

Errata items are continuing to be evaluated and will be posted after agreement by the DCI membership that the specific erratum needs to be modified in the DCI Specification. Please check back often for list additions. Please send suggested errata issues to: dcinfo@dcimovies.com Please include Subject: **ERRATA**

DCI Specification Errata Listing

29-Aug-06

Erratum	Spec 1.0 Page	Sections Affected	Description
20	6	Figure 1	Replace Figure 1 with:

Trusted Environment

Reel n+1... Image DCDM (Reel n) → Compression (Reel n) → Encryption (Reel n) [optional] → Packaging (Reel n)

Reel n+1... Audio DCDM (Reel n) → Multiple Tracks → Encryption (Reel n) [optional] → Packaging (Reel n)

Reel n+1... Subtitles DCDM (Reel n) → Multiple → Subtitles timed text or subpicture (PNG files) (Reel n) → Multiple → Encryption (Reel n) [optional] → Packaging (Reel n)

Reel n+1... Captions DCDM (Reel n) → Multiple Tracks → Encryption (Reel n) [optional] → Packaging (Reel n)

Security Manager (SM) ↔ Encryption (Reel n) [optional] ↔ Packaging (Reel n)

DCP → Transport

DCI Functional Flow Encode

Figure 1: System Overview Functional Encode Flow

Erratum	Spec 1.0 Page	Sections Affected	Description
21	7	Figure 2	Replace Figure 2 with :

