.1.0.exe**"

► When prompted, please **Restart** the system after installation.

► Ensure that **QuickTime™ player** is installed on the system if ".mov" files are to be used.

► Install all necessary codecs required to playback source files (for example the codec for ".mp4" may need to be installed separately if it is not already available on the system). A good indicator of codec requirements is to attempt to play a file in either QuickTime player or Windows Media Player - If a file does not play in either QuickTime player or Windows Media Player it will not be supported in QubeMaster Xpress either.

Software License

QubeMaster Xpress 3.0 is now a free-to-use software – with the only requirement being an active user account on www.qubewire.com.

The QubeMaster Xpress software is freely available for download from www.qubecinema.com and the downloaded version of QubeMaster Xpress 3 is a fully functional demo version, with the only limitation being a visible watermark on the encoded image. This watermark can be removed by logging into a registered/active user account on www.qubewire.com. Registration and user account creation on www.qubewire.com is completely free of cost.
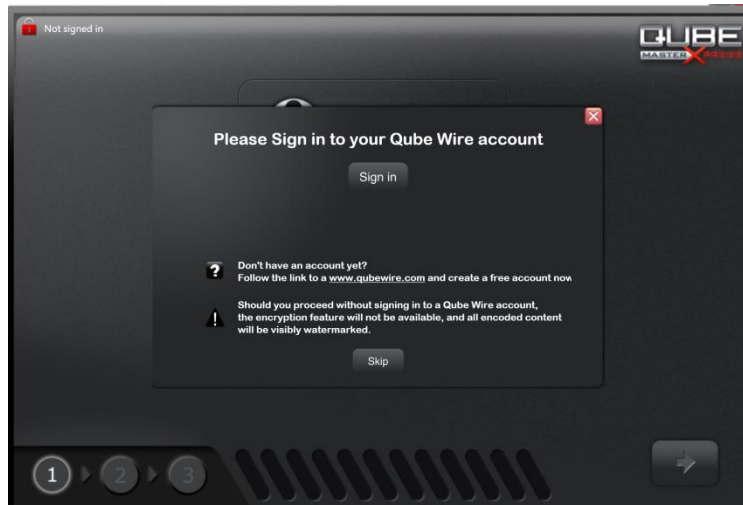
QubeMaster Xpress 3 – Product Activation

► Ensure an active internet connection

► Go to www.qubewire.com to register and create a free user account.

► After successful creation of a QubeWire account launch the QubeMaster Xpress software

► If you are not signed-in to the QubeWire account you will be prompted to do so.

► When QubeMaster Xpress 3 is successfully activated you will see a green, un-locked icon on the top left of the screen and details of the QubeWire user account will be displayed.
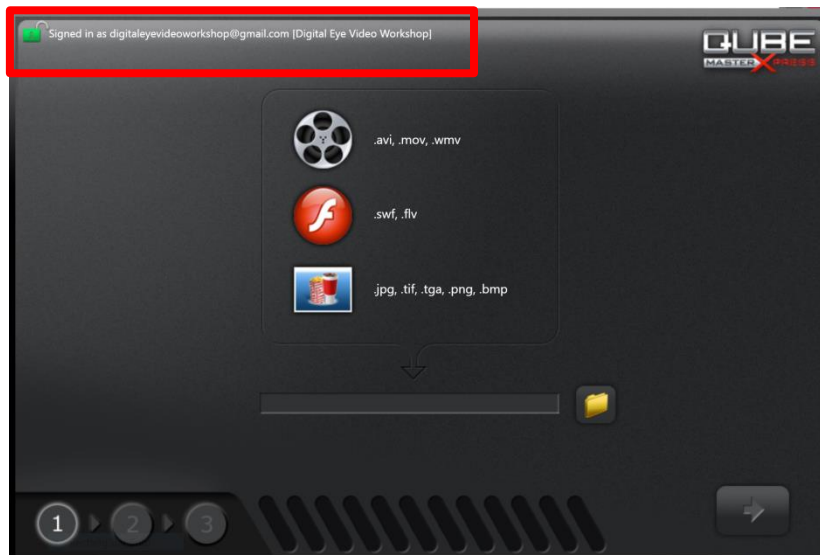
► If you choose to skip the QubeWire login, the software will continue to work in the "demo" mode – made apparent by a "red lock" icon in the top left corner of the QubeMaster Xpress UI – signifying that all encoded content will be watermarked.

