CE11: Summary report on coefficient scanning and coding
(JCTVC-F031)

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TEXAS INSTRUMENTS

Sub Experiments in CE11

- **CE.A: Context Modeling/Selection and Binarization for Transform Coefficient related syntax elements**
    - **F128: "Reduced neighboring dependency in context selection of significant_coeff_flag for parallel processing" (TI)**
    - **F129: "Parallelization of HHI_TRANSFORM_CODING (Fixed Diagonal Scan)" (TI)**

- **CE.B: Coefficient Scanning Methods**
    - **F288: "Unified scans for the significance map and coefficient level coding in high coding efficiency " (Qualcomm)**

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Summary of Modifications in CE11 Proposals

- **F128 (HE)**

  – Change context used for significant_coeff_flag at edge of transform

- **F129 (HE)**

  – Use fixed diagonal scan rather than zig-zag scan for significant_coeff_flag

- **F288 (HE) [Part 1]**

  – Change scanning of coefficient levels

  – Change context selection of coefficient level

- **F288 (HE) [Part 2]**

  – Reverse scan direction of significant_coeff_flag

  – Change context selection of significant_coeff_flag

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Cross-Verification Documents

Proponent	Document	Tool description	Cross-checker
TI	F128/E330	Reduced neighboring dependency in context selection of significant_coeff_flag for parallel processing	HHI(F451), Sony(F311), Canon(F185)
TI	F129/C227	Parallelization of HHI_TRANSFORM_CODING (Fixed Diagonal Scan)	Qualcomm (F293), I2R (F149)
Qualcomm	F288/E335	Unified scans for the significance map and coefficient level coding in high coding efficiency **(Part 1)**	Samsung(F607)
Qualcomm	F288/E335	Unified scans for the significance map and coefficient level coding in high coding efficiency **(Part 2)**	Panasonic(F369), TI(F136)

- Additional documents (?) F597, F134

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Reported Results (Coding Efficiency)

Proposal Document #	Configuration	Intra	Random Access	Low Delay
F128	HE	0.1	0.1	0.0
F129	HE	-0.1	-0.1	0.0
F288 (part 1)	HE	-0.05	0.07	-0.01
F288 (part 2)	HE	-0.25	-0.19	-0.07

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Summary of Progress and Adoption in CE11

- Since CE11 began at the 3rd meeting, there have been several adoptions to simplify CABAC.
  - E253: reduce number of context coded bins in coefficient level (from 14 to 2)
  - E227/ D260: reduce number of contexts in significant_coeff_flag and the complexity in selecting the contexts
  - E338: separate last significant coefficient position from significant_coeff_flag to enable easier parallel processing of contexts.
  - D239: remove adaptive scan

- All these adoptions enable CABAC in HEVC to potentially achieve higher throughput than in AVC.

- CE11 has also made progress in improving coding efficiency via adoption of D393, mode dependent coefficient scanning for intra predicted TU.

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