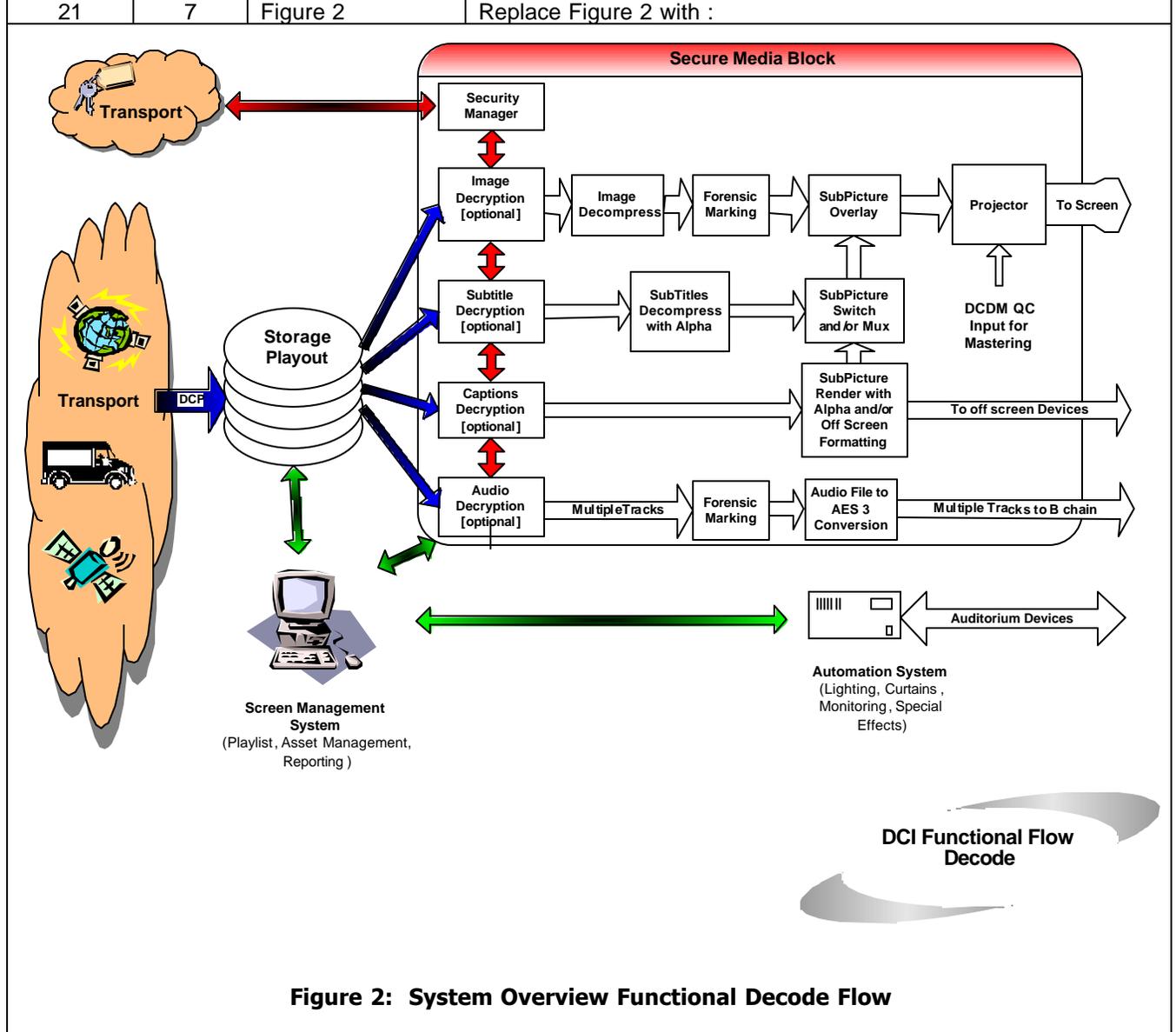


Figure 2: System Overview Functional Decode Flow

22	8	Section 2.1.1.3	The first sentence is replaced with "This document specifies a DCDM for the purpose of exchanging the image, audio and subtitles to encoding systems and to the Digital Cinema playback system."
23	10	Section 2.1.1.9	Change the three occurrences of 'should' to 'shall' in this Section to provide consistency with Section 1.4.
24	11	Section 3.1.2	The fourth bullet (Auxiliary Data) is removed
25	11	Section 3.1.3	The first sentence of the last paragraph of Section 3.1.3 is replaced with "Metadata within the DCDM provides a method to synchronize image, audio and subtitles."
26	12	Section 3.2.1.2	The entire paragraph of section 3.2.1.2 is replaced with "The DCDM shall provide an image structure that shall use equally sampled tristimulus code values to represent each pixel. The maximum number of horizontal and vertical pixels shall be constrained to fit within one of the following image pixel arrays: The number of active pixels (e.g. the pixels of the image structure that are intended to be displayed) shall extend to the maximum in

			either the horizontal or vertical direction of the defined level of operation as shown in Table 1. For example, a 4K image file with a 2.39:1 aspect ratio would require an image pixel array of 4096 x 1716, therefore filling the horizontal resolution of the 4K container. The pixel orientation, as displayed on the screen, shall be understood to flow from left to right and top to bottom. Also, the horizontal and vertical pixel count shall begin with 0. For example, the top left pixel of the displayed image shall be denoted as (0, 0).
27	13	Table 1	Replace Table 1 with:

Level	Horizontal Pixels	Vertical Pixels	Pixel Aspect Ratio	Frame Rate
1	4096	2160	1:1	24.00
2	2048	1080	1:1	48.00
3	2048	1080	1:1	24.00

Table 1: Image Structure

28	13	Section 3.2.1.3	Section 3.2.1.3 is replaced with “ <i>The center of the image structure shall correspond to the center of its image active pixel array.</i> Horizontally, there will be an equal number of pixels to the left and to the right of the center point. Vertically, there will be an equal number of pixels above and below the center point. The center of the image structure will depend on the down stream mapping of the content. (e.g. HDSDI or TIFF Files) For 4K (4096x1716) image structure mapped to a TIFF file, the center is between horizontal pixels 2047 and 2048 (Note: pixel counts begin at (0,0)) and between vertical pixels 857 and 858. For 2K (2048x858) image structure mapped into an HDSDI stream, the center is between horizontal pixels 1023 and 1024 and between vertical pixels 539 and 540.”
29	13	Section 3.2.1.5	Incorrect Reference Given: Replace [CIE Publication 15.2 (1986) Colorimetry] with [CIE Publication 15:2004, Colorimetry, 3 rd Edition]
30	14	Table 3	Replacement of Table 3 Example Image Aspect Ratios” to change Pv of Level 1 2.39 Aspect Ratio to 1716 pixels from 1714 pixels.
31	14	Section 3.2.2.1	The first and only sentence of the section becomes “The DCDM image file format is mapped into TIFF.” The second sentence, “A single file shall only contain elements from a single reel” is eliminated.
32	14	Section 3.2.2.2	Section 3.2.2.2 is replaced and re-titled to “File Mapping”. The new contents of the section becomes: <p style="text-align: center;"><i>The DCDM Image Structure shall be mapped into the TIFF Rev 6.0 File Format and further constrained as follows:</i></p> <ul style="list-style-type: none"> • 16 bits each per X, Y', and Z' channel, stored in the nominal TIFF R, G, and B channels. • The DCDM gamma-encoded X, Y', and Z' color channels are represented by 12-bit unsigned integer code values. These 12 bits are placed into the most significant bits of 16-bit words, with the remaining 4 bits filled with zeroes. • The image orientation shall place the first pixel in the upper left corner of the image.

