JPEG 2000 Encoder

(J2KENC and J2KENC-PRO)
JPEG 2000 Encoder Software

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL
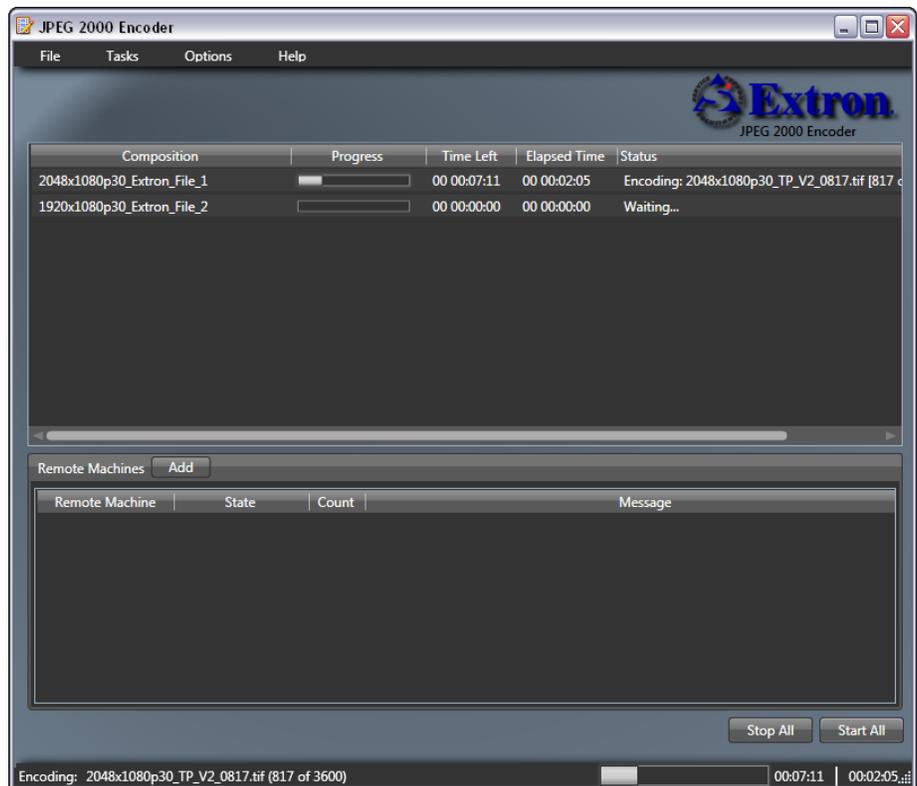
Conventions Used in this Guide

In this user guide, the following are used:

> **NOTE:** A note draws attention to important information.

> **TIP:** A tip provides a suggestion to make setting up or working with the software easier.

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

Contents

Introduction and Installation

This section gives an overview of the guide and features of the Extron JPEG 2000 Encoder software. Installation is also described. Topics that are covered include:

- **About this Guide**
- **About the JPEG 2000 Encoder**
- **System Requirements**
- **Software Installation**

About this Guide

This guide provides detailed information about the JPEG 2000 Encoder software, including software installation and encoding procedure. In this guide, "J2KENC" refers to the lite version of JPEG 2000 Encoder and "J2KENC-PRO" refers to the full version. Notes distinguish where the two versions differ.

About the JPEG 2000 Encoder

The Extron JPEG 2000 Encoder is available in two versions on the disc that is shipped with the JMP 9600 JPEG 2000 Media Player. These two versions are:

- **JPEG 2000 Encoder "Lite"** — Provided free of charge to all purchasers of the JMP 9600. This version is the default when the JPEG 2000 Encoder software is first installed on your encoding computer. The application has basic functionality powerful enough for situations that require encoding short clips with a single audio (stereo) file.

- **JPEG 2000 Encoder "Full"** — When the license and activation key are received from Extron, all functionality of the full version is enabled without further software installation (the full version is loaded as part of the initial installation on the encoding computer but is disabled until licensed).

The software runs on Microsoft® Windows® 7 or Windows XP operating systems and allows you to prepare content for playback on the JMP 9600 without the need for external encoding services. It constructs visually lossless MXF wrapped Digital Cinema Package (DCP) files. The DCP includes video, audio, and other associated data encoded to comply with the DCI (Digital Cinema Initiatives, LLC) requirements for unencrypted content. The DCPs that are generated by the JPEG 2000 Encoder are subsequently transferred to the JMP 9600 for playback.

As the time required for encoding a DCP is directly proportional to the number of image frames and the size of the associated audio files, the full version software is tailored to use all of the processing power of the encoding computer (see "**System Requirements**"). The application can run simultaneously on multiple computers, thereby functioning as an "encoding array" to significantly increase throughput when processing DCPs. The difference in processing speed between the two versions is considerable.

> **NOTES:** • Using the lite version for encoding large video clips can take many hours or days.
>
> • The lite version supports only a single thread (computer processor core), even if the computer is multi-threaded, and a single stereo audio input.

Features

Lite version

- Outputs unencrypted JPEG 2000 encoded video (encapsulated in DCPs) for playback on the JMP 9600
- Runs on a Microsoft Windows computer platform (see "**System Requirements**")
- Works on a single computer
- Image encoding for BMP, DPX, TGA (24 bpp [bits per pixel] and 32 bpp only), and TIFF file formats. Extron recommends using TIFF format.
- Facilities to MXF wrap uncompressed 24-bit Broadcast WAV files
- Supports a variety of video output parameters (such as format, colorspace, and compression rate)
- Status of the encoding process is tracked through to completion

Full version

- Outputs unencrypted JPEG 2000 encoded video (encapsulated in DCPs) for playback on the JMP 9600
- Supports a number of editing features including text overlay, timecode stamp, image crop, image letterbox, and letterbox position within the output frame
- Supports batch encoding
- Runs on a Windows computer platform (see "**System Requirements**")
- Adjustable to the number of threads (computer processor cores) available
- Works in parallel on multiple computers (encoding array)
- Image encoding for BMP, DPX, TGA (24 bpp and 32 bpp only), and TIFF file formats. Extron recommends using TIFF format.
- Facilities to MXF wrap uncompressed 24-bit Broadcast WAV files (up to 16 channels)
- Facilities to interleave multiple mono WAV files into a single, multi-channel WAV file
- Supports a variety of video output parameters (such as format, colorspace, and compression rate)
- Status of the encoding process is tracked through to completion

System Requirements

Ensure that the system hardware to be used meets or exceeds the minimum requirements listed below. Encoding performance improves when a system more powerful than the minimum listed here is incorporated.

> **NOTES:** • The encoding computers must be network capable.
>
> • It is recommended that the application be used on a computer with superior processing capacity, speed, and memory to reduce encoding time since the process can take hours (or days), depending on the length of the video.

Minimum system requirements:

- Intel® Pentium® 4, 2.8 Ghz (1 core)
- 2 GB RAM
- Windows XP SP3
- Microsoft .NET Framework 3.5 SP1
- 1 GB of available hard disk space on the system drive

    5 GB or more is recommended on the installation drive and 20 percent free space on the media drive (see the note below) for encoding temporary files (this value depends on encoder compression rate).

    > **NOTE:** The Media drive is the hard disk drive on the local computer reserved for DCP output.

- Typical encoding performance: 0.2 frames per second

Recommended system:

- Intel® Core™ i5, 3.4 Ghz (2 cores, 4 threads) or better
- 4 GB RAM
- Windows 7 64-bit
- Microsoft .NET Framework 3.5 SP1
- 1 GB of available hard disk space on the system drive

    5 GB or more is recommended on the installation drive and 20 percent free space on the media drive (see the note below) for encoding temporary files (this value depends on encoder compression rate).

    > **NOTE:** The Media drive is the hard disk drive on the local computer reserved for DCP output.

