Technical Specification Group Services and System Aspects **TSGS#27(05)0095**
Meeting #27, Tokyo, Japan
14-17 March 2005

Source: TSG-SA WG4

Title: CRs TS 26.401 & TS 26.405 & TS 26.410 on Corrections to Enhanced aacPlus codec specifications (Release 6)

Document for: Approval

Agenda Item: 7.4.3

The following CRs, agreed at the TSG-SA WG4 meeting #34, are presented to TSG SA #27 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.401	002	1	Rel-6	Correction to written specification: add missing reference to MPEG corrigendum	F	6.1.0	S4	TSG-SA WG4#34	S4-050151
26.405	001	1	Rel-6	Correction to written specification: wrong formula on ICC parameter extraction	F	6.0.0	S4	TSG-SA WG4#34	S4-050179
26.410	014	1	Rel-6	Correction to C-code: 3GPP file format wrong writing of brand	F	6.1.1	S4	TSG-SA WG4#34	S4-050180
26.410	015	1	Rel-6	Correction to C-code: remove copyright notice from 3GPP file format header files	F	6.1.1	S4	TSG-SA WG4#34	S4-050181
26.410	016	1	Rel-6	Correction to C-code: add capability for 10 kbit/s, mono and 16 kbit/s stereo encoding	F	6.1.1	S4	TSG-SA WG4#34	S4-050153
26.410	017	1	Rel-6	Correction to C-code: add capability for data stream element parsing	F	6.1.1	S4	TSG-SA WG4#34	S4-050154
26.410	018	1	Rel-6	Correction to C-code: PNS decoding algorithm not conform to MPEG	F	6.1.1	S4	TSG-SA WG4#34	S4-050155
26.410	019	1	Rel-6	Correction to C-code: the decoder mono only compile target not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050182
26.410	020	1	Rel-6	Correction to C-code: PS-decoding with varying upper frequency border not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050183
26.410	021	1	Rel-6	Correction to C-code: PS-decoding with variable framing not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050184
26.410	022		Rel-6	Correction to written specification: move WMOPS numbers to informative Annex	F	6.1.1	S4	TSG-SA WG4#34	S4-050165

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CHANGE REQUEST

⌘ **26.401** **CR** **002** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME [X] Radio Access Network ☐ Core Network [X]

Title:	⌘	Correction to written specification: add missing reference to MPEG corrigendum
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	MPEG has released a corrigendum for PS decoding which solves a couple of issues, the 3GPP specification of enhanced aacPlus should incorporate this corrigendum, too.
Summary of change:	⌘	An additional reference is added to the specification text.
Consequences if not approved:	⌘	3GPP specification does not incorporate the latest available corrigendum of MPEG

Clauses affected:	⌘	2, 5

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	CR 26.410 020
			X	Test specifications		
			X	O&M Specifications		

Other comments: ⌘ **Background information, not to be put into the specification text but for information purposes only:**

The MPEG corrigendum addresses a couple of issues related to Parametric Stereo Decoding. It should be noted that none of the changes affect the bit-exact behaviour of the reference enhanced aacPlus implementation encoder and decoder source code. The addressed issues are:

- editorial corrections
- previously, separate tables and equations for sampling rates < 32 kHz and >= 32

	kHz have been defined. This sampling rate dependancy for <32 kHz have been removed and been aligned to the >= 32 kHz tables (does not affect the configurations as provided within 3GPP, no change of source code required) - a number of clarifications for cases with changing configurations (does not affect the configurations as provided within 3GPP, no change of source code required) - clarification for cases where incomplete parameter sets are transmitted (does not affect the configurations as provided within 3GPP, no change of source code required) - clarification on how to handle a varying upper frequency border (does not affect the configurations as provided within 3GPP, however a source code change is required)

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2 Normative references

This TS incorporates by dated and undated reference, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this TS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] 3GPP TS 26.410 : Enhanced aacPlus general audio codec; Floating-point ANSI-C Code.

[2] 3GPP TS 26.403 : Enhanced aacPlus general audio codec; Encoder Specification AAC part.

[3] 3GPP TS 26.404 : Enhanced aacPlus general audio codec; Encoder Specification SBR part.

[4] 3GPP TS 26.405 : Enhanced aacPlus general audio codec; Encoder Specification Parametric Stereo part.

[5] ISO/IEC 14496-3:2001, Information technology - Coding of audio-visual objects - Part 3: Audio.

[6] ISO/IEC 14496-3:2001/Amd.1:2003, Bandwidth Extension.

[7] ISO/IEC 14496-3:2001/Amd.1:2003/DCOR1.

[8] ISO/IEC 14496-3:2001/Amd.2:2004, Parametric Coding for High Quality Audio.

[9] 3GPP TS 26.402: Enhanced aacPlus general audio codec; Additional Decoder Tools.

