

SONY

SEI message for Knee Function Information

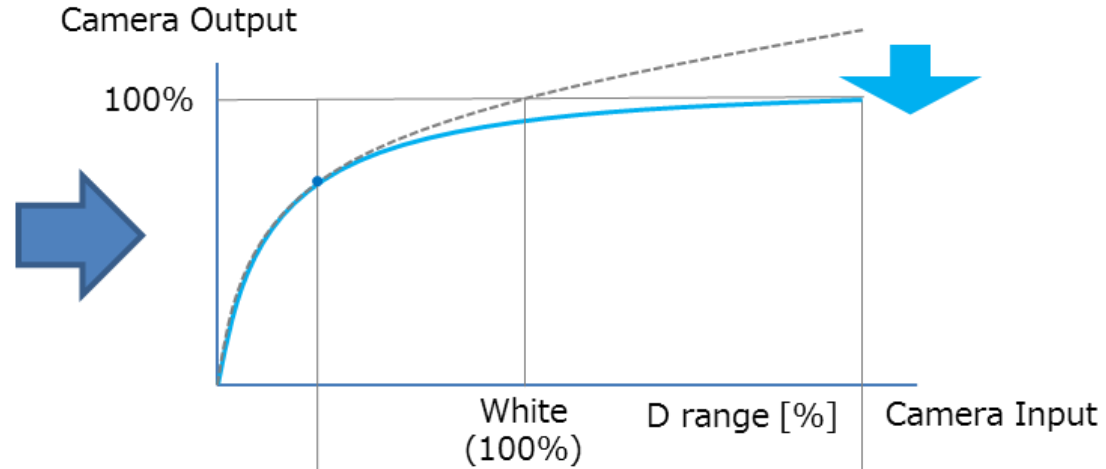
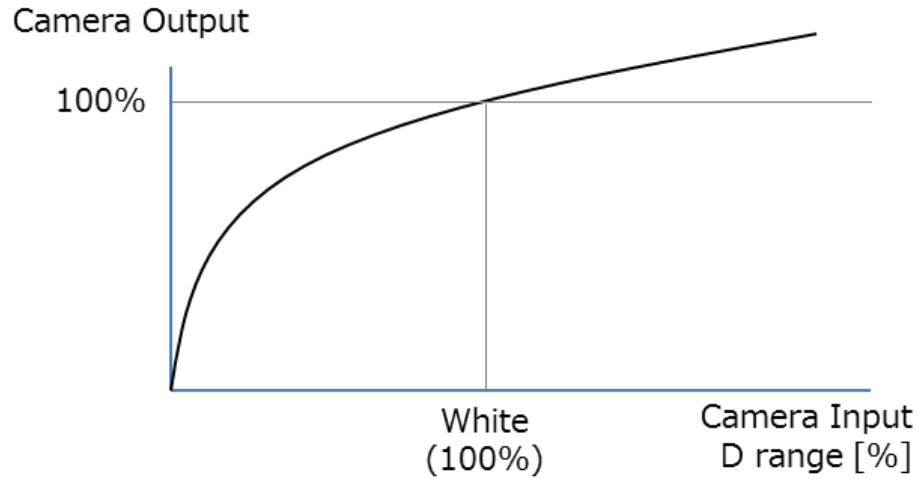
JCTVC-P0050

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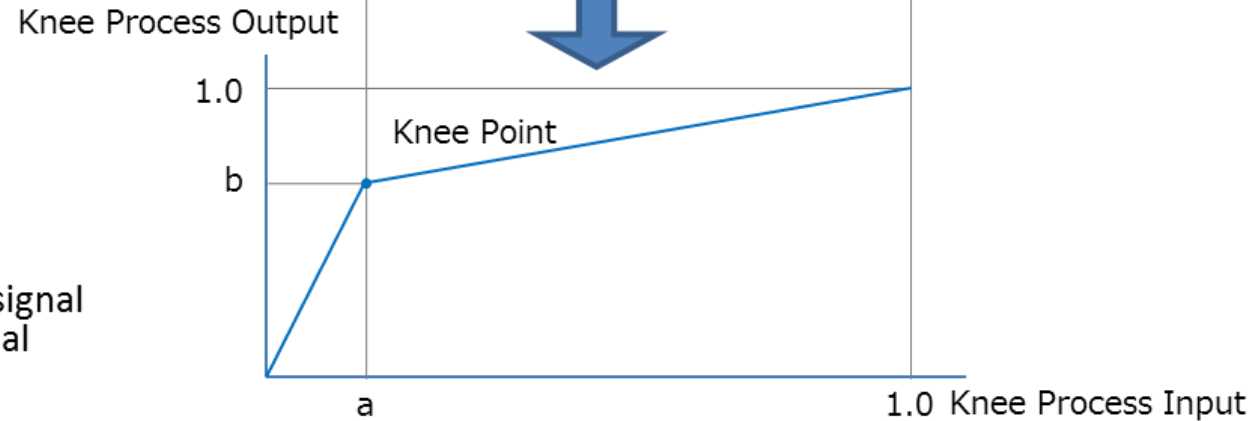
Introduction

