Tapeless Streaming Media Import Workflows in
Autodesk® Visual Effects and Finishing Applications

P2 and XDCAM MXF Media Handling and How-To Guide

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P2 and XDCAM MXF Media Handling

Topics Inside:

Overview

The availability of Panasonic P2 and Sony XDCAM digital cameras has helped to popularize the use of high quality digital images in the tapeless workflows of many production environments. These tapeless workflows for importing P2 or XCDCAM MXF media files are supported by Autodesk Visual Effects and Finishing products.

P2 MXF

Panasonic DVCPRO P2 digital cameras output media as P2 MXF.

These cameras save the media onto P2 cards, which are compatible with the PC Card (PCMCIA) slots on your laptop or PC.P2 MXF media files are stored in directory structures, containing separate directories for XML, video essences, audio essences, and other data. A P2 card reader with 5 slots is available to connect to your workstation or PC.

The benefits of using P2 or XCDCAM MXF media in these creative applications are clear. Autodesk Visual Effects and Finishing products are known for working with uncompressed source media, whereas many other systems use compression (and sometimes recompression at every stage).

XDCAM MXF

Sony XDCAM SD and XDCAM HD digital cameras output media as XDCAM MXF.

These cameras use a proprietary optical Professional Disc to store data. You will need to upload XDCAM MXF from the Professional Disc via either the camera or a Professional Disc reader available from Sony.XDCAM media files are stored in directory structures, containing separate directories for XML, video and audio essences, and other data. Although similar, this is not compatible with P2 MXF.

Even when using original formats that are already compressed, such as DVCPRO HD, using the original without further compression/decompression ensures no generational loss while maintaining the highest image quality.

The sections that follow describe workflows for ingesting P2 or XDCAM media into Flame or Smoke, including scenarios with direct import of camera-original media, importing QuickTime with ingest of MXF through FCP, and relink to original MXF sources via FCP XML. As well, important concepts are introduced and configuration options are outlined that will help the production and post-production teams using Autodesk products to make decisions that give them the desired results.

Some Important Concepts

Import

When you import media that resides on an external shared storage device, all the media is copied to Autodesk Direct-Attached Storage (DAS). Any changes that you make to this media are protected, and exclusive to this stored copy. However, it can take a long time to load large files and all of this duplicated stored media can take up a lot of space in Autodesk storage.

Soft-Import

Soft-import provides a more efficient way to handle media. When you soft-import media, the Autodesk Visual Effects and Finishing application creates a link that references the media at its original location (such as a SAN/NAS or USB drive), so that no media is actually imported and copied in Autodesk storage. Later, when you move or delete soft-imported clips, you affect only the references-not the actual media at the original storage location. You can also soft-import media when importing files using an EDL or when recapturing. If the media location is disconnected the soft-import link will be broken until the media location is reconnected.

Proxy

A proxy is a low-resolution copy of a high-resolution image. There can be one proxy for each frame in a clip. Proxies are used to provide real-time playback of processed results and to provide low-resolution stand-in clips in a compositing environment so that composites can be quickly created. Use proxies when your connection speed (to your SAN/NAS) is not fast enough to provide real-time streaming of the full resolution media. If you enabled proxies for the project or media resolution, then, upon soft-import, only the generated proxies reside in Autodesk storage. The proxies included with P2 or XDCAM media are never used.

About Existing Configurations

The tapeless workflows for ingesting P2 and XDCAM MXF media can be used with existing Autodesk Visual Effects and Finishing applications in direct-attached and centralized configurations.

Direct-Attached System Configurations

Stand-alone, Direct-Attached Storage (DAS) systems can have very high throughput (up to 700MB/sec) and can support real-time performance when soft-importing high resolution HD formats such as DVCPro HD (which typically stream at up to 15MB/sec), or HD RGB uncompressed media (which can stream at up to 180 MB/sec). Of course, other factors such as codec overhead and effects processing can contribute to the throughput. There are two available DAS configurations: proprietary Stone FS or open standard file system.

Using Stone FS

Stone FS provides local storage in a closed (proprietary) file system. Any media files moved onto a StoneFS must be converted, and stored in a proprietary RGB-based file format.
The only way to get media in or out of the filesystem is through an import or export action.
This is the classic configuration of Autodesk Effects and Finishing applications that provides maximum security, data integrity, and throughput.
The maximum size of a Stone FS system is 8TB.