- Typical encoding performance: 6.0 frames per second

    > **NOTE:** It is recommended that a monitor supporting the encoded resolution and frame rate be used. This is beneficial for production and quality control after encoding.

Software Installation

The JPEG 2000 Encoder application requires Microsoft .NET Framework 3.5 SP1 in order to function. Ensure that your encoding computer is equipped with this version of .NET Framework before installing the JPEG 2000 Software Encoder.

To verify or install .NET Framework:

1. Verify the presence (or absence) of Microsoft .NET Framework 3.5 SP1.

   If using Windows XP:
   From the desktop, navigate to **Start > Control Panel > Add or Remove Programs** and verify the presence (or absence) of Microsoft .NET Framework 3.5 SP1.

   If using Windows 7:
   From the navigate to **Start > Control Panel > Programs and Features > Turn Windows Features On or Off** and verify the presence (or absence) of Microsoft .NET Framework 3.5 SP1.

2. If Microsoft .NET Framework 3.5 SP1 is present, exit the current screen and continue to the JPEG 2000 Encoder installation steps.
   - or -
   If it is not present or if an earlier version of .NET (versions 1 through 3) is installed:

   a. Open the web browser and in the **Address** field, enter **http://download. microsoft.com/download/2/0/e/20e90413-712f-438c-988e-fdaa79a8ac3d/ dotnetfx35.exe**.

   b. Download Microsoft .NET Framework 3.5 SP1 from the website.

   c. Install the downloaded application on the encoding computer.

To install the JPEG 2000 Encoder:

Steps **3** and **4** are shown in **figure 1**.

1. Load the JPEG 2000 Encoder installation file on your encoding computer.

2. On-screen instructions appear, starting the installation setup of the JPEG 2000 Encoder. Click **Next**.

3. On the Select Installation Folder screen, click **Browse** to navigate to a different folder in which to install the application If desired and click **Disk Cost** to check available disk space.
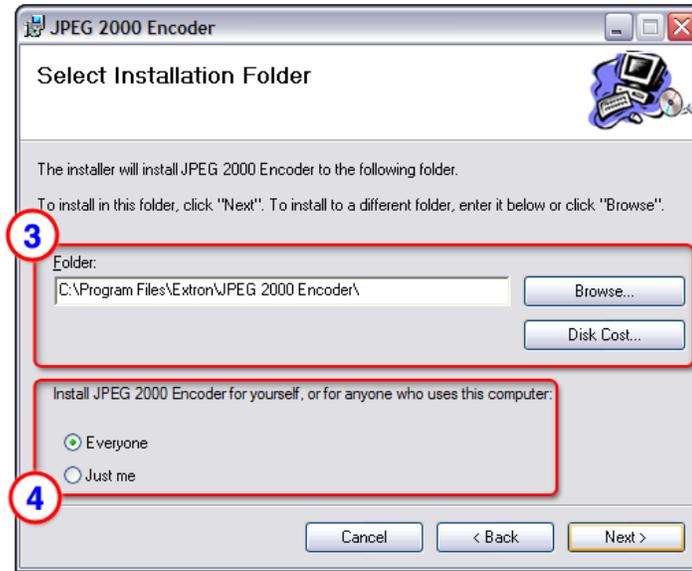
Figure 1.   Select Installation Folder Screen

4. Select whether to install the JPEG 2000 Encoder for yourself or for everyone using this computer.

5. Click **Next**.

6. On the License Agreement screen, read the license agreement and select **I Agree** to continue.

7. On the Confirm Installation screen, click **Next** to start the installation.

8. When installation is complete, click **Close**.

9. Verify the storage locations of the video and audio data on the network.

To open the JPEG 2000 Encoder:

Double-click the **JPEG 2000 Encoder** icon on your desktop.
- or -
From the desktop, click **Start > All Programs > Extron Electronics > JPEG 2000 Encoder**.

The default lite version of the application opens.
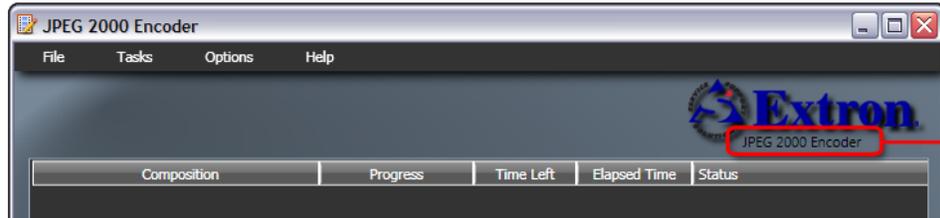
Figure 2. **Indication of Lite or Full Version of JPEG 2000 Encoder**

You can use the lite version of the application immediately (without access to its full feature set) or you can choose to activate the full version of the software.

Licensing and Activating the Full Version

Skip this process if you have not purchased the full version of the software.

To verify the software version being used:

1. From the **Help** menu, select **About JPEG 2000 Encoder**. The About dialog box opens.
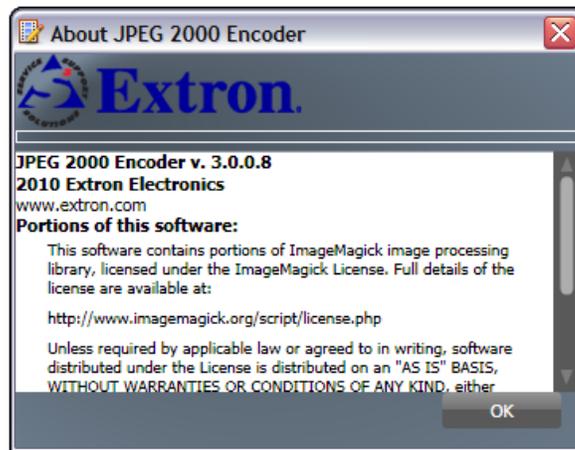
Figure 3. **About Screen**

2. Click **OK** to close the screen and return to the main screen of the application.

To license and activate the full version:

Some of the steps are shown in **figure 4**.

1. Contact Extron for a full license and to generate the license and activation keys. You will receive a license key from Extron via e-mail.

2. From the **Help** menu, select **Licensing and Activation**. The Licensing and Activation screen opens.
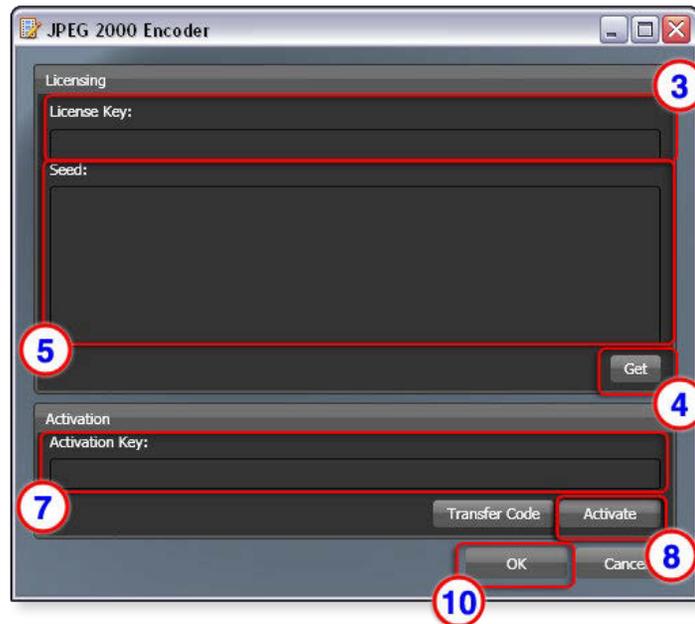
Figure 4.   Licensing and Activation Screen

3. Copy and paste the license key characters into the **License Key** field.

   > **NOTE:**   The hyphens in the license key are necessary when you are entering the information into the field.