[10] 3GPP TS 26.411 : Enhanced aacPlus general audio codec; Fixed-point ANSI-C Code.

[11] 3GPP TS 26.234 : Transparent end-to-end Packet-switched Streaming Service (PSS) ; Protocols and codecs

[12] ISO/IEC 14496-3:2001/Amd.2:2004/DCOR 1

5 General

The Enhanced aacPlus general audio codec consists of MPEG-4 AAC, MPEG-4 SBR and MPEG-4 Parametric Stereo. The AAC is a general audio codec, SBR is a bandwidth extension technique offering substantial coding gain in combination with AAC, and Parametric Stereo enables stereo coding at very low bitrates. In addition to the above parts of the Enhanced aacPlus codec that are specified in ISO standards [5][6][7][8][12] there are 3 additional tools included in the Enhanced aacPlus decoder:

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CHANGE REQUEST

⌘ **26.405** **CR** **001** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to written specification: wrong formula on ICC parameter extraction
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	In a formula in the written specification for the PS encoder a division by 2 is missing
Summary of change:	⌘	The corresponding formula needs to be replaced
Consequences if not approved:	⌘	Written specification and source code are not in line.

Clauses affected:	⌘	5.4.1			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

In 26.405-600, subclause 5.4.1 (Parameter estimation), replace

”

$$icc(b) = \begin{cases} \sqrt{1 - \min\left(\frac{\mathrm{Re}\left(e_R(b)\right)}{\sqrt{e_l(b)e_r(b)}}, 1 \right)} & ,b < 5 \quad and \quad num\_stereo\_bands = 10 \quad or \\ & ,b < 11 \quad and \quad num\_stereo\_bands = 20 \\ \sqrt{1 - \min\left(\frac{\left|e_R(b)\right|}{\sqrt{e_l(b)e_r(b)}}, 1 \right)} & ,otherwise \end{cases}$$

”

with

”

$$icc(b) = \begin{cases} \sqrt{\frac{1 - \min\left(\frac{\mathrm{Re}\left(e_R(b)\right)}{\sqrt{e_l(b)e_r(b)}}, 1 \right)}{2}} & ,b < 5 \quad and \quad num\_stereo\_bands = 10 \quad or \\ & ,b < 11 \quad and \quad num\_stereo\_bands = 20 \\ \sqrt{\frac{1 - \min\left(\frac{\left|e_R(b)\right|}{\sqrt{e_l(b)e_r(b)}}, 1 \right)}{2}} & ,otherwise \end{cases}$$

”

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CHANGE REQUEST

⌘ **26.410** **CR** **014** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to C-code: 3GPP file format wrong writing of brand
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	The brand, compatible brand and profile/level indication when producing 3GPP files were written wrongly
Summary of change:	⌘	Code to handle the branding info needs to be modified.
Consequences if not approved:	⌘	The enhanced aacPlus encoder would produce 3GPP files with wrong branding info.

Clauses affected:	⌘	C-code appendix

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments: ⌘

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

In the encoder file mp4file.c:

line 14, add

“

```
#define MAX_COMPATIBLE_BRANDS 4
```

“

line 63ff replace

“

```
 ISO3GppBrand = MP4_FOUR_CHAR_CODE( '3', 'g', 'p', '4' ),  /* brand for 3GPP
files */
```

“

by

“

```
 ISO3GppR4Brand      = MP4_FOUR_CHAR_CODE( '3', 'g', 'p', '4' ),  /* brand for
3GPP release 4 files */
 ISO3GppR6Brand      = MP4_FOUR_CHAR_CODE( '3', 'g', 'p', '6' ),  /* brand for
3GPP release 6 files */
 ISO3Gpp2aBrand      = MP4_FOUR_CHAR_CODE( '3', 'g', '2', 'a' ),  /* brand for
3GPP2 files */
```

“

line 176 add:

“

```
 u32        majorBrand = ISO3GppR6Brand;
 u32        minorVersion = 0x0;
 u32        compatibleBrands[MAX_COMPATIBLE_BRANDS] = {0};
 int        i;
```

“

line 198ff replace:

“

```
if (nChannels>2)
 mp4ProfileLevel.audio     = 0x10;  /* HQ Audio Profile L3 */
else
 mp4ProfileLevel.audio     = 0x0f;  /* HQ Audio Profile L2 */
```

“

by

“

```
 i = 0;
 if (bSbrPresent) {
   compatibleBrands[i++] = ISO3Gpp2aBrand;
   compatibleBrands[i++] = ISOMpeg4V2Brand;
     /* explicit hierarchical signalling */
   mp4ProfileLevel.audio = 0x2c;  /* HE AAC Profile L2 */
 }
```