► You can choose to remove the watermark and login to the QubeWire account at any time by clicking on the "red lock" icon on the top-left corner.
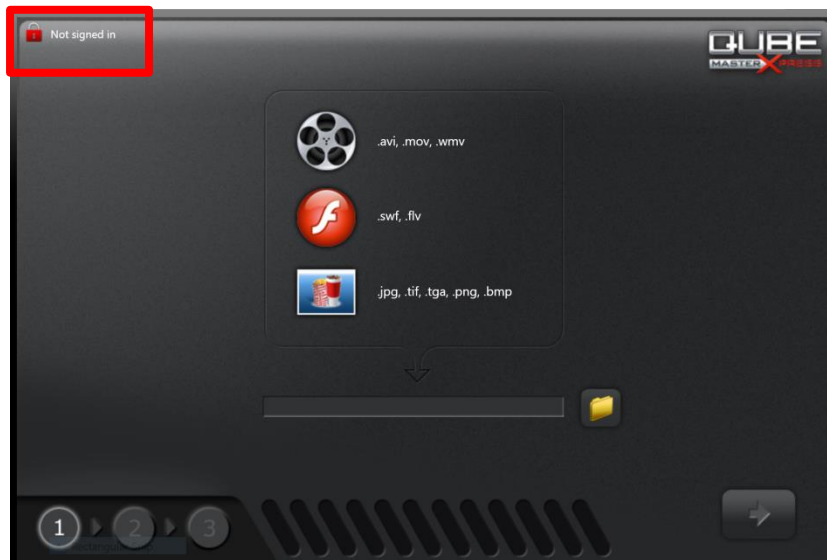
Step-by-Step Guide to DCP creation

QubeMaster Xpress (QMX) creates standards compliant Digital Cinema Packages (DCPs) from single or multiple graphic image files or video files in a simple process presented in a wizard-driven user interface.

The basic process is shown here with additional details of the various choices explained later in this document.

► Select the image or video source file.

► In step 2, select the audio source file – this option is ONLY available for graphic image file sources. In the case of video file sources (Quicktime/avi/wmv) the file MUST have embedded audio.

► Use the settings gearwheel to specify additional **source file parameters** – stereoscopic format for 3D source files, colour space and gamma.
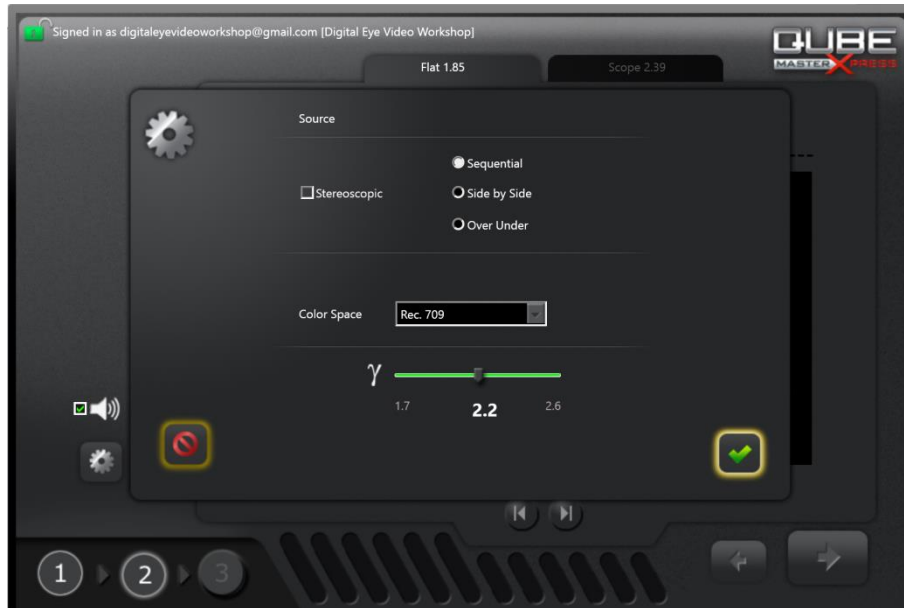
► The image can be cropped along the X or Y axes using the scissors icon. By default an image that is not in the DCI specified aspect ratio of FLAT (1998x1080) or SCOPE (2048x858) is padded with black to fit the required Flat or Scope containers.