4. Click **Get** to obtain seed information. This text appears in the Seed section of the Licensing and Activation screen.

5. Copy the seed information (there are multiple lines of characters) from the Seed section of the screen and paste it in a reply e-mail to Extron.

6. Send the e-mail containing the seed information to Extron.

7. In response, you receive the activation key from Extron via e-mail. Copy and paste it into the **Activation Key** field of the Licensing and Activation screen.

   > **NOTE:**   The hyphens in the activation key are necessary when you are entering the information into the field.

8. Click **Activate**. A dialog box opens confirming the activation.

9. Click **OK** in the dialog box.

10. Click **OK** to exit the screen. You are now ready to encode media for the JMP 9600.

Transferring a license to a different PC

Follow the steps below to transfer the full license to another computer if needed. You can also use this procedure to transfer the full license back to the original computer if needed.

1. From the **Help** menu, select **Licensing and Activation**. The Licensing and Activation screen opens. Make a note of the original license key.

2. Click **Transfer Code**. A transfer code is generated and the original PC now has the lite version of the JPEG 2000 Encoder. Make a note of this transfer code.

3. With the JPEG 2000 Encoder open on the new PC, enter the old license key into the **License Key** field of the Licensing and Activation screen.

4. Click **Get** to obtain seed information. This text appears in the Seed section.

5. Copy and paste the old license key, the transfer code you obtained on the original PC, and the new PC seed information into an e-mail to Extron.

6. Send the e-mail.

7. In response, you receive a new activation code for the new PC via e-mail. Copy and paste it into the **Activation Key** field of the Licensing and Activation screen.

8. Click **Activate**. A dialog box opens confirming the activation.

9. Click **OK** in the dialog box.

10. Click **OK** to exit the Licensing and Activation screen.

Encoding Procedure

This section describes the process of encoding content for the JMP 9600. Topics that are covered include:

- **Encoding Overview**
- **Main Menu Options**
- **Single Clip Encoding**
- **Batch Encoding**
- **Status Indication**
- **Encoding Across Multiple Computers (Remote Machines)**

Encoding Overview

The main steps for encoding content for the JMP 9600 are as follows:

1. Check that the hardware profile matches the player type for which you are encoding content (see "**JMP 9600 Hardware Profile**").

2. From the **Tasks** menu, select **Encode** to open the Encode Settings screen (see "**Tasks Menu**").

3. Select the input data to be encoded (such as image frames and audio files) (see "**Inputs**").

4. Set the encoding parameters (see "**Encoding parameters**").

5. Add remote machines to function as an encoding array (optional for full version) (see "**Encoding Across Multiple Computers [Remote Machines]**").

6. Name the DCP and choose a storage location on the local disk drive for the final output (see "**Outputs**").

7. Perform any editing tasks (see "**Effect Settings tab**" and "**Drawing Settings tab**").

8. Encode the content (see "**Single Clip Encoding**" and "**Batch Encoding**").

> **NOTES:** • The source data for encoding as well as the resultant output DCP resides on the local computer even if an encoding array is employed, unless the input path, output path, or both is a remote machine mapped on the network.
>
> • Ensure that frame file names that include a numerical component use the same number of digits in all file names.

Main Menu Options

The options available through the menu bar of the JPEG 2000 Encoder are used to access certain configuration settings. Modify these settings as needed before beginning an encoding session.

File Menu

From the **File** menu, select **Exit** to close the application. You can also click the ⊠ in the upper right corner of the application window to close the JPEG 2000 Encoder.

Tasks Menu

The **Encode** option is used to configure the application to find source files (video and audio inputs), set encoding parameters, edit the frames, define output names, and define the output location.

> **NOTE:** If you are using multiple machines, use mapped drives rather than relative paths for the locations of source and output data.

To access the encoding settings:

From the **Tasks** menu, select **Encode**. The **Encode Settings** tab of the Encode Settings screen opens.
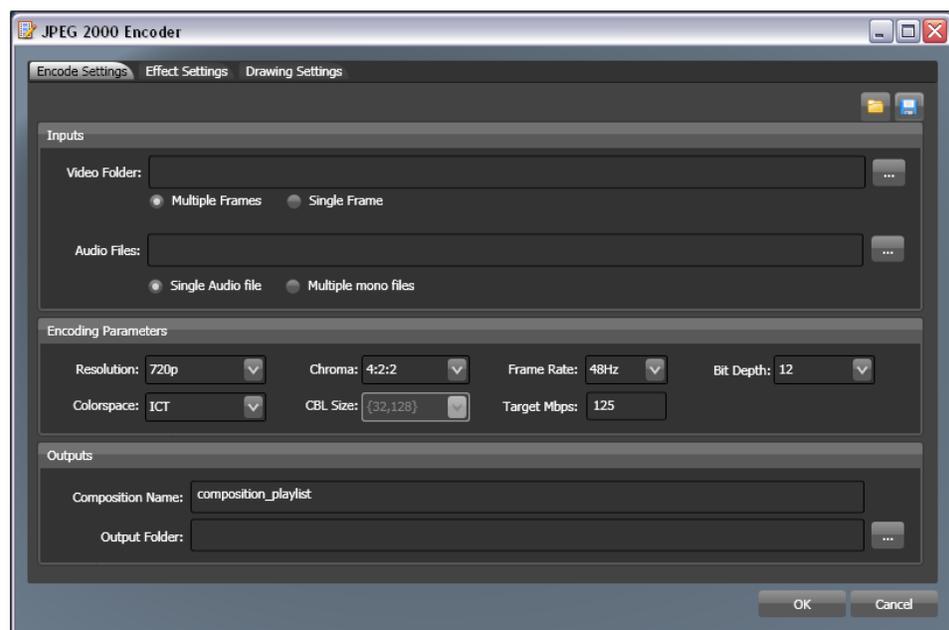
Figure 5. **Encode Settings Tab**

On this screen, you can:

- Select the **Encode Settings** tab to configure the application for the session.
- Select the **Effect Settings** tab to access image format (size) editing features.
- Select the **Drawing Settings** tab to access text overlay, editing features, and the timecode stamp.

You can also open the Encode Settings screen by double-clicking an item in the Composition column of the JPEG 2000 Encoder main screen.

Encode Settings tab

Loading or saving encode settings

You can save your encoding configuration settings as an EPR file that can be reused at a later time. The configuration settings that are saved include encoding settings, effect settings, and drawing settings.

To save a configuration:

1. From the **Tasks** menu, select **Encode**.

2. On the **Encode Settings** tab, adjust the encoding settings as desired.

> **NOTE:** An output folder needs to be specified in order to save the encoding settings (see "**Outputs**").

3. Click the button in the upper right corner of the **Encoding Settings** tab. The Save As dialog box opens.

4. Navigate to a folder in which to store the file.

5. In the **File name** field, enter a name for the file.

6. Click **Save**.

To retrieve a previously saved configuration:

1. From the **Tasks** menu, select **Encode**.

2. On the **Encode Settings** tab, click the button. The Open dialog box is displayed.

3. Navigate to and select the desired EPR file.

4. Click **Open**. This loads the saved encoding settings.

Inputs

The Inputs section of the **Encode Settings** tab allows you to let the encoder know where to look for the frames (graphics files) to be encoded.

To adjust video settings:

1. From the **Tasks** menu, select **Encode**.

2. Select the **Encode Settings** tab.

3. Below the **Video Folder** field of the Inputs section, select either **Multiple Frames** or **Single Frame** to define the type of encoding desired.

> **NOTE:** If **Multiple Frames** is selected, this field is called **Video Folder**. If **Single Frame** is selected, this field is called **Frame Path**.

Single Frame encoding allows the producer to generate a video clip (DCP package) with a specified length (number of frames) from a single graphics file in one of the supported formats.

