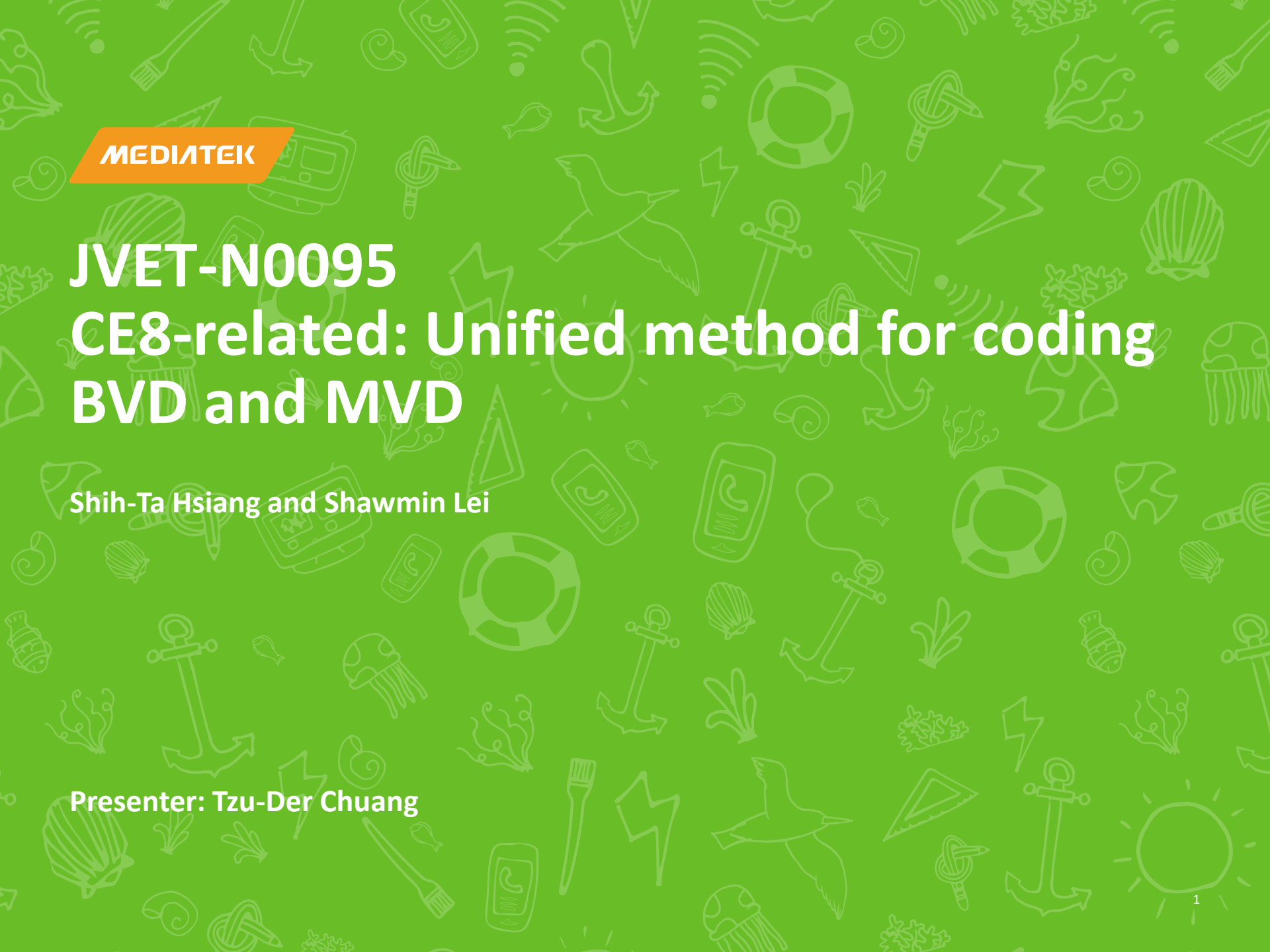


The background is a solid green color with a repeating pattern of white line-art icons. These icons include various nautical items like anchors, lifebuoys, seashells, and jellyfish, as well as technical symbols like Wi-Fi signals, lightning bolts, and geometric shapes.