- Background
 - Initially proposed in Geneva (JCTVC-O0064) – 2 modifications in this proposal (JCTVC-P0050)
 - Notes from Geneva: “*Further study was encouraged to confirm the appropriateness and completeness of the proposal.*”
 - Today, the video cameras typically ameliorate their sensor’s harsh clipping with a knee function which allows compression of the upper portion of the dynamic range.
 - Using knee function by camera or the video production process is widely being practiced today.
 - The purpose of using the knee function has been to fit the dynamic range of the pictures to the display brightness capability which is lower than what can be captured.
 - However, with the recent evolvement of the display brightness, many displays are becoming to be capable of displaying wider dynamic range with brighter luminance.
- Motivation
 - For these displays, providing parameters to enable decompressing the dynamic range to derive higher dynamic range can be very beneficial to make full use of the display capability.
- Proposal
 - Define an SEI message to transfer the characteristics of knee function.

Knee Function



- Knee function: 2 lines which connects 3 points
 - Normalized in range of 0.0 to 1.0
 - 1) origin (0,0)
 - 2) knee point (a,b)
 - 3) (1,1).
 - The D range (Dynamic range) represents the peak signal level of the original picture in relative to the nominal luminance level.



Proposal

2 modifications are proposed to the previous proposed syntax (O0064)

The contribution proposes to enable signaling of characteristics of knee function with multiple knee points to provide more flexibility.

For example, the compression in the range of lower dynamic range and the compression in the range of higher dynamic range may be preferred to be different. Multiple knee points enable to adjust compression by the setting different slopes.

The contribution proposes to signal display luminance for both input and output

In the contribution, 2 options to integrate the proposed syntax and semantics for the knee function parameters are proposed.

(1) **New SEI message** dedicated for the knee function parameters

This option provides simpler implementation for devices which only uses knee function process.

(2) **Extend Tone Mapping Information SEI message** with new model to signal knee function parameters

This option provides no need to define a new SEI message.

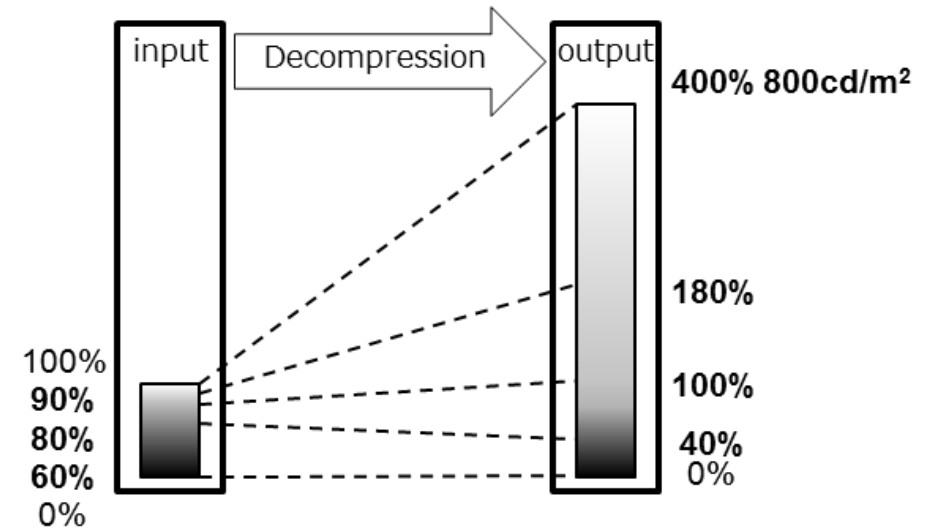
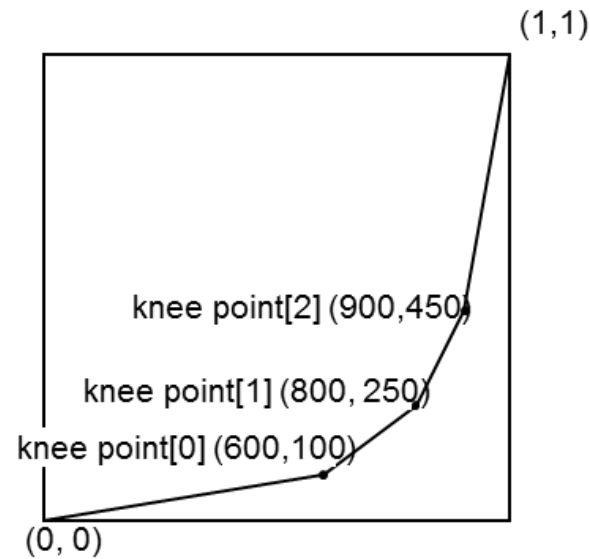
Proposed Syntax/Semantics

See the input document

Proposal

compression_flag = 0 (Decompression)
input_d_range = 1000 (100%)
input_disp_luminance = 100 (cd/m²)
output_d_range = 4000 (400%)
output_disp_luminance = 800 (cd/m²)
num_knee_points_minus1 = 2

i	0	1	2
input_knee_point	600	800	900
output_knee_point	100	250	450



$$\text{Input dynamic range(\%)} = 100 \times \frac{\text{input_knee_point}[i]}{1000}$$

$$\text{Output dynamic range(\%)} = \frac{d_range}{10} \times \frac{\text{output_knee_point}[i]}{1000}$$

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