> **TIP:** If corresponding audio is required, the audio tracks should be trimmed to the number of samples matching the length of the video.

4. If **Single Frame** is selected, enter the number of frames to be generated from the single frame in the **Frames** field. The **Frames** field is located beside the **Frame Path** field when **Single Frame** is selected.

5. Beside the **Video Folder** field, click the [···] button to navigate to the folder (or the previously mapped drive) containing sequential image frames (BMP, DPX, TGA, or TIFF) that are to be encoded (Extron recommends using TIFF format). The path for the selected folder appears in the **Video Folder** field.

> **NOTES:** • When selecting and opening a folder in the Browse for Folder dialog box, the files within the folder are not displayed.
>
> • All of the image files in this folder are included in the encoding process. Ensure that only the required files are placed in the selected folder. Audio files or files of a different type are not encoded.

> **TIPS:** • The encoder processes image files with 8 bits per color channel, but use of source material with a bit depth as low as this may result in visible contours in areas of the image with subtle graduation (for example, clouds).
>
> • The files should be located on a local drive for better performance.
>
> • For best results, use uncompressed, progressive file formats with the highest bit depth. Uncompressed TIFF files with 16 bits per color channel are ideal. DPX files with 10 bits per color channel are the next best option.

You can also adjust the settings for audio sources in the Inputs section of the **Encode Settings** tab.

> **NOTES:** • The JMP 9600 JPEG 2000 Media Player supports encoding only even pairs of audio and produces an MXF wrapped audio track consisting of 2, 4, 8, or 16 channels of audio. This is combined into the DCP with the video.
>
> • Audio files must be uncompressed PCM (WAV) files sampled at 48 KHz and 16, 20, or 24 bits.

The JPEG 2000 Encoder offers two options for handling audio input content:

● **Single Audio File** — The single audio WAV file can be composed of a stereo pair of audio channels or an even number of audio channels (up to 16 channels of audio content).

> **NOTE:** The lite version of the JPEG 2000 Encoder application supports one file consisting of a stereo pair or two channels of audio.

● **Multiple Mono Files** — The JPEG 2000 Encoder processes up to 16 separate WAV files from up to 16 separate data storage locations. This allows you to dedicate specific audio files to corresponding audio channels according to multi-channel audio requirements for theaters (DCI).

To select a single audio file:

1. From the **Tasks** menu, select **Encode**.

2. Select the **Encode Settings** tab.

3. Below the **Audio Files** field of the Inputs section, select **Single Audio file**.

4. Beside the **Audio Files** field, click the [···] button and navigate to the folder containing the audio (WAV) content to be encoded.

5. Select a file from the folder and click **Open**. The path for the selected file appears in the **Audio File** field.

To select multiple mono files:

1. Below the **Audio Files** field of the Inputs section, select **Multiple mono files**.

2. Beside the **Audio Files** field, click the [...] button to open the Audio Channels screen.


Figure 6. **Audio Channels Screen**

3. For each audio channel, click the respective [...] button to locate the desired audio content and assign the files to the respective "surround sound" channels.

4. Click **OK** to accept the settings or click **Cancel** to exit the Audio Channels screen. This returns you to the **Encode Settings** tab (**figure 7**).

TIP: The Microsoft mappings for audio channels 9 through 16 are:

- 9 — Back Center (BC)
- 10 — Side Left (SL)
- 11 — Side Right (SR)
- 12 — Top Center (TC)
- 13 — Top Front Left (TFL)
- 14 — Top Front Center (TFC)
- 15 — Top Front Right (TFR)
- 16 — Top Back Left (TBL)

The following mappings are not defined in the DCI specification and may be adjusted to suit the application:

- 17 — Top Back Center (TBC)
- 18 — Top Back Right (TBR)

Encoding parameters

Use the Encoding Parameters section of the **Encode Settings** tab to define the properties of the DCP.

The available settings include:

- **Resolution** — Choose an output resolution. The drop-down list displays formats that correspond with the JMP 9600 hardware profile selected from the **Options** menu.

- **Chroma** — Choose the chroma setting.

  > **TIP:** When 4:4:4 color sampling is selected, the resulting clip requires the JMP 9600 to be configured for single channel mode.

- **Frame Rate** — Choose a frame rate. The drop-down list displays formats that correspond with the JMP 9600 hardware profile selected from the **Options** menu.

- **Bit Depth** — Choose a bit depth (bits per channel).

  > **TIP:** 12 bits per channel is recommended.

- **Colorspace** — Choose a colorspace.

  > **TIP:** Select **None** when encoding for applications (such as Digital Cinema) using XYZ colorspace. The values are passed through without conversion. Otherwise, select **ICT** to create sRGB, RGB, or YCrCb colorspace files.

- **CBL (Code Block) Size** — The default (32, 128) is not adjustable unless:
  - Resolution is set to 720p and chroma is set to 4:4:4
  - Resolution is set to 1080p and chroma is set to 4:4:4
  - Resolution is set to 2K and chroma is set to 4:4:4

  If any of these settings are selected, you can choose between 32, 188 and 32, 32.

- **Target Mbps** — Set the target bit rate.

  > **TIP:** The default (suggested) values are 125 Mbps for 4:2:2 files and 250 Mbps for 4:4:4 files.

To adjust the settings:

1. Click the button for an available setting. This displays the drop-down list of options.

   > **NOTE:** Available settings depend on the JMP 9600 hardware profile that is set in the **Options** menu (see "**JMP 9600 Hardware Profile**").

2. From the drop-down list, select the desired option.

Outputs

Use the Outputs section of the **Encode Settings** tab to define the identity of the DCP and the location where the DCP is stored after it is generated.

To adjust the output settings:

1. From the **Tasks** menu, select **Encode**.

2. Select the **Encode Settings** tab.

3. In the **Composition Name** field of the Outputs section, enter a unique name for the DCP.

4. Beside the **Output Folder** field, click the ⬚ button to navigate to the folder designated as the storage location for the final Digital Cinema Package output. The path for the selected folder appears in the **Output Folder** field.

    > **NOTE:** In an encoding array, the source files (frames and audio) must be on a drive mapped with the same drive letter on both the local and remote machines. This applies to the output folder as well. For example, if an output folder on the local machine is mapped to F:, the output folder on the remote machine must also be mapped to F: (see "**Encoding Across Multiple Computers [Remote Machines]**"). When encoding with a single machine, use local drives for the source and output folders for better performance.

5. Click **OK** to save your settings and exit the Encode Settings screen or click **Cancel** to exit the screen without saving any changes.

Each unique composition name generates a new DCP for the output folder. These appear in the Composition column of the JPEG 2000 Encoder main screen.

Effect Settings tab

The features on the **Effect Settings** tab allow you to crop and scale the video for multi-screen applications or to match the native resolution of the target display device.

> **NOTES:** • The available effect options depend on the settings in the encoding parameters and the incoming frame size (see "**Encode Settings tab**").
>
> • The **Effect Settings** tab is disabled if the resolution of the source graphics file matches the target encoder resolution.

Figure 7. **Effect Settings Tab**

Disabled

The **Disabled** option on the **Effect Settings** tab indicates that no effects are in use and the output display window remains black.

The image description that is displayed for this option includes:

• **Image Size** — The horizontal and vertical pixel format of the source frame

• **Target Size** — The desired pixel aspect of the output frame

• **Position** — 0,0 (default position). No adjustment is possible in this mode.

Crop mode

To enable crop mode:

On the **Effect Settings** tab, click **Crop Mode**.

If the input frame is larger than the target frame, an image appears in the output window with a light blue rectangle superimposed upon it.

> **NOTE:** If the input frame is smaller than the target frame, Crop mode is not available.

The blue rectangle represents the area that will be kept after the cropping is complete. Cropping the image removes all pixels outside of the blue rectangle. The crop area can be modified as needed.

