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CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11  
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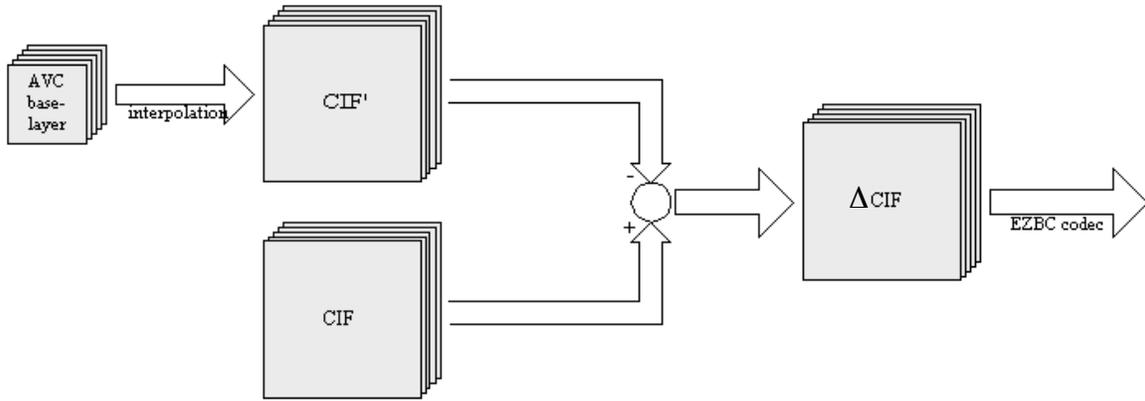
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**Sub group:** Video Group  
**Title:** Report of UNIBS SVC CE3 Inter-layer prediction: STool scheme on HHI software  
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## **1 Introduction**

This document describes the UNIBS-SCL work related to the MPEG21 SVC CE3 [2]. The proposal is based on “Scalable Video Model 3.0 of ISO/IEC 21000-13 Scalable Video Coding” (SVM) [1], modified by Samsung as described in [5]. This document provides some considerations about the implementation of STool scheme in SVM software.

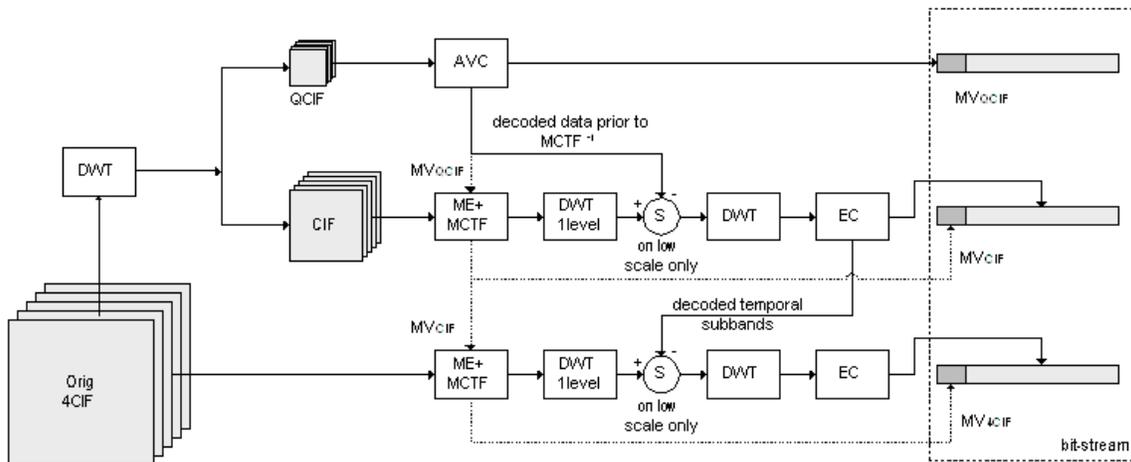
## **2 STool in HHI software: new inter-layer prediction**

The reference software implements an inter-layer residual prediction using lower layers for predicting the residual of the current layer. In particular, when the resolution of two layers is different, interpolation (upsampling) techniques are used and only the difference between residuals is encoded. Samsung extended this scheme utilizing both AVC and wavelet technologies. They implemented a hybrid framework using wavelet with an AVC base-layer [5]. Wavelets are used for coding residuals at the various resolution levels, while inter-(resolution) prediction is always based on data interpolation from the lower resolution (see fig. 1).



