JCT3V-G0024: CE4 summary report

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Proposal List

| Category	Proposal	Crosscheck report
CE proposal	JCT3V-G0158	JCT3V-G0223
	JCT3V-G0064	JCT3V-G0167 JCT3V-G0222
	JCT3V-G0121	JCT3V-G0226 JCT3V-F0247 JCT3V-G0220
	JCT3V-G0072	JCT3V-G0075
CE related proposal	JCT3V-G0033	JCT3V-G0041
	JCT3V-G0095	JCT3V-G0187
	JCT3V-G0076	JCT3V-G0154

REDEFINING MOBILITY

Proposed methods

- Topics in CE 4
    - Subset A: complexity reduction
    - Subset B: coding performance
    - Subset C: Interaction with other tools

- CE-related topics
    - Subset A: complexity reduction
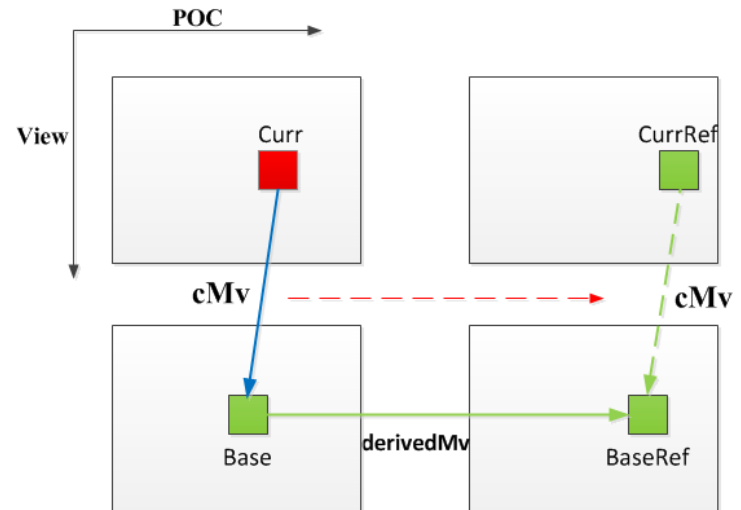   - Subset B: coding performance

Introduction

- Advanced residual prediction (ARP) in 3D-HEVC

  - Residual: same as conventional inter mode

  - Residual predictor generation

    - The difference between two reference blocks other than the reference block used in the conventional inter-mode

    - For temporal ARP: (Base – BaseRef); For inter-view ARP: (CurrRef – BaseRef)
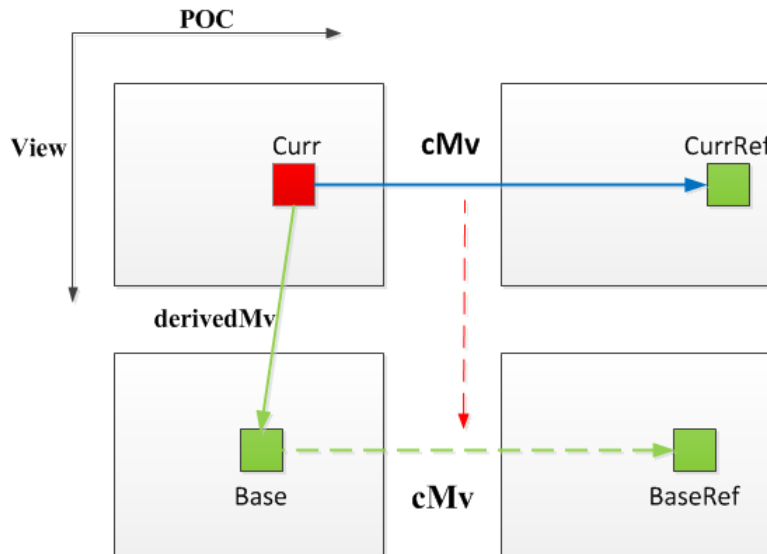
(a) Temporal ARP   (b) Inter-view ARP

Fig. 1 Prediction structure

  - A weighting factor index is signaled in CU-level

Proposed methods

- Topics in CE 4
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    - Subset C: Interaction with other tools

- CE-related topics
    - Subset A: complexity reduction
    - Subset B: coding performance