“

line 215ff. replace

“

```
if (b3GppFile) {
    err = ISOSetMovieBrand( hMp4->mp4Movie, ISO3GppBrand, 0x00000000 );

    if (err != ISONoErr)
      return (int)err;

    err = ISOSetMovieCompatibleBrand( hMp4->mp4Movie, ISOMpeg4V2Brand );

    if (err != ISONoErr)
      return (int)err;
  }
```

“

by

“

```
err = ISOSetMovieBrand( hMp4->mp4Movie, majorBrand, minorVersion );

if (err != ISONoErr)
  return (int)err;

i = 0;
while (i<MAX_COMPATIBLE_BRANDS && compatibleBrands[i]!=0) {
  err = ISOSetMovieCompatibleBrand( hMp4->mp4Movie, compatibleBrands[i]);
  if (err != ISONoErr)
    return (int)err;
  i++;
}
```

“

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CHANGE REQUEST

⌘ **26.410** **CR** **015** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to C-code: remove copyright notice from 3GPP file format header files
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	3GPP specifications shall not contain copyrights.
Summary of change:	⌘	Removal of copyright statement.
Consequences if not approved:	⌘	Specifcation would still contain copyright statements.

Clauses affected:	⌘	C-code appendix			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

In all instances of the files MP4Movies.h and MP4OSMacros.h, remove the copyright statement

“

```
/*
This software module was originally developed by Apple Computer, Inc.
in the course of development of MPEG-4.
This software module is an implementation of a part of one or
more MPEG-4 tools as specified by MPEG-4.
ISO/IEC gives users of MPEG-4 free license to this
software module or modifications thereof for use in hardware
or software products claiming conformance to MPEG-4.
Those intending to use this software module in hardware or software
products are advised that its use may infringe existing patents.
The original developer of this software module and his/her company,
the subsequent editors and their companies, and ISO/IEC have no
liability for use of this software module or modifications thereof
in an implementation.
Copyright is not released for non MPEG-4 conforming
products. Apple Computer, Inc. retains full right to use the code for its own
purpose, assign or donate the code to a third party and to
inhibit third parties from using the code for non
MPEG-4 conforming products.
This copyright notice must be included in all copies or
derivative works. Copyright (c) 1999.
*/
```

“

by

“

```
/*
This software module was originally developed by Apple Computer, Inc.
in the course of development of MPEG-4.
*/
```

”

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CHANGE REQUEST

⌘ **26.410** **CR** **016** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Correction to C-code: add capability for 10 kbit/s, mono and 16 kbit/s stereo encoding
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6 ***Date:*** ⌘ 15/03/2005
Category:	⌘	**F** ***Release:*** ⌘ Rel-6

Use one of the following categories:
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R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	For 10 kbit/s, mono encoding a tuning table entry was missing. For 16 kbit/s stereo encoding selection of the right entry failed.
Summary of change:	⌘	Adding a tuning table entry to allow 10 kbit/s mono encoding, enable selection of the correct entry for 16 kbit/s stereo.
Consequences if not approved:	⌘	10 kbit/s mono and 16 kbit/s stereo encoding with enhanced aacPlus would not be possible.
Clauses affected:	⌘	C-code appendix

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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In the encoder file main.c,

line 176ff, replace

“

```
if ( (inputInfo.nChannels == 2) && (!bEncodeMono) && (bitrate > 16000) &&
(bitrate < 36000) )
{
    MOVE(1);
    useParametricStereo = 1;
  }
```

“

with

“

```
if ( (inputInfo.nChannels == 2) && (!bEncodeMono) && (bitrate >= 16000) &&
(bitrate < 36000) )
{
    MOVE(1);
    useParametricStereo = 1;
  }
```

“

line 192ff, replace

“

```
if ( (inputInfo.sampleRate == 48000) && (nChannelsAAC == 2) && (bitrate <
24000) ) {
    MOVE(1);
    bDoIIR32Resample  = 1;
  }
```

“

with

“

```
if ( (inputInfo.sampleRate == 48000) && (nChannelsAAC == 2) && (bitrate <
24000)||
       (inputInfo.sampleRate == 48000) && (nChannelsAAC == 1) && (bitrate <
12000) )
 {
    MOVE(1);
    bDoIIR32Resample  = 1;
  }
```

“

In the encoder file sbr_main.c,

line 45, add

“

```
{ 10000, 12000,  16000, 1,  1,  3, 1, 0, 6, SBR_MONO, 3 },
```

“

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CHANGE REQUEST

⌘ **26.410** **CR** **017** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Correction to C-code: add capability for data stream element parsing
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
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A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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R98	*(Release 1998)*
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Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Parsing of Data Stream Elements in the decoder did not work.
Summary of change:	⌘	Capability to parse Data Stream Elements is added.
Consequences if not approved:	⌘	Bitstreams containing Data Stream Elements could not be decoded.

