Technical Specification Group Services and System Aspects Meeting #12, Stockholm, Sweden, 18-21 June 2001 TSGS#12(01)0307

Source: TSG-SA WG4

Title: CRs to TS 26.173 on AMR-WB Fixed codebook initialisation (Release 5)

Document for: Approval

#### Agenda Item: 7.4.3

The following CRs, agreed at the TSG-SA WG4 meeting #17, are presented to TSG SA #12 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.173	001	1	REL-5	Unnecessary printing in Az_isp-function	F	5.0.0	S4	TSG-SA WG4#17	S4-010365R
26.173	002	1	REL-5	Overflow in isp_az.c	F	5.0.0	S4	TSG-SA WG4#17	S4-010366R
26.173	003	1	REL-5	Error in the ISF extrapolation in 6.60 kbit/s mode	F	5.0.0	S4	TSG-SA WG4#17	S4-010367R
26.173	004	1	REL-5	14-bit masking to decoder	F	5.0.0	S4	TSG-SA WG4#17	S4-010368R
26.173	005	1	REL-5	Correction of the homing function	F	5.0.0	S4	TSG-SA WG4#17	S4-010369R
26.173	006	1	REL-5	Fixed codebook initialisation	F	5.0.0	S4	TSG-SA WG4#17	S4-010377R

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æ		26	<mark>.173</mark>	CR	001		ж	rev	1	ж	Curr	rent vei	rsion:	5.0.	0	ж
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Proposed chang	je a	affec	ts: #	(U)	SIM	ME	UE/UE	X	Rac	lio Ad	ccess	Netwo	ork	Core	Net	work X
Title:	Ж	Un	necess	sary pr	inting in A	<mark>z_is</mark> p	<mark>p-fur</mark>	nctior	ו							
Source:	ж	TS	G-SA	NG4												
Work item code:	: X	AN	IRWB									Date: 8	€ <mark>8-</mark> ,	<mark>June-20</mark>	01	
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Reason for change:	<b>#</b> Unnecessary printing in Az_isp-function.
Summary of change.	Connecessary printf-function is removed.
Consequences if	# AMR-WB codec prints unnecessary error message.
not approved:	
<b>A A A</b>	
Clauses affected:	₩ Files: az_isp.c
Other specs	#   Other core specifications   #
affected:	Test specifications

Other comments:

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Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. Below is a brief summary:

**O&M** Specifications

- 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 <u>ftp://www.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

There is still one unnecessary print-function call in the C-code. It was inserted in the development phase for debugging purposes and it is therefore not valid anymore.

When the AMR-WB encoder does not find enough roots from Az, az\_isp-function prints "!!Not M roots found in Az\_isp()!!!". This happens very rarely and in these instances, the previous ISP vector is used..

# 2. How the code is changed in file *az\_isp.c*

## 2.1 Before the change (lines 194...198)

for (i = 0; i < M; i++) { isp[i] = old\_isp[i]; move16(); }

printf("\n !!Not M roots found in Az\_isp()!!!\n");

## 2.2 After the change

```
\label{eq:constraint} \begin{array}{ll} for \ (i=0; \ i < M; \ i++) \\ \{ & \\ isp[i] = old\_isp[i]; \\ \} \end{array} \hspace{0.5cm} move16(); \end{array}
```

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Reason for change.	overnow may occur in Get_isp_poi-routine
Summary of change.	: # Computation order for two arithmetic operations is changed.
Consequences if	Constable LP filter can be generated.
not approved:	
Clauses affected:	業 Files: isp_az.c
Other specs	#   Other core specifications   #

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affected:

Other comments:

Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. Below is a brief summary:

Test specifications O&M Specifications

- 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.

In some very rare instances, overflow can occur with the current computation order. However, overflow has never been detected in speech signals. After the correction, overflows do not occur anymore. This correction does not change the output of the test vectors, but for some signals the correction prevents overflows.

