

JCTVC-F446

Core transform design for HEVC

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Summary

- Adopted in HM3.0 software (JCVF-E243)
- BDR-gain over HM2.0 transforms verified in HM3.0
- Performance results of optimized implementations

Summary of properties

Feature	HM2.0	Proposed (HM3.0)
Unified design	No	Yes
Intermediate bit width	>20	16
Multiplier bit width (software)	32	16
Equal norm of basis vectors	No	Almost
(De)quantization matrices	Yes	No
Matrix multiplication possible	No	Yes
TPE/IBDI value in simulations	2	0
Unified quantization scheme	No	Yes
Butterfly	Full	Partial

Performance study on Intel Sandy Bridge

- Optimized implementation
- Combined with transform usage statistics from HM3.0
- Estimated CPU load from inverse transforms alone

Sequence	Bitrate (kbps)	CPU load	Bitrate (kbps)	CPU load
	QP=37		QP=22	
Kimono	560	0,6%	5325	2,5%
ParkScene	590	0,3%	8221	1,1%
Cactus	1308	0,8%	19693	3,9%
BasketballDrive	1572	1,2%	20049	5,6%
BQTerrace	799	0,4%	50211	4,6%

Conclusion

- Unified transform design for HEVC
- Several advantages for efficient implementation
- Small but consistent gains over HM2.0 transforms
- CPU load for 1080p decoding: 0.3% - 5,6%

- Proposal: To consider for adoption in WD