GEM

Digital Cinema Package (DCP): Specifications & Requirements

Introduction

- This document provides standards and requirements for authoring Digital Cinema Packages (DCP) for GEM.
- For detailed best practices, refer to GEM's Digital Cinema Package (DCP): Best Practices guide.

Standard

- Interop (IOP) standard is required except when SMPTE standard is specified below.
- SMPTE standard must be used for:
  - High Frame Rate (HFR) content
  - Dolby ATMOS
  - HDR/Dolby Vision

SMPTE Features

- Specific SMPTE features are utilized selectively per use case:
  - High Frame Rate DCPs: Must be SMPTE standard, exclude CompositionMetadataAsset (SMPTE ST 429-16), exclude audio MXF MCA sub descriptor ULs.
  - Dolby ATMOS DCPs: SMPTE standard, fully flattened OV DCP with burned-in subtitles/captions, exclude CompositionMetadataAsset, exclude audio MXF MCA ULs.
  - HDR/Dolby Vision DCPs: SMPTE standard, include CompositionMetadataAsset fully filled, exclude audio MXF MCA ULs. CPL must contain Dolby Vision extension metadata specifying image transfer function as PQ10K.

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Restrictions

- Other SMPTE features (Markers, Ratings, 3D Subtitles, encrypted Timed Text MXF) must not be used for HFR, Dolby ATMOS, or HDR/Dolby Vision DCPs.

Reels/Segments

- DCPs must be segmented into reels ≤ 22 minutes, seamlessly joined to form long-play content.
- First frame of first reel and last frame of last reel must be black (e.g., ensured by GEM Theatrical Idents).

Dimension

- DCPs must be 2D.

Compression Rates

- Image encoded as DCI JPEG-2000, max Variable Bitrate (VBR) 250MB/s for SDR, or 500MB/s for HDR/Dolby Vision and HFR.
- Optional bitrate limit of 245MB/s for SDR to prevent spikes acceptable.

Resolution & Aspect Ratio

- Must be DCI 4K container at 3996x2160 (1.85:1 Flat) or 4096x1716 (2.39:1 Scope).
- With GEM approval, DCI 2K allowed: 1998x1080 (Flat) or 2048x858 (Scope).
- Content with 1.85 or 2.39 aspect ratio must fully fill DCI Flat or Scope container edge to edge.
- Other aspect ratios must fit and be padded with black in Flat or Scope container based on ratio (<2.30 Flat, ≥2.30 Scope).
- No cropping or zooming to fill container allowed.

Frame Rates

- Non-true 24fps sources consult GEM rep for DCP frame rate.
- Interop DCP frame rate fixed at 24fps.

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- SMPTE DCP frame rate options: 24,25,30 fps (2K/4K); 48,50,60 fps (2K).

Audio Configuration
- MXF audio files must have even number of tracks (8 or 16), unused channels silent/MOS.
- SMPTE DCPs use "Configuration 4" Channel Assignment UL (Wild Track Format). No other channel formats allowed.

Audio Track Layouts:

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5.1	L	R	C	LFE	Ls	Rs	-	-	-	-	-	-	-	-	-	-
7.1	L	R	C	LFE	Lss	Rss	-	-	-	-	Lrs	Rrs	-	-	-	-
7.1 ATMOS	L	R	C	LFE	Lss	Rss	-	-	-	-	Lrs	Rrs	-	Sync	-	-

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Extended Audio Track Layouts (including Hearing Impaired, Vision Impaired, DBOX and Sign Language Video):

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5.1	L	R	C	LFE	Ls	Rs	HI	VI	-	-	-	-	DBOX	-	SLV	-
7.1	L	R	C	LFE	Lss	Rss	HI	VI	-	-	Lrs	Rrs	DBOX	-	SLV	-
7.1 ATMOS	L	R	C	LFE	Lss	Rss	HI	VI	-	-	Lrs	Rrs	DBOX	Sync	SLV	-

Timed Text Specifications

- Timed Text includes Subtitles, Open Captions, Closed Captions.
- Language codes per ISO RFC 5646; time always starts at 00:00:00:00 per reel, no hour offsets.
- Font file size ≤ 640KB; Closed Caption XML ≤ 256KB.
- PNG subtitles match DCP resolution, cropped to text area, RGB colorspace, size per reel ≤ 115 MB.
- CPL entries and reel numbers must correspond to Timed Text.
- Playback devices require Subtitles and Closed Captions present together per reel to prevent issues.

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- US Closed Captions language set to "en".
- Interop DCP timed text: conform to "Subtitle Specification for DLP Cinema Projection Technology" v1.1.
- Timed Text XML must be unique for each DCP; update SubtitleID to new UUID if reused.
- SMPTE DCP timed text: conform to SMPTE ST 428-7:2014, no encryption, must use 2021 XML namespace.
- ClosedCaption asset type enforced; avoid ClosedSubtitle/MainCaption types.

Naming & ContentTitleText

- Use ISDCF naming convention; GEM Studio Code = "NET".
- For unencrypted DCP compositions, add "-unenc" modifier in files & ContentTitleText.
- ContentTitleText must be unique for each DCP composition.
- File names: alphanumeric, hyphens, underscores; no spaces or special chars; short for asset map efficiency.

Annotation Text

- PKL and CPL AnnotationText must match ContentTitleText exactly per referencing rules.
- For PKL referencing multiple CPLs, set AnnotationText to primary CPL's ContentTitleText.

Distribution Key Delivery Message (DKDM)

- For encrypted DCPs, provide active DKDM targeted at distribution partner's leaf certificate.