

# Digital Cinema System Requirements

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THE NATIONAL ASSOCIATION  
OF THEATRE OWNERS

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# NATO Digital Cinema System Requirements

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# NATO Digital Cinema System Requirements

## 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 system providers, product developers, and standards committees and other organizations in standardization and certification efforts.

## 2 Audio

### 2.1 Dynamic Downmixing

If Dynamic Downmixing is employed, the method used shall follow an industry-approved standard.

### 2.2 Dynamic Range Control

If the system employs Dynamic Range Control, the method used shall follow an industry-approved standard, and shall be capable of on/off selection by the exhibitor.

### 2.3 Lt/Rt Audio

Recognizing the requirement for director-approved audio in first-release presentations, that all theatres will not convert immediately to 5.1 audio playback, and the need for 2-channel audio to be sourced during audio B-chain failures, an Lt/Rt mix should be included in the 16-channel delivery format.

### 2.4 Assistive Listening

Two analog outputs shall be provided for Assistive Listening audio that may be recorded on the 16-channel delivery format.

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## 3 Theatre Systems

### 3.1 Show Playlist

The System shall employ a standardized and interchangeable Show Playlist, which shall instruct the playback system with a time-sequenced list of compositions and automation cues. Parent Show Playlists shall support nesting, such that a child Show Playlist, created for a Preshow or for Trailers, can be added or removed. (See Figure 1.)

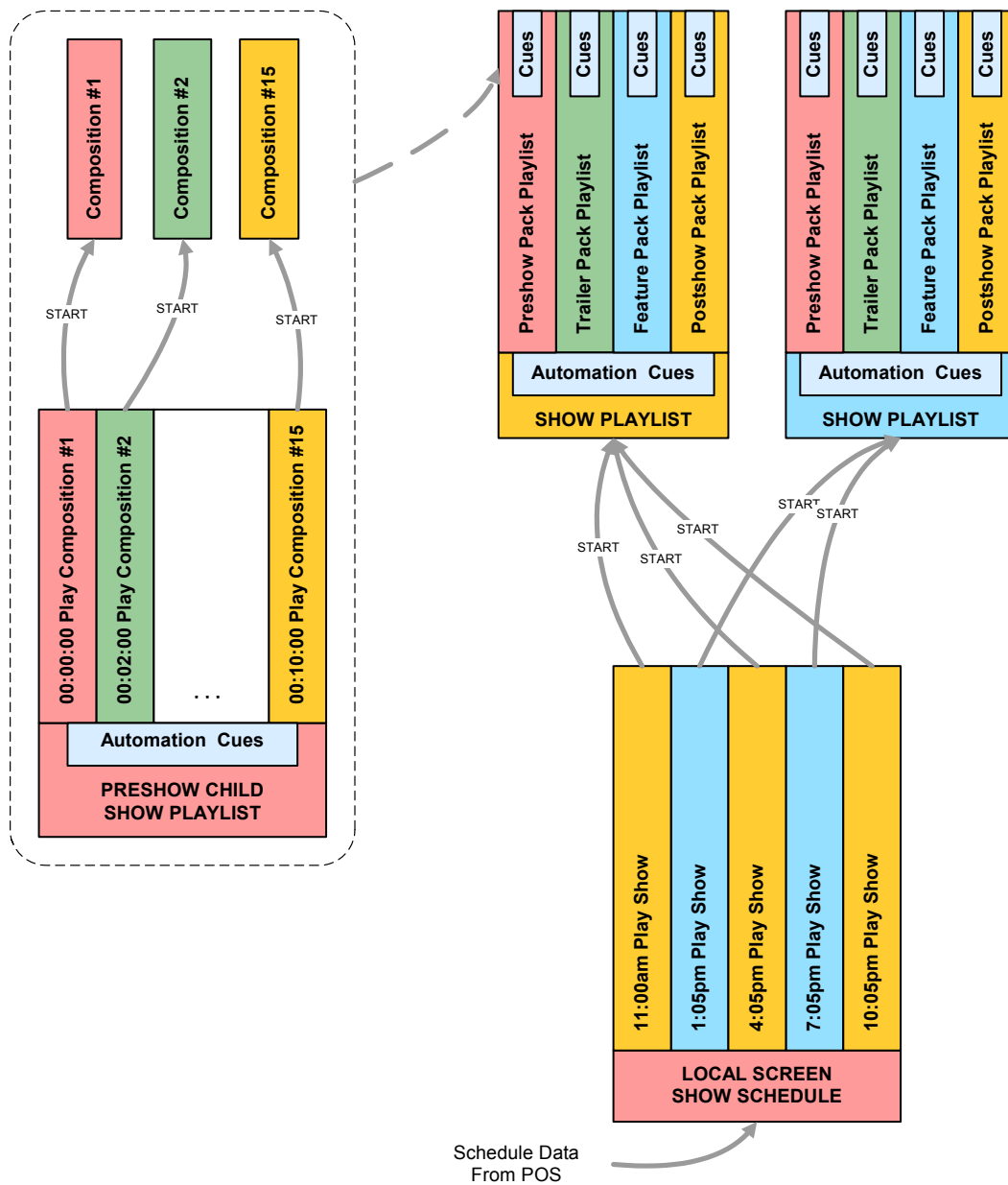


Figure 1. Workflow Relationship of POS, Show Schedule, Parent Show Playlists, Child Show Playlists, and Compositions

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## 3.2 Show Playlists, Performance Start Time, and Rules

The Show Playlist shall employ rules to determine, based on specific criteria, if a specific child Show Playlist is to be used in an active Show. Specific criteria shall include, but is not limited to, content rating within the child Show Playlist, the PerformanceStartTime cue, and flags that may be set by the user. The PerformanceStartTime cue shall define the time point in the Show Playlist that is referenced by the performance start time of the Point-of-Sale System (POS).