► Advance to Step 3 by clicking the right-arrow button and in this step, name the DCP and specify its regional properties.

► Select the ENCRYPT option if you require the DCP to be ENCRYPTED. Remember that you will require to be signed-in to your account on www.QubeWire.com to use the encryption option. (*Please see the section on ENCRYPTION to know more about this feature*).

► Once a DCP is encrypted, it is "locked" and can be "unlocked" for playback only on servers that have the "keys" to unlock it. These keys are sent to each server that has been authorized to play it by means of a KDM (Key Delivery Message). These KDMS are generated from www.QubeWire.com.

► Click on the "advanced settings" gearwheel to change the default settings for data-rate and audio channels.

► Select a data rate for the finished DCP and the number of audio
channels required.

► Click the "Go" button to create the DCP.

<u>Compatible Source Files for QubeMaster Xpress</u>

You can create a DCP in QubeMaster Xpress from any of the following compatible source file formats:

► Single or multiple static graphic image files in BMP, TIFF or JPEG formats (sequences of images are not supported).

► Video files in AVI, Quicktime, WMV and MPEG and MP4 formats (WITH embedded audio). Video files in the above formats can be used provided the required codecs are installed on the system running QubeMaster Xpress. This is especially true for AVI, Quicktime and MPEG files. To ensure compatibility, please install a codec pack that contains a comprehensive list of common codecs, for example the KLite Codec Pack.

► QubeMaster Xpress can work with mono, stereo or surround audio files in the wav or aiff format. Audio files that do not have the DCI recommended number of channels (stereo, 5.1, 6.1, 7.1 etc.) can be PADDED with silence in QubeMaster Xpress, in order to create DCI compatible audio files in the final DCP. 5.1 audio, whether embedded in the video file or separate, must have the correct format and channel mapping – please refer the image below for channel mapping configurations.

► **Note**: For video file sources (mov, avi, wmv), audio must be embedded. Separate audio files can only be used in the case of static Image file sources.

►

Channel in package	Configuration			Notes
	5.1	7.1 SDDS	7.1 DS	
1	L	L	L	Left
2	R	R	R	Right
3	C	C	C	Center
4	LFE	LFE	LFE	Screen low frequency effects
5	Ls	Ls	Lss	Left surround (or left side surround)
6	Rs	Rs	Rss	Right surround (or right side surround)
7	HI			Hearing impaired (with emphasis on dialog)
8	VI-N			Visually impaired narrative (audio description)
9	--	Lc	--	Left center
10	--	Rc	--	Right center
11	-- --	--	Lrs	Left rear surround
12	-- --	--	Rrs	Right rear surround
13	Motion Data			Synchronous signal (currently used by D-Box)

Terminology and Advanced Settings

Aspect Ratio and Resolution

Flat and *Scope* are the two commonly accepted aspect ratio formats for digital cinema. In QubeMaster Xpress, source image files will automatically be conformed to fit these aspect ratios – depending on your choice of Flat, Scope or both – by resizing them if the image is larger than the specified size and padding them vertically or horizontally with black as required. All source images are therefore fit into one of the following containers:

- ► Flat 2K: 1998 x 1080 (1:1.85)
- ► Flat 4K: 3996 x 2160 (1:1.85)
- ► Scope 2K: 2048 x 858 (1:2.39)
- ► Scope 4K: 4096 x 1716 (1:2.39)

For example, a 1920 x 1080 image (the default size and aspect for HD video) will be padded with 39 pixels of black on either side (*pillar-boxed*) to fit a Flat container. To fit a Scope container, the same 1920 x 1080 source picture will be scaled down to 1520 x 858 and 264 pixels of black added to either side (pillar-boxed) to fit the Scope container.

