# Digital Cinema
# System Requirements

Release 2.1

THE NATIONAL ASSOCIATION
OF THEATRE OWNERS

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# Table of Contents

# 1 Scope

This document represents exhibitor requirements for Digital Cinema Systems that supplement the requirements of other industry organizations. These requirements are intended for use by service providers, system providers, product developers, standards committees and other organizations in standardization and certification efforts.

# 2 Glossary

**Access Audio**: Audio tracks intended for the deaf and hard-of-hearing. Individually, these tracks are referred to as Hearing Impaired (HI), and Visually-Impaired Narrative (VI-N).

**Composition**: Collection of files that make up a movie, or a trailer, or an advertisement (defined by SMPTE 429-7)

**CMS**: Content Management System

**CPL**: Composition Playlist, the playlist that directs how to play the files that make up a Composition.

**DCP**: Digital Cinema Package (aka Distribution Package as defined by SMPTE 429-8). The contents of a DCP is described by a Packing List (SMPTE 429-8). Note that a DCP does not necessarily contain a complete Composition, and may contain multiple Compositions.

**DKMS**: Data and Key Management System

**FLM**: Facility List Message (defined by SMPTE 430-7)

**HI**: Hearing Impaired audio (defined in SMPTE 428-3)

**KDM**: Key Delivery Message (defined by SMPTE 430-1)

**Media Block**: The core signal processing functions, including security functions, of a digital cinema server.

**NOC**: Network Operations Center, a central facility that monitors equipment operational status.

**Playlist**: The list of Compositions to be played.

**POS**: Point of Sale

**PPL**: Pack Playlist. A sub-Show Playlist that is intended for use with a particular segment of Show content. E.g, a Trailer Pack Playlist or a PreShow Pack Playlist.

**Show**: The complete collection of Compositions played during a performance.

**SMS**: Screen Management System

**SNMP**: Simple Network Management Protocol (defined by IETF RFC 3411—RFC 3418)

**SPL**: Show Playlist. The playlist that instructs which Compositions and Pack Playlists are to be played, and in what order, for a Show.

**SSMS**: Show and Schedule Management System, a component of a Theatre Management System (TMS).

**TDL**: Trusted Device List (as defined by SMPTE 430-1), the in-theatre equipment (typically projectors) that is authorized to project a movie played from a specific server.

**TMS**: Theatre Management System

**URI**: Uniform Resource Identifier, a scheme encompassing methods for both locating and naming resources, standardized by IETF.

**UUID**: Universal Unique Identifier (defined in ITU-T X.667)

**VI-N**: Visually Impaired Narrative (defined in SMPTE 428-3)

**V-ISAN**: A V-ISAN is a registered, globally unique identifier for versions of an audiovisual work and related content. (defined in ISO 15706:2002 and 15706-2:2007)

# 3 Disability Access

## 3.1 VI-N and HI Audio

The digital cinema server shall play Visually-Impaired Narrative (VI-N) audio tracks and Hearing Impaired (HI) audio tracks when included in the content distribution.

## 3.2 Closed Captions

The digital cinema server shall play Closed Caption tracks when included in the content distribution, and shall support Closed Caption display systems provided by others.

# 4 Audio

## 4.1 Venue-Specific Audio

Recognizing the need for less than 6-channel sound in certain venues, including drive-in theatres, there shall be a means in the audio system to convert multi-channel audio to the number of channels in the venue.

## 4.2 Audio Bypass

In the event of a sound system failure, the cinema audio processor shall provide a “bypass” mode in which the available incoming multi-channel audio is mixed down to a mono signal, and the mono signal is sent to the Left, Center, and Right audio outputs. A means to separately adjust the auditorium sound level during bypass mode shall be provided.

## 4.3 Access Audio

The digital cinema server shall route Access Audio tracks (HI and VI-N) to owner-designated outputs.

# 5 Image

## 5.1 Projector Configuration

The Exhibitor shall have the ability to choose the best method for properly fitting an image to the theatre screen, using such options as image scaling, anamorphic lenses, or multiple lenses, provided that the integrity of the picture is not compromised when viewed by the target audience.

# 6 Interoperability

## 6.1 Digital Cinema Server

Digital cinema servers from all manufacturers shall be interchangeable such that a minimum level of system interoperability is retained. Interoperability is defined herein as plug-compatible and protocol-compatible. The minimum set of interfaces, messages, and content files that must be interoperable are:

- Projector interface (including caption interoperability),
- Audio interface,
- Closed Caption system interface,
- TMS interface (content management and transfer, key management and transfer, log management and transfer, equipment status reporting),
- Library Server interface (file management and transfer),

- SMPTE D-Cinema Packaging and KDM interoperability,
- Advertising Content,
- Auditorium Controls,
- Show Playlists,
- Pack Playlists,
- Show Schedules.

### 6.2 Digital Projectors without Internal Media Blocks

Digital projectors that do not have an internal media block shall be interchangeable with all makes of digital cinema servers.