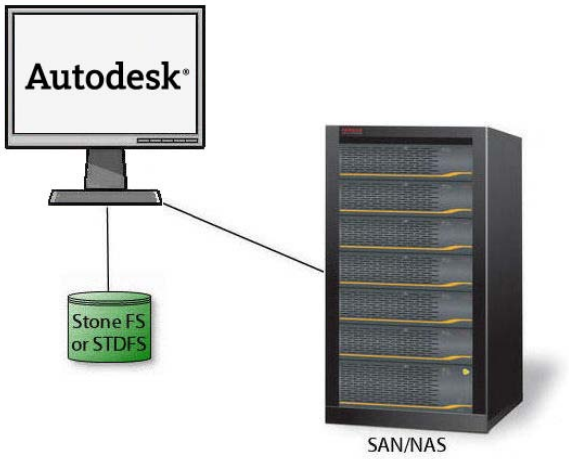
Using a Standard File System

A standard file system (such as XFS) provides local storage in an open system. This is a more practical configuration that provides greater accessibility as well as the high security and throughput of a Stone FS.
Standard media file formats are supported (including streaming media formats, such as QuickTime), which makes collaborative workflows easy. Files are visible and can be copied to or from other systems.
Standard file systems can also be used to store other files such as audio, notes, scripts, or EDLs.

Centralized Configurations

Autodesk Visual Effects and Finishing applications in centralized or networked configurations provide the maximum means for collaborative workflows, but can vary performance-wise.

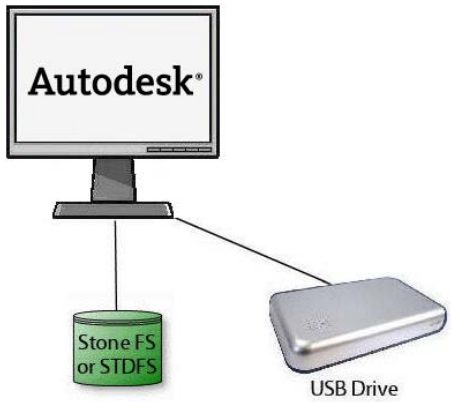
A Network Attached Storage (NAS) can generally work with data streams of between 30 - 150 MB/sec, which may not be enough to support real-time streaming of some HD formats. A Storage Area Network (SAN) can provide throughput of up to 500 MB/sec, which can support real-time performance when soft-importing high resolution HD formats. Using proxies is also an excellent option.



Portable Storage Devices

Portable storage devices (such as a USB drive, iPod, DVD, or Blu-Ray Disc) provide flexible solutions for transferring media files between isolated stand-alone systems. These devices are cheap and interchangeable, which also makes them ideal for storing separate project files, and for backup. These devices allow you to add significant amounts of temporary storage space and keep files off of Autodesk storage.

Throughput of USB 2.0 (the current standard) is up to 60MB/sec, which is not enough to support real-time streaming of some HD image formats, but it can be useful with the appropriate proxies.



Acquiring the MXF Media

Follow these guidelines to ensure that the generated P2 or XDCAM MXF media can be used most efficiently in Flame or Smoke.

Creating Usable P2 MXF Media

If you have any say before the P2 MXF media is shot, use these pointers to ensure best results:

- Panasonic P2 cameras can output a large variety of formats and frame rates. When shooting your clips, ensure that you use a native format (not Varicam) that is supported by your creative application (consult the user guide).
- Ensure that the P2 cameras are set to record clip metadata as Type 2. This allows important metadata, such as Timecode and User Clip Name, to be carried forward and used by your creative application.

Accessing P2 or XDCAM MXF Media Files

You can get P2 or XDCAM MXF material delivered to you in any of three formats. To ensure that you protect your MXF media assets always keep a back up!

- PC Card (also referred to as PCMCIA, for P2 material)
- Professional Disc (for XDCAM material)
- Portable mass storage device (such as USB drive, iPod, DVD, or Blu-Ray Disc)

The portable storage device is the most common medium. Treat the material on it a as the new masters.

