
**EUROPEAN FEDERATION
OF CINEMATOGRAPHERS**

Brussels / Copenhagen, 5 March 2006

IMAGO, The European Federation of Cinematographers, member of EDCF, would like to introduce the following suggestions / requests to EDCF-T, kindly requesting that EDCF-T would support them and forward them to SMPTE DC-28 for using these suggestions while building the future standard for cinema distribution and projection. Please feel free to contact kommer@imago.org for any questions or feedback.

IMAGO proposals (after the publication of the DCI specification) February 2006

1. Request for support of 60 fps frame rate.

The DCI specification document does allow for a frame rate above 24 fps. However, it allows for 48 fps only. We do not recommend the introduction of 48 fps and would rather propose 60 fps for the following reasons:

Although 48 fps is quite good performance wise, damage will happen to material shot at 48 fps when transferred to video for TV and home entertainment distribution after the cinema run. Indeed, frame rate conversions do cause considerable damage to moving images. A frame rate of 60 fps would yield an even better quality than 48 fps and interface better with the subsequent TV and home entertainment career of the movie. It will only require 25% more bandwidth, which is marginal.

Also, since 60 fps is already an established frame rate in daily use in the moving image industry, we would recommend it would be supported anyhow. With so much 60 fps material in existence and in daily production, risks may be high that proprietary systems might emerge if 60 fps is not included from the start into the standard. Additionally, 48 fps introduces a new frame rate into the moving image industry. An industry that already suffers from too many different frame rates. We would prefer to see a reduction of the number of commonly used frame rates in the industry, given that frame-rate conversions do a lot of damage to moving imagery. In the actual industry we already have to deal with 24, 25, 30, 50 and 60 fps presentation speeds, let us please not add one more.

2. Request to allow for full resolution, also at higher frame rates.

The DCI document limits resolution to 2k at the frame rate higher than 24 fps. Even if technology and economics may limit bandwidth for some time to come, we feel it is not a good idea for a standard to impose such limits. This may conduct to proprietary versions once the technology and economics will allow for higher resolution at high frame rates. That would be regrettable and contrary to the goal of a standard. We propose the standard will include an evolution path for that future.

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3. Request to allow for frame rate change during the show.

Frame rate changes during the movie will allow higher frame rates to be used more economically in the beginning (by limiting the higher frame rates to specific scenes within the movie). This should be possible without visible joint. The use of frame rate changes will then probably disappear later on when the higher frame rates become more economical, and entire movies can be shot and run at the higher speed at acceptable costs. Till then, frame rate changes may allow for a significantly better quality cinema experience.

4. Proposal to support other common existing and legacy film projection frame rates (8, 12, 16, 18, 20, 22, 30, 60) to be supported. We would like to suggest to SMPTE to add this possibility. This should be easy to implement (especially the lower ones) and would be a real practical advantage of DC projection equipment over film projection equipment.

Additionally, 25, 50 and 60 fps would allow for material distributed in cinemas but originally shot for TV, to be shown in better quality, again avoiding the need of damaging frame rate conversions.

5. Proposal to standardize how to represent stereoscopic 3D imagery. In order to avoid emergence of proprietary versions. (We have learned that a SMPTE working group has been started on the subject, which we think is very good news)

Addendum: Table of proposed container levels.

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Addendum: Table of proposed container levels.

Three container levels proposed by DCI

Container Level	Horizontal Pixels	Vertical Pixels	Container Aspect Ratio	Pixel Aspect Ratio	Frame Rate	Number of eyes
3	2048	1080	1.896	1:1	24.00	1 (mono)
1	4096	2160	1.896	1:1	24.00	1 (mono)
2	2048	1080	1.896	1:1	48.00	1 (mono)

IMAGO proposed container levels (8)

Container Level	Horizontal Pixels	Vertical Pixels	Container Aspect Ratio	Pixel Aspect Ratio	Possible Frame Rates (changes allowed)	Number of eyes	Unc. bandw rel to 2k/24	Possible Today from bandw pov
1	2048	1080	1.896	1:1	8,12,16,18,20,22,24	1 (mono 2D)	times 1	in exploitation
2	4096	2160	1.896	1:1	8,12,16,18,20,22,24	1 (mono 2D)	times 4	demonstrated
3	2048	1080	1.896	1:1	8,12,16,18,20,22,24,25,30,50,60	1 (mono 2D)	times 2,5	yes
4	4096	2160	1.896	1:1	8,12,16,18,20,22,24,25,30,50,60	1 (mono 2D)	times 10	a few years
5	2048	1080	1.896	1:1	8,12,16,18,20,22,24	2 (stereo 3D)	times 2	in exploitation
6	4096	2160	1.896	1:1	8,12,16,18,20,22,24	2 (stereo 3D)	times 8	a few years
7	2048	1080	1.896	1:1	8,12,16,18,20,22,24,25,30,50,60	2 (stereo 3D)	times 5	very soon or yes
8	4096	2160	1.896	1:1	8,12,16,18,20,22,24,25,30,50,60	2 (stereo 3D)	times 20	several years

Unc. bandw rel to 2k/24 stands for "Maximum uncompressed bandwidth relative to 2048 * 1080 @ 24fps"

Possible Today from bandw pov stands for: "Possible Today from bandwidth point of view" c.q. if equipment available today allows this or not