### 6.3 Digital Projectors with Internal Media Blocks

Digital projectors that contain a media block shall meet the interoperability requirements of a digital cinema server.

### 6.4 Facility Identifiers

A Theatre Complex shall be identified by a unique URI (Uniform Resource Identifier, as defined by IETF RFC 3986). The unique URI for each location shall be obtained from the Theatre Owner or its representative, and shall be the FacilityID used in Facility List Messages (FLM).

## 7 Workflow Automation

### 7.1 Automation of Security Key Management

The management of security keys shall be automated so as not to require human intervention by the Exhibitor. Automated processes shall manage the request and delivery of Facility List Messages (FLMs) and Key Delivery Messages (KDMs). (See Section 10.3 for a description of processes and exception handling.)

### 7.2 V-ISAN

Content shall be identified by a globally unique V-ISAN number at the time of booking, in the Composition Playlist, and throughout the fulfillment process.

### 7.3 Operations for Content Fulfillment

The operation of satellite and/or network content fulfillment systems shall be automated so as not to require human intervention by the Exhibitor Automated processes shall manage the receipt and validation of DCPs and Compositions. (See Section 10.2 for a description of processes and exceptions handling.)

# 8 Operations

## 8.1 Delivery of All KDMs

To facilitate movement and playback of a movie and/or other content among all playout systems within a Theatre Complex, all KDMs required to do so shall be delivered to the Theatre Complex.

## 8.2 KDM TDL Requirement

The Theatre Operator shall be able to interchange servers, projectors, and pre-projector processors in the Theatre Complex without a requirement for new or additional KDMs. To enable this, the TDL of each KDM shall authorize the use of each projector and pre-projector processor in the Theatre Complex.

## 8.3 Time for Receipt of Content and KDMs

When scheduling the distribution of digital content, adequate time must be given to allow for load and test-play within the constraints of equipment capability and available screen time. The exhibitor must have the ability to conduct test plays at least 48 hours in advance of opening to allow for recovery time from potential failures. Appropriate KDMs are required for test-play. Thus, content and all KDMs should arrive in their entirety 72 hours prior to the opening of the show.

## 8.4 Time to Move Shows

Shows shall be able to move from auditorium-to-auditorium in 15 minutes or less. The Digital Cinema System shall be capable of moving Shows among 50% of the screens in a Theatre Complex within a one hour window. *Note: This capability is possible with film systems.*

## 8.5 Late Receipt of Content

In the event of late receipt of content, the content shall be delivered in a manner such that the Digital Cinema System shall be able to play the content immediately. *Note: This capability is possible with film systems.*

## 8.6 Operational Management

The Exhibitor shall have full local and remote operational management of all systems. Operational management refers to system operation and administrative functions.

## 8.7 Daily Reports[1]

The Digital Cinema System shall create daily reports and on-demand reports (including queries) indicating System Health, in-house Content, and in-house KDMs including expiration dates. Reports shall be available at the Auditorium

level, aggregated at the Theatre Complex level, and aggregated at the Circuit Headquarters level.

# 9 Theatre Systems

## 9.1 Show Schedule

The Digital Cinema System shall employ standardized and interchangeable XML-based Show Schedules, which shall instruct the playback system to execute a time-sequenced list of Show Playlists. (See Figure 1.)

## 9.2 Show Playlist and Pack Playlist

The Digital Cinema System shall employ standardized and interchangeable XML-based Show Playlists (SPL), which shall instruct the playback system to execute a time-sequenced list of compositions, automation cues, and/or Pack Playlists (PPL). When in play, the Pack Playlist shall also instruct the playback system to execute a time-sequenced list of compositions and automation cues. The user shall be able to replace or update a Pack Playlist without changing the Show Playlist (See Figure 1.)

