|  |  |
| --- | --- |
| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  10th Meeting: Stockholm, SE, 11–20 July 2012 | Document: JCTVC-J0156 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **AHG 9/10: Generalized definition of the TLA for scalable extension** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Chul Keun Kim  Hendry Byeong Moon Jeon  #221 Yangjae-dong, Seocho-gu, Seoul 137-130 Korea | Tel: Email: | +82-10-8893-4332  chulkeun.kim@lge.com  [hendry.hendry@lge.com](mailto:hendry.hendry@lge.com)  [bm.jeon@lge.com](mailto:bm.jeon@lge.com) |
| *Source:* | LG Electronics | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

This contribution suggests that the layer switching feature enabled by current TLA NAL unit for temporal scalability may be extended for other scalability aspect such as spatial and quality scalabilities. Therefore, it is better to generalize the semantic of current TLA NAL unit to provide a hook for similar concept for scalable extensions. With this generalization, one can simple extend the temporal layer switching to any scalability layer switching and does not need to add new NAL types for that purpose.

It is assessed that the proposed generalization does not change the concept of TLA for HEVC specification.

# Introduction

 The purpose of the TLA picture is to indicate where switching to higher temporal can be done after one or more temporal layers have been extracted / removed. Such concept seems to be applicable for other scalability direction as well. Thus, for scalable extension, spatial and quality layer switching should be also taken into consideration when designing a NAL type.

# Proposed modifications

We propose generalize concept of TLA for accommodating switching in other scalability direction, not only in temporal direction. To achieve that, the following modifications are needed:

1. Change the name of Temporal Layer Access to a more general term, for example SLA (Switching Layer Access).

2. Modify current semantic of TLA as below

Current description

When the value of nal\_unit\_type is equal to 3 for all VCL NAL units of a particular picture, that particular picture is referred to as a TLA picture. A TLA picture and all coded pictures with temporal\_id greater than or equal to the temporal\_id of the TLA picture that follow the TLA picture in decoding order shall not use inter prediction from any picture with temporal\_id greater than or equal to the temporal\_id of the TLA picture that precedes the TLA picture in decoding order. A TLA picture shall not be TFD picture; hence TLA picture is also referred to as non-TFD TLA picture.

Proposed description

When the value of nal\_unit\_type is equal to 3 for all VCL NAL units of a particular picture, that particular picture is referred to as a **SLA** picture. A **SLA** picture and all coded pictures with **layer level** greater than or equal to the **layer level** of the SLApicture that follow the **SLA** picture in decoding order shall not use inter prediction from any picture with **layer level** greater than or equal to the layer level of the **SLA** picture that precedes the **SLA** picture in decoding order. A SLApicture shall not be TFD picture; hence SLApicture is also referred to as non-TFD **SLA** picture.

In the proposed modification, the term ‘temporal\_id’ is replaced by the term ‘layer level’ for generalization. Single-layer HEVC has only temporal layers so this modification does not require any changes in the current TLA features. In scalable extension, scalabilities other than the temporal scalability (i.e., spatial and quality scalabilities) are included. The purpose of the proposed modification is to make the existing NAL type for temporal layer switching applicable to other scalabilities.

The following figures depict how the SLA picture works.

* Group A pictures precede the SLA picture in decoding order and their layer levels are greater than or equal to the layer level of the LA picture.
* Group B pictures follow the SLA picture in decoding order and their layer levels are greater than or equal to that of the SLA picture.
* Group C pictures have the layer level smaller than SLA picture’s layer level.

Figure 1 shows an example of temporal layer switching. The spatial and quality levels of the SLA picture are same as those of the current picture, but the temporal level is different by 1. The SLA picture and all the pictures in Group B cannot refer to Group A pictures. Temporal layer access is achieved through this reference constraint. This is the same way that the TLA picture operates.



Figure1.  Example of temporal layer access

Figure 2 shows an example of spatial layer switching. Group B pictures can refer to group C. pictures that have a lower spatial level. Similarly to the temporal layer switching in Figure 1, Group B pictures cannot refer to Group A pictures. This reference mechanism allows spatial layer access.

 Figure2. Example of spatial layer access

# Conclusion

We propose a generalized (extended) definition of the TLA picture to support spatial and quality scalabilities in addition to the temporal scalability. With this proposition, one does not need to add new NAL types when other kinds of scalability are included in scalable extension.

# Patent rights declaration(s)

**LG Electronics may have current or pending patent rights relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**