Clauses affected:	⌘	4.1, C-code appendix

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Written specification, Section 4.1, modify Table5:

Table 5: Decoder source code files and lines of code

Directory	Module	Lines of code
src/	main.c	299
	fileifc.c	173
	spline_resampler.c	172
FloatFR_aacdec/	aacdecoder.c	~~168~~170
	streaminfo.c	10
	channelinfo.c	102
	stereo.c	78
	longblock.c	234
	shortblock.c	241
	pulsedata.c	24
	block.c	163
	pns.c	96
	imdct.c	50
	tns.c	137
	bitstream.c	15
	channel.c	92
	conceal.c	245
	dse.c	9
FloatFR_sbrdeclib/	env_dec.c	370
	FFR_aacPLUScheck.c	32
	sbr_bitb.c	37
	env_calc.c	775
	lpp_tran.c	504
	sbrdecoder.c	514
	sbr_dec.c	218
	sbr_crc.c	45
	sbr_fft.c	615
	hybrid.c	140
	ps_bitdec.c	223
	huff_dec.c	9
	env_extr.c	655
	freq_sca.c	337
	ps_dec.c	317
	qmf_dec.c	526

C-Code appendix:

In file aacdecoder.c,

line 11, add:

“

```
#include "dse.h"
```

“

lines 348-350 replace

“

```
        INDIRECT(1); MOVE(2);
        ErrorStatus = AAC_DEC_UNIMPLEMENTED_DSE;
```

```
        self->frameOK = 0;
```

“

with

“

```
        INDIRECT(1); PTR_INIT(1); FUNC(2);
        CDse_Read(bs, &self->byteAlignBits);
```

“

Add new file dse.h to FloatFR_aacdec/src:

“

```
#ifndef DSE_H
#define DSE_H

#include "FFR_bitbuffer.h"

void CDse_Read(HANDLE_BIT_BUF bs,
               long *byteBorder);

#endif
```

“

Add new file dse.c to FloatFR_aacdec/src:

“

```
#include "dse.h"
#include "bitstream.h"
#include "counters.h" /* the 3GPP instrumenting tool */

void CDse_Read(HANDLE_BIT_BUF bs,
         long *byteBorder)
{
  char data_byte_align_flag;
  short cnt, i;

  COUNT_sub_start("CDse_Read");

  FUNC(2);
  GetBits(bs, 4);
```

```
  FUNC(2); MOVE(1);
  data_byte_align_flag = GetBits(bs, 1);

  FUNC(2); MOVE(1);
  cnt = GetBits(bs, 8);

  ADD(1); BRANCH(1);
  if (cnt == 255) {
    ADD(1); FUNC(2);
    cnt += GetBits(bs, 8);
  }

  BRANCH(1);
  if (data_byte_align_flag) {
    FUNC(2);
    ByteAlign(bs, byteBorder);
  }

  LOOP(1);
  for (i = 0; i < cnt; i++) {
    FUNC(2);
    GetBits(bs, 8);
  }
}
```

“

3GPP TSG-SA4 Meeting #34
Lisbon, Portugal, Feb. 21-25 2005

Tdoc ⌘S4-050155

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.410** **CR** **018** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME [X] Radio Access Network ☐ Core Network [X]

Title:	⌘	Correction to C-code: PNS decoding algorithm not conform to MPEG
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	The random number generator in the PNS algorithm is non-MPEG conformant.
Summary of change:	⌘	Change PNS decoding to conform with MPEG standard by replacing table-based random number generator with pseudo-random number generation algorithm
Consequences if not approved:	⌘	Bitstreams containing PNS data would not conform to the MPEG standard.

Clauses affected:	⌘	4.1, 4.3.2, C-code appendix

Other specs affected:	Y	N		
⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	Requires 2 Words of additional static memory. The Enhanced aacPlus encoder does not make use of the PNS tool, thus selection and verification test results would not be affected.

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Written specification, Section 4.1, modify Table 5:

Table 5: Decoder source code files and lines of code

Directory	Module	Lines of code
src/	main.c	299
	fileifc.c	173
	spline_resampler.c	172
FloatFR_aacdec/	aacdecoder.c	~~168~~172
	streaminfo.c	10
	channelinfo.c	102
	stereo.c	78
	longblock.c	234
	shortblock.c	241
	pulsedata.c	24
	block.c	163
	pns.c	~~96~~89
	imdct.c	50
	tns.c	137
	bitstream.c	15
	channel.c	92
	conceal.c	245
FloatFR_sbrdeclib/	env_dec.c	370
	FFR_aacPLUScheck.c	32
	sbr_bitb.c	37
	env_calc.c	775
	lpp_tran.c	504
	sbrdecoder.c	514
	sbr_dec.c	218
	sbr_crc.c	45
	sbr_fft.c	615
	hybrid.c	140
	ps_bitdec.c	223
	huff_dec.c	9
	env_extr.c	655
	freq_sca.c	337
	ps_dec.c	317
	qmf_dec.c	526