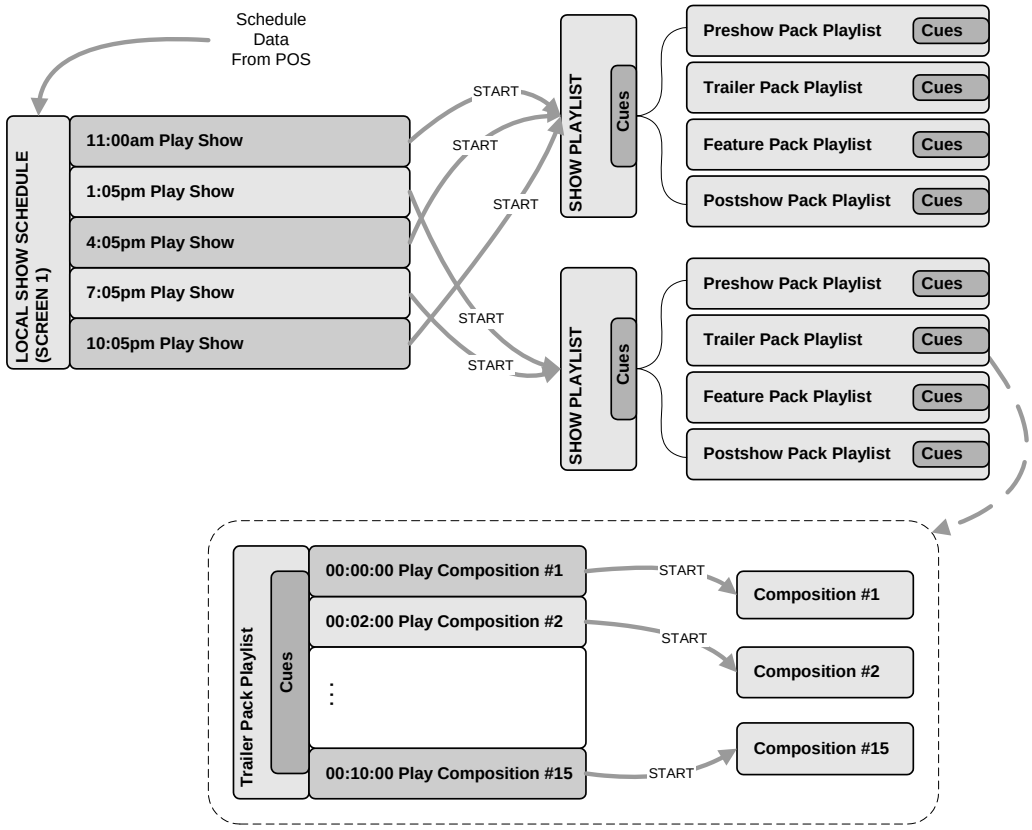


Figure 1. Hierarchical Relationship of POS, Show Schedule, Show Playlists, Pack Playlists, and Compositions

## 9.3 Show Playlist and Pack Playlist Generation

Show Playlists and Pack Playlists may be updated manually or automatically prior to showtime due to unforeseen changes. The minimum time-to-show immediately following the creation or loading of new Show Playlists, Pack Playlists, and/or Show Schedules shall be no more than the time it takes to move the necessary content.

## 9.4 Validation of Show Playlists and Pack Playlists

The digital cinema server shall determine if the Show Playlist and associated Pack Playlists are valid, and if the desired content and keys are loaded and ready to play, immediately following the loading of these elements.

## 9.5 Show Time Synchronization

All systems engaged in scheduling and/or playout of content shall have network time clocks synchronized to an official government time server or to a time source of the owner's choosing. Based on the time server being precise and continuously available, the network time clocks should remain in sync to +/- 30 seconds. Time adjustments shall not interfere with the correct operation of the device or any dependent system.

## 9.6 Show Playlist Synchronization with Point-of-Sale

The advertised show start time in the Point-of-Sale (POS) system may not be the desired start time of a performance. For instance, if the advertised show time is the time in the show sequence when trailers begin, any content that precedes trailers must then start earlier. To accommodate such differences, the Show Playlist shall include an AdvertisedShowTime marker (a relative time cue) that indicates the time position in the Show Playlist that is to playout at the advertised show time.

The advertised show time is scheduled in the POS, and represented by POSShowTime. The SSMS (see Section 10.4) shall calculate the actual start time of the show based on the absolute time of POSShowTime and the relative time position of AdvertisedShowTime marker. The calculation shall ensure that the playout time point of the AdvertisedShowTime marker matches the advertised show time in the POS.

The timing relationship between POS, Show Schedule, and Show Playlist is illustrated in Figure 2:

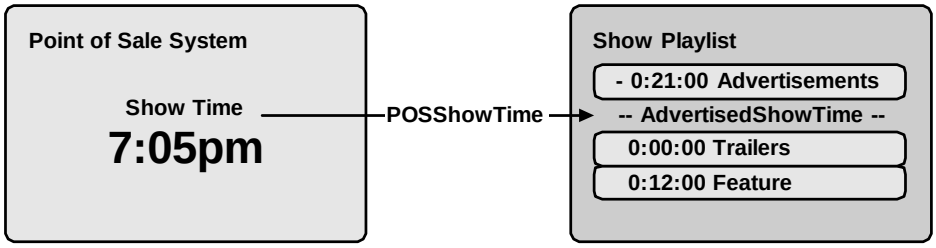


Figure 2. Timing relationship between POS and SPL

NOTE: In the example of Figure 2, the show advertising starts 21 minutes BEFORE the AdvertisedShowTime marker is encountered. In other words, for the trailers to start at the advertised show time of 7:05, the advertising must start 21 minutes earlier at 6:44pm. The SSMS can calculate the correct start time based on the relative position of the AdvertisedShowTime marker and the POSShowTime information.

