CE13: Summary report on intra smoothing

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CE13: Intra smoothing

- Participants

Company	P/C	Participants
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Samsung	C	Jianle Chen
Toshiba	C	Akiyuki Tanizawa
Sony	C	Kazushi Sato
NEC	C	Keiichi Chono,

- Proposals

Proponent	Document	Codebase	Tool description	Cross-checker
Qualcomm	JCTVC-C234	TMuC 0.9	Mode dependent intra smoothing Mode dependent hybrid intra smoothing	Fraunhofer HHI, Samsung, Toshiba
Fraunhofer HHI	JCTVC-C302	TMuC 0.9	LUT –based intra smoothing Fast Adaptive LUT-based intra smoothing	Qualcomm, Samsung, Sony, NEC

C234 Mode Dependent (Hybrid) Intra Smoothing

- JCTVC-D282
- Filtering decision is based on
  - prediction unit (PU) size
  - prediction direction
- Mode dependent intra smoothing
  - Use most probable filtering mode LUT$_{most\_probable\_filter}$
- Mode dependent hybrid intra smoothing
  - Second most probable filter → LUT$_{second\_most\_probable\_filter}$
  - PU size >= 16x16,   explicit signaling
- Results are cross-verified
  - JCTVC-D103: Toshiba
  - JCTVC-D176: Samsung
  - JCTVC-D313: HHI

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C302 (Fast Adaptive) LUT-based Intra Smoothing

- JCTVC-D313

- Filtering decision is based on
  - prediction unit (PU) size
  - prediction direction

- LUT-based intra smoothing
  - 2-pass filtering or not

- Fast adaptive LUT-based intra smoothing
  - Signaling of whether decision from LUT-based intra smoothing is used or inverted
  - No signaling for DC mode
  - Threshold based fast estimation

- Results are cross-verified
  - JCTVC-D208: NEC
  - JCTVC-D305:Sony
  - JCTVC-D363:Samsung
  - JCTVC-D402:Qualcomm

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Results:

Configuration	C-234 MDIS			C-234 MDHIS		
	Y	U	V	Y	U	V
HE Intra	-0.3	-0.3	-0.4	-0.5	-0.5	-0.6
LC Intra	-0.7	-0.3	-0.3	-0.9	-0.4	-0.4
HE Random Access	-0.1	-0.4	-0.2	-0.2	-0.4	-0.3
LC Random Access	-0.1	-0.3	-0.2	-0.1	-0.2	-0.3
HE Low Delay	0.0	-0.4	-0.2	0.0	-0.4	-0.3
LC Low Delay	0.1	0.0	0.0	0.0	0.1	-0.1

Configuration	C-302 LUT IS			C-302 Fast adaptive LUT IS		
	Y	U	V	Y	U	V
HE Intra	-0.1	-0.2	-0.2	-0.3	-0.2	-0.3
LC Intra	-0.5	0.1	0.0	-0.5	0.2	0.2
HE Random Access	-0.1	-0.5	-0.5	-0.1	-0.4	-0.4
LC Random Access	-0.0	-0.2	-0.2	0.1	0.0	-0.0
HE Low Delay	0.0	-0.2	-0.1	-0.0	-0.1	-0.2
LC Low Delay	0.1	0.1	0.0	0.2	0.0	-0.0

Average BD-rate savings compared to TMuC 0.9 [%]

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Simulations: Encoding/Decoding Time

Configuration	C-234 MDIS		C-234 MDHIS	
	Encoder	**Decoder**	**Encoder**	**Decoder**
HE Intra	101%	98%	101%	98%
LC Intra	98%	99%	99%	100%
HE Random Access	100%	100%	98%	100%
LC Random Access	99%	100%	98%	98%
HE Low Delay	98%	100%	96%	100%
LC Low Delay	100%	96%	100%	100%

Configuration	C-302 LUT IS		C-302 Fast adaptive LUT IS	
	Encoder	**Decoder**	**Encoder**	**Decoder**
HE Intra	98%	98%	109%	98%
LC Intra	99%	99%	114%	97%
HE Random Access	99%	99%	101%	103%
LC Random Access	98%	98%	100%	98%
HE Low Delay	100%	103%	101%	101%
LC Low Delay	99%	98%	99%	98%

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