Colour Space

The colour space of commonly used digital image files is RGB (Rec.709). This is the default selection in QubeMaster Xpress. If however, the source's colour space has been converted to the Digital Cinema requirement of XYZ prior to bringing the files to QubeMaster Xpress, then the selection must be set to DCI XYZ. Such colour space conversion to XYZ is normally only available in colour-grading systems. If the image file looks normal on a computer monitor or a television, then the image is most certainly in the Rec.709 colour space and not XYZ.

Frame-rates

Current digital cinema specifications support DCPs in different frame-rates for SMPTE DCPs but only support a frame rate of 24 fps for Interop DCPs. However, since not all servers as yet support different frame-rates, QubeMaster Xpress currently does not allow the creation of SMPTE DCPs in frame-rates other than 24fps.

QubeMaster Xpress will, by default, convert the source frame-rate to 24 fps (for 2D DCPs). For 25fps source material, QubeMaster Xpress employs the 4% slow-down method – thereby increasing the duration of the resultant DCP by 4% as well.

For 3D DCPs, the frame-rate of the source file must be 48fps and the resultant DCP will also be at 48fps (please refer to the section on 3D stereoscopic DCP creation for further details).

Encoding Data Rate

In Advanced Settings, the encoding data rate of the image file can be specified. Though the DCI Specification sets the maximum data rate for picture as 250 Mbits, it does not specify any minimum data rate. While deciding on an encoding data rate, just keep in mind the basic tenet that high data rates result in very good quality images but also result in larger file sizes and vice versa. Since data rate specifications affect the quality of an image and the resultant file size of a DCP, the choice should be made based on a good balance of quality and file size.
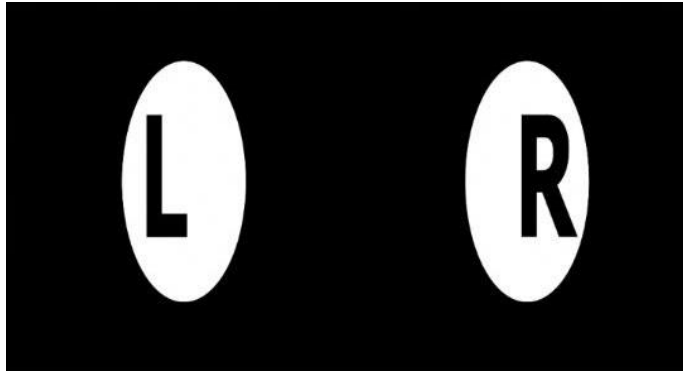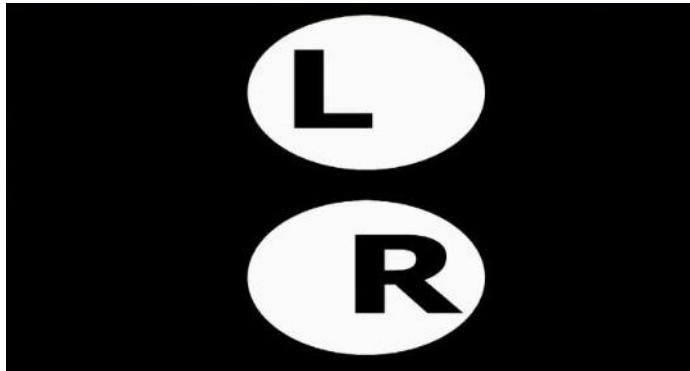
3D Formats

DCI compliant 3D DCPs are always *Frame Sequential*. This means that there will be only one MXF file for the picture, and this MXF file will have frames for the left and right eye stream, alternating. This MXF file will be at 48 fps (or 24 fps per eye). Currently QubeMaster Xpress can create 3D DCPs only in the 48fps frame-rate.

The 3D source file can be in any of the following formats:

► **Sequential:** In frame sequential sources, alternate frames in the movie file are left and right eye respectively. This option requires the frame-rate of the source to be 48 fps (24fps for each eye). If the frame-rate of the source is not 48 fps, the Sequential option will not be available.