Written specification, Section 4.3.2, modify Table 10:

Table 10: Decoder static memory

Name	Data type	Size [word]	Allocated in Source File	Description
OverlapBuffer[nChan]	float	1024	aac_ram.c	Delay buffer for overlap and add, only half the size for mono only decoder
AacDecoderInstance	AAC_DECODER_INSTANCE	11	aacdecoder.c	AAC decoder instance
StreamInfo	CStreamInfo	7	aac_ram.c	Bitstream information
AacDecoderStaticChannelInfo[nChan]	CaacDecoderStaticChannelInfo	~~14~~16	aac_ram.c	Channel information, only half the size for mono only decoder
sbr_CodecQmfStatesAnalysis	float	640	sbr_ram.c	QMF analysis filter bank states
sbr_GainSmooth	float	96	sbr_ram.c	Gain smoothing filter states
sbr_NoiseSmooth	float	96	sbr_ram.c	Noise level smoothing filter states
sbr_QmfStatesSynthesis	float	1280	sbr_ram.c	QMF synthesis filter bank states
sbr_OverlapBuffer	float	1536	sbr_ram.c	SBR delay buffer, only half the size for mono only decoder
sbr_LpcFilterStatesReal	float	128	sbr_ram.c	LPC filter states
sbr_LpcFilterStatesImag	float	128	sbr_ram.c	LPC filter states, obsolete for mono only decoder
sbr_TransposerSettings	float	18	sbr_ram.c	Transposer configuration parameters
FreqBandData	FREQ_BAND_DATA	164	sbr_ram.c	SBR Frequency band information
PrevFrameData[nChan]	SBR_PREV_FRAME_DATA	120	sbr_ram.c	SBR previous frame data, only half the size for mono only decoder
sbr_PrevBitstream	SBRBITSTREAM	584	sbr_ram.c	SBR previous frame bitstream
sbrDecoderInstance	SBR_DECODER_INSTANCE	797	sbrdecoder.c	SBR decoder instance
TimeDataFloat[nChan]	float	4096	main.c	Output buffer for time-domain signal, only half the size for mono only decoder
inBuffer	int	384	main.c	Input buffer for bitstream
splineResamplerInstance	SPLINE_RESAMPLER	21	spline_resampler.c	Spline resampler instance
Sum		~~11161~~ 11163		

C-Code annex:

In file aac_ram.c, line 19, add

“

```
/* The structure CPnsStaticInterChannelData contains the random number
generator state and the pns frame counter */
CPnsStaticInterChannelData PnsStaticInterChannelData;
```

”

In file aac_ram.h, line 15, add

“

```
extern CPnsStaticInterChannelData PnsStaticInterChannelData;
```
“

In file aacdecoder.c, line 106, add

“

```
/* these are static, but we access them via pointers inside the dynamic
data */
PnsStaticInterChannelData.current_seed = 0;
PnsStaticInterChannelData.pns_frame_number = 0;
```
“

In file aacdecoder.c, line 202, add

“

```
self->pAacDecoderChannelInfo[ch]->pPnsInterChannelData =
&pAacDecoderDynamicCommonDataInit->PnsInterChannelData;
self->pAacDecoderChannelInfo[ch]->pPnsStaticInterChannelData =
&PnsStaticInterChannelData;
```
“

In file channelinfo.h,

replace

“

```
#define PNS_BAND_FLAGS_SIZE              8
```

“

with

“

```
#define PNS_BAND_FLAGS_SIZE              16
```

“

replace the struct

“

```
typedef struct {
  unsigned char correlated[PNS_BAND_FLAGS_SIZE];
} CPnsInterChannelData;
```

“

with

“

```
typedef struct {
```

```
  unsigned char correlated[PNS_BAND_FLAGS_SIZE];
  short randomState[PNS_BAND_FLAGS_SIZE * 8];
} CPnsInterChannelData;
```

“

Add

“

```
typedef struct {
  short current_seed;
  short pns_frame_number;
} CPnsStaticInterChannelData;
```

“

Add to the struct CAacDecoderChannelInfo:

“

```
   CPnsInterChannelData *pPnsInterChannelData;
  CPnsStaticInterChannelData *PnsStaticInterChannelData;
```

“

In file pns.c,

apply the following patch:

“

```
15,17c15
< extern const float sbr_randomPhase[AAC_NF_NO_RANDOM_VAL][2];
<
< #define PNS_BAND_FLAGS_MASK             (PNS_BAND_FLAGS_SIZE - 1)
---
> #define PNS_BAND_FLAGS_MASK             ((1 << PNS_BAND_FLAGS_SHIFT)
- 1)
20d17
< #define PNS_RANDOM_PHASE_16_32_BIT_SCALE 4
30c27,28
<                            int bandOffsetEnd);
---
>                            int bandOffsetEnd,
>                            short *randomState);
38c36
<   CPnsInterChannelData *pInterChannelData = &pAacDecoderChannelInfo-
>PnsInterChannelData;
```

```
---
>   CPnsInterChannelData *pInterChannelData = pAacDecoderChannelInfo-
>pPnsInterChannelData;
112c110
<   CPnsInterChannelData *pInterChannelData = &pAacDecoderChannelInfo-
>PnsInterChannelData;
---
>   CPnsInterChannelData *pInterChannelData = pAacDecoderChannelInfo-
>pPnsInterChannelData;
135c133
<   CPnsInterChannelData *pInterChannelData = &pAacDecoderChannelInfo-
>PnsInterChannelData;
---
>   CPnsInterChannelData *pInterChannelData = pAacDecoderChannelInfo-
>pPnsInterChannelData;
211,221d208
<   BRANCH(1);
<   if (channel == 0) {
<
<     MOVE(2);
<     noise_left_index = noise_left_index_start = noise_index;
<   } else {
<
<     MOVE(1);
<     noise_left_index = noise_left_index_start;
<   }
<
252,269c239,257
<             FUNC(3); LOGIC(1); BRANCH(1);
<             if (channel > 0 &&
CPns_IsCorrelated(pAacDecoderChannelInfo[0], group, band)) {
<               int noise_index_tmp = noise_index;
<               noise_index = noise_left_index;
<
<               MOVE(2); /* counting previous operation */
<
<               FUNC(4);
<               GenerateRandomVector(scale,
<                                    spectrum,
<                                    BandOffsets[band],
<                                    BandOffsets[band + 1]);
<
<               MOVE(1);
<               noise_index = noise_index_tmp;
<             } else {
<
<               FUNC(4);
---
>             if (CPns_IsCorrelated(pAacDecoderChannelInfo[0], group,
band)) {
>               if (channel == 0) {
>                 /* store random state for right channel */
>                 pAacDecoderChannelInfo[0]->pPnsInterChannelData-
>randomState[pns_band] = pAacDecoderChannelInfo[0]-
>pPnsStaticInterChannelData->current_seed;
>                 GenerateRandomVector(scale,
>                                      spectrum,
```

```
>                                       BandOffsets[band],
>                                       BandOffsets[band + 1],
>                                       &(pAacDecoderChannelInfo[0]-
>pPnsStaticInterChannelData->current_seed));
>               } else {
>                 /* use same random state as was used for left channel
*/
>                 GenerateRandomVector(scale,
>                                       spectrum,
>                                       BandOffsets[band],
>                                       BandOffsets[band + 1],
>                                       &(pAacDecoderChannelInfo[0]-
>pPnsInterChannelData->randomState[pns_band]));
>               }
>             }
>             else {
273c261,262
<                                     BandOffsets[band + 1]);
---
>                                     BandOffsets[band + 1],
>                                     &(pAacDecoderChannelInfo[0]-
>pPnsStaticInterChannelData->current_seed));
278a268
>     pAacDecoderChannelInfo[0]->pPnsStaticInterChannelData-
>current_seed += pAacDecoderChannelInfo[0]->pPnsStaticInterChannelData-
>pns_frame_number;
279a270,272
>   if (channel == 0) {
>     pAacDecoderChannelInfo[0]->pPnsStaticInterChannelData-
>pns_frame_number++;
>   }
287c280,281
<                             int bandOffsetEnd)
---
>                             int bandOffsetEnd,
>                             short *randomState)
302,303c296,297
<     MOVE(1);
<     spec[i] = sbr_randomPhase[noise_index][0];
---
>     MOVE(2); MULT(1); ADD(1);
>     spec[i] = *randomState = (0x529L * *randomState) + 0x3a7fL;
307,309d300
<
<     noise_index = (noise_index + 1) & (AAC_NF_NO_RANDOM_VAL - 1);
<     noise_left_index = (noise_left_index + 1) & (AAC_NF_NO_RANDOM_VAL
- 1);
“
```

3GPP TSG-SA4 Meeting #34
Lisbon, Portugal, Feb. 21-25 2005

Tdoc ⌘S4-050182

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.410** **CR** **019** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to C-code: the decoder mono only compile target not working correctly
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	The mono-only decoder compile target wasn't functioning for mono bitstreams.
Summary of change:	⌘	Fixed defines for mono-only decoder compile target to behave as expected.
Consequences if not approved:	⌘	Mono only decoder compile target does not work for mono bitstreams.

