The CinemaDNG Initiative

More than a decade ago, photography experienced a technological shift with the proliferation of digital cameras. As photographers embraced digital cameras, their desire to access low-level image data increased, resulting in the increase of RAW file formats and workflows. Unfortunately, the Digital Still Image RAW workflow brought with it a slew of file formats (over 200 for still cameras!) that are proprietary, closed, and sometimes even encrypted.

Today, the cinema industry is experiencing a similar transition as many filmmakers are foregoing film in favor of digital cinema cameras and workflows. Digital cinema cameras have led to an increasing trend in the usage of RAW workflows and proprietary RAW formats. Proprietary RAW formats lock participants, both vendors and users, into walled gardens with limited interoperability and longevity. Adobe started the CinemaDNG Initiative to improve interoperability in Digital Cinema RAW workflows.

The CinemaDNG Initiative has generated much momentum since its unveiling at the 2008 NAB Show. Three years after its introduction, the CinemaDNG Initiative includes participants from more than 60 digital cinema camera and software manufacturers worldwide as well as international standards organizations.

The CinemaDNG Initiative offers a solution by defining an open file format for digital cinema files to streamline workflows and ensure that digital cinema files can be easily archived and exchanged. By providing a unified, publicly-documented file format, the CinemaDNG Initiative offers several core advantages for camera manufacturers, software vendors, and filmmakers.

Advantages for Camera and Software Vendors

- Reduce costs and time to market by eliminating the need to develop and maintain proprietary formats and conversion utilities
- Remove a key obstacle to the adoption of new products by providing instant interoperability with existing workflows

Advantages for Filmmakers

- Avoid roadblocks caused by incompatibilities in workflows that involve multiple devices, vendors, and file formats

Members of the digital cinema community are welcome to participate in the CinemaDNG Initiative. You can find more information on the CinemaDNG Initiative website at: http://adobe.com/go/cinemadng/

CinemaDNG File Format Summary

The CinemaDNG Format

The CinemaDNG file format is designed to store high-resolution video streams in camera raw format.

Each video frame is independently encoded using the DNG (Digital Negative) image format. The video stream is stored either as a picture track in an MXF (Material Exchange Format) file or as a sequence of individual frame files.

CinemaDNG uses fully-documented, vendor-neutral, standard formats for video and imaging — DNG, TIFF/EP, and MXF. The format is unencrypted and free from intellectual property encumbrances or license requirements. Several SDKs are available for each of the components of the format.

The CinemaDNG format allows vendors to add functionality on set or in post, for example, by extending the decoder SDKs with additional image processing or metadata processing.

The DNG Format

The camera sensor output can be stored directly into the DNG image file, without in-camera pixel processing or repackaging of the sensor data. The DNG image format is widely used to capture and archive camera raw images. Tools are available to convert images from over 200 proprietary camera raw file formats to the DNG format. The DNG format specification is now being incorporated into the ISO 12234-2 standard as TIFF/EP Profile 2.

DNG options in CinemaDNG include:

- Image data from a single-chip image sensor (with color filter array) or a multi-chip image sensor (without color filter array)
- Sensor values of any bit depth from 8 to 32 bits
- Arbitrary-size color filter arrays with up to seven different filter colors
- Arbitrary image height and width
- Lossless compression
- Black level, white level, and linearization parameters for decoding and scaling of sensor values
- Color-processing parameters for mapping sensor values to CIE XYZ color space

The MXF Format

SMPTE standard ST 2055 defines mapping of TIFF/EP images into MXF for the interchange of audiovisual material. The MXF file wraps multiple streams of essence, such as DNG, and includes metadata that describes the material contained within the MXF file.