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JVET-N0095

CE8-related: Unified method for coding BVD and MVD

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Overall Summary

- Screen content coding (SCC) tends to have higher magnitudes of motion vector differences (MVDs) and block vector differences (BVDs)
- Propose a unified method for entropy coding of MVDs and BVDs
 - Use the same binarization as that of VVC Draft 4 while increasing the number of context-coded bins for coding the prefix part

	AI	RA	LB
	Y	Y	Y
CTC	-0.02%	-0.04%	-0.05%
Class F	-0.47%	-0.41%	-0.43%
Class SCC	-1.41%	-1.20%	-0.99%

Introduction

- HEVC MVD coding method:
 - Binarization: Truncate Unary (TU) + Exp-Golomb (EG1)
 - Two fixed contexts for TU binIdx0 and binIdx1, shared between x/y components
 - Bypass coding for remaining EG1 bins & sign flags
- VVC Draft 4 reuses the HEVC MVD coding scheme for coding MVDs and BVDs

Proposed Method

- “d” is defined to be one component of the MVDs/BVDs

$|d| = \text{most significant bit (MSB) index} + \text{refinement bins}$

- Use unary code for MSB index
 - Code MSB index plus one (msb_plus_one)
- Use fixed-length binary code for refinement bins (refinement_bits)

If $\text{msb_plus_one} > 1$

$|d| = (1 \ll (\text{msb_plus_one} - 1)) + \text{refinement_bits},$

otherwise

$|d| = \text{msb_plus_one}$

Comparison of Binarization Schemes

- Lead to the same bin string as the VVC/HEVC binarization scheme

Proposed Method				VVC/HEVC mvd_coding()		
d	d in binary	msb_id_plus1	refinement bins	TU prefix	EG1 prefix	EG1 suffix
0	0	0	-	0	-	-
1	1	10	-	10	-	-
2	10	110	0	11	0	0
3	11	110	1	11	0	1
4	100	1110	00	11	10	00
5	101	1110	01	11	10	01
6	110	1110	10	11	10	10
7	111	1110	11	11	10	11
8 - 15	1000 - 1111	11110	000 - 111	11	110	000 - 111
16 - 31	10000 - 11111	111110	0000 - 1111	11	1110	0000 - 1111

Entropy Coding

- MVDs/BVDs = mvd_sign_flag + abs_mvd_msb_idx_p1+ abs_mvd_refinement_bits
- msb_plus_one is conditionally context coded
 - Context coded for the bin index ≤ 4
 - Context models are shared for coding MVDs and BVDs
 - At most 5 context variables for each MVD component are used
- mvd_sign_flag and refinement_bits are bypass coded
- Can support the HEVC MVD coding scheme for natural video contents by using context coded bins for bins with bin index ≤ 1

Table for deriving the context index variable ctxInc

bin index	0	1	2	3	4	> 4
Horizontal component	5	1	2	3	4	bypass
Vertical component	0	1	2	3	4	bypass

Results

- Anchor: VTM-4.0 under the CE8 SCC CTCs with IBC enabled
- Thank Alibaba for cross-checking

	All Intra Main10		
	Over VTM-4.0 (enable IBC)		
	Y	U	V
CTC	-0.02%	-0.03%	-0.05%
Class F	-0.47%	-0.51%	-0.60%
Class SCC	-1.41%	-1.48%	-1.48%
	Random Access Main 10		
	Over VTM-4.0 (enable IBC)		
	Y	U	V
CTC	-0.04%	-0.17%	-0.21%
Class F	-0.41%	-0.57%	-0.68%
Class SCC	-1.20%	-1.13%	-1.21%
	Low delay B Main10		
	Over VTM-4.0 (enable IBC)		
	Y	U	V
CTC	-0.05%	-0.39%	0.18%
Class F	-0.43%	-0.70%	-0.82%
Class SCC	-0.99%	-0.98%	-0.99%

Conclusions

- Propose a unified method for entropy coding MVDs and BVDs based on the same binarization scheme as HEVC
- Substantial BD bitrate savings are shown in Class F and Class SCC
- Minor BD bitrate savings are shown in natural videos from the JVET CTCs

The background is a solid blue color with a repeating pattern of white line-art icons. These icons include various nautical items like anchors, lifebuoys, and seashells, as well as outdoor and travel-related items like a compass, a map, a tent, and a bird in flight. There are also symbols for technology like a smartphone and a Wi-Fi signal.

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Thank you!