

JVET-P0363

AHG17: On NAL unit type table



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NAL unit type table in VVC

— The following issues have been identified with the NUT table in VVC:

1. RADL and RASL are in a different order compared to HEVC
2. VPS_NUT is missing
3. FD_NUT, which was adopted at the 14-th JVET meeting in Geneva, is missing
4. The parameter set NUTs are not in hierarchical order, which they are in HEVC
5. There are two ranges of reserved non-IRAP VCL NUTs. This seems to be a remnant from previous versions of the NUT table in VVC
6. There are 6 codes for reserved non-IRAP VCL NUTs and 2 codes for reserved IRAP VCL NUTs. This seems unbalanced

NAL unit type table in VVC (JVET-O2001-vE)

nal_unit_type	Name of nal_unit_type	Content of NAL unit and RBSP syntax structure	NAL unit type class
0	TRAIL_NUT	Coded slice of a trailing picture slice_layer_rbsp()	VCL
1	STSA_NUT	Coded slice of an STSA picture slice_layer_rbsp()	VCL
2	RASL_NUT	Coded slice of a RASL picture slice_layer_rbsp()	VCL
3	RADL_NUT	Coded slice of a RADL picture slice_layer_rbsp()	VCL
4..7	RSV_VCL_4.. RSV_VCL_7	Reserved non-IRAP VCL NAL unit types	VCL
8	IDR_W_RADL	Coded slice of an IDR picture slice_layer_rbsp()	VCL
9	IDR_N_LP		
10	CRA_NUT	Coded slice of a CRA picture silce_layer_rbsp()	VCL
11	GDR_NUT	Coded slice of a GDR picture slice_layer_rbsp()	VCL
12	RSV_IRAP_VCL12	Reserved IRAP VCL NAL unit types	VCL
13	RSV_IRAP_VCL13		
14..15	RSV_VCL14.. RSV_VCL15	Reserved non-IRAP VCL NAL unit types	VCL
16	SPS_NUT	Sequence parameter set seq_parameter_set_rbsp()	non-VCL
17	PPS_NUT	Picture parameter set pic_parameter_set_rbsp()	non-VCL
18	APS_NUT	Adaptation parameter set adaptation_parameter_set_rbsp()	non-VCL
19	AUD_NUT	Access unit delimiter access_unit_delimiter_rbsp()	non-VCL
20	EOS_NUT	End of sequence end_of_seq_rbsp()	non-VCL
21	EOB_NUT	End of bitstream end_of_bitstream_rbsp()	non-VCL
22, 23	PREFIX_SEI_NUT SUFFIX_SEI_NUT	Supplemental enhancement information sei_rbsp()	non-VCL
24	DPS_NUT	Decoding parameter set decoding_parameter_set_rbsp()	non-VCL
25..27	RSV_NVCL25.. RSV_NVCL27	Reserved non-VCL NAL unit types	non-VCL
28..31	UNSPEC28.. UNSPEC31	Unspecified non-VCL NAL unit types	non-VCL

Proposal

- Proposed changes to the NAL unit type table in the VVC specification:
 - Switch position of RADL and RASL in the table to align with the order in HEVC.
 - Add VPS_NUT, which is missing, and order the parameter set NUTs in hierarchical order as in HEVC, in the order of DPS_NUT, VPS_NUT, SPS_NUT, PPS_NUT, APS_NUT.
 - Add FD_NUT, which is missing, between EOB_NUT and PREFIX_SEI_NUT as in HEVC.
 - Group reserved non-IRAP VCL NUTs within one code range instead of two
 - Allocate 5 codes instead of 6 for reserved non-IRAP VCL NUTs and 3 codes instead of 2 for reserved IRAP VCL NUTs.