# 2. How the code is changed in file *isp\_az.c*

### 2.1 Before the change (lines 160...167)

```
for (j = 1; j < i; j++, f--)
{
    L_Extract(f[-1], &hi, &lo);
    t0 = Mpy_32_16(hi, lo, *isp); /* t0 = f[-1] * isp */
    t0 = L_shl(t0, 1);
    *f = L_add(*f, f[-2]); move32(); /* *f += f[-2] */
    *f = L_sub(*f, t0); move32(); /* *f -= t0 */
}</pre>
```

### 2.2 After the change

## 2.3 Before the change (lines 192...199)

```
for (j = 1; j < i; j++, f--)
{
    L_Extract(f[-1], &hi, &lo);
    t0 = Mpy_32_16(hi, lo, *isp); /* t0 = f[-1] * isp */
    t0 = L_shl(t0, 1);
    *f = L_add(*f, f[-2]); move32(); /* *f += f[-2] */
    *f = L_sub(*f, t0); move32(); /* *f -= t0 */
}</pre>
```

## 2.4 After the change

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Title:	Ж	Eri	or in t	he ISF	extrapola	ation i	<mark>n 6.6</mark>	0 kb	it/s m	ode						
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Reason for chan	ge.	: X	One	operati	on is mis	<mark>sing f</mark> i	rom 1	the I	SF ex	trapo	olation	functi	on.			

Summary of change:	ж	A multiplication operation is added into isf_extrapolation-function
Consequences if not approved:	Ħ	The ISF extrapolation in 6.60 kbit/s mode never selects one value in the algorithm.

Clauses affected:	策 Files: isf_extrapolation.c
Other specs affected:	%       Other core specifications       %         Test specifications       0&M Specifications
Other comments:	<b>光</b>

Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. 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.

The ISF extrapolation in 6.60 kbit/s mode never selects one value in the algorithm because of an error in the c-code. IsfCorr[2] is calculated incorrectly and when maximum of IsfCorr[0..2] is taken, index 2 of the vector is never selected.

After the correction it is possible to select all the values in the IsfCorr as a maximum and ISF extrapolation works correctly.

# 2. How the code is changed in file *isf\_extrapolation.c*

```
2.1 Before the change (lines 77...84)
for (i = 7; i < (M - 2); i++)
{
    tmp2 = sub(IsfDiff[i], mean);
    tmp3 = sub(IsfDiff[i - 4], mean);
    L_Extract(L_tmp, &hi, &lo);
    L_tmp = Mpy_32(hi, lo, hi, lo);
    IsfCorr[2] = L_add(IsfCorr[2], L_tmp); move32();
}</pre>
```

## 2.2 After the change

```
for (i = 7; i < (M - 2); i++)
{
    tmp2 = sub(IsfDiff[i], mean);
    tmp3 = sub(IsfDiff[i - 4], mean);
    L_tmp = L_mult(tmp2, tmp3);
    L_Extract(L_tmp, &hi, &lo);
    L_tmp = Mpy_32(hi, lo, hi, lo);
    IsfCorr[2] = L_add(IsfCorr[2], L_tmp); move32();
}</pre>
```

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¥	26	<mark>.173</mark>	CR 004	ж	rev	1 <sup>೫</sup>	Current ve	ersion:	5.0.0	¥
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<i>Title:</i> ដ	14-	bit ma	sking to decod	er						
Source: ೫	TS	<mark>G-SA ۱</mark>	WG4							
Work item code: %	AN	RWB					Date:	ж <mark>8-</mark> ,	June-2001	
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Reason for change	e: X		der and decode ler output.	er should in	clude '	14-bit m	asking but	it is mi	ssing from	the
Summary of chang	<b>је:</b> Ж	14-bit	masking is ins	erted into o	decode	r.				
Consequences if not approved:	ж		masking is mis output sample		the de	coder o	utput and th	ne deco	oder will p	roduce
Clauses affected:	ж	Files	: decoder.c							
Other specs affected:	ж	Τε	ther core speci est specification &M Specification	ns	¥					

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Other comments:

**How to create CRs using this form:** Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. 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 <u>ftp://www.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

The AMR-WB encoder input does have a 14-bit masking but it is missing from the decoder output. Currently the codec is taking in 14-bit samples and producing 16-bit output samples.