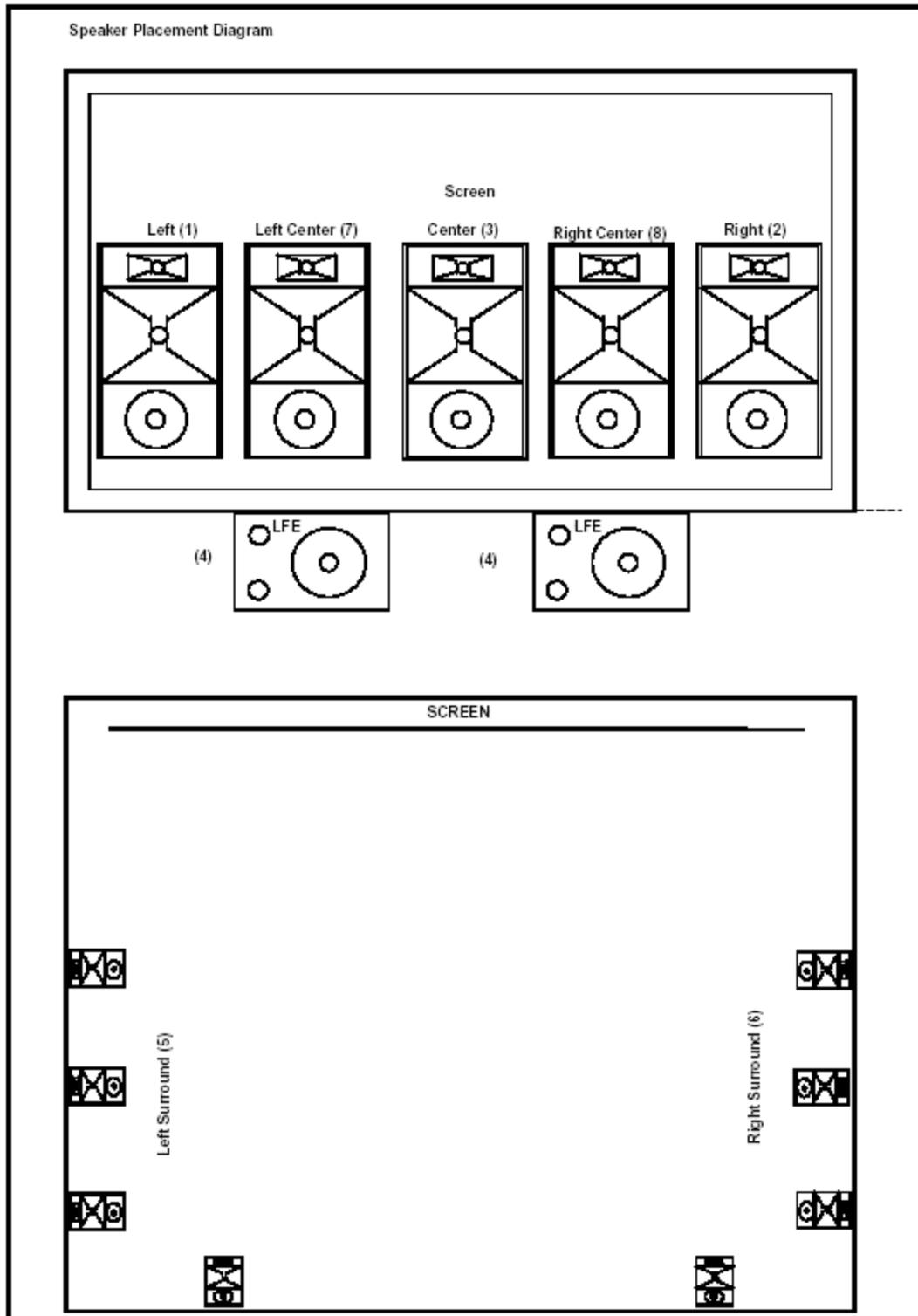
			<ul style="list-style-type: none"> The DCDM picture file shall contain only the active pixels in the image. In other words, it is not allowed to pad the picture to the full size of the DCDM container.
33	15	Section 3.2.2.3	<p>The contents of Section 3.2.2.3 “Synchronization” becomes:</p> <p>The DCDM file format is required to contain metadata that allows for synchronization of the images with other content:</p> <ul style="list-style-type: none"> Each directory shall contain only one contiguous sequence of frames. For assembled reels, a separate directory shall be used for each reel with the following naming convention: <ul style="list-style-type: none"> Composition.Name.Reel_#. For inserts, the directory naming convention shall be: <ul style="list-style-type: none"> Feature Name. Reel_#.Insert_#. Each reel shall contain sequentially numbered frames, using the following file naming convention. All names when sorted alphabetically shall be in sequential order (leading zeroes required). Therefore, the only thing that changes in the sequence is the frame numbers. <ul style="list-style-type: none"> Composition Name.Reel_#.Frame number.tif Example: Stealth.Reel_1.00000.tif
34	15	Section 3.2.2.4	<p>The contents of Section 3.2.2.4 becomes:</p> <p>Image information and parameters, required to successfully interchange the DCDM Image Structure, shall be provided to the mechanism that will ingest the DCDM.</p> <p>Each frame in the reel shall contain accurate and complete metadata, but it is permissible to read and extract the reel-based metadata from the first frame of a reel to use as a metadata “slate” for the rest of the frames in the reel.</p> <p>The information, as shown in Table 4 below, is the minimum required information to successfully interchange files.</p>
35	15	Table 4	Table 4 is replaced with:

Data Element Name	Data Element Definition
Active Horizontal Pixels (Ph)	Total number of active horizontal pixels in the image container
Active Vertical Pixels (Pv)	Total number of active vertical pixels in the image container
Frame Rate	The rate that images are to be projected, expressed in frames per second
Frame Count	The integer number of frames in a sequence

