

SMPTE Engineering Guideline

4:2:2 / 4:2:0 Format Conversion Minimizing
Color Difference Signal Degradation in
Concatenated Operations —
Application



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Foreword

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SMPTE EG 2050-2 was prepared by Technology Committee 32NF.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

1 Scope

This engineering guideline provides details on a possible implementation of the filter defined in SMPTE RP 2050-1. See the introduction of SMPTE RP 2050-1 for information on how the filter is used.

2 Guideline of the Implementation

2.1 General

2.1.1 Definitions

The following nomenclature is used in this guideline.

F0[-3]...F[4]: Filter coefficients for conversion from 4:2:2 to 4:2:0. The value of each coefficient is defined in SMPTE RP 2050-1. The filter normalizing divisor is 1024.

F1e[-1]...F1e[2], F1o[-1]...F1o[2]: Filter coefficients from 4:2:0 to 4:2:2. The value of each coefficient is defined in SMPTE RP 2050-1. The filter normalizing divisor is 1024.

NumLS: Number of luminance samples per active line in a 4:2:2 image sampled system.

NumAL: Number of active lines per frame for progressive systems, or per field for interlaced systems using 4:2:2 image sampling.

Y'[x,y] / C_B'[x,y] / C_R'[x,y]: Luminance and color-difference samples of color encoding and digital representation in a 4:2:2 image sampled system.

Y''[x,y] / C_B''[x,y] / C_R''[x,y]: Luminance and color-difference samples of color encoding and digital representation in a 4:2:0 image sampled system.

Limit(y, V): Mathematical notation for limiting of position. This process is defined in the following pseudo C-code function:

```
int Limit(y, V)
{
    if(y < 0) return (0);
    else if (y > V) return (V);
    else return y;
}
```

Clip(v, Min, Max): Mathematical notation for clipping of value. This process is defined in the following pseudo C-code function:

```
int Clip(v, Min, Max)
{
    if(v<Min) return (Min);
    else if(v > Max) return (Max);
    else return(v);
}
```

2.1.2 4:2:2 image format

Table 1 indicates the applicable 4:2:2 image formats for this engineering guideline. For each system nomenclature, the constant NumLS and NumAL are used for the 4:2:2/4:2:0 and 4:2:0/4:2:2 conversion processes defined in the Section 2.2.