# 2. How the code is changed in file *decoder.c*

## 2.1 Before the change (line 135)

fwrite(synth, sizeof(Word16), L\_FRAME16k, f\_synth);

## 2.2 After the change

```
for (i = 0; i < L_FRAME16k; i++) /* Delete the 2 LSBs (14-bit output) */
{
    synth[i] = (Word16) (synth[i] & 0xfffC); logic16(); move16();
}
fwrite(synth, sizeof(Word16), L_FRAME16k, f_synth);</pre>
```

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ж		26	. <mark>173</mark>	CR	005	5	Ħ	re\	1	ж	Cu	irrent	vers	ion:	5.0	0.0	ж
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Summary of change: 8	Shifting of a pointer is corrected. This changes also homing tables.
Consequences if a solution of approved:	Possibility of not detecting homing frames
Clauses affected:	Files: homing.c, homing.tab in C-code and table 9 in the specification document.
Other specs	Cher core specifications       #         Test specifications       #         O&M Specifications       *

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Other comments:

Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. Below is a brief summary:

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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.

The pointer for the homing tables was shifted incorrectly. The homing tables have to be also corrected.. This CR corrects the shifting as well as the homing tables.

## 2. How the code is changed in file *homing.c*

#### 2.1 Before the change (lines 43...51)

```
/* convert the received serial bits */
tmp = sub(nparms, 15);
while (sub(tmp, j) > 0)
{
    param[i] = Serial_parm(15, &prms);
    prms += 15;
    j = add(j, 15);
    i = add(i, 1);
}
```

#### 2.2 After the change

```
/* convert the received serial bits */
tmp = sub(nparms, 15);
while (sub(tmp, j) > 0)
{
    param[i] = Serial_parm(15, &prms);
    j = add(j, 15);
    i = add(i, 1);
}
```

## 3. How the code is changed in file *homing.tab*

3.1 Before the change (lines 26...112)

```
static const Word16 dfh_M7k[PRMN_7k] ={
25351, 4331, 515, 15620,
20992, 0, 0, 0, 0};
static const Word16 dfh_M9k[PRMN_9k] ={
25351, 14010, 26489, 30912,
5254, 3459, 0, 0,
0, 0, 0, 0};
static const Word16 dfh_M12k[PRMN_12k] ={
25351, 14010, 29177, 18070,
19971, 3968, 32492, 8430,
13280, 0, 0, 0,
0, 0, 0, 0,
0};
static const Word16 dfh_M14k[PRMN_14k] ={
25351, 14010, 1912, 16326,
25140, 16384, 502, 15167,
1772, 11512, 0, 0,
0, 0, 0, 0,
0, 0, 0;
static const Word16 dfh_M16k[PRMN_16k] ={
25351, 14010, 1912, 30593,
14594, 19990, 864, 4635,
20446, 27456, 21310, 0,
0, 0, 0, 0, 0,
0, 0, 0, 0, 0,
0, 0};
static const Word16 dfh_M18k[PRMN_18k] ={
25351, 14010, 19995, 14446,
6159, 7329, 20752, 4228,
19488, 24383, 364, 20124,
0, 0, 0, 0,
```

```
0, 0, 0, 0,
0, 0, 0, 0, 0,
0};
static const Word16 dfh_M20k[PRMN_20k] ={
25351, 14010, 3567, 560,
32536, 20534, 5139, 16384,
26161, 18755, 20444, 22173,
12623, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0};
static const Word16 dfh_M23k[PRMN_23k] ={
25351, 14010, 2912, 28827,
15347, 28610, 9853, 1316,
30720, 786, 32259, 13279,
14336, 29152, 23302, 20352,
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0, 0,
0, 0, 0};
static const Word16 dfh_M24k[PRMN_24k] ={
25351, 14010, 1601, 16734,
7923, 15017, 5450, 5477,
5760, 2187, 1534, 12142,
30894, 13419, 13141, 2376,
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0,
0, 0, 0, 0\};
```

