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

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Digital Cinema

Digital moving image sequences consist of raster 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 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, often 2K or 4K, although higher resolutions are possible. Motion Picture formats tend to be digital copies of analog originals that have been scanned as DPX or TIFF and may have associated, but separate, WAV files. 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). See NARA's Internal Products and Services "Glossary of Useful Terms."

Significant Properties of Digital Cinema

To preserve a motion picture sequence it is recommended to bundle the individual files as a Tarred or Zipped file to ensure that each image/frame is maintained. Each file within the sequence should be sequentially numbered and appropriate metadata should be embedded with the file(s). A checksum should also be included in the Tarred or Zipped file to validate fixity.

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 motion picture records: Digitize to standards appropriate for the accurate preservation of the original when converting analog material e.g. motion picture film.). -10 or 12 bit is acceptable but 16-bit is preferred.

Appearance

Name	Definition	Function Description
Color	Coloring is determined by the integrity of the original media piece.	Analog to digital adjustments can be done to the image through the saturation, gain, hue, etc.

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 bitrate for image and audio components.	

Behavior

Name	Definition	Function Description
Display	Image	Resolution, Color Model, Bit Depth
Audio	Sound is an audio waveform that has been created as, or converted into digital form and can be heard during playback of the video. The data is generally interleaved to allow for simultaneous play of audio and video.	

Context

Name	Definition	Function Description
Metadata	May include administrative, descriptive, and/or technical metadata.	Metadata can be embedded or saved as a sidecar file. Examples of metadata fields include coding history,

		origination date, title, creator, collection, unique identifier, etc.

Current NARA Transfer Guidance for Digital Cinema

Bulletin 2014-04

- Preferred:
  - Digital Picture Exchange (DPX), version 2.0
- Acceptable:
  - None specified

Current NARA Format(s) for Public Access and Reference for Moving Image/ Digital Cinema

Formats for Public Access are those made available online through the National Archives Catalog. Formats for Reference are defined as those made available to researchers upon direct requests for digital copies.

Formats Available for Public Access: MP4. Other file formats may be present depending on when they were added to the Catalog.

Format(s) Available for Reference: MPEG 4 (H.264), 4K ProRes 4444 MOV

Current NARA Internal Products and Services for Digital Cinema

NARA creates a wide variety of audio, video and motion picture products from NARA records in response to reference requests as well as for planned preservation projects and internal staff use. These specifications and standards are written for use by NARA's Moving Image and Sound Preservation Labs. They do not necessarily reflect industry standards, and are not intended as universal guidance or recommendations.

- NARA Internal Products and Services
- Additional Motion Picture Guidance