



INTERNATIONAL STANDARD  
ISO/IEC 14496-3:2001/Amd.1:2003/Cor.1:2004(E)

TECHNICAL CORRIGENDUM 1

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## Information technology — Coding of audio-visual objects —

### Part 3: Audio

#### AMENDMENT 1: Bandwidth extension

#### TECHNICAL CORRIGENDUM 1

*Technologies de l'information — Codage des objets audiovisuels —*

*Partie 3: Codage audio*

*AMENDEMENT 1: Extension de largeur de bande*

*RECTIFICATIF TECHNIQUE 1*

Technical Corrigendum 1 to ISO/IEC 14496-3:2001/Amd.1:2003 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

**NOTE** This document specifies the first corrigendum to ISO/IEC 14496-3:2001/Amd.1:2003. With the exception of the correction for Table 4.54 which is only relevant for multi-channel decoding of ER streams, all the corrections strive to correct errors in the standard text and thus aligning the standard text with the reference software.

In ISO/IEC 14496-3:2001/Amd.1, 4.4.2.8 Payloads for the audio object type SBR, replace Table 4.54 by the table below (modified parts are marked in gray):

Table 4.54A – Syntax of sbr\_extension\_data()

| Syntax                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | No. of bits        | Mnemonic                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------|
| <pre> sbr_extension_data(id_aac, crc_flag) {     num_sbr_bits = 0;      if (crc_flag) {         <b>bs_sbr_crc_bits;</b>         num_sbr_bits += 10;     }      if (sbr_layer != SBR_STEREO_ENHANCE) {         num_sbr_bits += 1;         if (<b>bs_header_flag</b>)             num_sbr_bits += sbr_header();     }      num_sbr_bits += sbr_data(id_aac, bs_amp_res);      num_align_bits = (8*cnt - 4 - num_sbr_bits) % 8;     <b>bs_fill_bits;</b>      return ((num_sbr_bits + num_align_bits + 4) / 8) } </pre> | <p>10</p> <p>1</p> | <p><b>uimsbf</b></p> <p>Note 1</p> <p>Note 2</p> <p>Note 2</p> <p>num_align_bits <b>uimsbf</b></p> |
| <p>Note 1: When the SBR tool is used with a non-scalable AAC core coder, the value of the helper variable sbr_layer is SBR_NOT_SCALABLE. When the SBR tool is used with a scalable AAC core coder, the value of the helper variable sbr_layer depends on the current layer and the scalability configuration of the AAC core coder as defined in Table 4.86 in subclause 4.5.2.8.2.4.</p> <p>Note 2: sbr_header() and sbr_data() return the number of bits read (cnt is a parameter in extension_payload()).</p>     |                    |                                                                                                    |

In ISO/IEC 14496-3:2001/Amd.1:2003, subclause 4.4.2.8 Payloads for the Audio Object Type SBR, Table 4.55A, replace:

Note 3: If this bit is not set the default values for the underlying bitstream elements should be used.

by:

Note 3: If this bit is not set the default values for the underlying bitstream elements shall be used disregarding any previous value.

In ISO/IEC 14496-3:2001/Amd.1, 4.4.2.8 Payloads for the audio object type SBR, Table 4.58, Table 4.59, and Table 4.60, add the part marked in gray:

|                                                |   |               |
|------------------------------------------------|---|---------------|
| if ( <b>bs_extended_data</b> ) {               | 1 |               |
| cnt = <b>bs_extension_size</b> ;               | 4 | uimbsf        |
| if (cnt == 15)                                 |   |               |
| cnt += <b>bs_esc_count</b> ;                   | 8 | uimbsf        |
| num_bits_left = 8 * cnt;                       |   |               |
| while (num_bits_left > 7) {                    |   |               |
| <b>bs_extension_id</b> ;                       | 2 | uimbsf        |
| num_bits_left -= 2;                            |   |               |
| sbr_extension(bs_extension_id, num_bits_left); |   | Note 1        |
| }                                              |   |               |
| <b>bs_fill_bits</b>                            |   | num_bits_left |
| }                                              |   |               |

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.5.2.8.2.3 SBR Extension Payload for the Audio Object Types ER AAC LC and ER AAC LTP replace:

The extension payload shall not include both DRC extension elements and SBR extension elements simultaneously. If SBR extension elements are used, DRC extension elements are prohibited.

by:

The SBR extension elements shall be placed after any other extension elements.

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.5.2.8.2.4 SBR Extension Payload for the Audio Object Types AAC Scalable and ER AAC Scalable, replace:

The scalable SBR data is embedded into the MPEG-4 stream in the same way as for non-scalable SBR data elements, by means of using the extension\_payload().

by:

The scalable SBR data is embedded into the MPEG-4 stream in the same way as for non-scalable SBR data elements, by means of using the extension\_payload(). The SBR extension elements shall be placed after any other extension elements.

