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**JCTVC-E345**

# **NAL unit header and sub-bitstream extraction**

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## 2 proposals

- ▣ **A change to the NAL unit header**
  - ▣ The second byte to be included for all NAL unit types
  
- ▣ **A sub-bitstream extraction process**
  - ▣ Only based on information in NAL unit headers

# Shortcomings associated with SVC sub-bitstream extraction process (1/2)

- Removal of SEI messages from the original bitstream needs to look into fields inside NAL unit payloads, including payloadType, sei\_temporal\_id, sei\_dependency\_id[ i ], and/or sei\_quality\_id[ i ].
  - If the sub-bitstream extractor only needs to look into NAL unit header fields, which are always fixed-length coded, the implementation complexity of the bitstream extractor would be lower and extracting a bitstream subset would be of either lower computational complexity or faster.

# Shortcomings associated with SVC sub-bitstream extraction process (2/2)

- NAL units not associated with priority\_id, temporal\_id, dependency\_id or quality\_id (e.g. SPS, PPS, subset SPS) may remain in the extracted sub-bitstream but are actually not needed.
  - Thus waste bandwidth when transmitted, and waste storage space when stored.
  - For HRD compliance, these non-required data need to be taken into account in setting the buffering parameters
    - Leading to sub-optimal buffering parameters, meaning unnecessarily bigger coded picture buffer or unnecessarily longer initial delay

Similar problems apply if the HEVC sub-bitstream extraction process follows the principles of the SVC sub-bitstream extraction process.

The SVC sub-bitstream extraction process and an example HEVC sub-bitstream extraction process following the same principles are included in the contribution.

The root of these problems is the exclusion of the scalability identifiers, e.g., temporal\_id, from NAL unit headers of NAL units containing SEI/SPS/PPS etc.

# Proposal 1 – change to NAL unit header syntax

In WD2

nal_unit( NumBytesInNALunit ) {	Descriptor
<b>forbidden_zero_bit</b>	f(1)
<b>nal_ref_idc</b>	u(2)
<b>nal_unit_type</b>	u(5)
NumBytesInRBSP = 0	
nalUnitHeaderBytes = 1	
if( nal_unit_type == 1    nal_unit_type == 5 ) {	
<b>temporal_id</b>	u(3)
<b>output_flag</b>	u(1)
<b>reserved_zero_4bits</b>	u(4)
nalUnitHeaderBytes += 1	
}	
...	
}	

Proposal

nal_unit( NumBytesInNALunit ) {	Descriptor
<b>forbidden_zero_bit</b>	f(1)
<b>nal_ref_idc</b>	u(2)
<b>nal_unit_type</b>	u(5)
<b>temporal_id</b>	u(3)
<b>output_flag</b>	u(1)
<b>reserved_zero_4bits</b>	u(4)
NumBytesInRBSP = 0	
<b>nalUnitHeaderBytes = 2</b>	
...	
}	

# Proposal 1 – semantics change

## (key points)

- The value of `temporal_id` shall be identical for *all VCL NAL units* in an access unit. (In SVC: “for all NAL units”)
- *The temporal\_id of an access unit* is derived as equal to the `temporal_id` value of the VCL NAL units in the access unit. (In SVC: not defined)
- For a non-VCL NAL unit (In SVC: `temporal_id` not included in non-VCL NAL units)
  - The value of `temporal_id` shall not be less than the `temporal_id` of the access unit.
  - For an SPS NAL unit, `temporal_id` shall be equal to 0.
  - For an AU delimiter NAL unit, `temporal_id` shall be identical to the `temporal_id` of the access unit.

## Proposal 2 – sub-bitstream extraction process (full text)

It is requirement of bitstream conformance that any sub-bitstream that is the output of the process specified in this subclause with tldTarget equal to any value in the range of 0 to 7, inclusive, shall be conforming to this Recommendation | International Standard.

NOTE – A conforming bitstream contains one or more coded slice NAL units with temporal\_id equal to 0.

Input to this process is a variable tldTarget (when present).

Output of this process is a sub-bitstream.

When tldTarget is not present as input to this subclause, tldTarget is inferred to be equal to 7.

The sub-bitstream is derived by removing all NAL units for which temporal\_id is greater than tldTarget.

# Thank you

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