Table 4: Required Image Structure Information

36	15	Section 3.3.2.2	In Section 3.3.2.2, replace the word 'Material' with 'DSM Audio Material'.
37	16	Section 3.3.2.4	Capitalize the section 3.3.2.4 title word 'count' for consistency.
38	18	Figure 4	Replace Figure 4 with this (labels modified) version

Figure 4: Suggested Auditorium Speaker Placement



39	22	Section 3.4.4	Replace the title words "Auxiliary Data" with "Show Control".
40	22	Section 3.4.5.1	Remove the last sentence of Section 3.4.5.1 that reads "If more extensive show control is required, then a show control DCDM auxiliary data file can be used."
41	22	Section 3.4.5.2	Section 3.4.5.2 is removed.
42	24	Section 4.4	A new first bullet is added to this codestream specification reading "• The capability parameter for a 2K distribution shall be Rsiz = 3, for a 4K distribution it shall be Rsiz = 4."
43	25	Section 4.4	The third bullet after Table 7 is changed to "For a frame rate of 24 FPS, a 2K distribution shall have a maximum of 1,302,083 bytes per frame (aggregate of all three color components including headers). Additionally, it shall have a maximum of 1,041,666 bytes per color component per frame including all relevant tile-part headers."
44	25	Section 4.4	The fourth bullet after Table 7 is changed to "For a frame rate of 48 FPS, a 2K distribution shall have a maximum of 651,041 bytes per frame (aggregate of all three color components including headers). Additionally, it shall have a maximum of 520,833 bytes per color component per frame including all relevant tile-part headers."
45	25	Section 4.4	The parenthetical clause within the fifth bullet after Table 7 is changed to "(aggregate of all three color components including headers)".
46	25	Section 4.4	The note on the fifth bullet after Table 7 – change the end of the sentence from 'per color component' to 'for the 2K portion of each color component'.
47	30	Section 5.3.1.1	The third sentence of Section 5.3.1.1 is replaced with "Each of these essence or metadata containers could be image, sound, subtitle (Timed Text, and/or subpicture) or caption data".
48	32	Section 5.3.1.3	Bullet 3 of Section 5.3.1.3 is modified to read "Reels are required to be composed of one or more Essence Track Files (e.g. Picture Only, Sound and Picture, Sound and Picture and Subtitle, etc.)"
49	32	Section 5.3.1.4	The second sentence of Section 5.3.1.4, "A Track file length is always equal to its associated Reel Length", is removed.
50	35	Section 5.3.3.4	In Section 5.3.3.4, change Bullet 4 to read 'Active Horizontal Pixels (Ph)' and change Bullet 5 to read 'Active Vertical Pixels (Pv)'.
51	36	Section 5.3.6	Re-titled "Auxiliary Track Files and Extensibility" and the new text content is: "It may be necessary to package auxiliary data or non-standard essence for a specific use case. In these cases the extension shall not interfere with the proper handling of the DCP by an otherwise compliant system. As a best practice, extensions should adhere to the requirements given in this section and to any extension requirements or guidelines presented in the relevant standards documentation." Subsections 5.3.6.1 through 5.3.6.3 are removed.
52	37	Section 5.4.3.2	In Section 5.4.3.2, "Image Track Information (list for each reel)", the first sentence is changed to read "Any given image Track File shall have one or more Entry Points within a given composition playlist."
53	37	Section 5.4.3.3	In Section 5.4.3.3, "Audio Track Information (list for each reel)", the first sentence is changed to read "Any given Audio Track File shall have one or more Entry Points within a given composition playlist."
54	38	Section 5.4.3.5	Section 5.4.3.5 is removed
55	45	Section 7.3.3.2	Bullets 3 and 4 should have 'Show' preceding the word 'Timeline' in each.
56	52	Section 7.5.3.7	Remove the sixth bullet in Section 7.5.3.7 dealing with Auxiliary Data.

