

## HDTV STANDARDS CONVERTERS STATUS

### 1. Part 1 Note from NABA

Following the assessment of the various HD Standards Converters worldwide a couple years ago, we concluded that the motion compensation algorithms of every standards converter reacts differently with the same content going through. Although some of them behave transparently others create motion artefacts.

Moreover, some HD Standards Converters manufacturers have corrected or improved its motion compensation algorithm following major events (e.g. FOR-A after the Germany World Cup 2006, Snell & Wilcox after the Beijing Olympics).

Perfect motion compensation algorithms are not developed yet. However, there seems to be a trend for manufacturers to improve their existing motion compensation algorithms. Interestingly, there are no new HD Standards Converters with MC in the market. On the contrary there are lesser than two years ago. For example, Pro-Bell is no longer in the market. Other manufacturers like Teranex, Harris don't have the intention to enhance their current products with motion compensation.

For the upcoming FIFA World Cup of South Africa of 2010, there would not be new HD Standards Converter with MC in the market, except for the usual suspects (e.g. FOR-A, Shibasoku and Snell & Wilcox). It appears that the market for HD Standards Converters is saturated already and there are no new drivers for developing converters for HD with better motion compensation.

I think that one of the reasons is that the recent world financial crisis of 2008 has put a halt for manufacturers investing in the development of new HD Standards Converters. In addition, the cost of this gear is quite expensive and the demand is limited to broadcasters exchanging content between countries with different frame rates.

### Conclusion

I think that broadcasters like NABA, EBU, ABU, OTI, and others should have a united front with HD Standards Converters manufacturers by putting some pressure on them to improve their motion compensation algorithms.

Since the MC is proprietary for each HD Standards Converter, perhaps the WBU-TC could discuss with the manufacturers to standardize their algorithms. The latter is no different than standardizing audio loudness algorithms of a few years ago (e.g. ITU-R BS.1770)

I think the WBU-TC could undertake this task for lobbying HD Standards Converter manufacturers to standardize their algorithms through the ITU-R SG 6C. Going further, the broadcast industry needs a **Recommendation ITU-R BT.XXXX** "Algorithms to compensate

motion for HD programme exchange between countries operating at different frame rates". Having an ITU-R recommendation on this subject will be important to reduce and/or equalize costs for HD Standards Converters.

## **Part 2. Note from EBU**

Our EBU conclusions on HDTV Field Rate Standards Conversion are as follows.

1. There is no one single HDTV field rate standards converter which is always better no matter what the content.
2. However, standards converters with 'motion compensation' do outperform those without it, though they are much more expensive. Expensive content such as sports events with worldwide interest deserves motion compensated converters, because the extra cost is small compared to the cost of the programme rights.
3. The major improvement with motion compensated standards converters is that you reduce the 'motion judder' which occurs largely with background objects when the camera pans.
4. Of the two commercially available motion compensated converters, each has different types of scenes where they work best.
5. We have assessed if the position of the standards converter in a contribution link, at the source or at the destination, influences the finally seen quality. In theory we might expect that standards conversion should always be left as late as possible in a contribution network so that the contribution network compression is not made more difficult by conversion artefacts. In practice, our tests show the difference is not significant, except possibly for ultra critical scenes, so the decision on where to put the standards converter can be taken on other grounds, such as staff or equipment availability.
6. Many of the EBU results were given in an IBC paper by Adi Kouadio, which can be made available.
7. Since many countries consult ITU documents for advice, it could be interesting as suggested by NABA to try to develop an ITU Recommendation or Report, however there may be patents which limit what can be said. It might be easier to develop a WBU Recommendation.
8. As explained by NABA, this is such a small market, that it may be difficult to encourage technical evolution in this area. In the past, this might have been done by the broadcasters' own research laboratories, but today there are few of them left in the world.