nal_unit_type	Name of nal_unit_type	Content of NAL unit and RBSP syntax structure	NAL unit type class
0	TRAIL_NUT	Coded slice of a trailing picture slice_layer_rbsp()	VCL
1	STSA_NUT	Coded slice of an STSA picture slice_layer_rbsp()	VCL
2	RA SL DL _NUT	Coded slice of a RA SL DL picture slice_layer_rbsp()	VCL
3	RA DL SL _NUT	Coded slice of a RA DL SL picture slice_layer_rbsp()	VCL
4.. 7 8	RSV_VCL_4.. RSV_VCL_ 7 8	Reserved non-IRAP VCL NAL unit types	VCL
8 9 9 10	IDR_W_RADL IDR_N_LP	Coded slice of an IDR picture slice_layer_rbsp()	VCL
10 11	CRA_NUT	Coded slice of a CRA picture silce_layer_rbsp()	VCL
11 12	GDR_NUT	Coded slice of a GDR picture slice_layer_rbsp()	VCL
12 13 .. 13 15	RSV_IRAP_VCL1 23 .. RSV_IRAP_VCL1 35 35	Reserved IRAP VCL NAL unit types	VCL
14 .. 15	RSV_VCL14 .. RSV_VCL15	Reserved non-IRAP VCL NAL unit types	VCL
16	DPS_NUT	Decoding parameter set decoding_parameter_set_rbsp()	non-VCL
17	VPS_NUT	Sequence parameter set seq_parameter_set_rbsp()	non-VCL
18	SPS_NUT	Sequence parameter set seq_parameter_set_rbsp()	non-VCL
19	PPS_NUT	Picture parameter set pic_parameter_set_rbsp()	non-VCL
18 20	APS_NUT	Adaptation parameter set adaptation_parameter_set_rbsp()	non-VCL
19 21	AUD_NUT	Access unit delimiter access_unit_delimiter_rbsp()	non-VCL
20 22	EOS_NUT	End of sequence end_of_seq_rbsp()	non-VCL
21 23	EOB_NUT	End of bitstream end_of_bitstream_rbsp()	non-VCL
24	FD_NUT	Filler data filler_data_rbsp()	non-VCL
25 .. 26	PREFIX_SEI_NUT SUFFIX_SEI_NUT	Supplemental enhancement information sei_rbsp()	non-VCL
24	DPS_NUT	Decoding parameter set decoding_parameter_set_rbsp()	non-VCL
25 .. 27	RSV_NVCL25 .. RSV_NVCL27	Reserved non-VCL NAL unit types	non-VCL
28..31	UNSPEC28.. UNSPEC31	Unspecified non-VCL NAL unit types	non-VCL

Proposal

Semantics



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When `nal_unit_type` is in the range of `IDR_W_RADL` to `RSV_IRAP_VCL135`, inclusive, `TemporalId` shall be equal to 0.

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7.4.2.4 Order of NAL units and association to coded pictures, layer access units, access units, and coded video sequences

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The order of the coded pictures and non-VCL NAL units within a layer access unit or an access unit shall obey the following constraints:

- When any DPS NAL units, VPS NAL units, SPS NAL units, PPS NAL units, APS NAL units, prefix SEI NAL units, NAL units with `nal_unit_type` ~~in the range of `RSV_NVCL_25`..`RSV_NVCL_26`, or NAL units with `nal_unit_type`~~ in the range of `UNSPEC28`..`UNSPEC29` are present in a layer access unit, they shall not follow the last VCL NAL unit of the layer access unit.
- NAL units having `nal_unit_type` equal to `SUFFIX_SEI_NUT` or `RSV_NVCL_27`, or in the range of `UNSPEC30`..`UNSPEC31` in a layer access unit shall not precede the first VCL NAL unit of the layer access unit.

NAL unit type table in VVC (JVET-O2001-vE)