57	52	Table 9	Replace Table 9 (and Errata 3) with the following: <table border="1"> <thead> <tr> <th>Average Bit Rate (Mbits/sec)</th> <th>3 Hour Image (GBytes)</th> <th>3 Hour Audio (GBytes)</th> <th>20 min. pre-show (Gbytes)</th> <th>Sub Picture (GBytes)</th> <th>Timed Text (GBytes)</th> <th>3 Hour Total (GBytes)</th> </tr> </thead> <tbody> <tr> <td>250</td> <td>337.500</td> <td>2.074</td> <td>37.500</td> <td>0.300</td> <td>0.001</td> <td>377.374</td> </tr> <tr> <td>200</td> <td>270.000</td> <td>2.074</td> <td>30.000</td> <td>0.300</td> <td>0.001</td> <td>302.374</td> </tr> <tr> <td>125</td> <td>168.750</td> <td>2.074</td> <td>18.750</td> <td>0.400</td> <td>0.001</td> <td>189.974</td> </tr> <tr> <td>100</td> <td>135.000</td> <td>2.074</td> <td>15.000</td> <td>0.600</td> <td>0.001</td> <td>152.674</td> </tr> <tr> <td>80</td> <td>108.000</td> <td>2.074</td> <td>12.000</td> <td>0.800</td> <td>0.001</td> <td>122.874</td> </tr> </tbody> </table>	Average Bit Rate (Mbits/sec)	3 Hour Image (GBytes)	3 Hour Audio (GBytes)	20 min. pre-show (Gbytes)	Sub Picture (GBytes)	Timed Text (GBytes)	3 Hour Total (GBytes)	250	337.500	2.074	37.500	0.300	0.001	377.374	200	270.000	2.074	30.000	0.300	0.001	302.374	125	168.750	2.074	18.750	0.400	0.001	189.974	100	135.000	2.074	15.000	0.600	0.001	152.674	80	108.000	2.074	12.000	0.800	0.001	122.874
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58	52	Section 7.5.3.7	Remove the Last Line of Section 7.5.3.7 “Auxiliary Data size: ...”																																										
59	53	Section 7.5.4.1	The first sentence is replaced with “Another key component in the playback chain is the Media Block. One or more Media Blocks are responsible for converting the packaged, compressed and encrypted data into raw image, sound and subtitles”.																																										
60	54	Section 7.5.4.2.2	In the second paragraph change incorrect reference “[AES3-1992 (r1997)]” to “[AES3-2003]”.																																										
61	55	Section 7.5.4.2.8	Section 7.5.4.2.8 is removed.																																										
62	56	Section 7.5.4.3	Item E “Auxiliary Data” of the second bullet in Section 7.5.4.3 is removed.																																										
63	57	Section 7.5.6.2	In the first bullet text, change incorrect reference “[AES3-1992 (r1997)]” to “[AES3-2003]”.																																										
64	57	Section 7.5.7.3	Section 7.5.7.3 is removed.																																										
65	60	Section 7.5.9.3.7	Section 7.5.9.3.7 is removed.																																										
66	66	Section 8.3.4.5	Replace “White Point Chromaticity” in the title with “Calibration White Point”.																																										
67	85	Section 9.4.2.4	The reference to Section 9.4.5.3 in the first sentence of the second paragraph is incorrect. It should be to Section 9.4.3.5.																																										
68	85	Section 9.4.2.5	The following sentence is added to the end of the opening paragraph of section 9.4.2.5: “From the security system perspective, SMS functions are those associated with ‘category 1’ Intra-Theater Messages of Table 15, page 103.”																																										
69	86	Sect 9.4.2.5 Bullet 2	The 2nd bullet is replaced with “The SMS digital certificate may be permanent to the SMS, or ‘operator certificates’ may be assigned to designated personnel (e.g. using a dongle, smart card, etc.) for association with the SMS.”																																										
70	86	Sect 9.4.2.5 Bullet 3	The secure silicon requirements of bullet 3 and the original bullet 2 are eliminated.																																										
71	86	Sect 9.4.2.5 Bullet 4	The 4th bullet is replaced with: “Identification of the SMS operator for purposes of the “AuthorityID” field (section 9.4.5.2.4) shall be by: – Certificate thumbprint – Where ‘operator certificates’ are used, <u>or</u> Username/password or the like, as specified by exhibition management.”																																										
72	86	Sect 9.4.2.5 Bullet 5	The 5th bullet is eliminated.																																										
73	86	Sect 9.4.2.5 Bullet 6	The 6th bullet is eliminated.																																										
74	86	Sect 9.4.2.5 Bullet 7	The last bullet is replaced with: “The SM provides log records identifying the SMS for which it operates, as well as the AuthorityID field. In the case where ‘operator certificates’ are used, this information is the same (i.e. the digital certificate thumbprint).”																																										
75	89	Section 9.4.3.2 Bullet 2	Remove “(including the SMS)” from last sentence of second bullet.																																										
76	90	Section 9.4.3.3 Bullet 1	The second and third sentences are changed to “This shall include validation of the authenticity and “trust status” of the suite SPBs, and delivery of all necessary keys per Section 9.4.3.5, Functions of the Security Manager (SM). SMs shall obtain trust status by confirming that the SPBs are listed in the TDL delivered as part of each KDM required for the entire Show Playlist.																																										