#### 3.2 After the change

```
static const Word16 dfh_M7k[PRMN_7k] =
ł
  3168, 29954, 29213, 16121,
  64, 13440, 30624, 16430,
 19008
};
static const Word16 dfh_M9k[PRMN_9k] =
{
   3168, 31665,
                   9943, 9123,
  15599, 4358, 20248, 2048,
  17040, 27787, 16816, 13888
};
static const Word16 dfh_M12k[PRMN_12k] =
ł
  3168, 31665, 9943, 9128,
3647, 8129, 30930, 27926,
 18880, 12319, 496, 1042,
4061, 20446, 25629, 28069,
 13948
};
static const Word16 dfh_M14k[PRMN_14k] =
ł
   3168, 31665, 9943, 9131,
24815, 655, 26616, 26764,
7238, 19136, 6144, 88,
   4158, 25733, 30567, 30494,
   221, 20321, 17823
};
static const Word16 dfh_M16k[PRMN_16k] =
{
     3168, 31665, 9943, 9131,
```

```
700, 3824,
    24815,
                                 7271,
              9528, 6594, 26112,
2068, 12867, 16317,
    26400,
    108, 2068,
23035, 24632,
                        7528,
                                 1752,
     6759, 24576
};
static const Word16 dfh_M18k[PRMN_18k] =
ł
       3168, 31665,
                        9943, 9135,
   14787, 14423, 30477, 24927,
                         916, 5728,
528, 16449,
   25345, 30154,
              2048,
   18978,
    2436,
              3581, 23527, 29479,
    8237, 16810, 27091, 19052,
        0
};
static const Word16 dfh_M20k[PRMN_20k] =
ł
    3168, 31665, 9943,
8637, 31807, 24646,
                                   9129,
                                  736,
   28643,
            2977, 2566, 25564,
   12930, 13960, 2048, 834,
3270, 4100, 26920, 16237,
31227, 17667, 15059, 20589,
30249, 29123, 0
};
static const Word16 dfh_M23k[PRMN_23k] =
    3168, 31665,
                       9943,
                                 9132,
   16748, 3202, 28179, 16317,
30590, 15857, 19960, 8818,
21711, 21538, 4260, 16690,
   20224,
                       4194,
             3666,
                                9497,
   16320, 15388, 5755, 31551,
14080, 3574, 15932, 50,
23392, 26053, 31216
};
static const Word16 dfh_M24k[PRMN_24k] =
ł
                       9943,
                                 9134,
    3168, 31665,
   24776, 5857, 18475, 28535,
   29662, 14321, 18261, 4396,
29353, 10003, 17068, 20504,
   720, 0, 8465, 12581,
28863, 24774, 9709, 26043,
    7957, 27649, 13965, 15236,
   18026, 22047, 16681, 3968
};
```

# 4. How 3GPP TS 26.173 V5.0.0 is changed

# 2.1 Before the change

#### Table 9: Table values for the decoder homing frame in 15-bit-long format for different modes

Mode	Value (MSB=b0)
0	25351, 4331, 515, 15620, 20992, 0, 0, 0, 0
1	25351, 14010, 26489, 30912, 5254, 3459, 0, 0, 0, 0, 0, 0, 0
2	25351, 14010, 29177, 18070, 19971, 3968, 32492, 8430, 13280, 0, 0, 0, 0, 0, 0, 0, 0, 0
3	25351, 14010, 1912, 16326, 25140, 16384, 502, 15167, 1772, 11512, 0, 0, 0, 0, 0, 0, 0, 0, 0
4	25351, 14010, 1912, 30593, 14594, 19990, 864, 4635, 20446, 27456, 21310, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5	25351, 14010, 19995, 14446, 6159, 7329, 20752, 4228, 19488, 24383, 364, 20124, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
6	25351, 14010, 3567, 560, 32536, 20534, 5139, 16384, 26161, 18755, 20444, 22173,12623, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
7	25351, 14010, 2912, 28827, 15347, 28610, 9853, 1316, 30720, 786, 32259, 13279,14336, 29152, 23302, 20352, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
8	025351, 14010, 1601, 16734, 7923, 15017, 5450, 5477, 5760, 2187, 1534, 12142, 30894, 13419, 13141, 2376, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,