## 9.7 Show Schedule and Point-of-Sale Data

The Show Schedule should include schedule data from a Point of Sale (POS) system. The standard Show Schedule should contain at a minimum the following POS-sourced data:

- **cpl:ID** and **cpl:ContentVersion**: The identifiers of the composition playlist and the composition, defined in SMPTE 429-7 Composition Playlist (CPL).
- **POSFeatureID**: An identifier used for the feature product by the Theatre Operator. This content identifier is not necessarily that used in a CPL.
- **BookingFeatureID**: Identifier used for the feature product at the time of booking. This content identifier is not necessarily that used in a CPL.
- **FeatureTitle**: Title of the feature, informative text.
- **FeatureRating**: Feature rating, standardized representation.
- **FeatureLength**: Length of the feature, used for scheduling purposes only, not as a substitute for the calculated track file length.
- **POSStartTime**: The advertised start time for the show, in absolute time. This is not necessarily the actual start time of the performance.
- **flm:FacilityID**: Unique identifier (URI) for the Theatre Complex, defined in SMPTE 430-7 Facility List Message.
- **AuditoriumID**: The auditorium for which the show is intended.

# 10 Theatre Management System

## 10.1 Separation and/or Segmentation of Network Services

The Theatre Management System (TMS) shall be divided, physically or conceptually, into a Content Management System (CMS), a Data and Key Management System (DKMS), and a Show and Schedule Management System (SSMS). Network services provided for use by authorized business partners shall be partitioned among the CMS, DKMS, and POS System per Figure 3 below.

In the preferred configuration, the DKMS shall receive and send data to authorized business partners through the Exhibitor's private network. However, other data delivery options may exist, including external network and physical media, at the discretion of the Exhibitor.

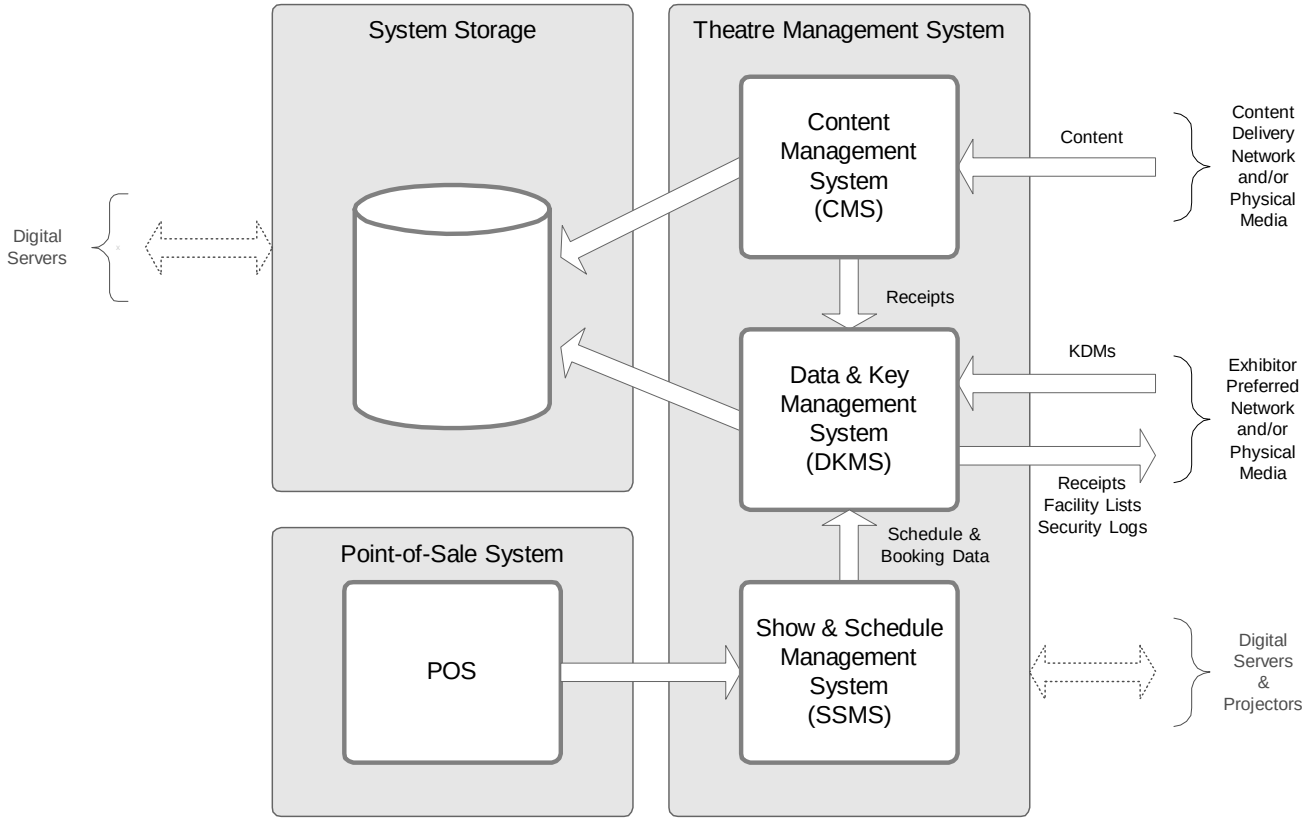


Figure 3. Networks for Theatre Management Systems

## 10.2 Content Management System (CMS)

### 10.2.1 CMS Requirements

The CMS shall perform and manage, at a minimum, the following functions:

- Log the arrival of content,
- Manage central storage systems, if present,
- Manage the movement of content from central storage or ingest cache storage to the playout system,
- Provide content management and aging for advertising, trailers, alternative content, and motion pictures.