77	90	Section 9.4.3.3 Bullet 1	The next to last sentence is changed to “Different compositions may have different requirements and the system shall check the SPBs against the TDL for each composition independently”.
78	93	Section 9.4.3.5	Item 9 (a) shall be replaced with “Suite preparation command (see Section 9.4.5.3.1.5 PrepSuite) received from the SMS for the composition being prepared for playback.”
79	93	Section 9.4.3.5	In item 9c “The system shall check the SPBs against the TDL for each composition independently” is added to the existing text. In addition, the reference in item 9d is incorrect and should be “15” (not “14”).
80	93	Section 9.4.3.5	In item 11: “(via SMS ‘PrepSuite’ command)” is replaced with “(upon receipt of the SMS ‘PrepSuite’ command)”. Item (11) is further clarified that the SMS shall issue the “PrepSuite” command within 30 minutes prior to each show time.
81	95	Section 9.4.3.6.1	The following sentence is added to the end of the opening of Section 9.4.3.6 (below the bullets and just before the start of Section 9.4.3.6.1): "In addition to the specific requirements given for SPB systems in this section, all SPB systems shall meet the behavior requirements of Section 9.6.1 (Digital Rights Management)."
82	101	Section 9.4.5.1	The last sentence of the 2 nd paragraph (starting with “In the case of a fully integrated ...”) is eliminated.
83	105	Sect 9.4.5.3.1.5	Remove “SMS and” from the second sentence. The second paragraph is eliminated.
84	106	Section 9.4.5.3.1.6	The second bullet note should additionally state “This does not mean SMS are required to internally store KDMs until they expire (where KDMs are stored is unspecified).” A third bullet note is added. “To avoid overloading the SM’s KDM storage capacity, it is recommended that SMS functions include a ‘PurgeKDM’ command for category 1 of Table 15.”
85	111	Section 9.4.6.1.1	Bullet 4 should be amended to read “Recovery can take up to a 30-minute content sample for positive identification”.
86	114	Section 9.4.6.2	Due to incorrect numbering within Section 9.4.6.2, the last six sequentially numbered sections 2-7 should instead be numbered 4-9.
87	115	Section 9.4.6.3.1	The following sentence is added to #11: “In no event shall remote SPB log records be overwritten prior to them being collected by the SM.”
88	129	Section 9.5.3	Section 9.5.3 is replaced with “There are no physical constraints or requirements imposed on the SMS by the security system (i.e., no SPB requirements); however, the SMS implementation shall not otherwise weaken or effect the security operations of other Security Entities or SPBs.”

The following pages are provided for easy printing to insert in your documentation