## 3.3 Show Schedule

The System shall employ a standardized and interchangeable Show Schedule, which shall instruct the playback system with a time-sequenced list of parent Show Playlists. The Show Playlist start time shall be calculated such that the time point of the PerformanceStartTime cue matches that described by the POS performance start time.

## 3.4 Point-of-Sale Interface

The System shall support XML-based schedule data from a Point of Sale (POS) system. This schedule data shall contain at a minimum the following information:

- **FeatureRecord:** Record that contains information about a Feature
  - **FeatureID:** Circuit wide (all theatres within a specific chain) unique identifier for a feature presentation.
  - **FeatureName:** Name 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.
  - **PresentationFormat:** Physical format of the feature, film or digital, or other (such as alternative content system). This information may also include, but is not limited to, aspect ratio, language, sound format, available captioning, and available Assistive Listening tracks.

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- **PerformanceRecord:** Record that contains information about a specific performance of a Feature.
  - **PerformanceID:** Theatre wide (all auditoriums within a specific complex) identifier of the performance.
  - **SiteID:** Unique identifier for the theatre complex.
  - **AuditoriumID:** Unique identifier for the auditorium/screen within the complex.
  - **FeatureID:** Circuit wide (all theatres within a specific chain) unique identifier for a feature presentation, provides a pointer to the FeatureRecord.
  - **PerformanceStartTime:** Time point used by system to calculate the show start time.
  - **Captioning:** Type of captioning available for the performance, Open, Closed/Personal, None.

## 4 System Management and Maintenance

### 4.1 Local and Remote Management

Systems shall allow both local and remote management for troubleshooting, maintenance, monitoring, and software updates.

### 4.2 Change Management

Access to systems, and all system changes, shall be logged for exhibitor review.

## 5 System Reports and Logs

### 5.1 System Status Reporting

Systems shall employ SNMP for reporting system status to both local and remote monitoring systems.

### 5.2 System Log Interchange

Systems shall employ a standard method of interchange for non-security-related system log reports.

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## 5.3 Maintenance Log

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

- Fan Speed Exceeded Threshold
- Physical Memory Error
- Hard Disk Errors
  - Loss of drive from array
  - SMART errors and warnings
  - Sector errors
  - Operating Temperature Threshold exceeded
  - Raid rebuild
- Secure environment opening/resealing
- Power-up status notifications
- Network link status change (down, up)
- Network errors (excessive lost packets, etc)
- Disk Space Threshold exceeded
- All SNMP Trap alerts
- Projection lamp power supply voltage, current, ripple
- Projector warnings and failures

## 5.4 Security Log

Systems shall employ the standard interchange method for security log reports prescribed by DCI's Digital Cinema Specification v1.0. Systems shall employ tools that allow the exhibitor to filter security log reports logs prior to sharing.

## 5.5 Performance Log

Systems shall create a log for each performance that includes information related to the playback of content during the performance. This log shall use a standard log format and be digitally signed. This log shall include at a minimum the following information in a hierarchical format:

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- **Header Record**
  - **PerformanceID:** UUID that specifies the feature performance that the playback was associated with.
  - **SiteID:** Unique identifier for the theatre complex.
  - **DeviceID:** A unique ID for the device that played the content.
  - **PlaylistStart:** Time/date at which the Show Playlist that included this content was started.
  - **PlaylistDuration:** Estimate duration of the complete Show Playlist.
  - **LogCreationDate:** Date/time at which the log record was created.
  
- **Content Record** – created for each individual piece of content
  - **PerformanceID:** UUID that specifies the feature performance that the playback was associated with.
  - **ContentID:** The identifier of the content played such as a composition playlist UUID.
  - **ContentName:** The name of the content played, informative text.
  - **ContentSequence:** Sequential number of the content within the overall Show Playlist.
  - **PlayStart:** The exact time at which the content started playing.
  - **PlayDuration:** the amount of time the content played.
  - **PlayResult:** Result code of the playback of the content:
    - 0 Unknown or Not Applicable
    - 1 Successful Presentation
    - 2 Skipped - Missing or Invalid Content
    - 3 No Presentation - Short Intermission (lamp off / douser closed, etc)
    - 4 No Presentation - Early Feature Start
    - 5 No Presentation - Stopped by Operator
    - 6 No Presentation - Show Started Late
    - 7 not defined
    - 8 Playback Error – Catastrophic Error

## 5.6 Confirmation Log

Systems shall create a standard, secure, Confirmation Log to identify the feature movies played on each system. The purpose of the Confirmation Log is to provide business information to business partners per contractual agreements.

