IEC 61966-2-2
(First edition – 2003)

Multimedia systems and equipment – Colour measurement and management – Part 2-2 – Colour management – Extended RGB colour space - scRGB

CORRIGENDUM 1

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Annex B

Replace the existing Annex B, by the following:

Annex B
(informative)

Non-linear encoding for scRGB : scRGB-nl and its YCC Transformation: scYCC-nl

B.1 General

This annex describes non-linear encoding for scRGB: scRGB-nl and its YCC transformation: scYCC-nl. Applications and hardware developers who want to support various colour compression schemes based on luma-chroma-chroma spaces can utilise this standard. This transformation is targeted for compression and storage, and is not targeted for displaying images.

B.2 Non-linear encoding in 12-bit

The relationship is defined as follows:

If $R_{\text{scRGB}}, G_{\text{scRGB}}, B_{\text{scRGB}} \geq 0{,}003\ 130\ 8$

$$\begin{aligned} R'_{\text{scRGB}} &= 1{,}055 \times R_{\text{scRGB}}^{(1{,}0/2{,}4)} - 0{,}055 \\ G'_{\text{scRGB}} &= 1{,}055 \times G_{\text{scRGB}}^{(1{,}0/2{,}4)} - 0{,}055 \\ B'_{\text{scRGB}} &= 1{,}055 \times B_{\text{scRGB}}^{(1{,}0/2{,}4)} - 0{,}055 \end{aligned} \quad \text{(B.1)}$$

If $0{,}003\ 130\ 8 > R_{\text{scRGB}}, G_{\text{scRGB}}, B_{\text{scRGB}} > -0{,}003\ 130\ 8$

$$\begin{aligned} R'_{\text{scRGB}} &= 12{,}92 \times R_{\text{scRGB}} \\ G'_{\text{scRGB}} &= 12{,}92 \times G_{\text{scRGB}} \\ B'_{\text{scRGB}} &= 12{,}92 \times B_{\text{scRGB}} \end{aligned} \quad \text{(B.2)}$$

If $R_{\text{scRGB}}, G_{\text{scRGB}}, B_{\text{scRGB}} \leq -0{,}003\ 130\ 8$

$$\begin{aligned} R'_{scRGB} &= -1{,}055 \times \left(-R_{scRGB}\right)^{(1{,}0/2{,}4)} + 0{,}055 \\ G'_{scRGB} &= -1{,}055 \times \left(-G_{scRGB}\right)^{(1{,}0/2{,}4)} + 0{,}055 \\ B'_{scRGB} &= -1{,}055 \times \left(-B_{scRGB}\right)^{(1{,}0/2{,}4)} + 0{,}055 \end{aligned} \quad \text{(B.3)}$$

12 bit non-linear version of scRGB-nl: $R_{\text{scRGB-nl}}, G_{\text{scRGB-nl}}, B_{\text{scRGB-nl}}$ is defined as:

$$\begin{aligned} R_{\text{scRGB-nl}} &= \text{round}\left(1\ 280 \times R'_{\text{scRGB}} + 1\ 024\right) \\ G_{\text{scRGB-nl}} &= \text{round}\left(1\ 280 \times G'_{\text{scRGB}} + 1\ 024\right) \\ B_{\text{scRGB-nl}} &= \text{round}\left(1\ 280 \times B'_{\text{scRGB}} + 1\ 024\right) \end{aligned} \quad \text{(B.4)}$$

For compression, scRGB-nl is converted to luma-chroma-chroma encoding: scYCC-nl.

$$\begin{bmatrix} Y'_{\text{scYCC}} \\ Cb'_{\text{scYCC}} \\ Cr'_{\text{scYCC}} \end{bmatrix} = \begin{bmatrix} 0{,}299\ 0 & 0{,}587\ 0 & 0{,}114\ 0 \\ -0{,}168\ 7 & -0{,}331\ 3 & 0{,}500\ 0 \\ 0{,}500\ 0 & -0{,}418\ 7 & -0{,}081\ 3 \end{bmatrix} \begin{bmatrix} R'_{\text{scRGB}} \\ G'_{\text{scRGB}} \\ B'_{\text{scRGB}} \end{bmatrix} \tag{B.5}$$

And quantization for 12 bit non-linear scYCC-nl: $Y_{\text{scYCC-nl}}$, $Cb_{\text{scYCC-nl}}$, $Cr_{\text{scYCC-nl}}$ is defined as:

$$\begin{aligned} Y_{\text{scYCC-nl}} &= \text{round}\left(1\ 280 \times Y'_{\text{scYCC}} + 1\ 024\right) \\ Cb_{\text{scYCC-nl}} &= \text{round}\left(1\ 280 \times Cb'_{\text{scYCC}} + 2\ 048\right) \\ Cr_{\text{scYCC-nl}} &= \text{round}\left(1\ 280 \times Cr'_{\text{scYCC}} + 2\ 048\right) \end{aligned} \tag{B.6}$$

Note that this quantization leads to the following relationships, where a value of 65 535 in $\text{scRGB}_{(16)}$ is equivalent to 7,499 9 in scRGB and 4 080 in scRGB-nl. This is to ease computational implementations.

Table B.1 – Quantization relationships using scRGB

$\text{scRGB}_{(16)}$	scRGB	scR'G'B	scRGB-nl
N/A	–0,603 8	–0,800 0	0
0	–0,5	–0,735 4	83
2 048	–0,25	–0,537 1	337
4 096	0	0,000 0	1 024
12 288	1	1,000 0	2 304
20 480	2	1,353 3	2 756
28 672	3	1,612 5	3 088
36 864	4	1,824 8	3 360
45 056	5	2,008 0	3 594
53 248	6	2,170 8	3 803
61 440	7	2,318 4	3 992
65 535	7,499 9	2,387 6	4 080
N/A	7,5	2,387 7	4 080
N/A	7,591 3	2,400 0	4 096

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Figure C.1 – Example workflow using scRGB

Replace, in the top line of Figure C.1, the words 'Output-referred colour', by the words 'Output-referred colour space'.