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

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

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

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

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

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

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

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

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

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

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

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

Note that this quantization leads to the following relationships, where a value of 65 535 in 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

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'.