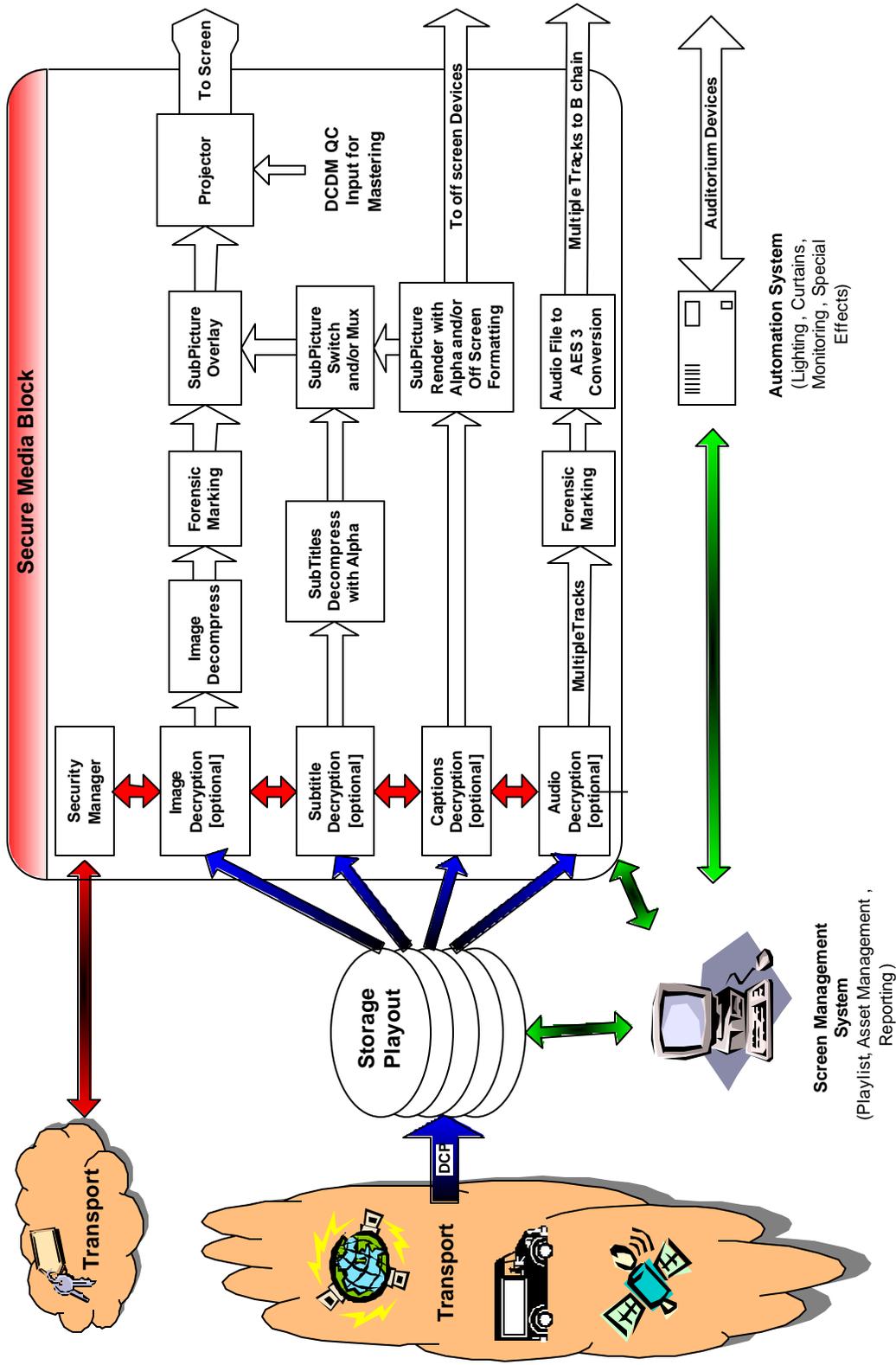


Figure 2: System Overview Functional Decode Flow

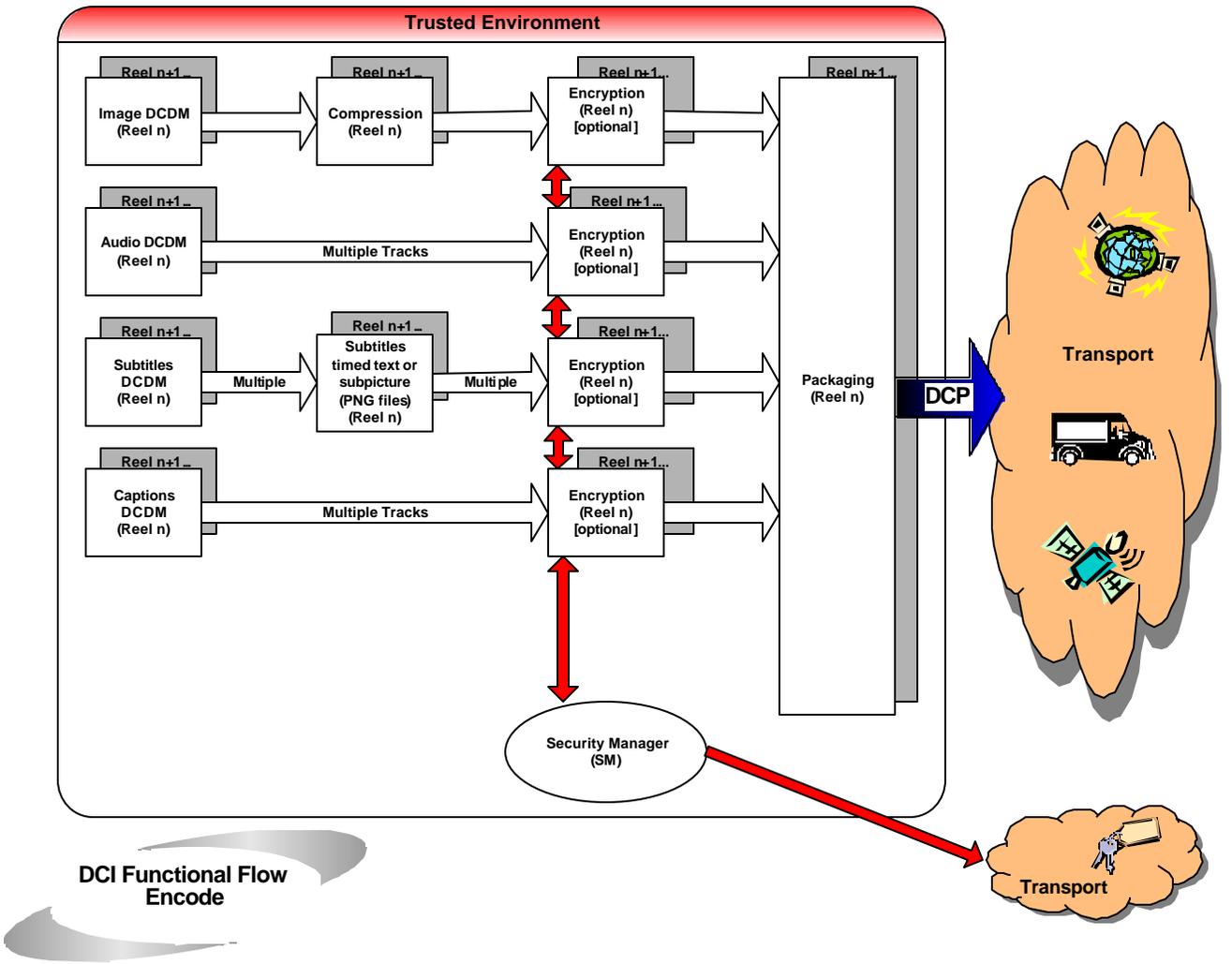


Figure 1: System Overview Functional Encode Flow

Level	Horizontal Pixels	Vertical Pixels	Pixel Aspect Ratio	Frame Rate
1	4096	2160	1:1	24.00
2	2048	1080	1:1	48.00
3	2048	1080	1:1	24.00