### 10.2.2 CMS Notifications

The CMS shall notify the Theatre Operator (local and central office) of the following events:

- Receipt of a Digital Cinema Package (DCP),
- Receipt of a complete Composition,

The CMS shall notify authorized business partners of the above events by means of Receipts communicated over the DKMS network.

### 10.2.3 CMS Exceptions Management

The CMS shall manage, at a minimum, these exceptions:

- Upon receipt of an incomplete or corrupt Composition, notify the Theatre Operator (local and central office),
- If a booking has not been matched with received content, notify the Theatre Operator (local and central office),
- If content has not been matched with KDMs within an owner-specified number of hours, notify both the Theatre Operator (local and central office) and the content provider,
- Manage all CMS and system storage-related exceptions and alerts including those noted in Section 13.1.

## 10.3 Data and Key Management System (DKMS)

### 10.3.1 DKMS Requirements

The DKMS shall perform and manage, at a minimum, these functions:

- Disseminate all network traffic for the TMS, including communication of KDMS, FLMs, logs, notifications, and alerts,
- Maintain a current database of Digital Cinema System equipment in the Theatre Complex,

- Upon a change of equipment within the Theatre Complex, automatically create and immediately communicate a new FLM to all KDM Fulfillment Services,
- Service requests from KDM Fulfillment Services for new FLMs,
- Provide means such that the Exhibitor, at will, may manually create and communicate an FLM to all KDM Fulfillment Services.

### 10.3.2 DKMS Notifications

The DKMS shall, at a minimum, perform the following notifications:

- Upon receipt of a Key Delivery Message (KDM):
  - notify the theatre operator (both local and central office), and
  - issue a Receipt to the sender.

  The notification and Receipt shall indicate the utility of the KDM, namely:
  - the presence (or lack of presence) of the content associated with the KDM, and
  - whether or not the KDM, including its TDL, matches the equipment information known by the DKMS at that time,
- Upon arrival of content and KDMs in the digital cinema server, notify the Theatre Operator (both local and central office), that:
  - both KDMs and content are loaded in the server,
  - KDMs validate with the content and equipment, and
  - the content is available for presentation.
- Notify the Theatre Operator that KDMs for all digital cinema servers in the complex have arrived.

### 10.3.3 DKMS Exceptions Management

The DKMS shall, at a minimum, manage these exceptions:

- Upon arrival of an orphan KDM (KDM without associated content), monitor the CMS for arrival of the appropriate content, notify the Theatre Operator (both local and central office) when the associated content arrives, and issue a Receipt to the KDM sender,
- If an orphan KDM has not been matched with content within an owner-specified number of hours, then notify both the Theatre Operator (local and central office) and the KDM sender,
- If an equipment match cannot be found for a KDM, then notify the Theatre Operator, construct a new FLM (Facility List Message), send the new FLM to the KDM sender, and request a new suite of KDMs,
- If the Show and Schedule Management System identifies that a POS-scheduled show does not have a corresponding Show Schedule and Show Playlist/Pack built within an exhibitor-specified number of hours of the first scheduled show, then notify the Theatre Operator (both local and central office),

- If a KDM used in a currently running or scheduled show has a remaining valid period that is less than an exhibitor-specified number of hours, then immediately notify the Theatre Operator (both local and central office),
- Manage all DKMS-related exceptions and alerts noted in Section 13.1.

### 10.3.4 Facility List Message (FLM) and Key Delivery Message (KDM)

#### 10.3.4.1 Facility List Message (FLM)

The DKMS shall create a single, standard, Facility List Message (FLM) per complex for communicating security certificate information to KDM Fulfillment entities, thus enabling the KDM Fulfillment entities to send the correct security keys to the DKMS. (See Figure 4.)

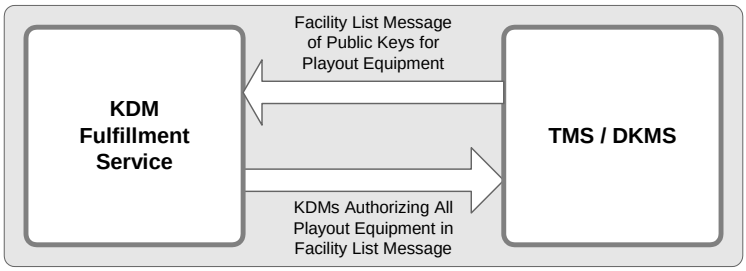


Figure 4. Workflow of FLMs and KDMs

#### 10.3.4.2 Refresh of KDMs

Within 15 minutes of receipt of an FLM, a new suite of KDMs shall be created and delivered to the Theatre by the KDM Fulfillment Service for all current and scheduled content whose keys are managed by the KDM Fulfillment Service at the Theatre.