# 2.2 After the change

#### Table 9: Table values for the decoder homing frame in 15-bit-long format for different modes

Mode	Value (MSB=b0)
0	3168, 29954, 29213, 16121, 64, 13440, 30624, 16430, 19008
1	3168, 31665, 9943, 9123, 15599, 4358, 20248, 2048, 17040, 27787, 16816, 13888
2	3168, 31665, 9943, 9128, 3647, 8129, 30930, 27926, 18880, 12319, 496, 1042, 4061, 20446, 25629, 28069, 13948
3	3168, 31665, 9943, 9131, 24815, 655, 26616, 26764, 7238, 19136, 6144, 88, 4158, 25733, 30567, 30494, 221, 20321, 17823
4	3168, 31665, 9943, 9131, 24815, 700, 3824, 7271, 26400, 9528, 6594, 26112, 108, 2068, 12867, 16317, 23035, 24632, 7528, 1752, 6759, 24576
5	3168, 31665, 9943, 9135, 14787, 14423, 30477, 24927, 25345, 30154, 916, 5728, 18978, 2048, 528, 16449, 2436, 3581, 23527, 29479, 8237, 16810, 27091, 19052, 0
6	3168, 31665, 9943, 9129, 8637, 31807, 24646, 736, 28643, 2977, 2566, 25564, 12930, 13960, 2048, 834, 3270, 4100, 26920, 16237, 31227, 17667, 15059, 20589, 30249, 29123, 0
7	3168, 31665, 9943, 9132, 16748, 3202, 28179, 16317, 30590, 15857, 19960, 8818, 21711, 21538, 4260, 16690, 20224, 3666, 4194, 9497, 16320, 15388, 5755, 31551, 14080, 3574, 15932, 50, 23392, 26053, 31216
8	3168, 31665, 9943, 9134, 24776, 5857, 18475, 28535, 29662, 14321, 18261, 4396, 29353, 10003, 17068, 20504, 720, 0, 8465, 12581, 28863, 24774, 9709, 26043, 7957, 27649, 13965, 15236, 18026, 22047, 16681, 3968

				CHAN	GE	R	EQ	UE	ST				CR-Form-v3
ж		26.173	CR	006		ж	rev	1	Ħ	Current vers	sion:	5.0.0	Ħ
For <u>HELP</u> o	n u:	sing this fo	rm, se	e bottom o	of this	s pa	ge or	look	at th	e pop-up text	tover	the ¥ syn	nbols.
Proposed chang	je a	nffects: #	(U)	SIM	ME	UE	X	Rac	lio Ad	ccess Networ	'k	Core Ne	etwork X
Title:	ж	Fixed co	debook	initialisat	ion								
Source:	ж	TSG-SA	WG4										
Work item code:	ж	AMRWB								Date: #	8-5	lune-2001	
Category:	ж	F								Release: #	RE	L-5	
		A (co B (Ac C (FL	sential o rrespon Idition o nctiona litorial n planatio	correction) ds to a cor f feature), I modification ondification ons of the a	ion of above	on in feat	ure)			2	(GSN (Rele (Rele (Rele (Rele	ollowing rele M Phase 2) ease 1996) ease 1997) ease 1998) ease 1999) ease 4) ease 5)	eases:

Reason for change:	: # Fixed codebook initialisation
Summary of change	e: # Fixed codebook indices are initialised
Consequences if not approved:	<b>%</b> In rare occasions uninitialised fixed codebook indices can be used
Clauses affected:	₩ Files: c4t64fx.c
Other specs affected:	%       Other core specifications       %         Test specifications          Ø&M Specifications

ж

Other comments:

Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. 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 <u>ftp://www.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

The fixed codebook search routine does not initialise the codebook indices. Therefore, in rare occasions uninitialised fixed codebook indices can be used.

# 2. How the code is changed in file *c4t64fx.c*

2.1 Before the change (lines 192...200)

default:
 nbiter = 0;
 alp = 0;
 nb\_pulse = 0;
}
/\*------\*
\* Find sign for each pulse position.
\*\*-----\*/

## 2.2 After the change

default:
 nbiter = 0;
 alp = 0;
 nb\_pulse = 0;
}
for (i = 0; i < nb\_pulse; i++)
{
 codvec[i] = i; move16();
}
/\*\_\_\_\_\_\_\*
\* Find sign for each pulse position.
 \*\*
\*\_\_\_\_\_\*/</pre>