



Finer Scaling of Quantization Parameter

Dzung Hoang JCTVC-D041



- **Current AVC-based QP scaling doubles quantizer step size when QP increases by 6.**
- **This results in 12.25% increase in quantizer step size for each increment of QP.**
- **Experimental results show actual bit rate increase of about 17% per QP increment.**
- **From the rate control perspective, 17% increase in rate is too coarse for many applications.**

- **This contribution is a follow-on to JCTVC-C135.**
- **We address concerns regarding the number of scaling tables by simplifying to two QP scaling granularity settings that can be implemented with one scaling table.**
 - “Coarse” quantizer step size doubles for every 8 increase in QP
 - “Fine” quantizer step size doubles for every 16 increase in QP
- **Expand the QP range to [0, 63] or [0, 71].**
- **Luma and chroma QP offsets can change at slice, picture, and/or sequence level.**

- Quantizer step size is computed based upon QP and a transform-dependent multiplier $m_{i,j}$ according to the following equation.

$$\Delta_{i,j} \approx 2^{\frac{QP}{6}} \times m_{i,j}$$

- Quantizer step size is computed based upon QP, a transform-dependent multiplier $m_{i,j}$, an offset α , and a doubling interval β , according to the following equation.

$$\Delta_{i,j} \approx 2^{\frac{QP+\alpha}{\beta}} \times m_{i,j}$$

- **Two granularity settings:**
 - Fine: $\beta = 16$
 - Coarse: $\beta = 8$
- **Can be implemented with a single scaling table for $\beta = 16$.**

Seq/Pic/Slice Header Syntax



...	
qp_scaling_flag	u(1)
if (qp_scaling_flag) {	
qp_granularity	u(1)
qp_luma_offset	ue(v)
qp_cr_offset	ue(v)
qp_cb_offset	ue(v)
}	
...	

- **Recommend adoption at the end of this meeting**
- **AHG or break-out can work on decide on range of offsets, range of QP, and even another set of β values.**