DAS Configuration

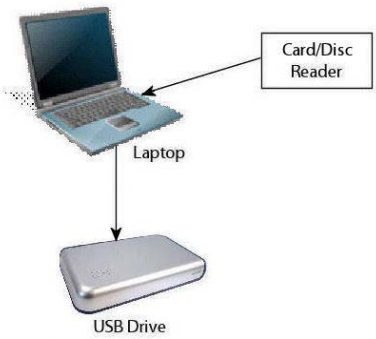
In a stand-alone DAS configuration, use one of the following three setups:

Direct via PC Card Reader

Access P2 MXF media directly from a PC Card reader connected to your Flame or Smoke workstation.
PC Cards can be read from the integrated PC Card slot, or from an attached PC Card reader. Professional Disc readers are not compatible with Linux systems. XDCAM MXF media files must be transferred to a portable storage device from another system.

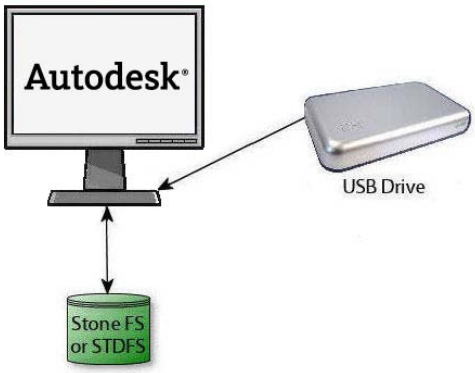
Indirect via Laptop

Access the P2 or XDCAM MXF media using a laptop computer with a PC Card reader (for P2 material) or Professional Disc reader (for XDCAM material).
Copy the P2 or XDCAM MXF media files to a portable mass storage device, then continue below.



Via Portable Mass Storage Device

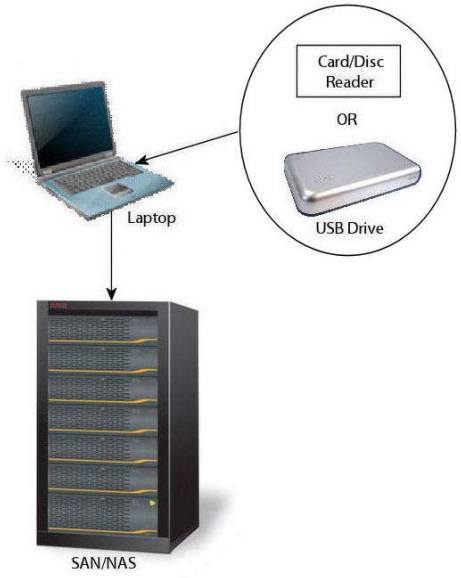
Use Flame or Smoke to access the P2 or XDCAM MXF media from a portable storage device.



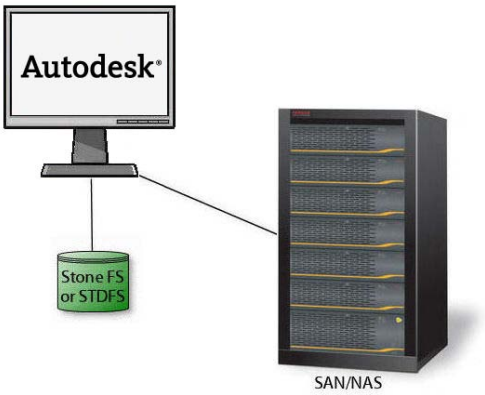
Centralized Configuration

In a centralized configuration do the following:

Access the P2 or XDCAM MXF media using a laptop computer with a PC Card reader (for P2 material), a Professional Disc reader (for XDCAM material), or a portable storage device.



Copy the P2 or XDCAM MXF media files to a SAN/NAS.
Use Flame or Smoke to access the P2 or XDCAM MXF media from the SAN/NAS.



Workflow: Import MXF Media Directly

This workflow describes how you can import or soft-import camera-original P2 or XDCAM MXF media files into Flame or Smoke. By importing camera-original media, you are assured of the best available image quality.

1. From Flame or Smoke, use the Import Image menu to import or soft-import one or more MXF media files to the current clip library. The MXF media file structures are recognized in the media browser and the files are identified with thumbnail proxies.

