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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  10th Meeting: Stockholm, SE, 11-20 July 2012 | Document: JCTVC-J0021 |

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| *Title:* | **CE1: Summary report of Core Experiment on intra transform mode dependency simplifications** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Report | | |
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| *Source:* | CE1 coordinators | | |

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# Introduction

A summary of Core Experiment 1 (CE1) on intra transform mode dependency simplifications is reported. Two variants are evaluated based on the common test conditions and two additional conditions according to the CE1 description in JCTVC-I1101.

# Document list

**JCTVC-J0035:** CE1: Nokia’s results on intra transform mode dependency simplifications

**JCTVC-J0034:** CE1: Cross-check of of Intra transform mode dependency simplifications

**JCTVC-J0030:** CE1: Cross-verification of Intra transform mode dependency simplifications (JCTVC-J0021)

**JCTVC-J0243:** CE1: Cross-check of intra transform mode dependency simplifications

**JCTVC-J0276:** CE1: Crosscheck of Nokia’s results on intra transform mode dependency simplifications (JCTVC-J0035) for low QPs

**Related documents:**

**JCTVC-J0129:** CE1: Cross-check of mode-dependent transform simplifications

Additional variant is tested where DST is used for all 4x4 TUs for both luma and chroma and for both inter and intra.

**JCTVC-J0267:** Non-CE1: DCT/DST adaptation for Chroma of 4x4 TU

Extends the DCT/DST selection to chroma

**JCTVC-J0275:** Non-CE1: DST quantization matrix syntax for CE1 Simplification 2

Proposes the syntax in JCTVC I0419, which supports an additional scaling list for 4x4 luma Intra transform blocks for Simplification-2.

**JCTVC-J0369:** Non-CE 1:Cross-Check of JCTVC-J0267 on DCT/DST adaptation for Chroma of 4x4 TU**JCTVC-J0388:** Cross-check of simplification 3 of JCTVC-J0129

# Summary of results

JCTVC-I0582 proposed two simplifications for the mode-mapping for using DCT or DST as the transform for 4x4 Intra Luma TU’s, which were tested in CE1:

**Simplification 1:** DST is used for both horizontal and vertical directions for all intra prediction modes of luma intra 4x4 TUs.

**Simplification 2:** For Intra\_DC mode of luma intra 4x4 TUs, DCT is used for both horizontal and vertical directions. For all other prediction modes of luma intra 4x4 TUs, DST is used for both horizontal and vertical directions. These two simplifications were tested with three different test conditions:

**Test 1 Configuration:**

* **Main, All-Intra, Common Conditions QP Range:**

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| **Simplification 1** | **Simplification 2** |
| |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | -0.1% | -0.1% | -0.2% | | Class B | 0.0% | -0.2% | -0.2% | | Class C | 0.2% | -0.2% | -0.2% | | Class D | 0.2% | -0.1% | -0.2% | | Class E | 0.0% | -0.2% | -0.2% | | **Overall** | 0.1% | -0.2% | -0.2% | |  | 0.1% | -0.2% | -0.2% | | Class F | 0.5% | 0.1% | 0.1% | | Enc Time[%] | 99% | | | | Dec Time[%] | 100% | | | | |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | -0.1% | -0.1% | -0.1% | | Class B | 0.0% | -0.1% | -0.1% | | Class C | 0.1% | -0.1% | -0.1% | | Class D | 0.1% | 0.0% | -0.1% | | Class E | 0.0% | -0.1% | -0.2% | | **Overall** | 0.0% | -0.1% | -0.1% | |  | 0.0% | -0.1% | -0.1% | | Class F | 0.3% | 0.1% | 0.1% | | Enc Time[%] | 101% | | | | Dec Time[%] | 99% | | | |

**Test 2 Configuration:**

* **Main, All Intra, Low QP Range: 2, 7, 12, 17:**

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| **Simplification 1** | **Simplification 2** |
| |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | 0.1% | -0.1% | -0.1% | | Class B | 0.1% | 0.0% | 0.0% | | Class C | 0.1% | 0.0% | 0.0% | | Class D | 0.2% | 0.0% | 0.0% | | Class E | 0.1% | -0.1% | -0.1% | | **Overall** | 0.1% | 0.0% | 0.0% | |  | 0.1% | 0.0% | 0.0% | | Class F | 0.8% | 0.1% | 0.1% | | Enc Time[%] | 99% | | | | Dec Time[%] | 100% | | | | |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | 0.1% | 0.0% | 0.0% | | Class B | 0.0% | 0.0% | 0.0% | | Class C | 0.1% | 0.0% | 0.0% | | Class D | 0.2% | 0.0% | 0.0% | | Class E | 0.1% | -0.1% | -0.1% | | **Overall** | 0.1% | 0.0% | 0.0% | |  | 0.1% | 0.0% | 0.0% | | Class F | 0.5% | 0.1% | 0.1% | | Enc Time[%] | 99% | | | | Dec Time[%] | 100% | | | |

**Test 3 Configuration :**

* **Main, All Intra, Common Conditions QP Range, Transform Skipping ON: The anchor for these tests was HM7.0 + Transform Skipping.**

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| **Simplification 1** | **Simplification 2** |
| |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | -0.1% | -0.2% | -0.1% | | Class B | 0.0% | -0.2% | -0.2% | | Class C | 0.1% | -0.2% | -0.2% | | Class D | 0.2% | -0.1% | -0.1% | | Class E | 0.0% | -0.1% | -0.2% | | **Overall** | 0.0% | -0.2% | -0.2% | |  | 0.0% | -0.2% | -0.2% | | Class F | 0.5% | 0.2% | 0.2% | | Enc Time[%] | 99% | | | | Dec Time[%] | 101% | | | | |  |  |  |  | | --- | --- | --- | --- | |  | **All Intra Main** | | | |  | Y | U | V | | Class A | -0.1% | -0.1% | -0.1% | | Class B | 0.0% | -0.1% | -0.1% | | Class C | 0.0% | -0.1% | -0.1% | | Class D | 0.1% | -0.1% | -0.1% | | Class E | -0.1% | -0.1% | -0.2% | | **Overall** | 0.0% | -0.1% | -0.1% | |  | 0.0% | -0.1% | -0.1% | | Class F | 0.2% | 0.0% | 0.0% | | Enc Time[%] | 99% | | | | Dec Time[%] | 101% | | | |

# Summary & Recommendations

It is recommended to conduct a visual test to evaluate the subjective impact of the simplifications.