#### 10.3.4.3 Log Management[1]

System logs shall be centrally collected by the DKMS such that the logs can be stored, reviewed, and filtered as required by the Exhibitor. Logs shall only be shared with authorized business partners at the Exhibitor's discretion.

## 10.4 Show and Schedule Management System (SSMS)

### 10.4.1 SSMS Requirements

The SSMS shall perform and manage, at a minimum, these functions:

- Creation, editing, and management of Show Playlists,
- Creation, editing, and management of Show Schedules, optionally based on POS-supplied data,
- Calculation of desired Performance Start Time based on POSStartTime (absolute time in the POS) and AdvertisedShowTime (relative time point in the SPL), as described in Section 9.6,

- Mating of CPL identifiers with the POSFeatureID and BookingFeatureID of the POS System.

# 11 System Monitoring and Alerts

## 11.1 Simple Network Management Protocol (SNMP)

Digital Cinema Systems shall employ Simple Network Management Protocol (SNMP) for monitoring system and network status. SNMP traps shall be used to issue alerts.

## 11.2 Critical Alerts

Theatre personnel and/or Network Operations Centers (NOCs) shall be notified of critical alerts using methods such as email, SMS, and SNMP. Critical alerts shall include, but are not limited to:

- Theatre system equipment failures,
- Security-related failures,
- Network-related failures,
- Show-related failures,
- Exceptions noted in Section 12, Presentation Hardware,
- Exceptions noted in Section 10, Theatre Management System.

# 12 Presentation Hardware

## 12.1 Exceptions

Media blocks, servers, projectors, and other presentation components shall report all exceptions that will prevent the successful presentation of a show, including:

- Missing show playlist or associated pack playlists for a scheduled show within a user-specified number of hours,
- No match of content and KDMs, including missing content and/or KDMs, within a user-specified number of hours of the scheduled show,
- Failure to assemble a show per a show playlist and associated pack playlists,
- KDMs set to expire within a user-specified number of hours of the scheduled show,
- Failure of the watermarking sub-system, if the watermark is required for content in the show,
- Failure to establish a secure link between server and projector,
- Any failure that would inhibit or degrade a performance.

### 12.2 Local Notifications

Media blocks, servers, projectors, and other presentation components shall indicate exceptions locally by means of a GUI or lighted indicators.

## 13 System Logs

### 13.1 Maintenance and Operations Log[1]

Digital Cinema Systems shall create a detailed Maintenance Log of all maintenance events that occur in each component. The logged events shall include the FacilityID, the device identifier, and a timestamp for each reported event. The Maintenance Log shall use a standard format. The Maintenance Log shall include, but is not limited to, the following elements:

- All notifications, alerts, and exceptions noted in these Requirements,
- Theatre System equipment warnings and failures,
- Security-related notifications, warnings, and failures, including those for KDMs, as well as secure component opening and resealing,
- Network-related errors, warnings, and failures, including network link status change (down, up), and excessive lost packets,
- Show-related warnings and failures,
- TMS-related warnings and failures,
- Projection lamp hours, power supply voltage, current, and ripple (recorded a minimum of once a day),
- Power-up status notifications,
- Component reboots,
- Capacity warnings and failures, including utilization levels and threshold limits exceeded
- Performance warnings and failures, including utilization levels and threshold limits exceeded

### 13.2 Performance Log[1]

Digital cinema servers shall maintain a Performance Log containing Show and Conent Records of each performance. The Performance Log shall have a standard format. The Performance Log should include at a minimum the following information per show and per content played:

**Show Record**

- A Show Record begins with the start of a Show Playlist and ends with the termination of the Show Playlist.
- **PerformanceID**: UUID that specifies the feature performance, as supplied by the Show Schedule. If a PerformanceID is not available, then this field must be empty.

- **ShowPlaylistID**: UUID that identifies the Show Playlist.
- **cpl:ContentTitleText**: Content title, defined in SMPTE 429-7 Composition Playlist (CPL).
- **POSFeatureID**: An identifier used for a feature product by the Theatre Operator. This content identifier is not necessarily that used in a CPL. (This could be a V-ISAN identifier.)
- **BookingFeatureID**: Identifier used for the feature product at the time of booking. (If the V-ISAN is used, the BookingFeatureID may be the same as the POSFeatureID.)
- **FeatureTitle**: Title of the feature as received from the POS, informative text.
- **FeatureRating**: Feature rating, standardized representation.
- **POSShowTime**: The advertised start time for the show. This is not necessarily the actual start time of the performance.
- **flm:FacilityID**: Unique identifier (URI) for the Theatre Complex, defined in SMPTE 430-7 Facility List Message.
- **AuditoriumID**: The auditorium in which the show was presented.
- **FeaturePresentationFormat**: Known format characteristics of the feature product, as presented in the Composition Playlist. This information may include aspect ratio, language, sound format, available captioning, and available audio access tracks.
- **dcml:DeviceDescription**: data that identifies and describes the devices employed for the show, defined in SMPTE 433 XML Data Types.
- **ShowPlaylistStart**: Time/date at which the Show Playlist that included this content was started.
- **ShowPlaylistEnd**: Time/date at which the Show Playlist terminated.
- **LogCreationDate**: Date/time at which the log record was created.