► **Side-by-Side:** In Side-by-Side 3D sources, both left and right eye images are included as two vertical halves of a single frame. This is a common format used by non-linear editing applications and 3D TVs.

► **Over-Under:** Over-Under is similar to Side-by-Side except that the left and right frames are combined as two horizontal halves of a single frame.

Interop and SMPTE DCP formats

Digital cinema standards have evolved over time and as a consequence the specifications for a DCI COMPLIANT DCP have changed from the first "Mpeg MXF INTEROP" to "JPEG2000 MXF INTEROP" and now to the specifications of the new SMPTE standard.

QubeMaster Xpress can create DCPs in the older Jpeg2000 MXF INTEROP standard (referred to, in short, as Interop DCPs) and in the new SMPTE Standard (referred to as SMPTE DCPs).

SMPTE Frame-rate options

One big difference between INTEROP and SMPTE DCPs is the support for different frame-rates. However, since not all servers support different frame-rates, QubeMaster Xpress currently does not allow the creation of SMPTE DCPs in frame-rates other than 24fps. All source frame-rates will automatically be converted to 24 fps for 2D DCPs.

For 3D DCPs, the frame-rate of the source file must be 48fps and the resultant DCP will also be at 48fps (please refer to the section on 3D stereoscopic DCP creation for further details).

Encryption

Encryption of DCPs in QubeMaster Xpress is closely integrated with **www.QubeWire.com** and you will require a QubeWire user account to use this option (registration on www.QubeWire.com is free).

www.QubeWire.com is a powerful online key (KDM) management and reporting service for digital cinema. It allows filmmakers to generate KDMs for their DCPs, by accessing a comprehensive online theatre database that is continuously updated through strategic regional partners and crowdsourcing.

The close integration between QubeMaster Xpress and QubeWire allows Distribution KDMs (or DKDMs) to be automatically uploaded to your QubeWire account. Any required theatre KDMs can then be quickly and easily generated by logging into your account at www.QubeWire.com.

QubeWire accesses an extensive, constantly updated theatre database to generate the required KDMs that will unlock the DCP for each selected theatre. Each KDM is tied to the unique identity of the digital cinema equipment in the theatre database. QubeWire can directly deliver the KDMs to theaters via email and will also support the Theatre Key Retrieval protocol (TKR) now recommended by the ISDCF. QubeWire also

has comprehensive reporting capabilities that allow the user to keep track of all their KDM orders.

The QubeWire service is protected by FIPS 140-2 certified hardware security modules and verifies the certificate chain so only devices from authorized manufactures can be added to the public theatre database.

QubeMaster Xpress and the QubeWire service together offer the independent filmmaker, who previously would not have encrypted their DCPs, an easy to use, 3-step process for encrypting their DCPs and protecting their intellectual property, while still having convenient and fast access to the required KDMs for screenings and worldwide distribution.

The encryption and KDM generation features are especially important now, with film festivals requiring DCPs. QubeMaster Xpress and www.QubeWire.com will keep content secure and easily accessible even during the chaos of a festival.

DCP Distribution to Cinemas

DCP Distribution Drives

The ISDCF specifies that distribution drives should be formatted as EXT2 or EXT3 volumes (with an *inode* size of 128). While many servers will accept FAT32 formatted drives as well, it is best to follow the specification to ensure compatibility with all server types. Drives can be USB (will result in slower ingestions) or CRU drive carriers – which will be the fastest. Copy all the files created by QubeMaster Xpress, without any changes, to the distribution drive. EXT2 and EXT3 formatted drives may be created using a Linux machine or using EXT management applications.