**Figure 1:** detail of Samsung codec scheme

Conversely in the proposed STool scheme, described in [3], interpolation is avoided and prediction takes place at homogeneous resolution levels. In fact, the lower resolution decoded data are used for predicting the low pass spatial wavelet subband of higher resolution data, after one level of transform. The general architecture of the STool scheme in the case of SVM 3.0 or AVC base-layer is shown in fig.2, while the detail of the prediction mechanism is illustrated in fig.3.



**Figure 2:** SToll coding scheme.

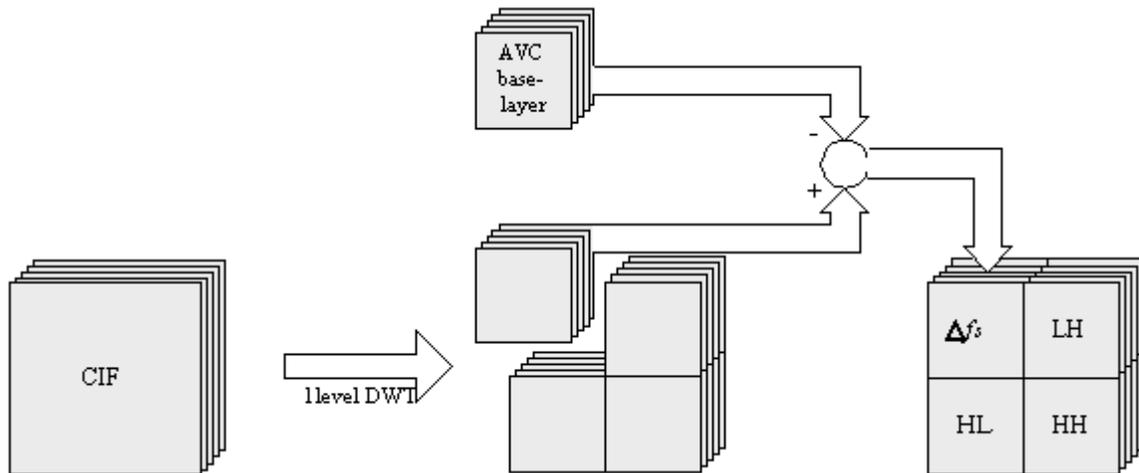


Figure 3: STool prediction (detail).

## 2.1 Status of STool implementation in SVC reference software

The STool inter-layer prediction scheme has been partially embedded in the codec presented by Samsung at Palma meeting as a primary verification of the expected coding gain. At this time prediction scheme has been tested on single frames, i.e. no bit stream has been generated and decoded. This preliminary results show no improvements in coding efficiency but more modification has to be applied, especially in the wavelet decomposition scheme, before to have the encoder/decoder working correctly.

## 2.2 Syntax and semantics modifications

Neither syntax nor semantics modification is required at the time.

## 3 Conclusions

Implementation of the STool architecture on the HHI-SVM software is not immediate. We spent much time in studying the software and the easiest way to implement our scheme on it. Moreover, we had little time to put STool scheme in the Samsung implementation. Due to the fact that the implementation is not completed it was not possible to obtain good decoded sequences and provide bit-streams as requested by the CE3. It is our intention to go on with this work and improve our implementation and results. Moreover, we'll substitute Samsung implementation of EZBC coding with the GOF-EMDC proposed in [4], in which context based arithmetic coding statistics evolves along the entire GOF. This should improve the coding performance with respect to a single frame approach and could require some syntax and semantics modifications.

## References

- [1] ISO/IEC JTC 1/SC 29/WG11, “Scalable Video Model 3.0 of ISO/IEC 21000-13 Scalable Video Coding,” N6716, Palma, Oct. 2004.
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- [3] N. Adami, M. Brescianini, R. Leonardi and A. Signoroni, “SVC CE1: STool - a native spatially scalable approach to SVC,” ISO/IEC JTC1/SC29/WG11, M11368, Palma, Oct. 2004.
- [4] N. Adami, M. Brescianini, R. Leonardi and A. Signoroni, “Fully embedded entropy coding with arbitrary multiple adaptation capabilities,” ISO/IEC JTC1/SC29/WG11, M11378, Palma, Oct. 2004.
- [5] Woo-Jin Han and Bae-Keun Lee, “SVC CE1 – Technical Description of Samsung Electronics Proposal for CE1,” M11277, Palma, Oct., 2004.