

Items to be clarified in HEVC design

JCTVC-G096

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Motivations

- **Confirm or clarify the operating range of the following items**
 1. *Maximum and minimum LCU size (64x64/16x16)*
 2. *Minimum slice granularity (16x16)*
 3. *Maximum number of reference frames (16)*
 4. *4x4 inter-prediction (`inter_4x4_enabled_flag = 0`)*
 5. *Chroma deblocking block edge size (8x8)*
- **Clarification of those items would benefit HEVC architectural studies to better analyze and identify implementation issues such as corner case scenarios**



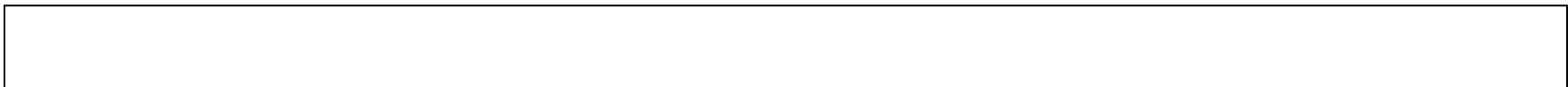
Maximum and minimum LCU size (64x64/16x16)

1. The maximum and minimum LCU sizes have a significant impact on HEVC codec data flow and architecture
2. A maximum LCU size of 64 x 64 is a good trade-off between coding efficiency and complexity
3. A minimum LCU size of 16 x 16 is a good trade-off between coding efficiency and latency
4. **Recommend that a maximum LCU size of 64 x 64 and a minimum LCU size of 16 x 16 be specified in the HEVC standard**



Minimum slice granularity

1. Slice granularity is designed for finer granularity, e.g. better MTU matching
2. It is quite challenging to support slice boundary breaking anywhere in a LCU
3. A minimum slice granularity of 16x16 appears to be a good trade-off between providing benefits and the required processing, and was agreed when the slice granularity was adopted
4. **Recommend that a minimum slice granularity of 16 x 16 be specified in the HEVC standard**



Maximum number of reference frames

1. In H.264/AVC, the maximum number of reference pictures is 16 and 32 for frame-picture and field-picture, respectively.
2. AVC has demonstrated that up to 16 reference frames are sufficient for a wide range of use cases.
3. Since HEVC supports progressive sequences only, it is logical to limit the maximum number of reference pictures to 16.
4. **Recommend that a maximum number of reference frames of 16 be specified in the HEVC standard**



4x4 inter-prediction

1. Additional coding efficiency benefit provided by 4x4 inter-prediction is fairly limited (0.1%)
2. Removing 4x4 inter-prediction would lower the worst case MC memory bandwidth by ~30%, and significantly reduce the implementation cost for supporting the merge/skip mode
3. **Recommend fixing `inter_4x4_enabled_flag` to 0 for all profiles in the HEVC standard**



Chroma deblocking block edge size

1. In HM4.0, the chroma de-blocking filter operates on 8x8 block boundaries
2. However, the WD text indicates that the chroma de-blocking filter is performed on 4x4 block boundaries
3. **WD text needs to be corrected to remove the discrepancy between the software and WD text**

