|  |  |
| --- | --- |
| **Joint Collaborative Team on 3D Video Coding Extension Development**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  3rd Meeting: Geneva, CH, 17–23 Jan. 2013 | Document: JCT3V-C0059 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **AHG7: Target output views for MV-HEVC** | | |
| *Status:* | Input Document | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Ying Chen Ye-Kui Wang  5775 Morehouse Drive San Diego, CA 92121 USA | Tel: Email: | 1-858-845-6589 [cheny@qti.qualcomm.com](mailto:cheny@qti.qualcomm.com)  1-858-651-8345 [yekuiw@qti.qualcomm.com](mailto:yekuiw@qualcomm.com) |
| *Source:* | Qualcomm Incorporated | | |

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

# Abstract

In MVC (multiview extension of AVC), an operation point (OP) is defined by a set of target output views and a target temporal level. In the HEVC base specification, an OP is defined as a bitstream extracted from another bitstream by operation of the sub-bitstream extraction process, which takes the input as a target temporal level (tIdTarget) and a set of nuh\_reserved\_zero\_6bits values (layerIdSetTarget), and no target output layer is defined or signalled. Consequently, in the currrent MV-HEVC wording draft, it is not possible to signal the target output views. This contributrion proposes to define a concept of OP with an assoicated list of target output views, referred to as output operation point (OOP), and to signal the target ouput views of each OOP in the VPS for MV-HEVC.

# Introduction

In MVC, an operation point is identified by a temporal\_id value as well as a set of target output views. When the target output views are known, the views to be decoded can be derived based on view dependencies and the sub-bitstream containing the operation point can be extracted out.

In HEVC, operation points are defined by a target temporal level (tIdTarget) and a set of nuh\_reserved\_zero\_6bits values (layerIdSetTarget). Applying this directly in MV-HEVC means that the sub-bitstream of the operation point contains all NAL units with temporalID less than or equal to tIdTarget and layer\_id belonging to layerIdSetTarget.

The definition of operation point in HEVC only effectively indicates the views to be decoded in MV-HEVC. A mechanism to indicate the target output views assocaited with an operation point in a way similarly as in MVC is needed for MV-HEVC.

# Proposal

It is proposed that the target output views are signaled in the video parameter set extension. Detailed changes based on the MV-HEVC working draft are described below.

## Definition

**Output operation point**: An operation point with a list of identified target output views that belong to the views included in the operation point.

## Video parameter set extesnsion syntax

|  |  |
| --- | --- |
| vps\_extension( ) { | **Descriptor** |
| while( !byte\_aligned( ) ) |  |
| **vps\_extension\_byte\_alignment\_reserved\_one\_bit** | u(1) |
| **num\_~~additional\_layer~~output\_operation\_points** | u(10) |
| **num\_additional\_profile\_level\_sets** | u(8) |
| for( i = 0; i <= vps\_max\_layers\_minus1; i++ ) { |  |
| **num\_types\_zero\_4bits**[ i ] | u(4) |
| **type\_zero\_4bits**[ i ] | u(4) |
| **view\_id**[ i ] | u(8) |
| if ( i > 0 ) |  |
| **num\_direct\_ref\_layers**[ i ] | u(6) |
| for( j = 0; j < num\_direct\_ref\_layers[ i ]; j++ ) |  |
| **ref\_layer\_id**[ i ][ j ] | u(6) |
| } |  |
| for( i = 0; i <= num\_additional\_profile\_level\_sets; i++ ) |  |
| profile\_tier\_level( 1, vps\_max\_sub\_layers\_minus1 ) |  |
| for( i = 0; i < num\_~~additional\_layer~~output\_operation\_points; i++ ) { |  |
| **op\_point\_index**[ i ] | u(10) |
| for( j = 0 ; j <= vps\_max\_nuh\_reserved\_zero\_layer\_id; j++) |  |
| if( op\_layer\_id\_included\_flag[ op\_point\_index[ i ] ][ i ] ) |  |
| **output\_layer\_flag**[ op\_point\_index[ i ] ][ j ] | u(1) |
| if ( num\_additional\_profile\_level\_sets > 0 ) |  |
| **profile\_level\_idx**[ i ] | u(8) |
| } |  |
| } |  |

## Video parameter set extesnsion semantics

**num\_output\_operation\_points** specifies the maximum number of output operation points present in the coded video sequences the video parameter set applies.

**op\_point\_index**[ i]identifies the operation point associated with the i-th output operation point.

**output\_layer\_flag**[ op\_point\_index[ i ] ][ j ] equal to 1 specifies that the layer with layer\_id equal to j is a target output view of the i-th output operation point. output\_layer\_flag[ op\_point\_index[ i ] ][ j ] equal to 0 specifies that the layer with layer\_id equal to j is not a target output view of the i-th output operation point.

# Patent rights declaration(s)

**Qualcomm Incorporated 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).**