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HDTV Standards Conversion Which work best? Where should they be located?

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What you know already...

- Inter-regional **HDTV** standards conversion
- Some combination of **1080i/25, 30 and 720p/50,60**
- The conversion can be done with **fixed interpolation**
- Fixed interpolation works by storing four frames or fields of the input format and converting them to four fields or frames of the target format
- The conversion can be done with a combination of fixed interpolation and **motion compensation** - track the movement of a small picture and shift it to the right place in the target picture
- Motion compensation tracking can be done in two ways – **block matching or phase correlation.**
- Phase correlation takes more computational power.



Intuitive conclusions.....

- Motion compensated standards conversion should **outperform** fixed interpolation on critical content.
- Phase correlation should **outperform** block matching (well, it costs more doesn't it!)
- Conversion from **60/30 to 50/25** should produce better results than the other way round, because there is more spectral occupancy headroom
- Conversion from **progressive to interlace** should work better than the other way round, because there is more spectral occupancy headroom.
- Having the **standards converter at the source** will/may create artefacts which will add to the criticality of the scene, and thus make contribution compression more difficult.
- Having the **standards converter at the end** of the contribution network, after decompression should have a small advantage.

What do we need (ideally) to examine?

- What do the pictures look like after conversion and contribution network? (**basic quality**)
- How much post processing headroom is available for downstream production? (**post processing headroom**). This may include expansion/compression of image, editing video compression, copying, colour key, etc. P.S. EBU usually takes seven cascaded codecs as representative.
- **Effect of contribution codec and bit rate on results.**

What we have found so far.....

- (Tony's findings) **All Converters can lead to artefacts** in certain conditions dependent of content type. There is no completely transparent converter yet.
- (Tony's findings) **Motion compensated converters can be significantly better** than fixed interpolation converters for critical content with high motion (e.g. sports).
- (Tony's findings) **Phase correlation motion Compensated converters often out perform** block matching converters but not always. (E.g. some image rotation combined with motion confuses the phase correlation algorithm and creates artefacts)
- (Adi's findings) As far as '**basic quality**' is concerned the **position** of the standards converter is **not important**.

What we would still like to know/do...

- What happens to post-processing headroom with different converters?
- What happens to post processing headroom with different positions of the converter?
- Should we make an ITU-R Recommendation proposing that MC standards conversion should be used for premium content?
- **Do you have any suggestions?**

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THANK
You!

Thank you for listening

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