Clauses affected:	⌘	C-code appendix

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘

Other comments: ⌘

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

In file sbr_dec.c,

line 56, replace

“

```
  BRANCH(1); ADD(1);
  if (nChannels == 1) {
    MOVE(1);
    bUseLP = 0;
  }
```

“

with

“

```
#ifndef LP_SBR_ONLY
  BRANCH(1); ADD(1);
  if (nChannels == 1) {
    MOVE(1);
    bUseLP = 0;
  }
#endif
```

“

3GPP TSG-SA4 Meeting #34
Lisbon, Portugal, Feb. 21-25 2005

Tdoc ⌘S4-050183

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.410** **CR** **020** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to C-code: PS-decoding with varying upper frequency border not working correctly
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6 — ***Date:*** ⌘ 15/03/2005
Category:	⌘	**F** — ***Release:*** ⌘ Rel-6

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	The decoder PS-module was not able to handle a varying upper frequency border.
Summary of change:	⌘	Code to handle varying upper frequency borders is added.
Consequences if not approved:	⌘	The decoder could not handle bitstreams with varying upper frequency borders correctly.

Clauses affected:	⌘	C-code appendix

	Y	N			
Other specs affected:	X		Other core specifications	⌘	CR 26.401 002
		X	Test specifications		
		X	O&M Specifications		

Other comments: ⌘

How to create CRs using this form:
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Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Note: The Enhanced aacPlus encoder does not produce bitstreams with varying upper frequency borders, thus selection and verification test results would not be affected

In file ps_dec.c,

line 629, replace

“

```
    if (usb != pms->lastUsb && pms->lastUsb!=0)
    {
      assert(0);
    }
```

“

with

“

```
    if (usb > pms->lastUsb && pms->lastUsb!=0)
    {
      int sb, i, k, kmax;
      kmax = 2;

      for (sb = pms->lastUsb-NO_QMF_CHANNELS_IN_HYBRID; sb < usb-
NO_QMF_CHANNELS_IN_HYBRID; sb++){
        if (sb<NO_QMF_ALLPASS_CHANNELS) {
          for (i=0 ; i<NO_SERIAL_ALLPASS_LINKS ; i++) {
            for (k=0 ; k < pms->aNoSampleDelayRSer[i]; k++) {
              pms->aaaRealDelayRBufferSerQmf[i][k][sb] = 0;
              pms->aaaImagDelayRBufferSerQmf[i][k][sb] = 0;
            }
          }
        }
        else {
          kmax = pms->aNoSampleDelay[sb-NO_QMF_ALLPASS_CHANNELS];
        }
        for (k=0 ; k < kmax; k++) {
          pms->aaRealDelayBufferQmf[sb][k] = 0;
```

```
            pms->aaImagDelayBufferQmf[sb][k] = 0;
          }
        }
      }
```
“

3GPP TSG-SA4 Meeting #34
Lisbon, Portugal, Feb. 21-25 2005

Tdoc ⌘S4-050184

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.410** **CR** **021** ⌘ **rev** **1** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction to C-code: PS-decoding with variable framing not working correctly
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change:	⌘	The PS-decoder did not hande bitstreams with variable PS framing correctly.
Summary of change:	⌘	The code to handle variable PS framing is being corrected.
Consequences if not approved:	⌘	The decoder could not handle bitstreams with variable PS framing correctly.

Clauses affected:	⌘	C-code appendix

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Note: The enhanced aacPlus encoder does not produce frames with variable PS frames, thus selection and verification test results would not be affected

In file ps_bitdec.c,

line 245, replace

“

```
      for (gr = 0; gr < NO_HI_RES_BINS; gr++) {
        h_ps_dec->aaIidIndex[h_ps_dec->noEnv][gr] =
          h_ps_dec->aaIidIndex[h_ps_dec->noEnv-1][gr];
      }

      for (gr = 0; gr < NO_HI_RES_BINS; gr++) {
        h_ps_dec->aaIccIndex[h_ps_dec->noEnv][gr] =
          h_ps_dec->aaIccIndex[h_ps_dec->noEnv-1][gr];
      }
```

“

with

“

```
      for (gr = 0; gr < NO_HI_RES_BINS; gr++) {
        h_ps_dec->aaIidIndex[h_ps_dec->noEnv-1][gr] =
          h_ps_dec->aaIidIndex[h_ps_dec->noEnv-2][gr];
      }

      for (gr = 0; gr < NO_HI_RES_BINS; gr++) {
        h_ps_dec->aaIccIndex[h_ps_dec->noEnv-1][gr] =
          h_ps_dec->aaIccIndex[h_ps_dec->noEnv-2][gr];
      }
```