   An MXF video file can be encoded with any of a number of different codecs. During import, the codec flag and other detected metadata for a supported movie appears in the Movie Attributes area.

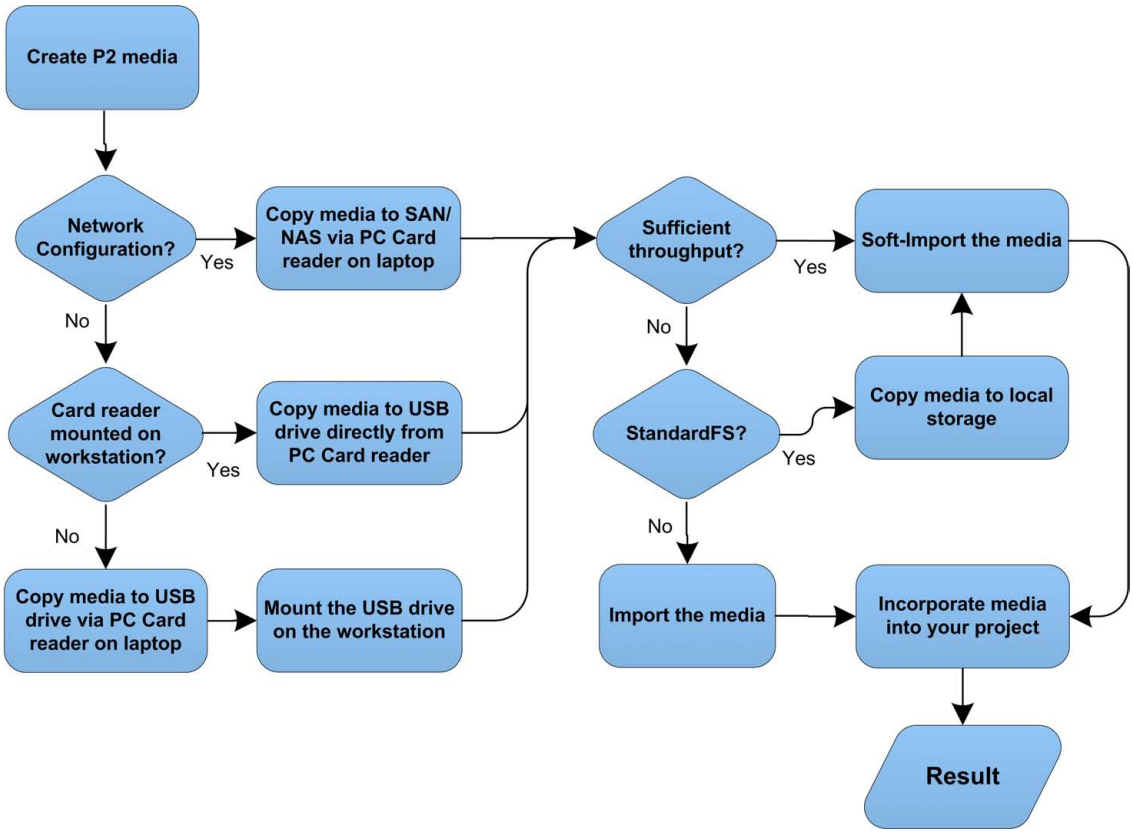
2. Depending on the throughput, do one of the following:
   - High Throughput
     1. Soft-import the MXF media to your DAS directly from a PC Card reader (for P2 material), from a portable storage device, or from the SAN/NAS.
     2. Use proxies, if needed.
     3. For DAS configurations with standard file systems, it is recommended that you copy the MXF media directly to your DAS.

   - Low Throughput
     - Standard File System.
       1. Copy the media to your DAS directly from a PC Card reader (for P2 material), from a portable storage device, or from the SAN/NAS.
       2. Soft-import the media. Use proxies, if needed.

