Encoder configuration for VSO

This document describes the encoder settings and macros in HTM version 3.1 for View Synthesis Optimization (VSO) using the Synthesized View Distortion Change (SVDC) as described in m22570, m22571 and m23714. Syntax, semantics and examples for the encoder configuration parameter *VSOConfig* are given.

The *VSOConfig* string specifies how the views to test and their reference views are synthesized from the base views in the VSO process.

# VSO configuration specification:

*VSOConfig*

*DepthCodingDescriptor* *<DepthCodingDescriptor>…*

A *VSOCfg* consist of one or multiple *DepthCodingDescriptors*, each *DepthCodingDescriptor* describes the encoding of one depth view. One *DepthCodingDescriptor* should be assigned per view.

[cx0 B(cc1) I(s0.5)][cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*DepthCodingDescriptor*

**[** *BaseViewSpecifier <AdditionalBaseViewSpecifier>… SynthViewSpecifier < SynthViewSpecifier >…* **]**

A *DepthCodingDescriptor* is parenthesized by square brackets. A *DepthCodingDescriptor* consist of a *BaseViewSpecifier* and optionally one or multiple *AdditionalBaseViewSpecifiers* and *SynthViewSpecifiers*. *BaseViewSpecifiers* and *AdditionalBaseViewSpecifiers* are needed to specify the base views that are used for synthesis, whereas the *SynthViewSpecifiers* specify the views that are synthesized.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*BaseViewSpecifier*

*TestTypeVideo TestTypeDepth ViewNumber*

The *BaseViewSpecifier* specifies a base view used for synthesis. *TestTypeVideo* and *TestTypeDepth* specify if original or coded data are used for generation of reference view and the view to test within the VSO process. The *ViewNumber* must be an integer number within the number of views e.g. 0 1 or 2 for the three view case. If the *BaseViewSpecifier* is not part of the *AdditionalBaseViewSpecifier,* but directly part of the *DepthCodingDescriptor* the *ViewNumber* also indicates the view for that the *DepthCodingDescriptor* is used for.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*TestTypeVideo*

*TestType*

The *TestTypeVideo* specifies whether original or coded texture data is used for rendering the reference view or the views to test.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*TestTypeDepth*

*TestType*

The *TestTypeDepth* specifies whether original or coded depth data is used for rendering the reference view or the views to test.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*TestType*

**o** … original for view to test; original for reference view

**r** … coded for view to test; coded for reference view

**c** … coded for view to test; original for reference view

**x** … current partly encoded depth for view to test; original for reference view (must be applied for the *BaseViewSpecifier* being not a part of a *AdditionalBaseViewSpecifier* but being directly a part of the *DepthCodingDescriptor*).

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*ViewNumber*

Double value *D* for synthesized views or

integer value *I* for base views.

Must be >= 0 and <= NumberOfViews.

Used for numbering of views from left to right, with 0 denoting the leftmost view position. The *ViewNumber* must be integer for in *BaseViewSpecifiers*.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*AdditionalBaseViewSpecifier*

**B(** *BaseViewSpecifier* *<BaseViewSpecifier>…* **)**

On or multiple *AdditionalBaseViewSpecifier* must be give for view interpolation, since two base views are required for interpolation. The view to test and the reference view are synthesized from the view given by the *BaseViewSpecifier* that is directly part of the *DepthCodingDescriptor* and the *BaseViewSpecifier* being part of the *AdditionalBaseViewSpecifier* closest to the view position of the view to synthesize. For view extrapolation the *AdditionalBaseViewSpecifier* is not needed.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*SynthViewSpecifier*

*SynthTestType***(** *RefType ViewNumber <RefType ViewNumber>…* **)**

*SynthTestType***(** *RefType* **{** *ViewNumber <ViewNumber>…* **} )**

The *SynthViewSpecifier* specifies the position and method of synthesis for a view used in VSO.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*SynthTestType*

**E** … extrapolation

**I** … interpolation

**L** … interpolation, left view is main view

**R** … interpolation, right View is main view

Specifies by which method the synthesized view is generated. *E* is extrapolation from the view specified by the *BaseViewSpecifier* being directly part of the *DepthCodingDescriptor*. *I*, *L*, and *R* are interpolation from the base view specified by the *BaseViewSpecifier* being directly part of the *DepthCodingDescriptor* and an additional view given by the *AdditionalBaseViewSpecifier*. For *SynthTestTypes L* and *R* extrapolation of the main view is carried out and data from the other view is only used for hole filling (as applied in the interview skip proposal m....).