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## 5.7 Notification of Security Key Expiration

The system shall report to the exhibitor those Security Keys that are due to expire in 48 hours, for which notification may use a variety of communication mechanisms, including email and SNMP.

## 5.8 Daily Reports

The System shall create daily reports indicating System Health, in-house Content, and in-house Security Keys including expiration dates. Reports shall be available at the Auditorium level, aggregated at the Theatre Complex level, and aggregated at the Circuit Headquarters level.

## 6 Captioning

### 6.1 Timed-Text

Timed-text shall be available in real-time using a standardized method and interface for driving 3rd party closed caption display systems.

### 6.2 Open Caption Content

Systems shall employ standard methods for delivery and display of open caption content in the theatre.

## 7 Content Security and Key Management

### 7.1 Forensic Marking

The insertion of forensic marks in the playback system, where the marking technology is determined at the time of content mastering, is preferred over the use of single forensic marking technology in the playback system. Where a single forensic marking technology is employed in the playback system, the system provider shall be responsible for updating the technology should the effectiveness of the marking technology be compromised.

### 7.2 Link Encryption

Server-to-projector links shall employ a standard link encryption. 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.

### 7.3 Facility List

Systems shall create a single, standard, Facility List per complex for communicating security certificate information to Key Distributor(s), thus enabling the Key Distributor(s) to provide the necessary security keys to the Theatre Complex. (See Figure 2.)

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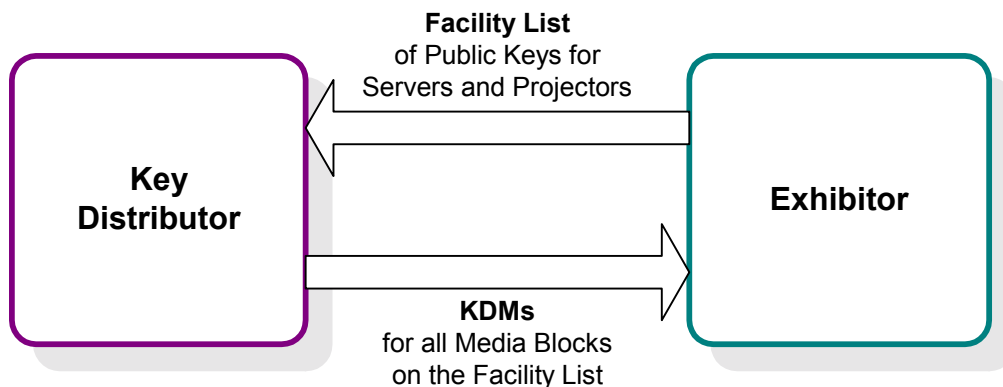


Figure 2. Workflow of Facility Lists and KDMs

## 7.4 Change of Equipment

Upon a change of equipment within the Theatre Complex, a single Supervisory System shall automatically create and communicate a new Facility List to all Key Distributors engaged in business with the Theatre Complex. The Exhibitor shall be able, at will, to manually create and communicate a new Facility List to all Key Distributors engaged in business with the Theatre Complex.

## 8 Network Security

### 8.1 Security

The System shall not compromise the security of the theatre's in-house network, including the security of digital cinema systems, point-of-sale systems, and other data systems owned and/or operated by the exhibitor.

### 8.2 Point of Sale (POS) Security

The System shall allow only Authorized communications between it and the POS System. All such communications shall be recorded and shall be auditable by the Exhibitor.

### 8.3 Pushing of data

The system shall be designed to *push* data to outside business entities per the needs of the exhibitor, and shall not allow outside business entities to *pull* data from the exhibitor's equipment or from the premises without the express written permission of the exhibitor on a case-by-case basis. All such communications shall be recorded and shall be auditable by the Exhibitor.

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## 9 Operations

### 9.1 Operational Management

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

### 9.2 Movement of Equipment Among Screens

System components (servers, projectors) shall be capable of being moved from auditorium to auditorium within the same facility in any combination without limitation and without requiring receipt of new decryption keys.

### 9.3 Movement of Shows Among Screens

Systems shall allow the movement and playback of shows among all auditorium systems within a complex.

### 9.4 Time to Move Shows

Shows shall move from auditorium-to-auditorium in 15 minutes or less. The System shall be capable of moving Shows among 50% of the screens in a Theatre Complex within a one hour window.

### 9.5 Time to Get Keys

Equipment changes and possibly repairs will require the immediate delivery of new Security Keys for all encrypted content in the complex within its engagement window. New Security Keys shall be delivered within 15 minutes of the time of request.

### 9.6 Delivery of Security Keys

The primary delivery of Security Keys into the Theatre Complex and to the Screen System shall be automated and seamless in operation and shall not require the manual intervention of the Exhibitor.

### 9.7 Response to POS changes

The digital cinema system shall respond instantaneously to schedule changes made in the POS.

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## 10 Vendor and Service Provider Requirements

### 10.1 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 allowing 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.

### 10.2 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, etc.).