

PRESENTATION TEXT KOMMER KLEIJN presenting the IMAGO Frame Rate proposals on the DC28.0 meeting in Amsterdam 20060727

I will very shortly describe myself and the proposal.

My name is Kommer Kleijn, I am a cinematographer with IMAGO, the European Federation of Cinematographers. IMAGO has approx. 1200 members all over Europe.

IMAGO is a member of EDCF. EDCF is and an input body for specification towards SMPTE DC-28.

I have written most of the frame rate proposal with IMAGO members starting in December 2003, and it was changed after the release of the DCI specifications last summer. It was then endorsed by the IMAGO general assembly in Copenhagen Feb 2006 after being sent to all members. The EDCF board then decided to support the proposals for proposal to DC28

Since most of you probably already have seen it (It is available from the www.IMAGO.org web site), I am going to describe the proposal a bit differently, in a non-leveled way, while also integrating response to some remarks I received.

IMAGO cinematographers are not only concerned about how their movies will be seen in the movie theaters but also care about how these same movies will subsequently render on televisions and home cinema systems.

IMAGO wants to thank and congratulate the DCI and the DC28 work groups on impressive and much appreciated work on color space, pixel geometry and security. This work has been followed by IMAGO members and is much appreciated. The concerns are frame rate issues.

The IMAGO frame rate proposals are about image quality, enhanced cinema experience for the customers, enhanced creative possibilities for filmmakers and better interoperability

One of the starting points is that we consider frame rate conversions to be very damaging to moving images, leaving artefacts, hurting movement quality, image quality and severely hurting 3D perception of stereoscopic moving imagery. For these reasons, frame rate conversion should not be considered as a solution for solving non corresponding frame rate issues.

1 - We would like all server/projector combinations and the DCDM and DCP to be capable of running 2k imagery at the frame rates of 8, 12, 16, 18, 20, 22, 24, 25, 30, 50 and 60 fps.

(8, 12, 20, 25 and 30 could eventually be left out because they can be obtained otherwise but I prefer to let them in, because file sizes will be smaller by leaving them in).

It would be acceptable that 4k systems could in the beginning be not capable of showing the higher frame rates at 4k, but then they should be able to show the higher rates at 2k.

8-22 are for legacy material, 25-30-50 for better video and mains interoperability, and 60 for better movement quality.

2 - It should also be possible to switch between those frame rates at any time during the show. The DCDM/DCP would then contain metadata telling the server/projector combination to run at the desired speed, there should be no need for user (projectionist) intervention. All would run automatically.

Reasons are: 1. The possibility of higher rates on action sequences, lower rates for other parts of the movie. 2 Run excerpts of legacy footage within a movie at their native speed.

3 - How stereoscopic imagery is represented in the DCDM and DCP should be standardized in order to avoid a multitude of proprietary systems and obtain interoperability among existing stereoscopic systems. (We know this is in the works)

4 - Stereoscopic projection would also be capable of running at all the specified frame rates, at least all the speeds up to 25 or 30. But preferably also up to 60 fps per eye. It would be acceptable that the higher stereoscopic speeds (those above 25 or above 30 per eye) would be implemented only later, but we think the standard should anticipate and provide an evolution path giving directions to the possibility of upgrade in the future. Stereoscopic projection would preferably also support the frame rate changes. (or define an evolution path to it)

Mandatory in a base installation:

2k system

monoscopic (2D) 8,12,16,18,20,22,24,25,30,50,60 with change

stereoscopic (3D) 8,12,16,18,20,22,24,25,30

4k system

monoscopic (2D) 8,12,16,18,20,22,24,25 (4k) 30 (2k or 4k) 50,60 (2k)
with change (2k)

stereoscopic (3D) 8,12,16,18,20,22,24,25,30

If many speeds raises a cost issue then we could consider that
8, 12, 20, 22 are rare and 8, 12, 20 can eventually be obtained by
duplicating frames.

Minimum would then be 16, 18, 24, 25, 30, 50 and 60

Need for 22 should be studied with archive specialists

Later evolution would allow 4k at all the speeds

Later evolution would allow stereoscopic 3D at all speeds

Even more evolution will eventually allow 3D @ 4k and high speeds

(Yes, 3D 4k @ 60 fps per eye, don't forget that film can do that today)

We would like to discourage the use of 48 fps in production. We would
not recommend the introduction of a new frame rate in the film making
industry. We advocate for less different frame rates in order to avoid
frame rate conversions. We have not found advantages in the 48 fps
speed for the movie production or exhibition industry. We fear that
movies shot @ 48 fps will not transfer well to video, neither 50 Hz or 60
Hz video. (No problem with 24 fps stereoscopic 3D: We do not consider
24 fps stereoscopic 3D as 48 fps, but as 24 fps stereo. Even if the
server is running @ 48 fps, the picture is actually seen @ 24 fps)

About the interface (The dual HDSDI between the server and the
projector). We understand the problem. This will be a temporary
problem. More powerful interfaces will soon emerge. For now we will
probably need to find a temporary compromise like maybe 4:2:2
transmission in order to support the 60 fps using the actual interfaces.
Then, when movies can actually be shot @ 60 fps, they will be shown in
4:2:2 on the first generation systems (those build today) while new
interfaces will allow to show the same movies in 4:4:4 later on in
upgraded or second generation systems. Those upgrades could then
come along gradually. Frame rates slower than 60 fps would still use
4:4:4 on first generation systems. Actual 4k systems theoretically have
enough bandwidth to show 2k @ 60 fps in 4:4:4

Actually, when you think about it, 24 fps is not all that great. We have
been cherrying it mainly because those 140.000 installed projectors just
can't do anything else. And although far from ideal, it seems like a fair
compromise between film (print) costs and image (movement) quality.

Both reasons will gradually disappear with the progression of Digital Cinema. It will probably be more interesting to shoot movies at 25 (Europe), 30 or 60 fps. 25 already is more economical in production and used frequently in Europe. 30 fps will probably advantageous too. 60 fps has all assets.

24 fps cause movies to be seen at the wrong speed in Europe (24/25)
24 fps causes an important movement artefact on 60 Hz TV (2:3 pull down)

24 fps causes many sync problems on set during production

24 fps is cumbersome to deal with in off line editing systems etc etc.

I know of the tendency of some members that fear to use figures that are also used in television. But don't forget that our patrons (the movie goers) do not consider this. They want a good performance and do not care if the system uses a frame rate that is similar to that of his TV or not. He will buy more tickets and buy more DVD if the quality is at its best. We feel that our main objective should be maximum image quality in order to provide the best movie goer experience.

Recent Practical developments concerning this proposal:

- Not many European proposals made it into DC28 yet
- The European commission has been suggesting that Europe should build its own standards, however, this is not what we want at IMAGO or EDCF. We both strongly wish for a common standard.
- There is a need for European elements to be present in the standard draft to help get it accepted as world standard.
- We would like to be able to present the future draft as a "common effort". As such, integrating the IMAGO frame rate proposals would have an important additional benefit in contributing to building a single world standard for Digital Cinema.
- A common standard, better movement quality in both cinema and video releases of both European and American movies and production and post-production costs savings are all to the benefit of all and the IMAGO frame rate proposals are made to deliver these.

Thanks!,

Kommer Kleijn SBC

Please feel free to comment, enquire and discuss:

kommer@kommer.com www.imago.org