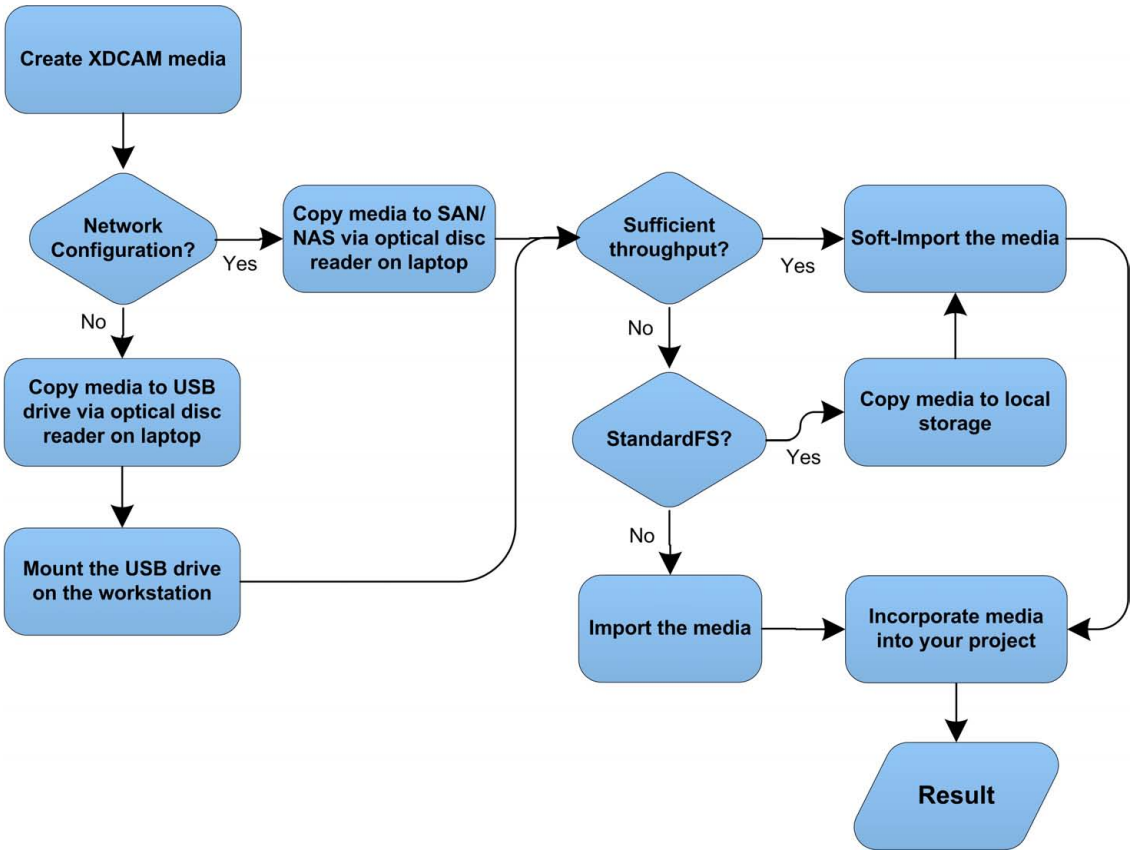
     - Stone FS
       ➤ Import the MXF media to your DAS directly from a PC Card reader (for P2 material), from a portable storage, or from the SAN/NAS.

3. Use the high-quality, camera-original MXF media files in your project. Once you are done, you can export the final media as any supported type.

Flowchart: Import P2 MXF Media Directly



Flowchart: Import XDCAM MXF Media Directly



Workflow: Ingest MXF as QuickTime Media

This workflow describes how you can import or soft-import QuickTime media files (ingested as P2 or XDCAM MXF media into Final Cut Pro) and the FCP XML into Flame or Smoke. While this workflow provides a fast and simple method for linking to the QuickTime media and preserving the FCP timeline, the media is not camera-original and has gone through at least one compression cycle.

1. Ensure that the P2 or XDCAM MXF media resides in a location that is accessible by FCP.
2. Ingest the MXF media into FCP.

   When the P2 or XDCAM MXF media is imported into FCP, it is regenerated as QuickTime movies and stored on the Scratch Disk (which, in a centralized configuration, is usually on the SAN/NAS).
3. Ensure that you use a QuickTime format that is supported by Flame or Smoke.

   Some QuickTime codecs (such as ProRes) are not supported, but using them does not keep you from working in FCP. Using an unsupported codec will only oblige you to perform a potentially lengthy Recompress upon export (see inset).
4. Edit the material as you wish in FCP. Ensure that any effects you apply are supported by Flame or Smoke (see the user guide).

