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Title	Solution to the access unit identification problem for MIV special atlas.
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Abstract

During the course of discussions in the ad-hoc meetings prior to MPEG-130, two issues came into focus. The first was issue was identified in the results produced in m53501 where it was reported that the use of NAL_SKIP produced quite some bitrate over-head. The second issue, and more serious one, was that there is no way to know to which access-unit that an AAPS or an SEI carried in an atlas with atlas_id equal to 0x3F belonged to, in the V3C bitstream format. This contribution offers a solution to both these problems by introducing a new NAL unit type.

1   Introduction

First, we propose a new NAL unit type, NAL_DFOC, which carries the syntax structure delta_frame_order_count_rbsp.

Delta Frame Order Count RBSP syntax

delta_frame_order_count_rbsp() {	**Descriptor**
dfoc_current_atlas_frm_order_cnt_lsb	u(v)
dfoc_loop_count	u(8)
dfoc_delta_atlas_frm_order_cnt_lsb	u(v)
}	

Delta Frame Order Count RBSP Semantics

dfoc_current_atlas_frm_order_cnt_lsb specifies the atlas frame order count modulo MaxAtlasFrmOrderCntLsb for the NAL units that immediately precedes this NAL unit. The length of the dfoc_current_atlas_frm_order_cnt_lsb syntax element is equal to asps_log2_max_atlas_frame_order_cnt_lsb_minus4 + 4 bits when delta_frame_order_count_rbsp is used in atlas with atlas_ids in the range of 0..0x3E (and an equivalent field when used in atlas with atlas_id equal to 0x3F). The value of the dfoc_atlas_frm_order_cnt_lsb shall be in the range of 0 to MaxAtlasFrmOrderCntLsb − 1, inclusive. When atgh_atlas_frm_order_cnt_lsb is not present, it shall be inferred to be equal to 0.

dfoc_loop_count specifies the floor(atlas frame order count/MaxAtlasFrmOrderCntLsb) for the NAL unit that immediately succeeds this NAL unit. When dfoc_loop_count is not present, it shall be inferred to be equal to 0.

dfoc_delta_atlas_frm_order_cnt_lsb specifies the delta frame order count for the NAL immediately succeeding this NAL unit. When dfoc_delta_atlas_frm_order_cnt_lsb is not present, it shall be inferred to be equal to 0.
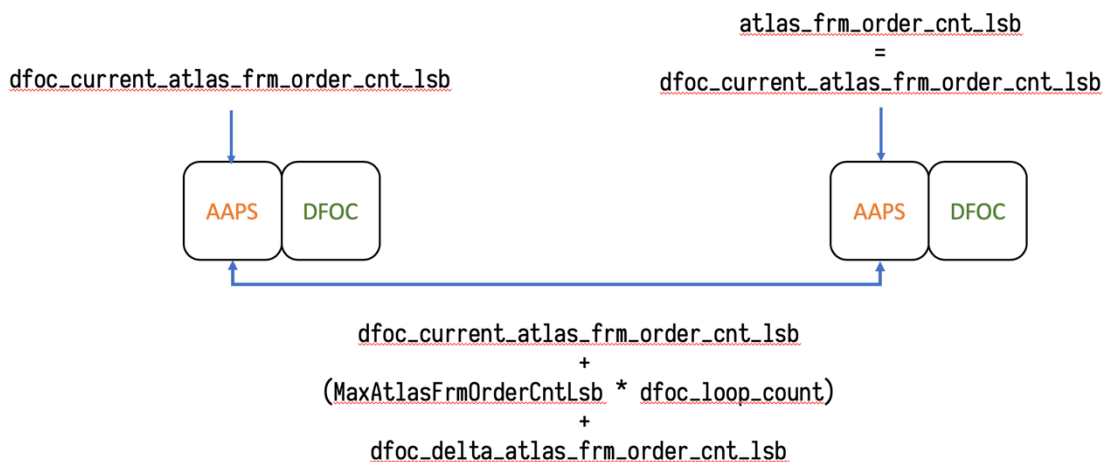
2 Discussion

Figure 1: Diagram illustrating the working of NAL_DFOC

An IRAP is self-sufficient. Therefore, the AAPS is always present in an MIV access unit. An AAPS MAY be followed, immediately, with a NAL_DFOC. If so, then the dfoc_current_atlas_frm_order_cnt_lsb is appropriately set. The atlas_frame_order_count_lsb, *n*, of the next nal_unit, whether it be an SEI message or an AAPS update, is computed as follows:

```
Let:

c be the value of dfoc_current_atlas_frm_order_cnt_lsb,
l be the value of dfoc_loop_count
d be the value of dfoc_delta_atlas_frm_order_cnt_lsb
n be the value of the atlas_frm_order_cnt_lsb of the next NAL unit belonging to the
same atlas
m be the value of MaxAtlasFrmOrderCntLsb

then n is computed as,

n = c + (l*m) + d.
```

The presence of a NAL_DFOC access-unit indicates the start of a new access unit. In other words, all NALs following a NAL_DFOC in the MIV sub-bitstream shall belong to a new access unit.

NAL_DFOC can also be used to replace a long run of NAL_SKIP. NAL_SKIP are still useful if the skip is very small (for example skipping every alternate access_unit).

For cases where every MIV access-units have content in atlas with atlas_id=0x3f then the NAL_VPCC_AUD can be used to identify AU boundaries. The presence of NAL_VPCC_AUD in the atlas with atlas_id = 0x3F increments the value of atlas_frm_order_cnt_lsb.

An aspect that is allude to in the semantics, but requires further discussion, is that **dfoc_current_atlas_frm_order_cnt_lsb** is a u(v) field where the length of the field is deduced from asps_log2_max_atlas_frame_order_cnt_lsb_minus4. A similar field should be available in the some structure in the atlas with atlas_id = 0x3F, Reusing the ASPS as defined for atlases that also carry coded video data is not very convenient because they contain many fields that are not required for any purpose in the atlas with atlas_id=0x3F.

3 Conclusion

This contribution is a quick response to problem identified during the course of discussions in the adhoc meetings prior to MPEG-130. There may be fine-tuning of syntax and semantics required to the one proposed in this contribution, but the solution in the contribution, we think, would help mitigating the identified problems.