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.2.2 SBR specific notation, replace:

$$Q_{Mapped}(m - lsb, l) = Q_{Orig}(i, k(l)), f_{TableNoise}(i) \leq m < f_{TableNoise}(i+1), 0 \leq i < N_Q, 0 \leq l < L_E$$

where  $k(l)$  is defined by  $t(l) \geq t_Q(k(l)), t(l+1) \leq t_Q(k(l)+1)$

should be interpreted as follows.  $Q_{Mapped}(m - lsb, l)$  equals  $Q_{Orig}(i, k(l))$

by:

$$\mathbf{Q}_{Mapped}(m - k_x, l) = \mathbf{Q}_{Orig}(i, k(l)), \mathbf{f}_{TableNoise}(i) \leq m < \mathbf{f}_{TableNoise}(i + 1), 0 \leq i < N_Q, 0 \leq l < L_E$$

where  $k(l)$  is defined by  $\mathbf{t}(l) \geq \mathbf{t}_Q(k(l)), \mathbf{t}(l + 1) \leq \mathbf{t}_Q(k(l) + 1)$

should be interpreted as follows.  $\mathbf{Q}_{Mapped}(m - k_x, l)$  equals  $\mathbf{Q}_{Orig}(i, k(l))$

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.2.5 Constants, replace:

$\varepsilon$  A constant to avoid division by zero, e.g. 96 dB below maximum signal input.

by:

$\varepsilon = 1$  A constant to avoid division by zero, e.g. 96 dB below maximum signal input.

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.2.6, add:

**W** is the subband matrix where the QMF filtered subband samples are stored.

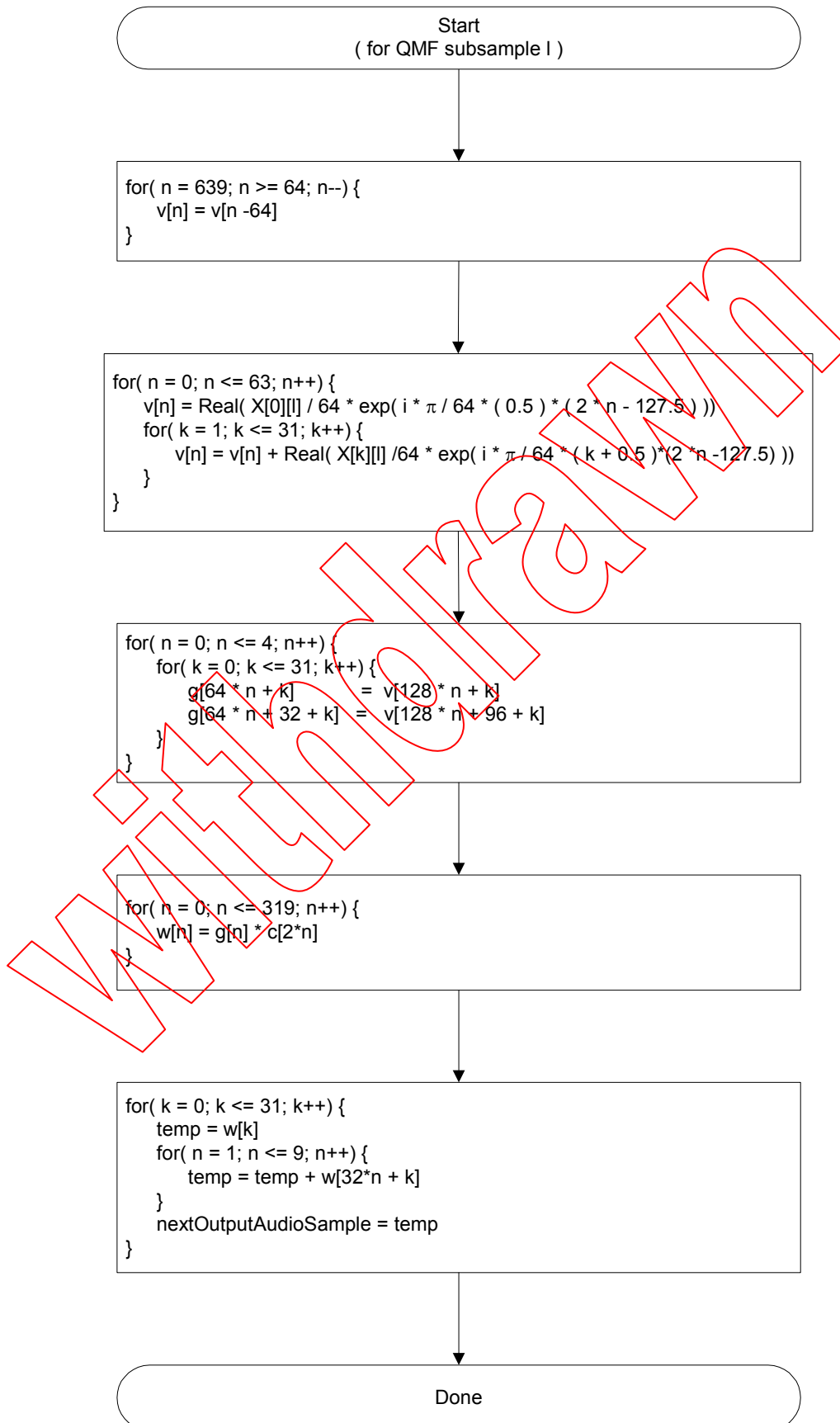
In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.4 and 4.6.18.8.2, replace all instances (in text flowcharts and pictures) of

