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**Information technology — Coding of audio-visual objects — Part 15: Carriage of network abstraction layer (NAL) unit structured video in the ISO base media file format — Amendment 2: Picture-in-picture support and other extensions**

CDAM stage

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ISO copyright office

CP 401 • Ch. de Blandonnet 8

CH-1214 Vernier, Geneva

Phone: +41 22 749 01 11

Email: copyright@iso.org

Website: www.iso.org

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*Add subclause 4.16 as follows:*

* 1. **Storage of SEI manifest and SEI prefix indication SEI messages**

When one or more SEI NAL units containing an SEI manifest SEI message and/or an SEI prefix indication SEI message are available, they should be stored in the decoder configuration information as follows:

* For AVC, SVC, and MVC, these SEI NAL units should be stored as instances of sequenceParameterSetNALUnit in AVCDecoderConfigurationRecord, SVCDecoderConfigurationRecord, and MVCDecoderConfigurationRecord, respectively.
* For HEVC and L-HEVC, these SEI NAL units should be stored as instances of nalUnit with NAL\_unit\_type indicating a prefix SEI NAL unit in HEVCDecoderConfigurationRecord and LHEVCDecoderConfigurationRecord, respectively.
* For VVC, these SEI NAL units should be stored as instances of nal\_unit with NAL\_unit\_type indicating a prefix SEI NAL unit in VvcDecoderConfigurationRecord.

When a parameter set elementary stream is in use for AVC, SVC, MVC, or MVD, SEI NAL units containing an SEI manifest SEI message and/or an SEI prefix indication SEI message should also be placed in the parameter set elementary stream.

*Add subclause 4.17 as follows:*

* 1. **Picture-in-picture region replacement sample group**

### Definition

Picture-in-picture (PiP) services offer the ability to include a video with a smaller spatial resolution within a video with a bigger spatial resolution, referred to as the PiP video and the main video, respectively. A video track containing a 'pipm' track reference indicates that the track contains PiP video and the main video is contained in the referenced track or any track in the alternate group to which the referenced track belongs, if any.

For each pair of PiP video and main video, using the tools defined in ISO/IEC 14496-12, the window in the main video for embedding/overlaying the PiP video, which is smaller in size than the main video, is indicated by the values of the matrix fields of the TrackHeaderBoxes of the PiP video track and the main video track, and the value of the layer field of the TrackHeaderBox of the PiP video track shall be less than that of the main video track, to layer the PiP video in front of the main video.

When PicInPicRegionReplacementEntry is present in a PiP video track, it indicates that the NAL units representing the target PiP region in the main video can be replaced with the corresponding NAL units of the PiP video track. In this case, it is required that the same video codec is used for coding of the PiP video and the main video. The absence of this sample group indicates that it is unknown whether such replacement is possible.

When this sample group is present, the player may choose to replace the NAL units representing the target PiP region in the main video with the corresponding NAL units of the PiP video before sending to the video decoder for decoding. In this case, for a particular picture in the main video, the corresponding NAL units of the PiP video are all the NAL units in the decoding-time-synchronized sample in the PiP video track.

### Syntax

class PicInPicRegionReplacementEntry() extends VisualSampleGroupEntry ('pprr') {  
 bit(5) reserved = 0;  
 unsigned int(3) region\_id\_type;  
 unsigned int(8) num\_region\_ids\_minus1;  
 for(i=0; i<=num\_region\_ids\_minus1; i++)  
 unsigned int(16) region\_id[i];  
}

### Semantics

region\_id\_type indicates the type for the value taken by the region\_id. If the video codec used for the main video track is VVC (i.e., the sample entry type is 'vvc1', 'vvi1', or 'vvs1'), in which case the video codec used for the PiP video track is also VVC, region\_id\_type equal to 0 specifies that the region IDs are VVC subpicture IDs. Otherwise, the value of region\_id\_type equal to 0 is reserved. When region\_id\_type is equal to 1, the region IDs are the groupID values in the NAL unit map sample group for the NAL units that may be replaced by the NAL units of the PiP track. region\_id\_type values greater than 1 are reserved.

num\_region\_ids\_minus1 plus 1 specifies the number of the following region\_id[i] fields.

region\_id[i] specifies the i-th ID for the NAL units representing the target picture-in-picture region.

When region\_id\_type is equal to 1, the main video track shall have a 'nalm' sample group with grouping\_type\_parameter equal to 'pprr' indicating the NAL units in the main track that may be replaced by the NAL units in the PiP track with the same groupID values.

When region\_id\_type is equal to 1 and num\_region\_ids is equal to 1, 'nalm' sample group shall not be present in the PiP track and all the NAL units of the PiP track are inferred to have groupID equal to region\_id[0].

When region\_id\_type is equal to 1 and num\_region\_ids is greater than 1, a 'nalm' sample group with grouping\_type\_parameter equal to 'pprr' shall be present in the PiP track and provide a mapping of groupID values to NAL units.

*In subclause 5.4.3.2.3, replace*

NALUnit contains a single NAL unit. The syntax of a NAL unit is defined in ISO/IEC 14496-10 and includes both the one byte NAL header and the variable length encapsulated byte stream payload.

*with*

NALUnit contains a single NAL unit. The syntax of a NAL unit is defined in ISO/IEC 14496-10 and includes both the one-byte NAL unit header and the variable length NAL unit payload.

*In subclause 6.4.2.2, replace*

SequenceParameterSetLength indicates the length in bytes of the SPS or subset SPS NAL unit.

SequenceParameterSetNALUnit contains a SPS or subset SPS NAL unit. SPSs shall occur in order of ascending parameter set identifier with gaps being allowed. Subset SPSs shall occur in order of ascending parameter set identifier with gaps being allowed. Any SPS shall occur before all the subset SPSs, if any.

*With (just changing the starting ‘S’ with ‘s’ in both sentences, no other changes)*

sequenceParameterSetLength indicates the length in bytes of the SPS or subset SPS NAL unit.

sequenceParameterSetNALUnit contains a SPS or subset SPS NAL unit. SPSs shall occur in order of ascending parameter set identifier with gaps being allowed. Subset SPSs shall occur in order of ascending parameter set identifier with gaps being allowed. Any SPS shall occur before all the subset SPSs, if any.

*In subclause 8.3.2.1.1, replace*

* The level indication general\_level\_idc shall indicate a level of capability equal to or greater than the highest level indicated for the highest tier in all the parameter sets.

*with*

* The level indication general\_level\_idc shall indicate a level of capability greater than or equal to the highest level in all the parameter sets.

*In subclause 8.3.2.1.3, replace*

array\_completeness when equal to 1 indicates that all NAL units of the given type are in the following array and none are in the stream; when equal to 0 indicates that additional NAL units of the indicated type may be in the stream; the default and permitted values are constrained by the sample entry name.

*with*

array\_completeness when equal to 1 indicates that all NAL units of the given type are in the following array and none are in the stream; when equal to 0 indicates that additional NAL units of the indicated type may be in the stream; the permitted values are constrained by the sample entry name.

*In subclause 8.3.2.1.3, remove the following from the semantics of nalUnit:*

When one or more SEI NAL units containing an SEI manifest SEI message and/or an SEI prefix indication SEI message are available, they should be stored as instances of nalUnit.

*In subclause 8.4.1.1.1, replace*

When the sample entry name is 'hvc1', the default and mandatory value of array\_completeness is 1 for arrays of all types of parameter sets, and 0 for all other arrays. When the sample entry name is 'hev1', the default value of array\_completeness is 0 for all arrays.

*with*

When the sample entry name is 'hvc1', the value of array\_completeness shall be equal to 1 for the arrays of all types of parameter sets.

*In subclause 9.5.3.1.1, replace*

When the sample entry name is 'lhv1', the default and mandatory value of array\_completeness is 1 for arrays of all types of parameter sets, and 0 for all other arrays. When the sample entry name is 'lhe1', the default value of array\_completeness is 0 for all arrays.

*with*

When the sample entry name is 'lhv1', the value of array\_completeness shall be equal to 1 for the arrays of all types of parameter sets.