DCP Naming

DCPs should ideally follow the ISDCF Naming Convention and QubeMaster Xpress automatically suggests a default name that conforms to this convention. The name should not exceed 14 characters and no special characters or spaces may be used. It is important that no changes should be made to the names of any files after a DCP is created as this

will cause the DCP to fail integrity verification when ingesting into a digital cinema server. The ISDCF Naming Convention is explained in the diagram below:
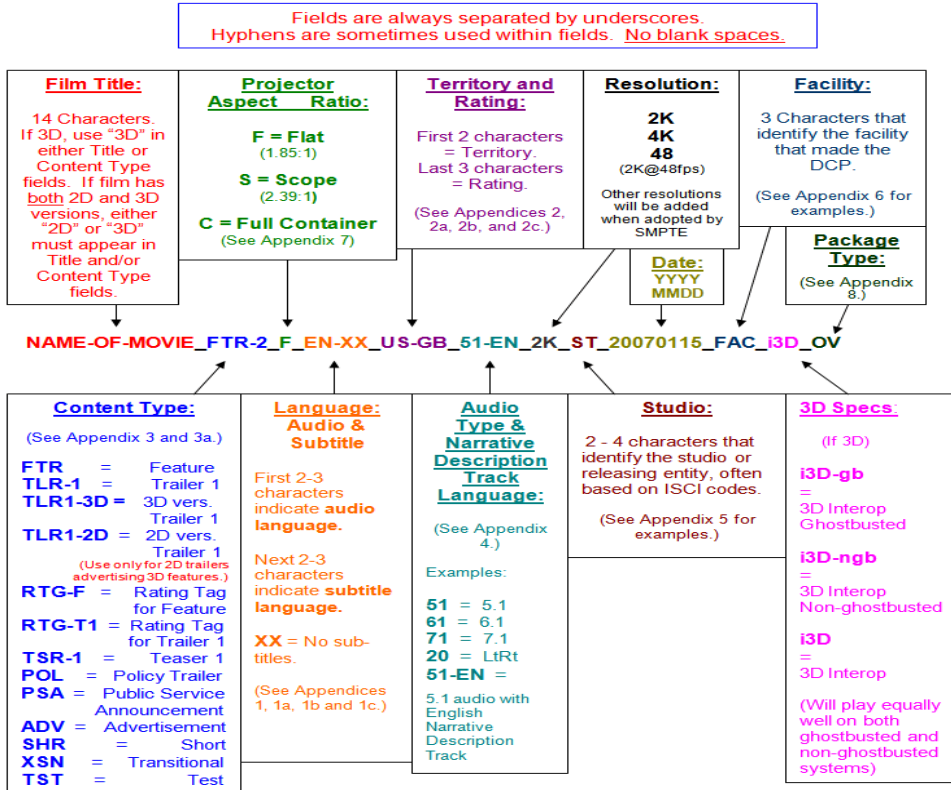
ISDCF naming convention illustration courtesy Mark Harrah.

www.isdcf.com

Detailed Workflows

Create a DCP from single or multiple graphic files

► Browse to the location of the source image file(s) and select them (note: QubeMAster Xpress does not accept sequences of image files).

► In the next page attach an audio file. If the slide does not require audio, you must still attach *silent audio to* create a compliant DCP. DCPs without audio may be rejected by some servers.

► Specify the duration of the finished DCP – in other words, specify how long you want each slide to be displayed on the screen.

► You may choose to format your picture to fit a Flat aspect ratio and/or Scope aspect ratio by cropping and scaling the image to fit – using the *Scissor* icons. Please note that the image is padded with black to fit these aspect ratios.

► Dragging the Scissor icon from top-to-bottom will crop the image on the top and bottom. Dragging the Scissor icon from left-to-right will crop the image on both sides.

► Click the *Advanced Settings* icon and select the source file's colour space if you need to change it from the default RGB Rec.709 setting which is the colour space of commonly used digital image files. If however the source's colour space has been converted to

the Digital Cinema requirement of DCI XYZ, prior to bringing the files to QubeMaster Xpress, then the colour space selection must be set to DCI XYZ.

► Change the *Gamma* of the source if necessary. Source Gamma for digital images and video files is usually 2.2.

► Click the *Next* icon to go to the final page and specify a name for the DCP.

► Select the Content Type, Country, Ratings, etc. Apart from being incorporated as meta-data within the DCP, these selections are also incorporated into the name of the DCP as per the ISDCF Naming Convention as detailed elsewhere in this User Guide.

► Click the *Advanced Settings* icon to specify the *Encoding Bit Rate* for the picture.

► Check the *Pad Audio* option to pad the audio file with silence to create a 6, 7 or 8 channel audio MXF file in the DCP. This option is available only of there is at least one channel of audio already present. If no audio source file was selected to begin with, then the Pad Audio option will be greyed-out.

