



JCTVC-N0050/JCT3V-E0037: Specification text to support AVC base layer in HEVC layered extensions

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SHVC hybrid scalability with AVC base layer

- Propose full specification text modifications to SHVC WD to support AVC base layer, which is not currently fully supported
 - Could also be used with MV-HEVC
 - Full text in attachment, based upon Editor's input draft JCTVC-N0242
 - Text modifications fit within one page of additional text
- Propose SHVC Hybrid Scalable Main profile
- SHM software for SHVC currently provides support for an AVC base layer
 - Used in conjunction with a modified version of the JSVM which is available with the SHM software

- *Combination of Spatial Scalability, AVC and HEVC standards:*
 - The scalability extension should include one or more modes (Profiles) where it is able to operate with a base layer that is compliant with AVC Standard's Constrained Baseline Profile, Main Profile and High Profile.
- *Combination of View Scalability, AVC and HEVC standard:*
 - The scalability extension should include a mode where it is able to operate with a base layer that is compliant with AVC standard's Constrained Baseline Profile, Main Profile or High Profile.

Proposed specification modifications

1. Decoding process modified for the AVC base layer (when `nuh_layer_id` equal to 0 and `avc_base_layer_flag` equal to 1) to reference decoding using the Rec. ITU-T H.264 | ISO/IEC 14496-10 and defines HEVC variable values `PicOrderCntVal` and `PicOutputFlag`
2. NAL unit type syntax is modified for the AVC base layer (when `nal_unit_type` equal to `ENC_NUT`) to refer to the Rec. ITU-T H.264 | ISO/IEC 14496-10 `nal_unit(NumBytesInNalUnit)` syntax function
3. VPS extension syntax is modified to add `avc_base_profile_level_idc` syntax element when `avc_base_layer_flag` equal to 1
4. Hybrid Scalable Main profile is defined

Decoding process in 8.1.1

...

Otherwise, the decoding process operates as follows for the current picture CurrAvcPic.

The decoding process of Rec. ITU-T H.264 | ISO/IEC 14496-10 is invoked with the NAL unit payload as input for current Rec. ITU-T H.264 | ISO/IEC 14496-10 nal_unit() for current picture CurrAvcPic. PicOrderCntVal is set equal to Rec. ITU-T H.264 | ISO/IEC 14496-10 PicOrderCnt(CurrAvcPic).

PicOutputFlag is set equal to Rec. ITU-T H.264 | ISO/IEC 14496-10 output_flag.

After all slices of CurrAvcPic have been decoded, the following applies:

- If Rec. ITU-T H.264 | ISO/IEC 14496-10 discardable_flag is equal to 1, the decoded picture is marked as "unused for reference".
- Otherwise, the decoded picture is marked as "used for short-term reference".

NAL unit syntax in F.7.3.1

nal_unit(NumBytesInNalUnit) {	Descriptor
nal_unit_header()	
if (nal_unit_type != ENC_NUT) {	
NumBytesInRbsp = 0	
for(i = 2; i < NumBytesInNalUnit; i++)	
if(i + 2 < NumBytesInNalUnit && next_bits(24) == 0x000003) {	
rbsp_byte [NumBytesInRbsp++]	b(8)
rbsp_byte [NumBytesInRbsp++]	b(8)
i += 2	
emulation_prevention_three_byte /* equal to 0x03 */	f(8)
} else	
rbsp_byte [NumBytesInRbsp++]	b(8)
} else	
Rec. ITU-T H.264 ISO/IEC 14496-10 nal_unit(NumBytesInNalUnit)	
}	

VPS Extension in F.7.3.2.1.1.1

vps_extension() {	Descriptor
while(!byte_aligned())	
vps_extension_byte_alignment_reserved_one_bit	u(1)
avc_base_layer_flag	u(1)
if (avc_base_layer_flag)	
avc_base_profile_level_idc	u(24)
splitting_flag	u(1)
...	

avc_base_profile_level_idc indicates the conformance point of the Rec. ITU-T H.264 | ISO/IEC 14496-10 base layer. **avc_base_profile_level_idc[i]** is the exact copy of the three bytes Rec. ITU-T H.264 | ISO/IEC 14496-10 comprised of **profile_idc**, **constraint_set0_flag**, **constraint_set1_flag**, **constraint_set2_flag**, **constraint_set3_flag**, **constraint_set4_flag**, **constraint_set5_flag**, **reserved_zero_2bits** and **level_idc**, as if these syntax elements were used to specify the profile and level conformance of the representation of the Rec. ITU-T H.264 | ISO/IEC 14496-10 base layer.

Hybrid scalable main profile proposed

- Input documents M30422 and VCEG-AV13 propose profile to parent bodies
- Base layer must be AVC
 - AVC base layer must meet constraints of AVC Progressive High profile, but need not be labeled as such
 - High profile or Main profile with frame_mbs_only_flag equal to 1 satisfies proposed constraint
- No inter-layer syntax prediction from AVC base layer
- Otherwise, tools identical to Scalable Main profile
 - No complexity increase in enhancement layer coding expected

Hybrid Scalable Main profile definition

Bitstreams conforming to the hybrid scalable main profile shall obey the following constraints:

- The picture resampling process as specified in subclause G.8.1.4.1 shall not be invoked more than once for decoding of each particular picture.
- `avc_base_layer_flag` shall be equal to 1.
- It is a requirement of bitstream conformance that `MotionPredRefLayerId[iNuhLid][mIdx]` shall not be equal to 0 for `iNuhLid` equal to any value of `nuh_layer_id` present in the bitstream and any value of `mIdx` in the range of 0 to `NumMotionPredRefLayers[iNuhLid] - 1`, inclusive.
- The encapsulated Rec. ITU-T H.264 | ISO/IEC 14496-10 bitstream shall obey all constraints specified in Rec. ITU-T H.264 | ISO/IEC 14496-10 A.2.4.1 for the Progressive High profile.

- Clarify that `avc_base_layer_flag` shall be equal to 0 in the Stereo Main and Scalable Main profiles
 - not currently restricted in the draft text but is marked with an editor's note as being in need of clarification
- **Scalable Main profile**
- Bitstreams conforming to the scalable main profile shall obey the following constraints:
- The picture resampling process as specified in subclause G.8.1.4.1 shall not be invoked more than once for decoding of each particular picture.
- **`avc_base_layer_flag` shall be equal to 0**

Conclusion

- Recommend to include AVC base layer support in SHVC WD using proposed text
 - Additional text fits within one page
- No modification to SHVC schedule