Subset A. Complexity reduction

- Simplification of inter-view ARP in JCT3V-G0158 (#1)
  - The temporal motion information used in inter-view ARP is derived using the same way as shifted temporal inter-view merging candidate derivation process.
  - The disparity vector from DoNBDV process is updated to the coded disparity motion vector associated with current block.
  - Residual: Curr - CurrRef
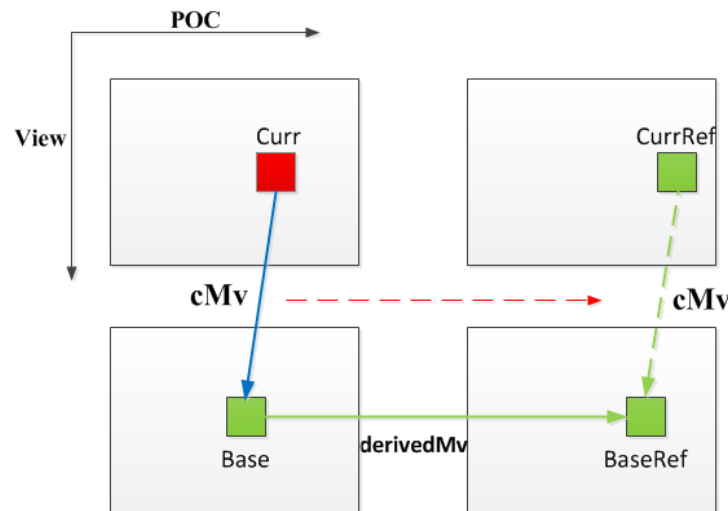 - Residual predictor: Base – BaseRef

Fig 2. Inter-view ARP

Subset B. Coding efficiency

- **Motion vector candidate lists for ARP (**MV-Cand ARP) in JCT3V-G0064 (#1)
  - Main concept: multiple choices of derivdMv
    - A disparity/tempora MV candidate list is derived for temporal/inter-view ARP.
    - The best candidate index is selected according to RDO criterion and signaled in the bitstream.

  - MV candidate list construction
    - Spatial neighbouring blocks are the top and left blocks of current block while temporal neighbouring blocks are those used in NBDV or the TMVP process.
    - For temporal ARP, the DoNBDV results of current block and spatial neighbouring blocks may be included.
    - A new MV candidate is appended into the list only if it is not equal to first candidate already in the list.

Subset B. Coding efficiency

- Block-level advanced residual prediction in JCT3V-G0121 (#1)

  - For temporal ARP, the default derivedMv may be updated to the disparity MV from corresponding 8x8 block within *CurrRef*.

  - For inter-view ARP, the default derivedMv may be updated to the temporal MV from corresponding 8x8 block within *Base*.
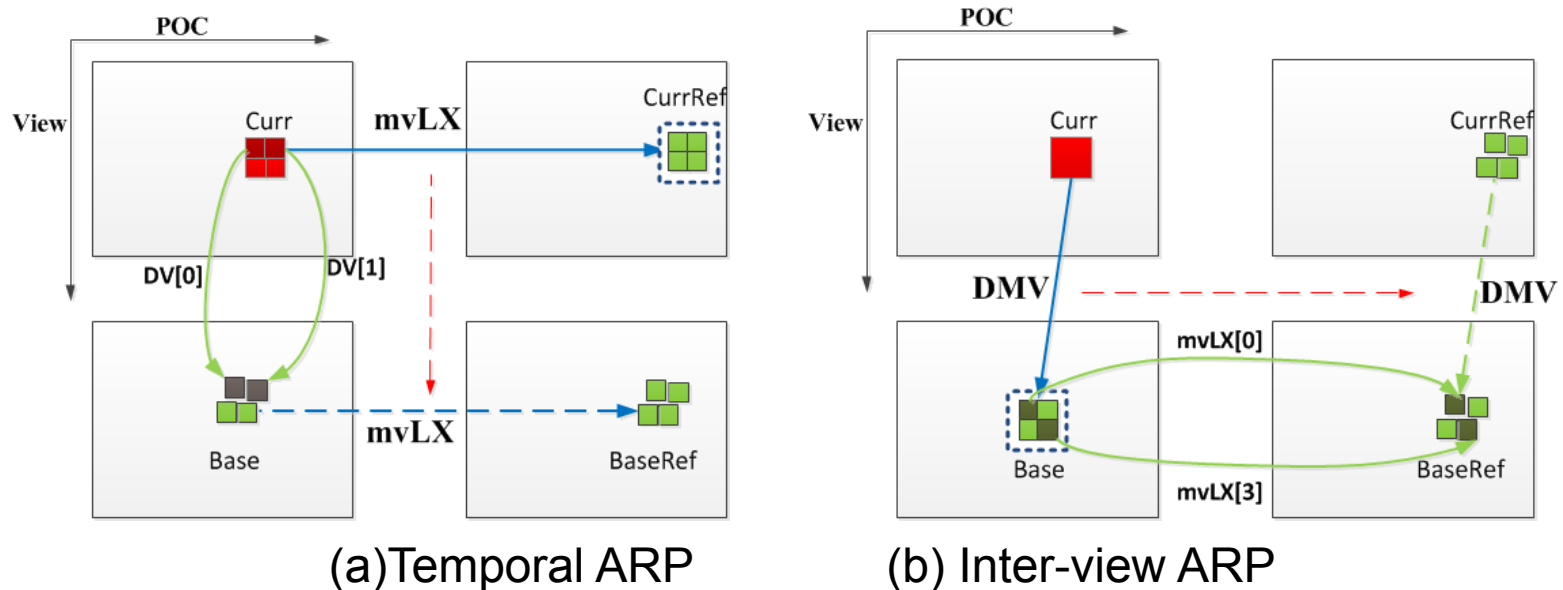

(a) Temporal ARP   (b) Inter-view ARP
Figure 2. Prediction structure of block-level ARP.