Table 1: Image Structure

Data Element Name	Data Element Definition
Active Horizontal Pixels (Ph)	Total number of active horizontal pixels in the image container
Active Vertical Pixels (Pv)	Total number of active vertical pixels in the image container
Frame Rate	The rate that images are to be projected, expressed in frames per second
Frame Count	The integer number of frames in a sequence

Table 4: Required Image Structure Information

Figure 4: Suggested Auditorium Speaker Placement

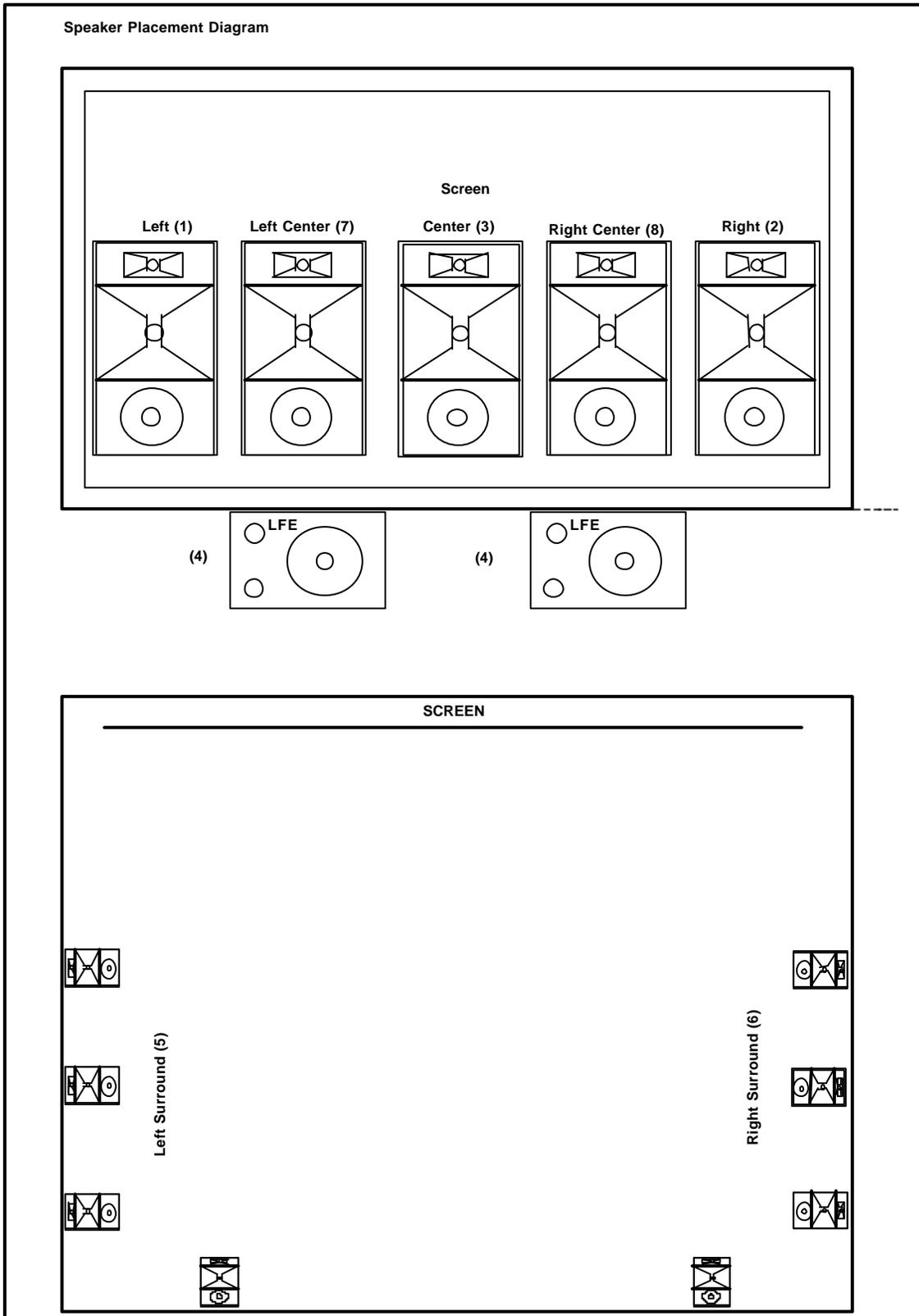


Table 9 Replace Table 9 (and Errata 3) with the following:

Average Bit Rate (Mbits/sec)	3 Hour Image (GBytes)	3 Hour Audio (GBytes)	20 min. pre-show (Gbytes)	Sub Picture (GBytes)	Timed Text (GBytes)	3 Hour Total (GBytes)
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