



# Syntax and Structure for Coding and Utilizing Partition Types

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# Outline

- Part 1: Syntax for coding Inter partition types
- Part 2: Hierarchical partition type structure
- Experimental results
- Conclusions

# Part 1: Partition Types for Inter Coding

## In HM2.0

Partition type	CU>SCU	CU==SCU
INTER 2N <sub>x</sub> 2N	1	1
INTER N <sub>x</sub> 2N	01	01
INTER 2N <sub>x</sub> N	001	001
INTER N <sub>x</sub> N		0001
INTRA 2N <sub>x</sub> 2N	000	00001
INTRA N <sub>x</sub> N		00000

## Proposed modification in SCU

Partition type	CU>SCU	CU==SCU
INTER 2N <sub>x</sub> 2N	1	1
INTER N <sub>x</sub> 2N	01	01
INTER 2N <sub>x</sub> N	001	001
INTRA 2N <sub>x</sub> 2N	000	000 1
INTRA N <sub>x</sub> N		000 01
INTER N <sub>x</sub> N		000 00

# Part 1: Partition Types for Inter Coding

- CU syntax

coding_unit( x0, y0, log2CUSize ) {	<b>Descriptor</b>
...	
if( slice_type != I )	
<b>inter_partitioning_idc</b>	ue(v)   ae(v)
...	
if( CU == SCU ) {	
<b>scu_split_flag</b>	ue(1)   ae(v)
if(scu_split_flag) {	
<b>scu_intra_inter_flag</b>	ue(1)   ae(v)
...	
}	
...	
}	

# Part 1: Result

	Random access			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.0	0.0	-0.1	-0.2	-0.1	-0.1
Class B	0.0	0.1	0.1	-0.1	-0.1	-0.1
Class C	0.0	0.0	0.1	-0.1	-0.2	-0.2
Class D	0.0	-0.1	0.0	-0.1	-0.2	0.0
Class E						
All	0.0	0.0	0.0	-0.1	-0.1	-0.1
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

	Low delay			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	0.0	0.1	0.0	-0.1	-0.2	-0.1
Class C	0.0	0.3	0.1	-0.1	-0.2	-0.2
Class D	-0.1	0.0	0.0	0.0	-0.2	0.0
Class E	0.0	-0.4	0.0	-0.1	-0.2	-0.1
All	0.0	0.0	0.0	-0.1	-0.2	-0.1
Enc Time[%]	101%			101%		
Dec Time[%]	100%			100%		

## Part 2: Hierarchical Partition Type Structure

- Partition types linked to CU depth

Partition type	Depth = 0	Depth = 1	Depth = 2	Depth = 3
INTER 2Nx2N	infer	1	1	1
INTRA 2Nx2N	n/a	0	000	000
INTER 2NxN	n/a	n/a	001	001
INTER Nx2N	n/a	n/a	00	00
INTRA NxN	n/a	n/a	n/a	00001
INTER NxN	n/a	n/a	n/a	00000

## Part 2: Result

	Random access			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	0.6	1.3	0.8	0.7	1.0	0.8
Class B	0.5	0.6	0.6	0.7	0.5	0.6
Class C	0.3	0.4	0.4	0.2	0.3	0.3
Class D	0.3	0.2	0.3	0.0	0.1	0.3
Class E						
All	0.4	0.6	0.5	0.4	0.5	0.5
Enc Time[%]	88%			88%		
Dec Time[%]	101%			100%		

	Low delay			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	0.7	1.0	0.9	0.4	0.5	0.9
Class C	0.4	0.8	0.7	-0.1	0.0	-0.1
Class D	0.2	0.5	0.3	-0.1	-0.1	0.1
Class E	0.9	1.6	2.8	1.1	2.1	2.0
All	0.5	0.9	1.1	0.3	0.5	0.6
Enc Time[%]	88%			87%		
Dec Time[%]	100%			100%		

# Conclusion

- Proposed a syntax modification for coding Inter partition types
  - Align SCU partition type syntax and coding flow with CU in other depths;
  - 0.1-0.2% BD-rate reduction in Low Complexity configuration;
  - Negligible BD-rate change in High Efficiency configuration;
  - No encoding or decoding time increase;
  - Recommend to be included in HM.
- Investigated a pyramid like hierarchical partition type structure
  - Associate partition types with CU depth;
  - Encoding time reduction 12%, BD-rate increase ~0.4%;
  - No decoding time increase;
  - Recommend for further study.