► Specify a destination folder to which the DCP should be saved. Ideally each DCP must be saved to an empty folder. Click the *Go* icon to create the DCP. After the successful completion of the DCP creation process, take care not to click the *Go* icon again

inadvertently as the creation will begin again and the old files will no longer be useable.

► Copy the DCP to an EXT2 formatted drive.

Create a DCP from a video file

► Browse to the location of the source media file and select it. The file must include both image and sound - audio cannot be added separately.

► You may choose to format your picture to fit a Flat aspect ratio and/or a Scope aspect ratio by cropping and scaling the image to fit – using the *Scissor* icons. Please note that the image is padded with black to fit these aspect ratios.

► Dragging the Scissor icon from top-to-bottom will crop the image on the top and bottom. Dragging the Scissor icon from left-to-right will crop the image on both sides.

► Click the *Advanced Settings* icon and select the source file's properties. Specify if the source video file uses Interlaced or Progressive scanning.

► Select the source file's colour space if you need to change it from the default RGB Rec.709 setting which is the colour space of commonly used digital image files. If however the source's colour space has been converted to the Digital Cinema requirement of

DCI XYZ, prior to bringing the files to QubeMaster Xpress, then the colour space selection must be set to DCI XYZ.

► Change the *Gamma* of the source if necessary. Source Gamma for digital images and video files is usually 2.2.

► Click the *Next* icon to go to the final page and specify a name for the DCP.

► Select the Content Type, Country, Ratings, etc. Apart from being incorporated as meta-data within the DCP, these selections are also incorporated into the name of the DCP as per the ISDCF Naming Convention as detailed elsewhere in this User Guide.

► Click the *Advanced Settings* icon to specify the *Encoding Bit Rate* for the picture.

► Check the *Pad Audio* option to pad the audio file with silence to create a 6, 7 or 8 channel audio MXF file in the DCP. This option is available only of there is at least one channel of audio already present. If no audio source file was selected to begin with, then the Pad Audio option will be greyed-out.

► Specify a destination folder to which the DCP should be saved. Ideally each DCP must be saved to an empty folder. Click the *Go* icon to create the DCP. After the successful completion of the DCP creation process, take care not to click the *Go* icon again inadvertently as the creation will begin again and the old files will no longer be useable.

► Copy the DCP to an EXT2 formatted drive.

Create a 3D DCP from a stereoscopic video file

QubeMaster Xpress can create stereoscopic DCPs only from video sources, not from image files. Stereoscopic or 3D video source files must be in one of the following formats:

- Frame Sequential at 48fps
- Side-by-Side at 24fps
- Over-Under at 24fps

In all cases, the audio for the DCP must be in sync with the source image and a part of the same file.

► Browse to the location of the file and select it. A video file must have both image and sound in the same file, audio cannot be added separately.

► You may choose to format your picture to fit a Flat aspect ratio and/or a Scope aspect ratio by cropping and scaling the image to fit – using the *Scissor* icons. Please note that the image is padded with black to fit these aspect ratios.

► Dragging the Scissor icon from top-to-bottom will crop the image on the top and bottom. Dragging the Scissor icon from left-to-right will crop the image on both sides.

► Click the *Advanced Settings* icon and select the source file's properties. Specify if the source video file uses Interlaced or Progressive scanning.

► Select the *Stereoscopic* option and specify the format of the **source** file as Sequential, Side-by-Side or Over-Under (based on your source file's properties).

► Select the source file's colour space if you need to change it from the default RGB Rec.709 setting which is the colour space of commonly used digital image files. If however the source's colour space has already been converted to the Digital Cinema requirement of DCI XYZ, prior to bringing the files to QubeMaster Xpress, then the colour space selection may be set to DCI XYZ.

► Change the *Gamma* of the source if necessary. Source Gamma for digital images and video files is usually 2.2.

► Click the *Next* icon to go to the final page and specify a name for the DCP.