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

*RefType*

**s** … synthesized view

**o** … original view

The *RefType* specifies if a synthesized view or a base view is used as reference view. *RefType* *o* is only applicable for views with integer base view numbers. For *RefType* *o* the *TestType* for the reference view is not used.

[cx0 B(cc1) I(s0.5)] [cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

# Example:

Interpolation, coding order T1D1T0D0T2D2 or T1D1T2D2T0D0:

[cx0 B(cc1) I(s0.5)][cx1 B(oo0 oo2) I(s0.5 s1.5)] [cx2 B(cc2) I(s1.5)]

Synthesis setup when encoding depth 1: [cx1 B(oo0 oo2) I(s0.5 s1.5)]

View 0.5:

Reference: interpolated from original texture and original depth of view 1

and original texture and original depth of view 0

Tested: interpolated from coded texture and partly coded depth of view 1

and original texture and original depth of view 0

View 1.5:

Reference: interpolated from original texture and original depth of view 1

and original texture and original depth of view 2

Tested: interpolated from coded texture and partly coded depth of view 1

and original texture and original depth of view 2

Synthesis setup when encoding depth 0: [cx0 B(cc1) I(s0.5)]

View 0.5:

Reference: interpolated from original texture and original depth of view 0

and original texture and original depth of view 1

Tested: interpolated from coded texture and partly coded depth of view 0

and coded texture and coded depth of view 1

Synthesis setup when encoding depth 2: [cx2 B(cc2) I(s1.5)]

View 1.5:

Reference: interpolated from original texture and original depth of view 2

and original texture and original depth of view 1

Tested: interpolated from coded texture and partly coded depth of view 2

and coded texture and coded depth of view 1

# Other examples:

Interpolation, three view case, coding order arbitrary

[ox0 B(oo1) I(s0.5)][ox1 B(oo1 oo2) I(s0.5 s1.5)] [ox2 B(oo2) I(s1.5)]

Interpolation, two view case, coding order T1D1T0D0

[cx0 B(cc1) I(0.5)][cx1 B(oo0) I(0.5)]

Extrapolation, two view case, coding order TxDxTyDy

[cx0 E(s0.5)][cx1 E(s0.5)]

Extrapolation, two view case, three reference views, coding order TxDxTyDy

[cx0 E(s0.25 s0.5 s0.75)][cx1 E(s0.25 s0.5 s0.75)]

Interpolation and Extrapolation, two view case, coding order T1D1T0D0

[cx0 B(cc1) I(s0.5) E(s0.5)][cx1 B(oo1) I(s0.5) E(s0.5)]

Optimization to original view positions:

[cx0 E(o1)][cx1 E(o0)]

Interpolation with Interview Skip ( )

[cx0 B(cc1) R(s0.5)][cx1 B(oo1 oo2) R(s0.5) L(s1.5)] [cx2 B(cc2) L(s1.5)]

# Other parameters:

LambdaScaleVSO (double)

Factor that is multiplied to the Lagrange parameter used for depth coding

ForceLambdaScaleVSO (bool)

If true LambdaScaleVSO is used for depth even if VSO is turned off.

AllowNegDist (bool)

If true negative distortion change in VSO RDO is allowed.

VSOLSTable (bool)

If true a table based depth QP dependent Lagrange multiplier adaptation for depth rate adjustment is carried out (m23714). Otherwise the original Lagrange multiplier setting as used in CfP responses (m22570 and m22571) is applied.

UseEstimatedVSD (bool)

If true the SVDC computation is replaced by a model based estimate of view synthesis distortion for some encoder decisions. (JCT3V-A0033 modification 3).

VSOEarlySkip (bool)

If true SVDC computation is skiped if the depth distortion can be assumed to cause no synthesized view distortion. (JCT-3V-A0093 modification 4)

# Software defines:

HHI\_VSO\_DIST\_INT

1: Use signed distortion to allow negative distortion change.

0: Use unsigned distortion.

HHI\_VSO\_COLOR\_PLANES\_

1: Use UV-planes in VSO computation.

0: Do not use UV-planes.