   When done, you are ready to export the QuickTime movies and FCP XML.

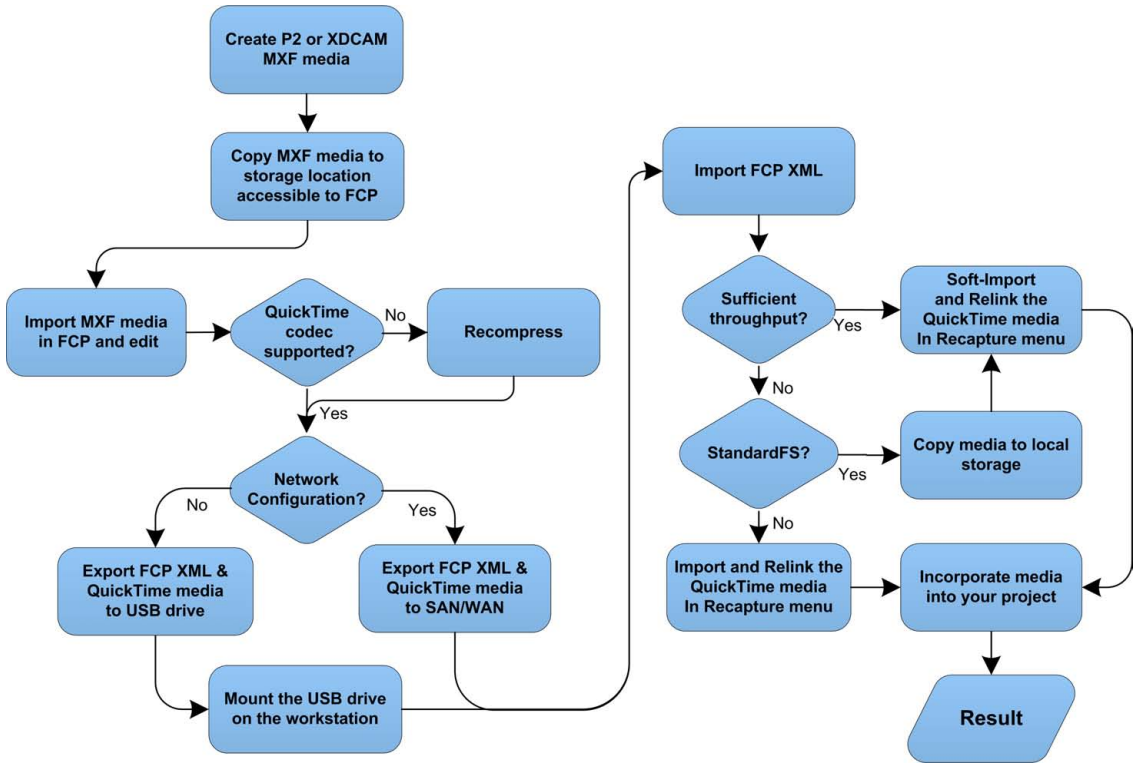
   If you are NOT using a supported QuickTime codec, from the Media Manager, use "Recompress" to recompress the QuickTime movies into a codec that is compatible with Flame or Smoke (see the user guide).

   An added benefit of using Recompress is that it consolidates all the movies into one directory. This is especially useful if you have many movies spread over many different directories.Ensure that you create a new project and use handles on the in and out points of each clip (use a length that will balance freedom of adjustment versus process time and space required).

   Export the XML from the recompressed FCP sequence as Type 2.
5. Ensure that QuickTime media and FCP XML resides in a location that is accessible to Flame or Smoke.
6. Depending on your connectivity or storage configuration, do one of the following:
   - DAS Configuration
     1. For standard file systems, it is recommended that you copy the FCP XML and QuickTime media to your DAS directly from the portable storage device.
     2. Import the FCP XML into Flame or Smoke.
     3. From the Recapture menu, soft-import (if the throughput is sufficient to support your HD media streaming) or import, and then relink the QuickTime media.

   - Centralized Configuration
     1. Import the FCP XML from the SAN/NAS into Flame or Smoke.
     2. From the Recapture menu, soft-import (if the throughput of the SAN/NAS is sufficient to support your HD media streaming) or import, and then relink the QuickTime media.
7. Use the QuickTime movie files in Flame or Smoke projects. Once you are done, you can export the final media as any supported type.