The image description that is displayed for this option includes:

- **Image Size** — The horizontal and vertical pixel format of the source frame
- **Target Size** — The desired pixel aspect of the output frame
- **Position** — The crop window location on the frame. The default position is the top left of the output frame (pixels 0,0).

The size of the crop region can be any size from 32x16 pixels up to and including the target resolution.

To reposition the image:

On the **Effect Settings** tab, click and drag the image on the screen.

- or -

Click the **Up**, **Down**, **Left**, and **Right** buttons to nudge the image in single-pixel increments.

- or -

1. Click the ![pencil icon] button beside the **Position** field to open the Change Value screen.
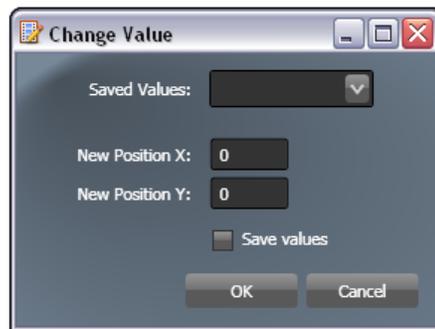
Figure 8. Change Value Screen

2. Enter specific pixel coordinates in the **New Position X** and **New Position Y** fields.

3. Select the **Save values** check box if desired.

4. Click **OK** to exit the Change Value screen.

The position information updates in real time.

The crop size appears below the position information. The default crop size is the output resolution set on the **Encode Settings** tab. Cropping works only if the input image is larger than the output frame.

To adjust the crop size:

On the **Effect Settings** tab, click and drag the corners of the crop region box within the Crop Editor window to change the crop size.

- or -

1. Click the button beside the **Crop Size** field to open the Change Value screen.

Figure 9. Change Value Screen

2. Enter a new pixel width and height in the respective **New Width** and **New Height** fields.

3. Select the **Save values** check box if desired. If the **Save values** check box is selected, copies of the cropped output frames are saved along with the DCP.

4. Click **OK** to exit the Change Value screen.

In the Crop Regions section of the **Effect Settings** tab, click the button to add as many crop regions as needed. Each crop region is encoded as a separate DCP.

For example, you can use multiple overlapping crop regions to set up frame segments that will be sent to separate projectors and blended on screen to form a single large image.

> **NOTE:** If the crop size is less than the encoder target size, the cropped image is centered in the output video.

To rename a crop region for easier identification:

1. On the **Effect Settings** tab, double-click a name in the Crop Regions section. The Crop Region Name screen opens.

Figure 10. **Crop Region Name Screen**

2. In the **New Name** field, enter a name to identify the crop region.

3. Click **OK** to exit this screen and return to the **Effect Settings** tab.

Stretch mode

To enable stretch mode, click **Stretch Mode** on the **Effect Settings** tab. When stretch mode is enabled, the display shows the input frame stretched to fit into the output frame determined by the encoder settings on the **Encode Settings** tab. Stretch mode can be applied when the input frame is smaller or larger than the output frame so that the input size is forced to the output size.

The image description that is displayed for this option includes:

- **Image Size** — The horizontal and vertical pixel format of the source frame
- **Target Size** — The desired pixel aspect of the output frame
- **Position** — 0,0 (default position). No adjustment is possible in this mode.

Letterbox mode

To enable letterbox mode, click **Letterbox Mode** on the **Effect Settings** tab. The video frame that is displayed is centered horizontally and vertically with a red border in letterbox format.

> **NOTES:** • Letterbox mode functions only if the input frame is smaller than the output frame determined by the encoder settings on the **Encode Settings** tab.
>
> • Depending on the resolution of the source files and the target resolution, this mode may also result in pillarbox images (black bars on the sides) or windowbox images (black border around the image).

The image description that is displayed for this option includes:

- **Image Size** — The horizontal and vertical pixel format of the source frame
- **Target Size** — The desired pixel aspect of the output frame as defined on the **Encode Settings** tab
- **Position** — It is dependent upon the sizes of the input and output frames. By default, the source image is centered within the output image size.

To reposition the image:

On the **Effect Settings** tab, click and drag the image on the screen.

- or -

Click the **Up**, **Down**, **Left**, and **Right** buttons to nudge the image in single-pixel increments.

- or -

1. Click the ![pencil icon] button beside the **Position** field to open the Change Value screen.

2. Enter specific pixel coordinates in the **New Position X** and **New Position Y** fields.

3. Select the **Save values** check box if desired.

4. Click **OK** to exit the Change Value screen.

The position information updates in real time.

Drawing Settings tab

Using the features mentioned on the **Drawing Settings** tab, you can overlay text blocks and timecode stamps on the video output frames.
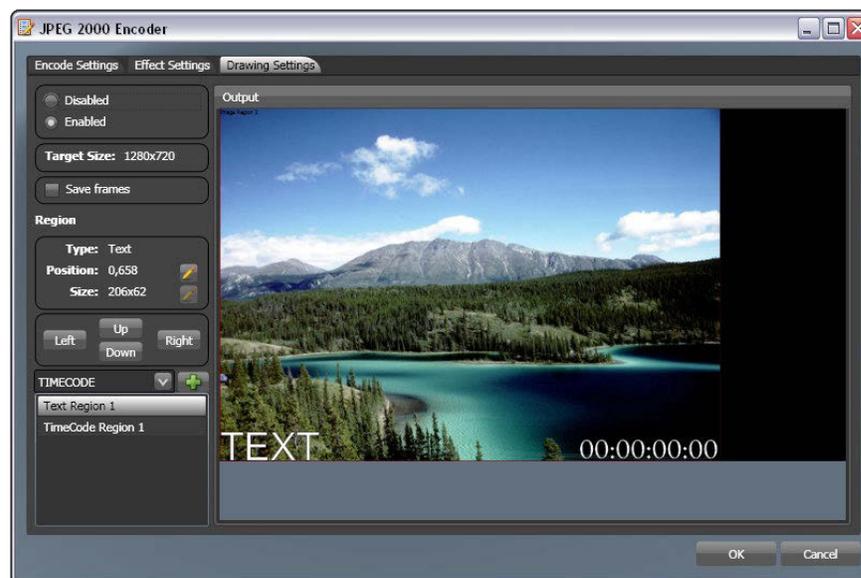
Figure 11. Drawing Settings Tab

Text editing

To add a text block:

1. On the **Drawing Settings** tab, click the **Enabled** radio button. This activates the settings on the tab.

2. In the Text section, click the button and select **Text** from the drop-down list of options.

3. In the Text section, click the button to add a text block.

4. Edit the text block that appears in the upper left corner of the output display.

> **NOTE:** Move the text block into the output frame (within the red-bordered image) or it will not appear on the output screen. The text block position can be anywhere on the output frame.

To reposition the text block:

On the **Drawing Settings** tab, click and drag the text block on the screen.

- or -

Click the **Up**, **Down**, **Left**, and **Right** buttons to nudge the text block in single-pixel increments.

- or -

1. Click the button beside the **Position** field to access the Change Value screen.

2. Enter specific pixel coordinates in the **New Position X** and **New Position Y** fields.

3. Select the **Save values** check box to save these settings as preset values for use in the future.

4. Click **OK** to exit the Change Value screen.

The position information updates in real time.

