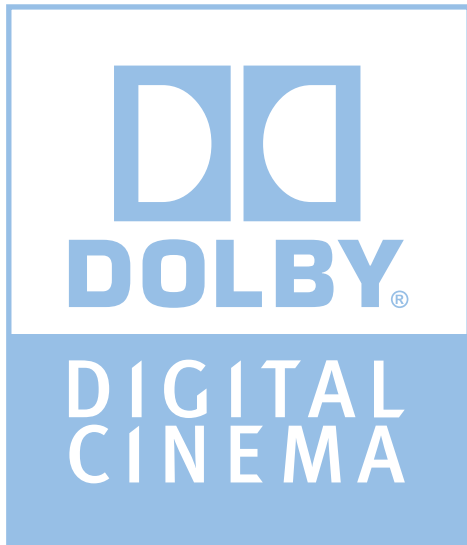


Like many new technologies, digital cinema can sometimes seem to have a language all its own. This short guide explains some of the key terms used to describe the operation, performance, and features of digital cinema equipment.



BELIEVE YOUR EYES

1.3K/2K/4K resolution Proposed resolutions for digital cinema projectors. Resolution is one of several factors that influence onscreen quality. The numbers (quoted roughly in thousands) refer to the number of pixels (dots) across the horizontal axis of the image, so 2K is approximately 2,000 pixels across the screen.

Alternative content Entertainment programming other than movies that can be played in a digital cinema environment. Possibilities include sports and other live events. Alternative sources are usually connected via the second input of a digital cinema projector and a suitable cinema audio adapter.

Color space The complete range of colors that can be represented by a given device. Color space can be reprogrammed on some devices, including digital cinema projectors, to enable different looks for different content. During replay in cinemas, the same color space should be selected on the projector as was used during original mastering. Standards are in process for a common color space.

Compression A way of processing digital images or sound so that they take up less space on a disk, less bandwidth for a transmission, or less time to transfer. Image compression is used in digital cinema so file sizes remain manageable for mastering, distributing, loading, and projecting. The image must be uncompressed in the theatre before it can be displayed.

Data Digital information. Digital data has the advantage of being able to be copied or transmitted over a digital network any number of times without adversely affecting quality. In digital cinema, instead of the movie images and sound being stored on celluloid film, they are stored as digital data in a file, usually on a hard disk.

DC28 A technology committee of the SMPTE formed to provide an industry forum for the development of digital cinema technology specifications. DC28 consists of working groups to provide standards and recommendations to ensure interoperability, compatibility, and performance.

DCI Digital Cinema Initiatives, LLC. A company formed as a joint venture between Disney, Fox, MGM, Paramount, Sony Pictures Entertainment, Universal, and Warner Bros. Studios. DCI's purpose is to establish voluntary specifications and an open architecture for digital cinema.

Delivery Method of transferring digital cinema file packages to cinema facilities. This can be via physical delivery of digital media such as removable hard drives or by fiber or satellite. File encryption is used to secure the files from theft during transport and storage.

Digital cinema The highest-quality theatre display of cinematic content such as first-run feature motion pictures. Minimum performance specifications are intended to follow the DCI specifications.

Digital cinema playback system Often referred to as a server, the playback system performs several functions, including storage and replay of the digital movie data, security decryption, and image decoding. Advanced systems may also provide a control panel for the projectionist, scheduling features, and comprehensive automation interfacing. Digital cinema playback systems should not be confused with simple broadcast or PC-based video servers that do not offer the security and image decoding features required by DCI.

Digital cinema projector A high-performance device designed specifically for cinematic display of movie content. Projects the digital image from the digital cinema playback system onto the screen. Digital cinema projectors today use the 2K DLP Cinema® technology from Texas Instruments, although other suppliers, including Sony, are developing their own solutions.

Digital projector Any projector that uses digital technology to create the image. Performance levels vary from tabletop designs for offices, to large “rental and staging” projectors, to digital cinema projectors. Smaller units are sometimes used in cinemas for slide-style advertising and to project subtitles with 35 mm film.

EDCF European Digital Cinema Forum. A group with representatives from public and industry cinema organizations formed with the intention of encouraging cooperation in European digital and electronic cinema projects and providing input into worldwide standards.

Electronic cinema Also known as e-cinema. Noncinematic content such as advertising or alternative content displayed in a theatre. Electronic cinema is often shown on smaller projectors with lower performance than digital cinema projectors, and can be presented live or replayed from broadcast-type video servers. Also includes the presentation of motion pictures in smaller venues, again with smaller, nondigital cinema projectors. The presentations use standard- to high-definition television formats.

Encryption The general name for techniques used to protect digital data so that it can be accessed only by authorized users. Encrypted data is meaningless until it is decrypted using a mathematical “key.” In digital cinema, encryption is used at several points along the electronic chain to prevent valuable digital movie data from being stolen. In parts of the system process where encryption cannot be used (for example, during image decoding), physical security is required so that the data cannot be accessed.

