# Encoder description of Weighted Prediction

### Estimation of the Weighted Prediction (WP) parameters

In the HM encoder, if the configuration parameter *estimate\_wp\_param* is set to 1, the following process is performed to determine the WP parameters:

1. Calculate AC and DC values for current original picture and store them in the local memory corresponding to POC number.
2. Compute the weighting factor w0 using the calculated AC value and the stored AC value corresponding to POC number.
3. Compute the offset factor o0 using the weighting factor w0, the calculated DC value and the stored DC value corresponding to POC number.
4. Compute SAD and SADw values between current picture and reference picture with and without WP parameters respectively.
5. Select whether WP is used or not based on SAD and SADw values.
6. Encode the current picture with or without WP method.

At first, AC and DC values of current picture are calculated in the following equations;

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where Y ( t ) is the original picture at time t and N means the number of samples in current picture. These values are calculated from the original picture only once for each picture and stored in local memory based on DPB. The weighting factor is calculated in the next equation using the AC value calculated in current picture and the stored AC value for target reference picture.



At next step, the offset factor is calculated in the next equation using DC value calculated in current picture and the stored DC value for target reference picture and the derived weighting factor.

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The SAD and SADw values between current picture and reference picture (which means to use default WP parameter) are calculated in the following equations.





where, shift means the luma\_log2\_weight\_denom or chroma\_log2\_weight\_denom of weighted prediction. This equation is calculated for both luminance and chrominance components. If SAD(t)<SADw(t) then no WP is applied on the reference pictures samples, else (SAD(t)>SADw(t)) the WP is applied on the reference picture samples.