To modify the text in a text block:

1. In the Output section of the **Drawing Settings** tab, right-click the text and select **Change Text** from the drop-down menu. The TextDialog screen opens.
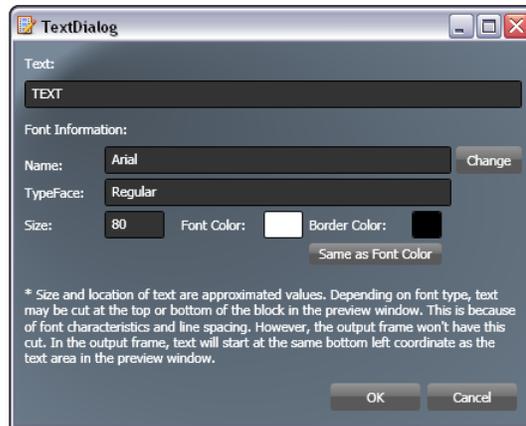
Figure 12. TextDialog Screen

2. In the **Text** field of the TextDialog screen, enter the desired text.

3. Click **Change** beside the **Name** field of the Font Information section to change the font style. The Font screen opens.
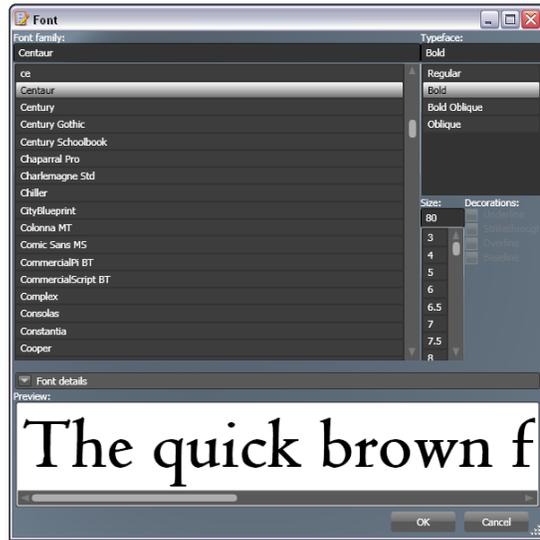
Figure 13. Font Screen

> **NOTE:** Depending on the overlay font in use, the "tails" of lowercase characters and other "flourishes" in decorative fonts may be cut off in the Preview section of the Font screen. The actual font output displays correctly.

4. On the Font screen, select the desired font family, font style, and font size.

5. Click **OK** to return to the TextDialog screen.

6. Modify the text color.

    a. In the Font information section of the TextDialog screen, double-click the **Font Color** box to change the font color. The Select a Color screen opens.
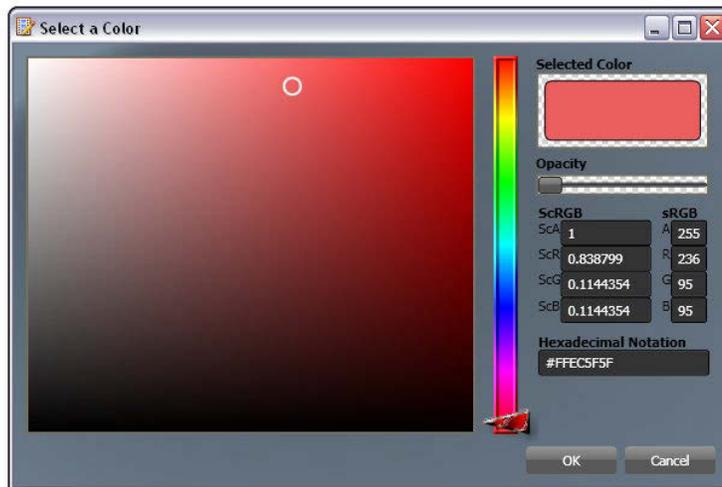

Figure 14. Select a Color Screen

    b. Adjust the color settings as desired.

    c. Click **OK** to accept the text color parameters and return to the TextDialog screen. Alternatively, click **Cancel** to return to the TextDialog screen without making changes.

7. Modify the border color:

   a. In the Font information section of the TextDialog screen, double-click the **Border Color** box to change the border (stroke) color. The Select a Color screen opens.

   b. Adjust the color settings as desired.

   c. Click **OK** to accept the border color parameters and return to the TextDialog screen. Alternatively, click **Cancel** to return to the TextDialog screen without making changes.

8. On the TextDialog Screen, click **OK** to return to the **Drawing Settings** tab.

Timecode stamp

To add a timecode stamp:

1. In the Text section of the **Drawing Settings** tab (**figure 11**), click the button and select **Timecode** from the drop-down list of options.

2. In the Text section, click the button to add a timecode stamp. A timecode stamp (00:00:00:00) appears in the upper left corner of the output display.

   > **NOTE:** Move the timecode stamp into the output frame (within the red-bordered image) or it will not appear on the output screen. The text block position can be anywhere on the output frame.

3. You can edit the position and appearance of the timecode stamp using the same procedures as described for text blocks in "**Text editing**."

   You cannot edit the contents of the timecode stamp. This changes automatically for each frame during the encoding process.

4. On the **Drawing Settings** tab, click **OK** to return to the main screen of the JPEG 2000 Encoder.

Options Menu

The options available on the **Options** menu depend on which version of the application (lite or full version) is in use.

Threads

> **NOTE:** The **Threads** option is available only with the full version of the software.

This option allows the use of multiple threads (computer processor cores) for increased system throughput.

To adjust the threads setting:

1. From the **Options** menu, select **Threads** to access the slider bar.

2. Click and drag the slider bar to change the threads value. The maximum number is limited to the number of cores on the computer.

JMP 9600 Hardware Profile

The options listed on the **JMP 9600 Hardware Profile** submenu of the **Options** menu tailor the output of the encoder for particular use on the JMP 9600 player. Select a profile to define which encoding parameters are best suited to the required DCP. See the *JMP 9600 User Guide* for more information about the JMP 9600.

To select the JMP 9600 hardware profile:

> From the **Options** menu, locate the **JMP 9600 Hardware Profile** submenu and select one of the listed options:

- **V. 2.0 HD** (Default)
- **V. 2.0 2K**
- **V. 3.0 2K**

> A check mark appears beside the selected option.

> **NOTE:** V. 3.0 2K supports high frame rates of 1920x1080 or 2K with frame rates of 48, 50, 59.94, or 60.

Validate Frames (Full Version Only)

This option validates the video data to be encoded for continuity and other frame information. Validation detects errors before the encoding process begins. By using the **Validate Frames** option you can validate a composition apart from encoding.

To start manual validation:

1. From the **Options** menu, select **Validate Frames**. The following screen opens:
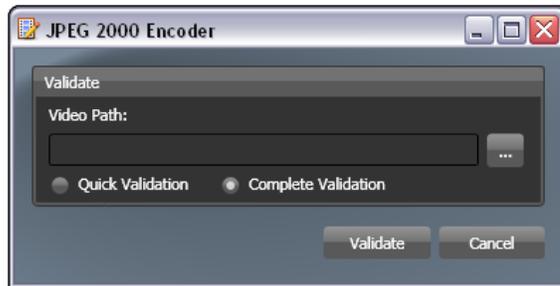
Figure 15. Validate Screen

2. In the **Video Path** field, click the [...] button to choose a folder containing video data.
3. Select **Quick Validation** or **Complete Validation**.

   Quick Validation selects a small number of random frames to verify if their size is the same whereas **Complete Validation** checks the sizes of all the frames. **Complete Validation** can be used in instances such as when there is an issue with the encoded content and you want to detect if there is a frame that is causing the issue.

4. Click **Validate** to begin the validation process or click **Cancel** to exit.

You can also choose whether frame validation occurs before encoding:

1. From the **Options** menu, select **More Options**.
2. Select the **Validate frames before encoding** check box.
3. Select either **Quick Validation** or **Complete Validation** as the validation type.
4. Click **OK** to return to the JPEG 2000 Encoder main screen.

More Options

`More Options` on the `Options` menu controls certain basic parameters of the JPEG 2000 Encoder.

To adjust the settings listed under this option:

1. From the `Options` menu, select `More Options`. The JPEG 2000 Encoder Options screen opens:
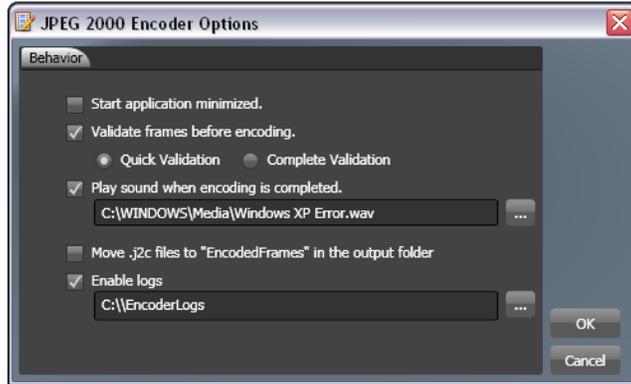
Figure 16. **JPEG 2000 Encoder Options Screen**

2. Select or clear the settings as needed. Available options include:

   - `Start application minimized.` — When starting the JPEG 2000 Encoder, the application opens in a minimized view in the notification area of the desktop taskbar.

   - `Validate frames before encoding.` — Select this check box, then select `Quick Validation` or `Complete Validation` based on the desired validation type. When `Validate frames before encoding` is selected, frames are validated at the start of encoding a composition (see "**Validate Frames**").

   - `Play sound when encoding is completed.` — You can change the default sound by clicking the ⊡ button to browse to a different sound file.

   - `Move .j2c files to "EncodedFrames" in the output folder`. — This option saves copies of the video frames in a separate location from the DCP.

   - `Enable`/`Disable logs`. — This is a text file that offers a "properties view" of the encoded package. Click the ⊡ button to change the location of this file.

3. Click `OK` to accept the modified settings or click `Cancel` to keep the existing settings and return to the main screen.

Help Menu

Licensing and Activation

To activate the full version of the JPEG 200 Encoder and view other license information, select `Licensing and Activation` from the `Help` menu (see "**Licensing and Activating the Full Version**").

End User License Agreement

To view the End User License Agreement, select `End User License Agreement` from the `Help` menu.

About

To view information about the software, including the version that is in use, select **About** from the **Help** menu.

Single Clip Encoding

Before you start to encode a single DCP or clip, ensure that the relevant settings of the JPEG 2000 Encoder are correct.
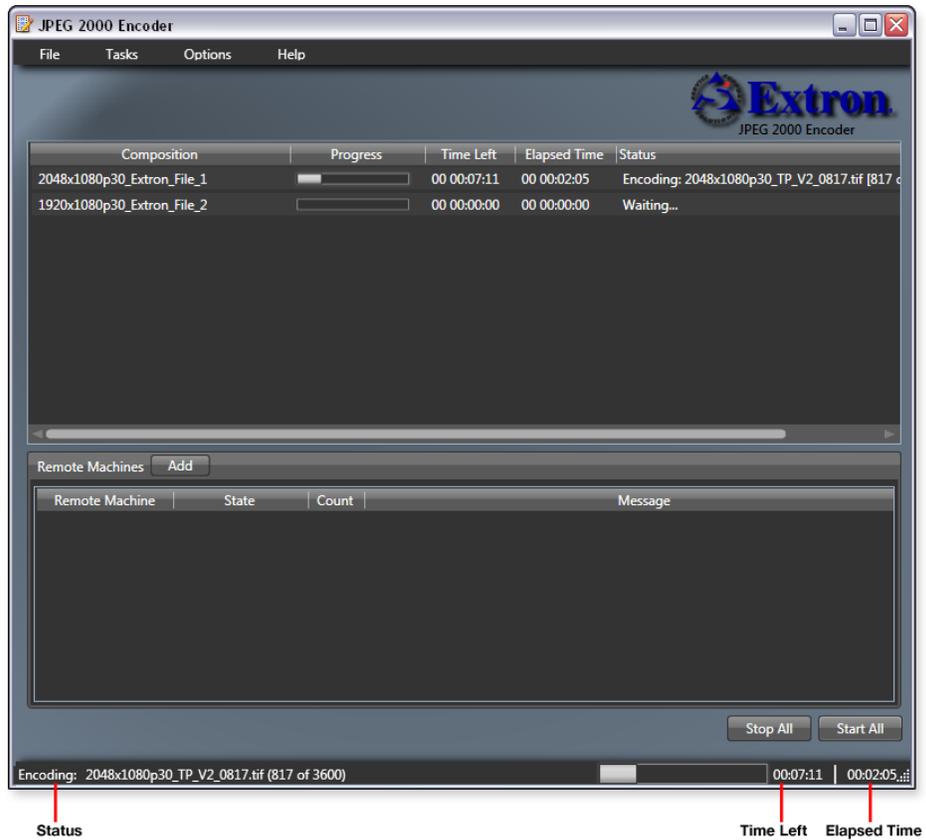

Figure 17. JPEG 2000 Encoder Main Screen

To encode a single DCP or clip:

1. Right-click an encoding task listed in the Composition column of the JPEG 2000 Encoder main screen and select **Start** from the drop-down menu. The available options on the drop-down menu include:

    - **Start** — Starts the encoding process for this item only
    - **Stop** — Pauses the encoding process for this item only. If there is a single DCP listed in the Composition column, you can also click **Stop All**.
    - **Edit** — Opens the **Encode Settings** tab (see "**Encode Settings tab**").
    - **Open Output in Explorer** — Displays the contents of the DCP in a Windows Explorer panel
    - **Remove this job** — Deletes this item from the Composition column
    - **Remove All Completed** — Deletes all completed encoding items

2. Observe the progress bar and ensure that encoding is active.

If there is a single encoding task listed in the Composition column, you can also click **Start All** to start encoding the file.

To stop or pause the encoding process:

Right-click a file listed in the Composition column and select **Stop** from the drop-down list. You can also click **Stop All** on the main screen.

Batch Encoding

Before you start to encode a batch of clips, ensure that the relevant settings of the JPEG 2000 Encoder are correct.

If more than one Composition name appears in the Composition list, the Batch Encode feature is available.

To encode a batch of files:

1. On the main screen of the JPEG 2000 Encoder, click **Start All**.

2. Observe the progress bar and ensure that encoding is active.

To stop or pause the batch encode process:

On the main screen of the JPEG 2000 Encoder, click **Stop All**.

Status Indication

The progress bar that appears beside the Composition name displays a real-time measure of the encoding process while it is underway. The status of the encoding process is displayed along the bottom of the application window:

- **Ready** — The system is ready to encode. This changes when encoding begins.
- **Encoding** — The system is encoding data (the progress bar moves slowly to the right). When encoding is complete, the status reverts to "Ready."
- **Time Left** — The amount of time remaining until the current data set is encoded
- **Elapsed Time** — The length of time that has passed since starting to encode the current data set. When encoding is complete, the status reverts to "Ready." The DCP is now available for transfer to a JMP 9600 JPEG 2000 Media Player.

Encoding Across Multiple Computers (Remote Machines)

You can incorporate a number of computers on a network into an encoding array to greatly expand the throughput of the encoding system. The time required to encode the quantity of data is reduced. This is significant as JPEG 2000 files can be very large (terabytes).

> **NOTE:** The same (fully licensed) version of the JPEG 2000 Encoder software must be installed on each computer that makes up the array.

When used in an array, the software behaves as a dual-master system. During the encoding process, specific computers within the array can be set to encode a different DCP while the remaining computers continue (albeit with fewer processing cores available) encoding the specified DCP. Each computer running the JPEG 2000 Encoder is visible by the other computers in the system, thus status and availability is known by each computer. This allows you to bring more or fewer computers online for an encoding task.