Ethernet A standard way of interconnecting pieces of digital equipment on a network, used in digital cinema systems to interconnect equipment within a screen or between multiple screens. Different kinds are used depending on the application: slower 10Base-T or 100Base-T is used for transferring simple information such as control instructions, and Gigabit Ethernet (1000Base-T) can be used for large amounts of data such as movie files.

File encryption Used to secure the movie file package during distribution and in the cinema. The file package is encrypted before distribution to cinemas. For maximum security, the file stays encrypted when it is loaded onto the playback system and is only decrypted during playback. A valid security license is required to decrypt the movie.

File package The digital cinema equivalent of a film print, sometimes referred to as a digital print. A collection of the various image, audio, subtitle, and playlist data files for a specific piece of content. The file package can be stored on disk or transferred over electronic networks.

Hard drive Also known as a hard disk, this device is used to store large quantities of digital data. Used in RAIDs in digital cinema playback systems to store the digital movie file packages ready for playback. Removable hard drives can also be used to transfer movies to cinemas.

HD-SDI High-definition serial digital interface. A standard interconnection for carrying high-resolution image data. Often used for connecting digital cinema playback systems to digital cinema projectors.

Image decoder The portion of the digital cinema playback system that decodes the image compression. Some designs use dedicated silicon chips to do this, but these can decode only one image format and are therefore difficult to upgrade. Other designs use software or reprogrammable or modular hardware.

Interoperability Compatibility between different manufacturers’ digital cinema systems. A vital industry requirement is the ability to replay a common digital movie file on playback systems from multiple manufacturers. Standardization is in progress.

JPEG 2000 An image compression technology developed for a broad range of applications by the Joint Photographic Experts Group (JPEG). A specific new profile of JPEG 2000 has been identified by DCI for future use in digital cinema.

KDM See *License*.

Key A mathematical code that is used to decrypt (unlock) encrypted content. In digital cinema, it forms part of the playback license that enables playback of the movie.

License Also known as a key delivery message (KDM). A standardized method of delivering security keys to digital cinema playback systems. The license contains the keys necessary to decrypt a movie in a given cinema, plus information about how it may be used. Licenses are often distributed on CD-ROMs, but can also be carried on USB memory sticks, over a network, or even on the removable hard drive together with the content.

Link encryption A local form of encryption used to secure the valuable image data when it is transmitted over an open connection (for example, when the data passes from the playback system to the projector).

Mastering Also known as content preparation. The process of creating the master digital cinema file package containing all movie images, audio, subtitles, and any additional information. Mastering is performed on behalf of the movie distributor at a suitable mastering facility. Encryption is also applied at this stage. The file package is then ready for duplication onto removable hard disks or for transfer via satellite or fiber for distribution to cinemas.

MPEG-2 An image compression technology with a wide range of applications developed by the Moving Pictures Experts Group (MPEG). For digital cinema releases, a high-quality MPEG-2 encoding is currently used.

MXF Material exchange format. The open file format used for many types of image interchange. The interchange of movie file packages between digital cinema systems from different manufacturers is accomplished with a subset of the MXF standards.

Physical security Product construction designed to protect digital data. Movie data cannot always be encrypted inside the digital cinema system because it must be decrypted for the image to be decompressed. Physical security can be used to prevent access to any part of the circuit where valuable movie data is processed, so a pirate cannot open the lid of the equipment during decompression and steal the unprotected movie data. This is a requirement in the latest DCI draft specifications.

Projector configuration file A method of storing various projector settings, including aspect ratio and color space. In the future, individual projector configuration files could be distributed with specific movie releases.

RAID Redundant array of independent disks. Used in some digital cinema systems to enable very high-quality movie data to be played back reliably by storing the data across multiple hard drives. Hard drives contain moving parts and have a finite lifetime, so RAIDs can be used to ensure that even if a hard drive fails completely, show playback will continue unaffected.

Redundant power supplies Dual power supplies used on some digital cinema equipment to ensure that the show remains on screen, even if one power supply fails.

Reliability The ability of equipment to withstand a nonideal operational environment. This is important for digital cinema equipment, as projection booths often have nonideal electrical, ventilation, or operational characteristics.

Server See *Digital cinema playback system*.

Show A term referring to a complete digital cinema presentation. This could include movie trailers, cinema advertising, and feature films. A show is assembled on the digital cinema playback system by selecting the desired pieces of content, called “clips,” and setting the running order. On some systems, shows can be scheduled for automatic playback at specific times, or can be triggered externally by an existing automation system.

SMPTE Society of Motion Picture and Television Engineers. An international body creating standards for the motion picture and television industries.

UPS Uninterruptible power supply. A power conditioning device that is required for digital cinema playback systems with insufficient onboard electrical protection.

User interface The way in which a user can control a device. Digital cinema playback systems sometimes offer different controls optimized for different uses (for example, illuminated keys for use by the projectionist during a show, or a screen and mouse for show setup).

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