$\mathbf{X}_{Low}$

by:

**W**

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.4.3 Down sampled synthesis filterbank, in Figure 4.44, where it says "127", it should say "127.5", hence replace it by the following figure:



In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.5 SBR tool overview, replace:

start-up  $l_{Temp}$ ,  $lsb'$  and  $bsco'$  are set to zero. And where

$$bsco = \max\left(\text{INT}\left(\frac{\max AACLine \cdot 32}{frameLength}\right) - lsb, 0\right), \text{ and where}$$

by:

start-up  $l_{Temp}$ ,  $k_x'$  and  $bsco'$  are set to zero. Where  $bsco = 0$  unless a scalable core coder is used, for which

$$bsco = \max\left(\text{INT}\left(\frac{\max AACLine \cdot 32}{frameLength}\right) - k_x, 0\right), \text{ and where}$$

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.5 SBR Tool overview, replace:

The output from the filtering is stored in the matrix:

$$\mathbf{X}_{Low}(k, l + t_{HFGen}), 0 \leq k < 32, 0 \leq l < numTimeSlots \cdot RATE$$

by:

The subband filtered low band is defined by  $\mathbf{X}_{Low}$  according to:

$$\mathbf{X}_{Low}(k, l) = \begin{cases} \mathbf{W}(k, l - t_{HFGen}) & , 0 \leq k < k_x', t_{HFGen} \leq l < l_f + t_{HFGen} \\ 0 & , k_x \leq k < 32, t_{HFGen} \leq l < l_f + t_{HFGen} \\ \mathbf{W}'(k, l + l_f - t_{HFGen}) & , 0 \leq k < k_x', 0 \leq l < t_{HFGen} \\ 0 & , k_x' \leq k < 32, 0 \leq l < t_{HFGen} \end{cases}$$

where  $\mathbf{W}'$  is the  $\mathbf{W}$  matrix from the previous frame, and  $k_x'$  is the  $k_x$  value from the previous frame, and where  $l_f = numTimeSlots \cdot RATE$ . If scalable SBR is used the following apply instead of the equation above:

$$\mathbf{X}_{Low}(k, l) = \begin{cases} \mathbf{W}(k, l - t_{HFGen}) & , 0 \leq k < 32, t_{HFGen} \leq l < l_f + t_{HFGen} \\ \mathbf{W}'(k, l + l_f - t_{HFGen}) & , 0 \leq k < 32, 0 \leq l < t_{HFGen} \end{cases}$$

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.5 SBR Tool overview, replace:

$$\mathbf{X}(k, l) = \begin{cases} \mathbf{X}_{Low}(k, l + t_{HFAdj}) & , 0 \leq k < k_x' + bsco', 0 \leq l < l_{Temp} \\ \mathbf{X}_{Low}(k, l + t_{HFAdj}) & , 0 \leq k < k_x + bsco, l_{Temp} \leq l < numTimeSlots \cdot RATE \\ \mathbf{Y}(k, l + t_{HFAdj}) & , k_x' + bsco' \leq k < k_x + M, 0 \leq l < l_{Temp} \\ \mathbf{Y}(k, l + t_{HFAdj}) & , k_x + bsco \leq k < k_x + M, l_{Temp} \leq l < numTimeSlots \cdot RATE \\ 0 & , \max(k_x + bsco, k_x + M) + M \leq k < 64, 0 \leq l < numTimeSlots \cdot RATE \end{cases}$$

by:

$$X(k,l) = \begin{cases} X_{Low}(k, l+t_{HFAdj}) & , 0 \leq k < k'_x + bsco', 0 \leq l < l_{Temp} \\ Y'(k, l+t_{HFAdj} + l_f) & , k'_x + bsco' \leq k < k'_x + M', 0 \leq l < l_{Temp} \\ 0 & , \max(k'_x + bsco', k'_x + M') \leq k < 64, 0 \leq l < l_{Temp} \\ X_{Low}(k, l+t_{HFAdj}) & , 0 \leq k < k_x + bsco, l_{Temp} \leq l < l_f \\ Y(k, l+t_{HFAdj}) & , k_x + bsco \leq k < k_x + M, l_{Temp} \leq l < l_f \\ 0 & , \max(k_x + bsco, k_x + M) \leq k < 64, l_{Temp} \leq l < l_f \end{cases}$$

where

$$l_f = numTimeSlots \cdot RATE$$

and

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.6.2 Inverse filtering, replace:

where **bs\_invf\_mode'** are the **bs\_invf\_mode** values from the previous SBR frame.

by:

where **bs\_invf\_mode'** are the **bs\_invf\_mode** values from the previous SBR frame, and are assumed to be zero for the first frame.

In ISO/IEC 14496-3:2001/Amd.1, subclause 4.6.18.6.3 HF generator, replace Figure 4.46 by the following figure:

