



HIGH LEVEL SYNTAX FOR SCALABILITY SUPPORT IN HEVC

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THOMAS RUSERT, RICKARD SJÖBERG,
ZHUANGFEI WU, PER FRÖJDH
ERICSSON AB

MOTIVATION

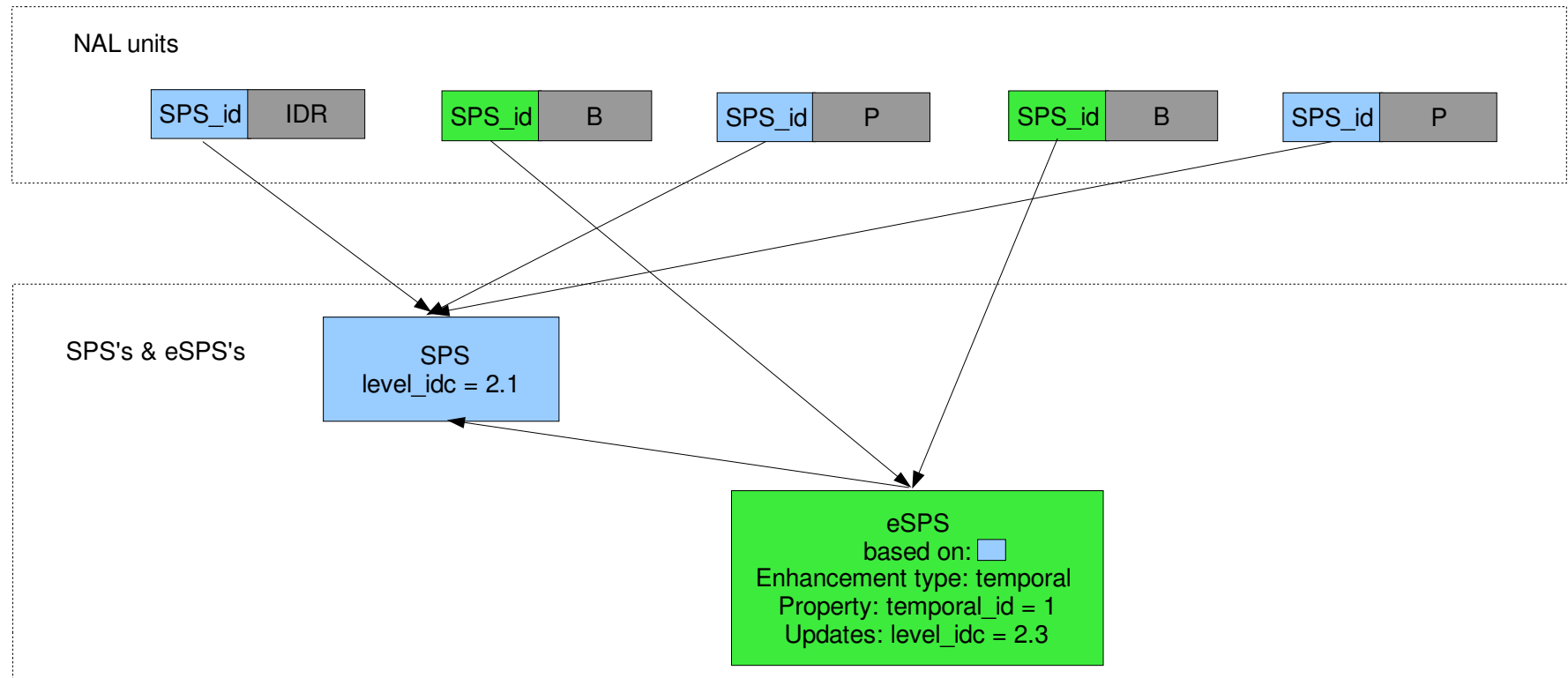
- › Bit stream scalability requires NAL units to convey information about the scalable layers they are associated with
- › SVC/MVC solution
 - Several different IDs carried in NAL unit headers (temporal_id, dependency_id, quality_id, priority_id, view_id)
 - Considering that several scalability extensions may be introduced in HEVC, this approach may lead to variable length and/or long NAL unit headers
- › This contribution
 - Alternative “scalability hook” solution that can extensibly applied for different types of scalability while having a fixed NAL unit header length

PROPOSED BASIC DESIGN

1. One SPS per scalability layer, conveying
 - › Layer identifiers (currently only temporal_id)
 - › Dependency information towards respective base layer (expressed by a link to a different SPS)

2. seq_parameter_set_id in every NAL unit header
 - › Associate both VCL and non-VCL NAL units with scalable layers
 - › Fixed-length NAL unit header

TWO TEMPORAL LAYER EXAMPLE



- › “eSPS” = SPS in enhancement layer mode
 - Describing layer-specific updates relative to referenced base SPS

WHY SEQ_PARAMETER_SET_ID IN EVERY NAL UNIT HEADER?



1. Tie all NAL units (including SEI and parameter sets) associated with a given scalable layer together
 - Enables simple bit stream extraction
2. Fixed NAL unit header length
 - Network friendly

PROPOSED NAL UNIT HEADER SYNTAX

nal_unit(NumBytesInNALunit) {	Descriptor
forbidden_zero_bit	f(1)
nal_ref_idc	u(2)
nal_unit_type	u(5)
seq_parameter_set_id	u(16)
NumBytesInRBSP = 0	
nalUnitHeaderBytes = 3	
if(nal_unit_type == 1 nal_unit_type == 4 nal_unit_type == 5) {	
 temporal_id	u(3)
 output_flag	u(1)
 reserved_one_4bits	u(4)
 nalUnitHeaderBytes += 1	
}	

PROPOSED SPS SYNTAX

	Descriptor
seq_parameter_set_rbsp() {	
profile_idc	u(8)
reserved_zero_8bits /* equal to 0 */	u(8)
level_idc	u(8)
base_seq_parameter_set_flag = 1	
temporal_dependency_flag	u(1)
if(temporal_dependency_flag == 1) {	
temporal_base_seq_parameter_set_id	u(16)
temporal_id	u(3)
base_seq_parameter_set_flag = 0	
}	
if(profile_idc == multiview_profile) {	
multiview_dependency_flag	u(1)
if(multiview_dependency_flag == 1) {	
view_base_seq_parameter_set_id	u(16)
...	
base_seq_parameter_set_flag = 0	
}	
}	
...	
if(base_seq_parameter_set_flag == 1)	
base_seq_parameter_set_rbsp()	
rbsp_trailing_bits()	
}	

SUMMARY

› Proposal

- Use seq_parameter_set_id as a generic layer indicator in the NAL unit header
- Have one SPS per scalable layer convey layer-specific information
- Use “links” included in enhancement layer SPSs to indicate dependencies between scalability layers

› Advantages

- Extensibility for different different types of scalability
- Fixed-length NAL unit header
- Simple bit stream extraction

- › We propose that the presented concept should be further studied and be considered for the future HEVC scalability extension design



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