> **NOTES:**
> - The source files (frames and audio) must be on a drive mapped with the same drive letter on both the local and remote machines. This applies to the output folder as well. For example, if an output folder on the local machine is mapped to F:, the output folder on the remote machine must also be mapped to F:.
> - Actual encoding throughput in an array depends on the network speed more than the processing speed of the individual computers that make up the array. Consequently, adding computers may not necessarily increase throughput. Verify the capacity of your network with your administrator before adding machines.
> - The encoder service is enabled through port 9600 for distributed encoding. To connect to the JPEG 2000 Encoder on a remote machine with an enabled firewall, it is necessary to add an exception for this port in the local firewall.
> - For Windows 7 users: to enable port 9600, it is necessary to add a rule for TCP port 9600 in inbound rules as well as outbound rules.

To set a multiple-encoding array:

1. In the Remote Machines section of the JPEG 2000 Encoder main screen, click **Add**. The New Remote Machine screen opens.
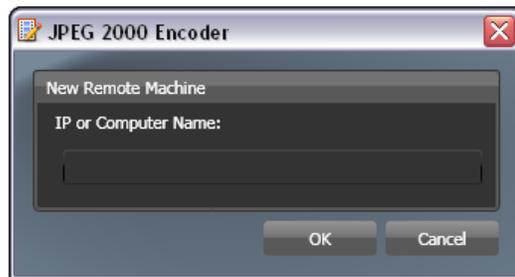

Figure 18. **New Remote Machine Screen**

2. On the New Remote Machine screen, enter the IP address or computer name for a machine on the network.

3. Click **OK** to return to the main screen or click **Cancel** to return to the main screen without adding a machine. The computer IP address or name appears in the Remote Machines section of the main screen. The following states can appear beside each listed remote machine:

- **Ready** — Indicates that the computer is available for encoding tasks

- **Unavailable** — Indicates that the computer is not connected. Check with your network administrator to ensure that necessary connections are in place and that the JPEG 2000 Encoder software (same version) is loaded on the remote device.

4. Repeat steps **1** through **3** to add more remote machines as needed. The system is now set up for processing data over multiple machines.

To remove a computer from a multiple-encoding array:

1. In the Remote Machines section of the main screen, select one of the listed computers by clicking on it.

2. Press the <Delete> key on your keyboard.

Reference

This section provides reference information regarding the encoding and packaging processes when creating content for the JMP 9600 JPEG 2000 Media Player. Topics that are covered include:

- **Encoding and Packaging Overview**
- **Encoding Related Specifications**
- **Part Numbers**

Encoding and Packaging Overview

Creating content for the JMP 9600 using the JPEG 2000 Encoder is accomplished in three stages: encoding, wrapping, and packaging, as shown in **figure 19**.
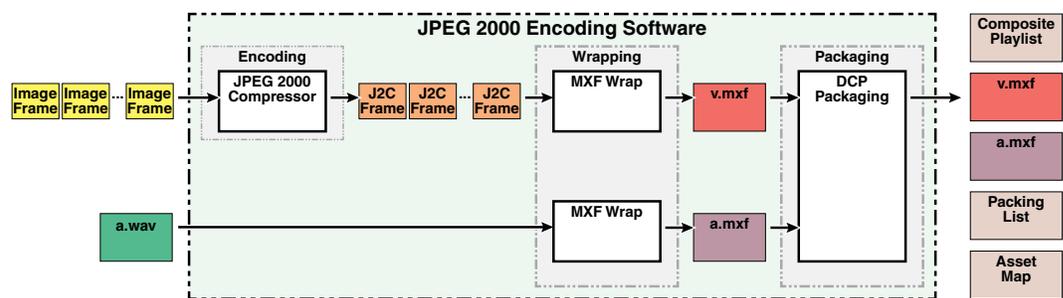

Figure 19. Encoding, Wrapping, and Packaging Process

- **Encoding** — Each frame of source video is compressed by passing the raw pixel data through a JPEG 2000 compressor. The compressor creates a stream of JPEG 2000-coded frames. The parameters that are applied in the JPEG 2000 Encoder software affect the compression level and quality of the image.

  The source audio is encoded using pulse code modulation (PCM).

- **Wrapping** — The individual compressed video frames are combined into a single track file using the Material Exchange Format (MXF). The audio is converted into a separate MXF track file.

- **Packaging** — Additional control files describing the format of, and the relationship between, the audio and video files are generated. The resulting files are collectively known as a Digital Cinema Packagte (DCP) as described in the DCI specification.

Video Track Files

A video track file is the smallest unit of video in the system. It is an MXF container that has all of the compressed video data and associated meta-information necessary to recreate a piece of video (for example, see the v.mxf file shown in **figure 19**).

The JMP 9600 supports unencrypted frame-wrapped video track files that conform to SMPTE 377M-2004 and SMPTE 422M-2006 standards.

Audio Track Files

An audio track file is the smallest unit of audio in the system. It is an MXF container that has all of the PCM-encoded, compressed audio data and associated meta-information necessary to recreate a piece of audio (for example, see the a.mxf file shown in **figure 19**). The JMP 9600 supports frame-wrapped audio track files that conform to SMPTE 377M-2004 and SMPTE 382M-2007 standards.

Reels

In the movie industry, it is common practice to split a feature onto several film reels for distribution. This concept is supported digitally by splitting a feature into several separate files. The digital reel is a track file (see "**Video Track Files**" and "**Audio Track Files**") that contains either video content or audio content. You may want to use multiple reels to create more manageable file sizes such as hundreds of gigabytes rather than a few terabytes).

Composition Playlist

A composition playlist (CPL) is a text file that contains all of the information necessary to reassemble a presentation from its individually encoded components and to specify how the files for a specific presentation should be played back. The CPL file points to the reels (see **figure 20**), identifying locations (folders) and filenames, and specifies the manner in which the audio and subtitles are synchronized with the picture. The CPL can specify one video reel and one audio reel or multiple reels of both types, depending on the wrapping process.
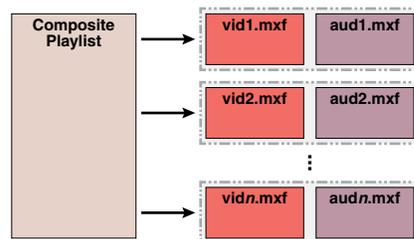

Figure 20. Composite Playlist

Packing list and asset map

The packing list and asset map provide size and checksum information for audio and video MXF files in the DCP so that the player can ensure no corruption occurred during the file transfer. These files are described in SMPTE 429-8-2006 and SMPTE 429-9-2007 standards.

Encoding Related Specifications

- **SMPTE 377M-2004** — Material Exchange Format (MXF) FIle Format
- **SMPTE 422M-2006** — Mapping JPEG 2000 Codestreams into the MXF Generic Container
- **SMPTE 382M-2007** — Mapping AES3 and Broadcast Wave Audio into the MXF Generic Container
- **SMPTE 429-3-2006** — D-Cinema Packaging - Sound and Picture Track FIle
- **SMPTE 429-4-2006** — D-Cinema Packaging - MXF JPEG 2000 Application
- **SMPTE 429-7-2006** — D-Cinema Packaging - Composition Playlist
- **SMPTE 429-8-2006** — D-Cinema Packaging - Packet List
- **SMPTE 429-9-2007** — D-Cinema Packaging - Asset Mapping

Part Numbers

These items are the available software versions and JMP 9600 models. The JPEG 2000 Encoder software included with the JMP 9600 supports content preparation for one unit; two-channels of audio per video clip and single processor encoding only.

Available Models	Description	Part Number
J2KENC	JPEG 2000 Encoding Software	79-550-01
J2KENC-PRO	JPEG 2000 Professional Encoding Software	79-550-02
JMP 9600 HD	JPEG 2000 Media Player HD	60-1135-01
JMP 9600 HD 128	JPEG 2000 Media Player HD 128 GB SS	60-1135-02
JMP 9600 2K	JPEG 2000 Media Player 2K	60-1136-01
JMP 9600 2K 128	JPEG 2000 Media Player 2K 128 GB SS	60-1136-02