Flowchart: Ingest MXF as QuickTime Media



Workflow: Relink to Original MXF Media via FCP XML

This workflow describes how you can import or soft-import original P2 or XDCAM MXF media into Flame or Smoke via Final Cut Pro XML.

1. Ensure that the P2 or XDCAM MXF media resides in a location that is accessible by FCP and Flame or Smoke.
2. Import the P2 or XDCAM MXF media into FCP.

The media is regenerated in FCP as QuickTime movies and stored on the Scratch Disk. You will not be needing these movies.

Stand-Alone FCP

Networked FCP

3 Create a sequence of the same resolution with the source in it.

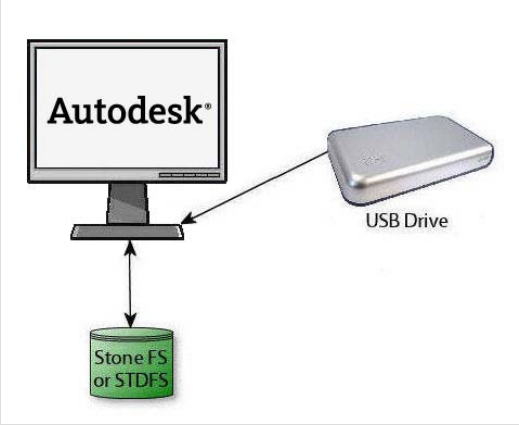
4 Edit the material as you wish in FCP. Ensure that any effects you apply are supported by Flame or Smoke.

5 Export the FCP XML as Type 2 (with no media files) to the same portable storage device or SAN/NAS containing the original P2 or XDCAM MXF files.

6 Import the FCP XML timeline into Flame or Smoke. Make sure that you select Link with video files and Link with audio files.

The metadata contained in the FCP XML references the original MXF sources.

DAS Configuration



7 In the Recapture menu, reset the path of every clip to the location of the source media.

This path is different for video and audio MXF files, based on the P2 or XDCAM MXF file structure. Sort by Track to make your selection task easier.

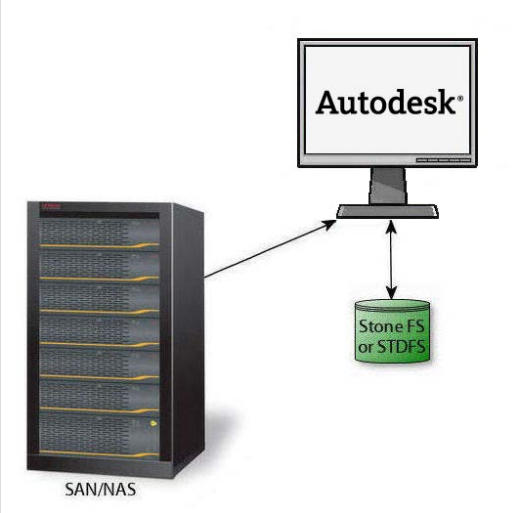
8 Click the File Name field to reset the file name for each media file.

The audio and video files referenced in the XML have MOV extensions, since they point to QuickTime movies. For each file, from the path location, select the equivalent source file name with the MXF extension.

For P2 audio files, there are normally four audio tracks (1, 2, 3, and 4) that point to a single MOV file (such as 0003B6.mov). But there are usually four MXF audio essences (such as 0003B600.mxf, 0003B601.mxf, 0003B602.mxf, and 0003B603.mxf). Make sure that these are matched properly during file name selection (such as audio track 1 to 0003B600.mxf, track 2 to 0003B601.mxf, and so on).

9 Click Import or Soft-Import (if the throughput is sufficient to support your HD media streaming). The Relinkable state changes to YES. If not, in the library, select the imported (or soft-imported) media files and drag them to the same reel as the XML file.

Networked Configuration



10 If necessary, use the Reformat tool on the XML file to correct any differences in the frame rate or resolution with the MXF media files.

11 Relink the files using Relink from Reel.

12 Use the high-quality, uncompressed, camera-original MXF files in your project. Once you are done, you can export the final media as any supported type.

Flowchart: Relink to Original MXF Media via FCP XML