“

3GPP TSG-SA4 Meeting #34
Lisbon, Portugal, February 21-25 2005

Tdoc ⌘S4-050165

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.410** **CR** **22** ⌘ **rev** **-** ⌘ Current version: **6.1.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME [X] Radio Access Network ☐ Core Network [X]

Title:	⌘	Correction to written specification: move WMOPS numbers to informative Annex
Source:	⌘	TSG SA WG4
Work item code:	⌘	PSSrel6
Date:	⌘	15/03/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	WMOPS numbers do not belong to normative part to the specification.
Summary of change:	⌘	The WMOPS numbers are moved to the informative Annex.
Consequences if not approved:	⌘	Information which is intended to be informative is in the normative section of the specification

Clauses affected:	⌘	4.4, Annex (informative)			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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~~4.4 Weighted MOPS and PROM~~

~~The complexity numbers for the Enhanced aacPlus audio codec can be found in the following table, the numbers have been derived using the "allcat.wav" item, which holds all the material from the selection test concatenated in one single item. For every test case the average and worst frame weighted MOPS figure has been derived. The worst case wMOPS figure over all test cases has been marked in **blue**.~~

~~Table 15: Weighted MOPS and PROM figures~~

	~~Test Case~~	~~Mono Encoder~~	~~Stereo Encoder~~	~~Decoder~~	~~Decoder, mono only~~
~~wMOPS [average / worst frame]~~	~~14m~~	~~15.23 / 16.98~~	~~15.36 / 17.21~~	~~9.38 / 10.07~~	~~8.07 / 8.78~~
	~~18s~~	~~---~~	~~25.79 / 28.36~~	~~19.48 / 20.35~~	~~8.31 / 9.17~~
	~~24m~~	~~**16.72 / 18.93**~~	~~16.86 / 19.14~~	~~10.30 / 11.39~~	~~8.89 / 9.94~~
	~~24s~~	~~---~~	~~27.01 / 29.85~~	~~20.45 / 21.63~~	~~8.82 / 9.93~~
	~~32s~~	~~---~~	~~27.49 / 29.97~~	~~**21.08 / 22.42**~~	~~9.28 / 10.58~~
	~~48s~~	~~---~~	~~**35.22 / 42.22**~~	~~17.96 / 20.26~~	~~**12.42 / 14.32**~~
	~~14m, 16 kHz~~	~~15.42 / 18.41~~	~~15.47 / 18.46~~	~~7.85 / 8.61~~	~~7.85 / 8.60~~
	~~14m, 3% FER~~	~~---~~	~~---~~	~~9.38 / 10.07~~	~~8.07 / 8.78~~
	~~24s, 3% FER~~	~~---~~	~~---~~	~~20.45 / 21.63~~	~~8.81 / 9.93~~
	~~32s, 1%FER~~	~~---~~	~~---~~	~~**21.08 / 22.42**~~	~~9.28 / 10.58~~
	~~32s, 3%FER~~	~~---~~	~~---~~	~~21.08 / 22.38~~	~~9.27 / 10.58~~
~~Program ROM [ops]~~	~~---~~	~~**12540**~~	~~**14365**~~	~~**8048**~~	~~**6209**~~

Annex A (informative):

Weighted MOPS and PROM

The complexity numbers for the Enhanced aacPlus audio codec can be found in the following table, the numbers have been derived using the "allcat.wav" item, which holds all the material from the selection test concatenated in one single item. For every test case the average and worst frame weighted MOPS figure has been derived. The worst case wMOPS figure over all test cases has been marked in **blue**.

Table 15: Weighted MOPS and PROM figures

	Test Case	Mono Encoder	Stereo Encoder	Decoder	Decoder, mono only
wMOPS [average / worst frame]	14m	15.23 / 16.98	15.36 / 17.21	9.38 / 10.07	8.07 / 8.78
	18s	---	25.79 / 28.36	19.48 / 20.35	8.31 / 9.17
	24m	**16.72 / 18.93**	16.86 / 19.14	10.30 / 11.39	8.89 / 9.94
	24s	---	27.01 / 29.85	20.45 / 21.63	8.82 / 9.93
	32s	---	27.49 / 29.97	**21.08 / 22.42**	9.28 / 10.58
	48s	---	**35.22 / 42.22**	17.96 / 20.26	**12.42 / 14.32**
	14m, 16 kHz	15.42 / 18.41	15.47 / 18.46	7.85 / 8.61	7.85 / 8.60
	14m, 3% FER	---	---	9.38 / 10.07	8.07 / 8.78
	24s, 3% FER	---	---	20.45 / 21.63	8.81 / 9.93
	32s, 1%FER	---	---	**21.08 / 22.42**	9.28 / 10.58
	32s, 3%FER	---	---	21.08 / 22.38	9.27 / 10.58
Program ROM [ops]	---	**12540**	**14365**	**8048**	**6209**