  - The residual of chroma components is not coded if the current PU is coded with ARP;

Subset C. Interaction with other coding tools

- Disable IC when APR is applied: JCT3V-G0121(#2) and JCT3V-G0072(#1)

- Disable ARP when IC is applied: JCT3V-G0072(#2)

Simulation results

- Simulation results reported in CE proposals
  - * using a different platform
  - ** coding results of BVSP off case missing

Table 1: Summary of CE results compared to 3D-HTM

Topics	Proposals	Simulation Results						
		Video 1	Video 2	Video PSNR / Video bitrate	Video PSNR / total bitrate	Synth PSNR / total bitrate	Enc. time	Dec. time
Simplified Inter-view ARP *	JCT3V-G0158	0.3%	0.3%	0.1%	0.1%	0.1%	101%	102%
MV-Cand ARP with 3 weighting factors**	JCT3V-G0064	-0.4%	-0.4%	-0.2%	-0.2%	-0.1%	110%	99%
MV-Cand ARP with 2 weighting factors**	JCT3V-G0064	-0.5%	-0.5%	-0.2%	-0.2%	-0.1%	103%	100%
Block-level ARP	JCT3V-G0121	-0.5%	-0.7%	-0.2%	-0.2%	-0.2%	104%	102%
disable IC when ARP is enabled	JCT3V-G0072	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	98%	99%
	JCT3V-G0121	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	98%	100%
disable ARP when IC is enabled	JCT3V-G0072	-0.1%	-0.1%	0.0%	0.0%	0.0%	98%	99%

Proposed methods

- Topics in CE 4
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- CE-related topics
  - Subset A: complexity reduction
  - Subset B: coding performance

Subset A. Complexity reduction

- Simplification of inter-view ARP in JCT3V-G0158

  - Removal of the constraint of DV-MCP: in NBDV derivation process, the DV-MCP information of spatial neighbouring blocks are always checked even they are not coded as skip mode.

  - Combination of inter-view and temporal ARP: The DVs from NBDV and DoNBDV processes are both updated to the disparity motion vector associated with current block, if available. The updated disparity vectors are used in ARP process.

Subset B. Coding efficiency

- Aligned Temporal DV (ATDV) in JCT3V-G0064 (#2)

  - On top of ADVD, a new DV candidate, i.e., ATDV, is obtained from the aligned block, which is located by a scaled MV to the collocated picture.

  - Two collocated pictures are utilized, which are also used in the NBDV derivation.

  - ATDV is checked before DV candidates from neighbouring blocks when it is used.

Subset B. Coding efficiency

- An alternative disparity vector derivation method for ARP in JCT3V-G0095

  - Two candidates, including both disparity vectors from NBDV process and the from DoNBDV process may be utilized by ARP.

  - The best candidate is signalled in the bitstream.

- Residual Prediction for View Synthesis Prediction in JCT3V-G0076

  - ARP is applied to BVSP coded blocks

Simulation results

- Coding performance of CE related techniques

Table 2: Summary of CE related results compared to 3D-HTM

Topics	Proposals	Simulation Results						
		Video 1	Video 2	Video PSNR / Video bitrate	Video PSNR / total bitrate	Synth PSNR / total bitrate	Enc. time	Dec. time
Simplified Inter-view ARP + DV-MCP	JCT3V-G0158*	0.3%	0.2%	0.1%	0.1%	0.1%	101%	101%
Simplified Inter-view and temporal ARP + DV-MCP	JCT3V-G0158**	0.3%	0.2%	0.1%	0.1%	0.1%	101%	102%
ARP Removal for 4x4 chroma blocks	JCT3V-G0033	0.1%	0.1%	0.0%	0.0%	0.0%	100%	100%
MV-Cand ARP + ATDV with 2 weighting factors	JCT3V-G0064	-0.7%	-0.7%	-0.2%	-0.2%	-0.2%	103%	98%
NBDV and DoNBDV adaptation	JCT3V-G0095**	-0.3%	-0.3%	-0.1%	-0.1%	-0.1%	100%	100%
Extension of ARP to BVSP	JCT3V-G0076	-0.3%	-0.2%	-0.1%	-0.1%	-0.1%	100%	99%

Thank you!