

Preservation Action Plan for Digital Cinema Records National Archives and Records Administration (NARA)

DRAFT 20190801

Template: 201907

Electronic Record or Digital Surrogate Types and Associated Formats

Digital moving images consist of bitmap digital images or “frames” displayed in rapid succession at a constant rate, giving the appearance of movement. Digital Cinema generally refers to the technology and file formats used to create, distribute, and project motion pictures. Digital Cinema is distinct from digital video (SD, HD, UHD) and does not necessarily use standards pertaining to television or other video standards in regards to aspect ratios, frame rates, and resolution.

Resolution is determined by pixel count, usually 2K or 4K, although higher resolutions are possible. Digital cinema formats are composed of raw camera (multiple formats) or scanned film formats (DPX, TIFF), production formats (Digital Source Master (DSM), Digital Cinema Distribution Master (DCDM), Academy Color Encoding Specification (ACES)), and a delivery format (Digital Cinema Package (DCP) - JPEG2000 and WAV wrapped in MXF).

Essential Characteristics of this Record Type

To render an authentic digital cinema file one must preserve the structural and technical metadata that allows for proper transmission of the video stream (size, codec, frame rate, interlacing, chroma subsampling, duration, channels, and bit depth).

General requirements for digital video records: Digitize to standards appropriate for the accurate preservation of the original video, when converting analog material (e.g., video cassettes, open reel video, etc.). For reformatted video, 8-bit is acceptable but 10-bit is preferred.

Appearance

Name	Definition	Function Description
Size	Determined by bit depth, frame rate, compression, sub/sampling rate, and duration	

Structure

Name	Definition	Function Description
Layout Structure	Embedded technical metadata describing, among other things: GUID, file size, format, duration, codec, frame rate, frame width, frame height, bit depth, and bit rate for video and audio components.	

Behavior

Name	Definition	Function Description
Display	Image	Video signal is made up of Luminance, Chrominance, and frame rate.

Audio	Sounds is an audio waveform that has been created as, or converted into digital form and can be heard during playback of the video	
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Context

Name	Definition	Function Description
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Descriptive Metadata	This includes but is not limited to: Unique identification number assigned by creator; Title; Creator; Copyright: Summary	Digital Cinema Files could contain, or link to: metadata that describes any attribute that could be seen in a recording or provides information about the recording.
Technical Metadata	This includes but is not limited to: Originator: Unique identification number assigned by creator; origination date; coding history; levels	Digital Cinema Files could contain or link to: data on the recording/ digitizing process.
Administrative Metadata	This includes but is not limited to: catalog URL; classification or access level	Digital Cinema Files could contain, or link to: metadata that describes how/ where to access the record

Current NARA Transfer Guidance for this Record Type

Preferred:

- Digital Picture Exchange (DPX)

Acceptable:

- None

Current NARA Public Access/Reference Format(s) for this Record Type

This Plan references existing public access file formats for electronic records at NARA, determined with a survey of the available public access formats in the National Archives Catalog. These references do not represent recommended public access formats under NARA policies. They are intended for informational purposes only.

Reference Format: MPEG 4 (H.264)

Public Access Format: MPEG 4 (H.264)

Comments and Notes

DPX - http://www.simplesystems.org/users/bfriesen/dpx/S268M_Revised.pdf

Digital Picture Exchange (DPX)

NARA Format ID: NF00160

Extension(s):

- dpx

Documentation

- http://www.simplesystems.org/users/bfriesen/dpx/S268M_Revised.pdf
- https://en.wikipedia.org/wiki/Digital_Picture_Exchange
- <https://www.loc.gov/preservation/digital/formats/fdd/fdd000178.shtml>
- http://www.cineon.com/ff_draft.php
- <http://www.nationalarchives.gov.uk/PRONOM/fmt/541>

Risk and Prioritization Analysis

Low Risk

Moderate Risk

High Risk

33 Numeric Risk Rating

30 Numeric Prioritization Rating

Proposed Preservation Plan

Retain file format in its existing format.

Transform file to a new format.

Selected Format:

Procure/develop tools to preserve, manage and provide access to records of this type in their existing form.

Procure/develop tools to transform the format to the preferred normalized form.

Provide Additional Information so that the record type remains understandable/usable over time.

Explore Additional Options

Justification: The file format is well documented, ubiquitous, and there are open source tools available for transcoding if required in the future.

Preferred Processing and Transformation Tool(s)

- FFMPEG

Preferred Viewer/Access Software

Specialized hardware/software is required for playback of DPX files - the following list is of some companies that provide hardware/ software to process DPX content:

- Adobe
- Blackmagic
- Digital Film Technology
- Digital Vision
- FilmLight
- Final Cut
- Grass Valley
- Red Giant

Additional Resources/ Information

<https://www.oscars.org/science-technology/aces/aces-documentation>

<https://www.loc.gov/preservation/digital/formats/fdd/fdd000177.shtml>

[http://dcimovies.com/specification/DCI DCSS Ver1-3 2018-0627.pdf](http://dcimovies.com/specification/DCI_DCSS_Ver1-3_2018-0627.pdf)

<https://www.oscars.org/film-archive/collections/digital-cinema-initiatives-llc>

Digital Cinema Package

NARA Format ID: NF00462

Extension(s):

- dcp

Documentation

- <https://www.dcmovies.com/>
- <https://www.dcmovies.com/specification/index.html>
- https://en.wikipedia.org/wiki/Digital_Cinema_Package
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Risk and Prioritization Analysis

- ✓ Low Risk
 - Moderate Risk
 - High Risk
- 28 Numeric Risk Rating
26 Numeric Prioritization Rating

Proposed Preservation Plan

- ✓ Retain file format in its existing format.
- Transform file to a new format.
Selected Format:
- Procure/develop tools to preserve, manage and provide access to records of this type in their existing form.
- Procure/develop tools to transform the format to the preferred normalized form.
- Provide Additional Information so that the record type remains understandable/usable over time.
- Explore Additional Options

Justification: The file format is a container format that is open, well-documented, maintained by a standards organization, and ubiquitous in the film industry.

Preferred Processing and Transformation Tool(s)

- openDCP
- easyDCP
- Dolby/Doremi CineAsset

Preferred Viewer/Access Software

- NeoDCP
- easyDCP
- Dolby/Doremi CineAsset Player