nal_unit_type	Name of nal_unit_type	Content of NAL unit and RBSP syntax structure	NAL unit type class
0	TRAIL_NUT	Coded slice of a trailing picture slice_layer_rbsp()	VCL
1	STSA_NUT	Coded slice of an STSA picture slice_layer_rbsp()	VCL
2	RASL_NUT	Coded slice of a RASL picture slice_layer_rbsp()	VCL
3	RADL_NUT	Coded slice of a RADL picture slice_layer_rbsp()	VCL
4..7	RSV_VCL_4.. RSV_VCL_7	Reserved non-IRAP VCL NAL unit types	VCL
8	IDR_W_RADL	Coded slice of an IDR picture slice_layer_rbsp()	VCL
9	IDR_N_LP		
10	CRA_NUT	Coded slice of a CRA picture silce_layer_rbsp()	VCL
11	GDR_NUT	Coded slice of a GDR picture slice_layer_rbsp()	VCL
12	RSV_IRAP_VCL12	Reserved IRAP VCL NAL unit types	VCL
13	RSV_IRAP_VCL13		
14..15	RSV_VCL14.. RSV_VCL15	Reserved non-IRAP VCL NAL unit types	VCL
16	SPS_NUT	Sequence parameter set seq_parameter_set_rbsp()	non-VCL
17	PPS_NUT	Picture parameter set pic_parameter_set_rbsp()	non-VCL
18	APS_NUT	Adaptation parameter set adaptation_parameter_set_rbsp()	non-VCL
19	AUD_NUT	Access unit delimiter access_unit_delimiter_rbsp()	non-VCL
20	EOS_NUT	End of sequence end_of_seq_rbsp()	non-VCL
21	EOB_NUT	End of bitstream end_of_bitstream_rbsp()	non-VCL
22, 23	PREFIX_SEI_NUT SUFFIX_SEI_NUT	Supplemental enhancement information sei_rbsp()	non-VCL
24	DPS_NUT	Decoding parameter set decoding_parameter_set_rbsp()	non-VCL
25..27	RSV_NVCL25.. RSV_NVCL27	Reserved non-VCL NAL unit types	non-VCL
28..31	UNSPEC28.. UNSPEC31	Unspecified non-VCL NAL unit types	non-VCL

NAL unit type table in HEVC (V6)

nal_unit_type	Name of nal_unit_type	Content of NAL unit and RBSP syntax structure	NAL unit type class
0	TRAIL_N	Coded slice segment of a non-TSA, non-STSA trailing picture	VCL
1	TRAIL_R	slice_segment_layer_rbsp()	
2	TSA_N	Coded slice segment of a TSA picture	VCL
3	TSA_R	slice_segment_layer_rbsp()	
4	STSA_N	Coded slice segment of an STSA picture	VCL
5	STSA_R	slice_segment_layer_rbsp()	
6	RADL_N	Coded slice segment of a RADL picture	VCL
7	RADL_R	slice_segment_layer_rbsp()	
8	RASL_N	Coded slice segment of a RASL picture	VCL
9	RASL_R	slice_segment_layer_rbsp()	
10	RSV_VCL_N10	Reserved non-IRAP SLNR VCL NAL unit types	VCL
12	RSV_VCL_N12		
14	RSV_VCL_N14		
11	RSV_VCL_R11	Reserved non-IRAP sub-layer reference VCL NAL unit types	VCL
13	RSV_VCL_R13		
15	RSV_VCL_R15		
16	BLA_W_LP	Coded slice segment of a BLA picture	VCL
17	BLA_W_RADL	slice_segment_layer_rbsp()	
18	BLA_N_LP		
19	IDR_W_RADL	Coded slice segment of an IDR picture	VCL
20	IDR_N_LP	slice_segment_layer_rbsp()	
21	CRA_NUT	Coded slice segment of a CRA picture	VCL
		slice_segment_layer_rbsp()	
22	RSV_IRAP_VCL22	Reserved IRAP VCL NAL unit types	VCL
23	RSV_IRAP_VCL23		
24..31	RSV_VCL24.. RSV_VCL31	Reserved non-IRAP VCL NAL unit types	VCL
32	VPS_NUT	Video parameter set video_parameter_set_rbsp()	non-VCL
33	SPS_NUT	Sequence parameter set seq_parameter_set_rbsp()	non-VCL
34	PPS_NUT	Picture parameter set pic_parameter_set_rbsp()	non-VCL
35	AUD_NUT	Access unit delimiter access_unit_delimiter_rbsp()	non-VCL
36	EOS_NUT	End of sequence end_of_seq_rbsp()	non-VCL
37	EOB_NUT	End of bitstream end_of_bitstream_rbsp()	non-VCL
38	FD_NUT	Filler data filler_data_rbsp()	non-VCL
39	PREFIX_SEI_NUT	Supplemental enhancement information	non-VCL
40	SUFFIX_SEI_NUT	sei_rbsp()	
41..47	RSV_NVCL41.. RSV_NVCL47	Reserved	non-VCL
48..63	UNSPEC48.. UNSPEC63	Unspecified	non-VCL