**Content Record** (created for each individual piece of content)

- A Content Record begins with the start of a Composition Playlist and ends with the termination of the Composition Playlist.
- **PerformanceID**: same as used in the Show Record
- **ShowPlaylistID**: UUID that identifies the Show Playlist for this performance. If a ShowPlaylistID is not available, then this field must be empty.
- **cpl:ID** and **cpl:ContentVersion**: The identifiers of the composition playlist and the composition played, defined in SMPTE 429-7 Composition Playlist (CPL).
- **cpl:ContentTitleText**: The name of the content played, defined in SMPTE 429-7 Composition Playlist (CPL).
- **CPLSequence**: Sequential number of the Composition within the overall Show Playlist.
- **CPLStart**: Time/date at which the Composition started.

- **CPLEnd**: Time/date at which the Composition terminated.
- **kdm:KeyIDList**: KDM identifiers, defined in SMPTE 430-1 Key Delivery Message (KDM).
- **kdm:ContentKeysNotValidAfter**: KDM expiration time, defined in SMPTE 430-1 Key Delivery Message (KDM).
- **PlayResult**: Result code of the playback of the content:
  - 0 Successful Presentation
  - 1 Skipped - Missing or Invalid Playlist Element
  - 2 Short Intermission (lamp off / douser closed, etc)
  - 3 Early Start
  - 4 Late Start
  - 5 No Presentation – Stopped by Operator
  - 6 No Presentation – Valid KDM not found
  - 7 No Presentation – Other Security Failure
  - 8 No Presentation - Other

# 14 Content Security

## 14.1 Forensic Marking

The content provider shall be responsible for replacing required forensic marking technology should the content provider determine that the effectiveness of the marking technology is compromised.

## 14.2 Link Encryption

Server-to-projector links shall employ a standard link encryption to ensure interoperability among servers and projectors. Where link encryption is required, a single link encryption shall be employed for 2K systems, and a single link encryption shall be employed for 4K systems.

# 15 Network and Other Communications

## 15.1 Network Security

Exhibitor security policies and procedures as well as pre-existing and/or future obligations to business partners require the Exhibitor to maintain a secure network environment. Therefore, the Digital Cinema System shall not compromise the security of the theatre's wide-area and local networks, including the security of Digital Cinema Systems, point-of-sale systems, and other content and data systems owned and/or operated by the Exhibitor and/or the Exhibitor's business partners.

## 15.2 Point of Sale (POS) Security

For POS System security reasons, the POS System shall only provide the Digital Cinema System with Exhibitor approved information. All such communications shall be approved and auditable by the Exhibitor.

## 15.3 Persistent Connection

A persistent and secure connection to each Theatre Circuit shall be available for communicating KDMs, FLMs, Receipts, and other data to and from authorized business partners. This may be accomplished over one or more electronic paths approved by the Exhibitor.

## 15.4 KDMs, FLMs, Receipts, and Other Data

The DKMS shall be the receiver of KDMs and originator of FLMs, Receipts, and other data. This may be accomplished by means of one or more electronic paths approved by the Exhibitor.

## 15.5 Content Fulfillment

The CMS shall receive content from content fulfillment centers by means of physical delivery and/or one or more electronic paths approved by the Exhibitor.

## 15.6 Data Communication with Outside Entities

The Digital Cinema System shall not allow outside business entities to communicate to and from the Exhibitor's equipment and/or premises without the express written permission of the Exhibitor. All such communications shall be recorded and shall be auditable by the Exhibitor.

## 15.7 Trusted Communications

Establishment of trusted communications with business partners is an important part of conducting business. Entities who wish to establish networked communications with exhibitors must:

- Engage in an exchange of digital certificates to enable the authentication of communications,
- Demonstrate the correct use of communication protocols and message types,
- Demonstrate adequate operational protections against the spread of viruses and malicious software.

# 16 Vendor and Service Provider Requirements

## 16.1 General Control Policies

Service Vendors providing services to the Exhibitor shall adhere to and follow the Exhibitor's IT General Control policies, including Security and Change Control Management policies and procedures, or allow the Exhibitor to approve and audit the Vendor's policies and procedures. These policies shall be Standards-based for good General Control of Technology Systems and Networks.

## 16.2 System Readiness

System Vendors providing equipment installed on the Exhibitor's premises shall instrument their Systems (Software, Hardware, and Firmware, etc.) for good General Control practice, including good Security and Change Control Management. System Vendors shall also instrument their systems for the ability to audit them for good General Control practice. General Controls for Technology Systems and Networks shall be Standards-based (COBIT, ISO, ITIL, etc.).

## 16.3 Facility Site Restrictions

Content fulfillment solutions may not apply uniformly to all Theatre sites. Each Theatre site has a set of restrictions (such as lease or zoning) that must be observed when considering systems for satellite or network distribution.