► Select the Content Type, Country, Ratings, etc. Apart from being incorporated as meta-data within the DCP, these selections are also incorporated into the name of the DCP as per the ISDCF Naming Convention as detailed elsewhere in this User Guide.

► Click the *Advanced Settings* icon to specify the *Encoding Bit Rate* for the picture.

► Check the *Pad Audio* option to pad the audio file with silence to create a 6, 7 or 8 channel audio MXF file in the DCP. This option is available only of there is at least one channel of audio already present. If no audio source file was selected to begin with, then the Pad Audio option will be greyed-out.

► Specify a destination folder to which the DCP should be saved. Ideally each DCP must be saved to an empty folder. Click the *Go* icon to create the DCP. After the successful completion of the DCP creation process, take care not to click the *Go* icon again inadvertently as the creation will begin again and the old files will no longer be useable.

► Copy the DCP to an EXT2 formatted drive.

Digital Cinema Terms and Concepts

It is useful to understand some of the concepts of Digital Cinema when working with the QubeMaster Xpress software.

The basic unit of content that can be played by a DCI Compliant Digital Cinema Server is the **Track File.** A Track File is either a picture, sound or subtitle file in the JPEG2000 compression format *and* MXF container format. A Track File is analogous to a roll of picture positive or a sound positive in the film environment.

Picture, Sound and Subtitle Track Files are synced together with Start and End Points to form a **Reel** which can be considered equivalent to a Reel of a Film Print.

Multiple Reels in a specific order go to form a **Composition.** A Composition also has additional *meta-data* associated with it and usually consists of a complete feature film, an advertisement commercial, a documentary or other logical unit of programming. In the film environment, a Composition can be considered equivalent to a complete Film Print. One or more Compositions or parts of a Composition can be

made into a **Digital Cinema Package** or DCP that can be ingested or loaded into a Digital Cinema Server.

A DCP created by QubeMaster Xpress is a folder containing a specific set of files created according to the exacting requirements of the DCI Specification and named according to the ISDCF Naming Convention.

> ► **DCP Folder**
> *Meta-data Files*
> - Composition Playlist or CPL, an XML file
> - Packing List or PKL, an XML file
> - ASSETMAP, an XML file
> - VOLINDEX, an XML file
> *Track Files*
> - Picture Track File, an MXF file
> - Sound Track File, an MXF file

QubeMaster Xpress will of course create all these files in the required formats.

Error Logging

QubeMaster Xpress records all errors and application logs to the Windows EVENT VIEWER. Often, it is necessary to view or retrieve these logs for support purposes.

The event log can be accessed thus:

► Right- Click windows "Start" and select Event Viewer from the menu
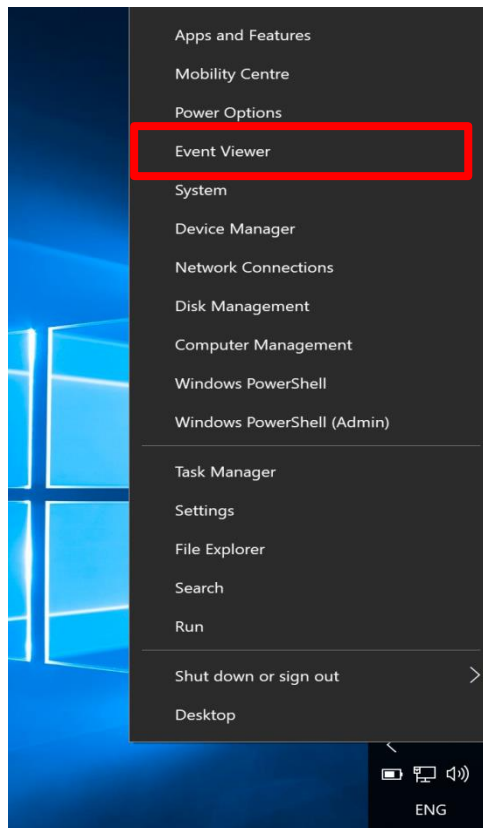
► In the "Computer Management Console" window, Expand
  Applications and Services logs
   o Expand Qube
   o In the rightmost pane select "Save All Events as" and save as
     ".evtx"
   o Zip and email to support@qubecinema.com