

# **AHG9: A bug fix for scaling list signalling in SPS when transform skipping is enabled**

**JCTVC-K0203**

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# Problem statement

1. In section 7.4.2.4 of JCTVC-J1003 it says
  - If *transform\_skip\_enabled\_flag* is equal to 1 and *SizeID* is equal to 0, *ScalingList[ SizeID ][ MatrixID ][ i ]* is set equal to 16 for  $i=0..15$ . Otherwise, *ScalingList[ SizeID ][ MatrixID ]* is specified in Table 7 4 and Table 7.5.
2. However, *transform\_skip\_enabled\_flag* is only signaled in PPS while *scaling\_list\_data()* is called from SPS as well as PPS
  - Default 4x4 scaling lists are undefined in SPS
3. If *transform\_skip\_enabled\_flag* is enabled in PPS but scaling lists are not transmitted in PPS, PPS inherits “undefined” Default 4x4 scaling lists from SPS
  - HM8.0 software has encoder/decoder mismatch in this case, the encoder uses flat 4x4 scaling lists, but the decoder uses non-flat ones

# Proposed fix

- Insert an additional flag in SPS to explicitly signal in SPS whether 4x4 scaling lists are flat or not

seq_parameter_set_rbsp() {	<b>Descriptor</b>
... ..	
<b>scaling_list_enable_flag</b>	u(1)
if( scaling_list_enable_flag ) {	
<b>sps_scaling_list_data_present_flag</b>	u(1)
if( sps_scaling_list_data_present_flag ) {	
<b>sps_flat_scaling_list_enabled_flag</b>	u(1)
scaling_list_data()	
}	
}	
... ..	
}	

**sps\_flat\_scaling\_list\_enabled\_flag** equal to 1 specifies that ScalingList[0][ MatrixID ][ i ] is set equal to 16 for MatrixID = 0..5 and i = 0..15 when both scaling\_list\_pred\_mode\_flag and scaling\_list\_pred\_matrix\_id\_delta are set equal to 0. When not present, the value of sps\_flat\_scaling\_list\_enabled\_flag is inferred to be equal to 0.

# Additional text changes for the fix

**scaling\_list\_pred\_matrix\_id\_delta** specifies the target reference matrix to copy the value of scaling list. When **scaling\_list\_pred\_mode\_flag** is equal to 0, **scaling\_list\_pred\_matrix\_id\_delta** specifies which matrix should be used in the current matrix by the following:

$$\text{RefMatrixID} = \text{MatrixID} - \text{scaling\_list\_pred\_matrix\_id\_delta} \quad (0-1)$$

where **MatrixID** is specified in Table 7-4. The variable **RefMatrixID** shall be greater than or equal to 0. When **scaling\_list\_pred\_matrix\_id\_delta** is equal to 0, i.e. **RefMatrixID** is equal to **MatrixID**, the scaling list is inferred from the default scaling list as follows.

- If **sps\_flat\_scaling\_list\_enabled\_flag** is equal to 1, or **transform\_skip\_enabled\_flag** is equal to 1 and **SizeID** is equal to 0, **ScalingList[ SizeID ][ MatrixID ][ i ]** is set equal to 16 for **i=0..15**
- Otherwise, **ScalingList[ SizeID ][ MatrixID ]** is specified in Table 7 4 and Table 7 5.

# Alternative Solution

- decouple transform skipping from default 4x4 scaling list
- if 4x4 flat scaling lists should be used when transform skipping is enabled, they can be transmitted as user-defined matrices
- text changes

**scaling\_list\_pred\_matrix\_id\_delta** specifies the target reference matrix to copy the value of scaling list. When **scaling\_list\_pred\_mode\_flag** is equal to 0, **scaling\_list\_pred\_matrix\_id\_delta** specifies which matrix should be used in the current matrix by the following:

$$\text{RefMatrixID} = \text{MatrixID} - \text{scaling\_list\_pred\_matrix\_id\_delta} \quad (0-1)$$

where **MatrixID** is specified in Table 7-4. The variable **RefMatrixID** shall be greater than or equal to 0. When **scaling\_list\_pred\_matrix\_id\_delta** is equal to 0, i.e. **RefMatrixID** is equal to **MatrixID**, the scaling list is inferred from the default scaling list **specified in Table 7 4 and Table 7 5 as follows:**

~~———— If transform\_skip\_enabled\_flag is equal to 1 and SizeID is equal to 0, ScalingList[ SizeID ][ MatrixID ][ i ] is set equal to 16 for i=0..15~~  
~~———— Otherwise, ScalingList[ SizeID ][ MatrixID ] is specified in Table 7 4 and Table 7 5.~~