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| *Title:* | **Clipping for candidate index of single depth mode** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
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**Abstract**

The single depth mode is adopted for depth intra coding of 3D-HEVC in the last meeting. The method reconstructs the current coding unit as a single sample value without residual coding. The single sample value is selected between two candidate samples generated from five neighboring samples. This contribution proposes to add clipping operation on the candidate generation process for single depth mode. The experimental results are identical with HTM-12.0 under CTC configuration.

# Introduction

The single depth mode (SDM) is employed for depth intra coding [1] reconstructs the current coding unit (CU) as a single sample value without residual coding. To indicate the sample value, a sample candidate list is constructed by inserting the neighboring samples of the current CU in a predefined order If empty entry exists in the candidate list after the derivation of sample candidates from the spatial neighboring samples, offset candidates which are derived by adding offsets to first available sample of candidate list be used to fill in those empty entries. After the list is constructed, a candidate index is signaled to indicate which sample candidate is selected to fill the current CU.

# Proposal

For the single depth sample of SDM sample candidates are generated from neighboring samples and pruning is performed on the sample candidates. If entry of the candidates remain as empty state after the pruning, offset candidates will be added on the list. In the specification of the process is as follows:

The list sampleCandList is derived as specified in the following:

numCand = 0  
 for( i = 0; i < 5; i++ )  
 if ( availableFlag[ i ] && numCand < 2 )   
 sampleCandList[ numCand++ ] = predSample[ i ]  
 if( numCand = = 0 )  
 sampleCandList[ numCand++ ] = ( 1  <<  ( BitDepthY − 1 ) )  
 if( numCand = = 1 )  
 sampleCandList[ numCand++ ] = sampleCandList[ 0 ] + 1

The values of the prediction samples predSamples[ x ][ y ], with x, y = 0..nTbS − 1 are derived as follows:

predSamples[ x ][ y ] = sampleCandList[ single\_sample\_idx ] (I‑60)

However, the filling process for candidate list with one element (highlighted with yellow) can lead to potential bugs. Therefore, it is proposed to modify the specification of 3D-HEVC as follows:

The list sampleCandList is derived as specified in the following:

numCand = 0  
 for( i = 0; i < 5; i++ )  
 if ( availableFlag[ i ] && numCand < 2 )   
 sampleCandList[ numCand++ ] = predSample[ i ]  
 if( numCand = = 0 )  
 sampleCandList[ numCand++ ] = ( 1  <<  ( BitDepthY − 1 ) )  
 if( numCand = = 1 )  
 sampleCandList[ numCand++ ] = Clip3( 0, ( 1  <<  bitDepth ) − 1, sampleCandList[ 0 ] + 1)

The values of the prediction samples predSamples[ x ][ y ], with x, y = 0..nTbS − 1 are derived as follows:

* 1. predSamples[ x ][ y ] = sampleCandList[ single\_sample\_idx ] (I‑60)

# Experimental result

The experimental results are identical with the current 3D-HEVC.

# Conclusion

In this contribution, it is proposed to add clipping operation on filling process of sample candidates for single depth mode. The operation makes to avoid unintended bugs in the filling process. The coding results of the proposal are the same as results of HTM-12.0 under CTC configuration.

# References

1. Y. Chen, J. Lin,Y. Huang, S. Lei “3D-CE2: Single depth intra mode for 3D-HEVC,” Joint Collaborative Team on 3D Video Coding Extension Development of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11, Sapporo, JP, July 2014.

# Patent rights declaration(s)

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