[1] Logs and reports herein described are intended solely for the benefit of theatre owner operations, and not intended for exchange with business partners.

# Annex A System Organization

System organization requirements may vary. While operation of a server and projector without higher level system elements may work fine for installations with a small number of digital screens, larger installations will seek more managed forms of operation. Three tiers of system organization are envisioned to accommodate the needs of the industry, as illustrated in Figures 5 through 7.

### Tier 1 Systems

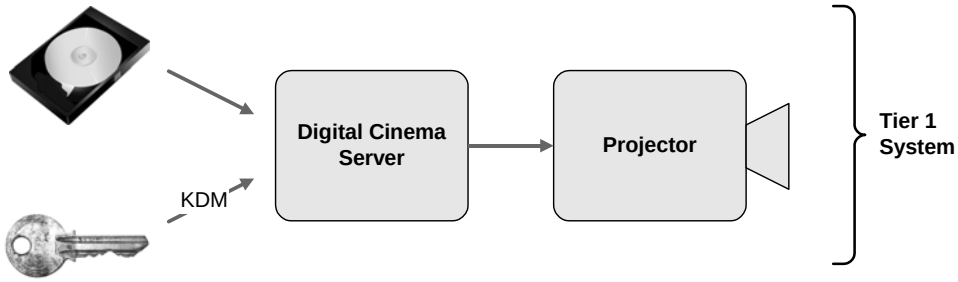


Figure 5. Tier 1 Systems

Tier 1 systems are suitable for Theatre Complexes having a small number of screens. Content is most likely received on hard drives. KDMs are most likely delivered by means of email or physical storage.

### Tier 2 Systems

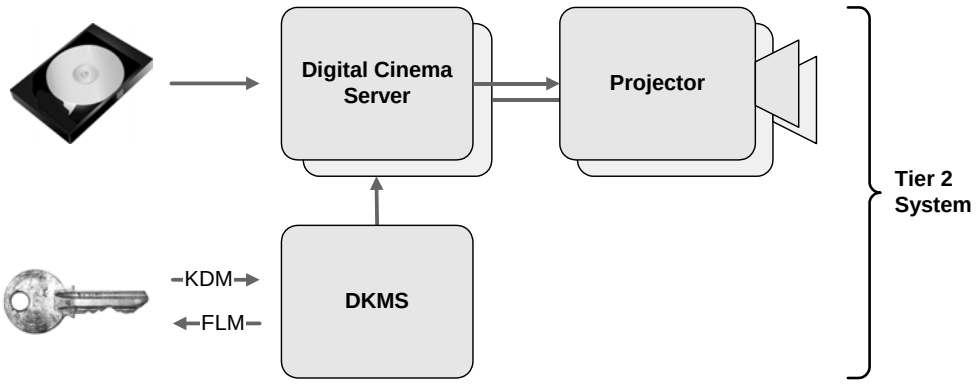


Figure 6. Tier 2 Systems

Tier 2 systems are suitable for small multiplex theatres, or where automated key delivery is desired but the cost of a full TMS is not warranted. Content is most likely received on hard drives. KDM delivery and FLM transmission are managed by the DKMS.

### Tier 3 Systems

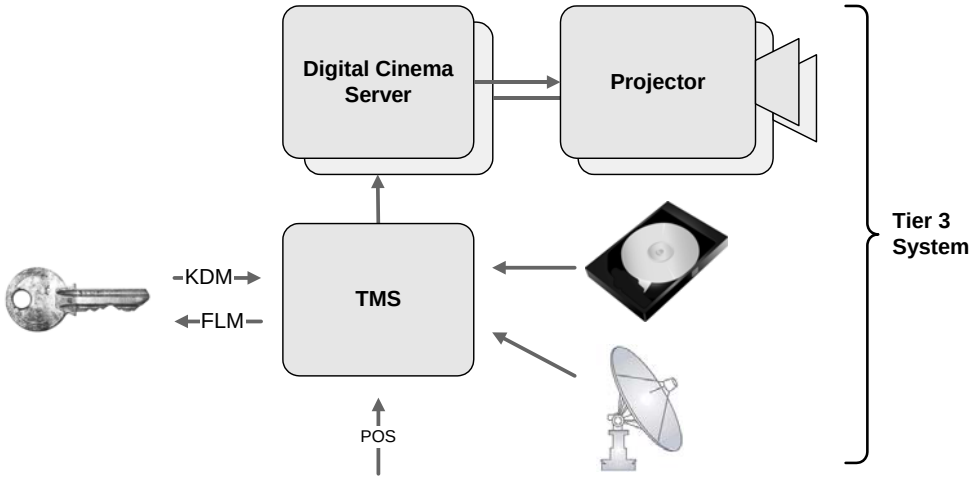


Figure 7. Tier 3 Systems

Tier 3 systems are intended for large multiplex theatres. Content may be received by satellite and managed by the CMS component of the TMS. KDM delivery and FLM transmission are managed by the DKMS component of the TMS. POS scheduling is managed by the SSMS component of the TMS.