Technical Specification Group Services and System Aspects **TSGS#12(01)0306**
Meeting #12, Stockholm, Sweden, 18-21 June 2001

Source: **TSG-SA WG4**

Title: **CRs to TS 26.104 Corrections encoder-decoder operations AMR-NB floating point (R99 and Release 4)**

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
26.104	003	1	R99	Limiting predicted codebook gain computing in encoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010407R
26.104	004	1	REL-4	Limiting predicted codebook gain computing in encoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010407R
26.104	005	1	R99	Correction of decoder operation in error concealment of lost frames	F	3.1.0	S4	TSG-SA WG4#17	S4-010408R
26.104	006	1	REL-4	Correction of decoder operation in error concealment of lost frames	A	4.0.0	S4	TSG-SA WG4#17	S4-010408R
26.104	007	1	R99	Correction of mode state bug in AMR decoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010409R
26.104	008	1	REL-4	Correction of mode state bug in AMR decoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010409R
26.104	011	1	R99	Correction of decoder Reset	F	3.1.0	S4	TSG-SA WG4#17	S4-010411R
26.104	012	1	REL-4	Correction of decoder Reset	A	4.0.0	S4	TSG-SA WG4#17	S4-010411R
26.104	013	1	R99	Correction of comfort noise parameter interpolation bug of AMR decoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010412R
26.104	014	1	REL-4	Correction of comfort noise parameter interpolation bug of AMR decoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010412R
26.104	015	1	R99	Correction of the TX_TYPE and RX_TYPE identifiers	F	3.1.0	S4	TSG-SA WG4#17	S4-010413R
26.104	016	1	REL-4	Correction of the TX_TYPE and RX_TYPE identifiers	A	4.0.0	S4	TSG-SA WG4#17	S4-010413R

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0407R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **003** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Limiting predicted codebook gain computing in encoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	It is very important that the excitation is same in encoder and decoder. In the case of very high amplitude signals, it is possible that the predicted codebook gain can have greater values in encoder than in decoder. The limited notation of the fixed-point arithmetic limits decoder value.
Summary of change:	⌘	• Predicted codebook gain is limited to decoders maximum predicted codebook gain value.
Consequences if not approved:	⌘	This can cause degradation of speech quality if signal energy is high.

Clauses affected:	⌘	sp_enc.c
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. sp_enc.c

1.1. sp_enc.c before the change

```
8513        gcode0 = (Float32)Pow2( exp, frac );
```

1.2. sp_enc.c after the change

```
8504        gcode0 = (Float32)Pow2( exp, frac );
8505        /* saturation at decoder */
8506        if (gcode0 > 2047.9375F) gcode0 = 2047.9375F;
```

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0407R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **004** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Limiting predicted codebook gain computing in encoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	It is very important that the excitation is same in encoder and decoder. In the case of very high amplitude signals, it is possible that the predicted codebook gain can have greater values in encoder than in decoder. The limited notation of the fixed-point arithmetic limits decoder value.
Summary of change:	⌘	• Predicted codebook gain is limited to decoders maximum predicted codebook gain value.
Consequences if not approved:	⌘	This can cause degradation of speech quality if signal energy is high.

Clauses affected:	⌘	sp_enc.c
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. sp_enc.c

1.1. sp_enc.c before the change

```
8513        gcode0 = (Float32)Pow2( exp, frac );
```

1.2. sp_enc.c after the change

```
8504        gcode0 = (Float32)Pow2( exp, frac );
8505        /* saturation at decoder */
8506        if (gcode0 > 2047.9375F) gcode0 = 2047.9375F;
```

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0408R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **005** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction of decoder operation in error consealement of lost frames
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073
Summary of change:	⌘	• LSF values are moved toward their mean in mode 12.2 k/bits differently than on other modes: ALPHA -> ALPHA_122, ONE_ALPHA -> ONE_ALPHA_122 • Saturations added to decoder_amr, dtx_dec, gc_pred_average_limited, d_gain_code, ph_disp and Bgn_scd
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 Approximately 6s of NO_DATA frames causes high-level noise.

Clauses affected:	⌘	sp_dec.c, rom_dec.h
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] 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/3G_Specs/CRs.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.

How the code is changed

1. sp_dec.c

function D_plsf_5

```
   /* if bad frame */
   if ( bfi != 0 ) {
      /* use the past LSFs slightly shifted towards their mean */
      for ( i = 0; i < M; i += 2 ) {
         /* lsfi_q[i] = ALPHA*st->past_lsf_q[i] + ONE_ALPHA*meanLsf[i]; */
         lsf1_q[i] = ( ( st->past_lsf_q[i] * ALPHA_122 ) >> 15 ) + ( (
mean_lsf_5[i]
               * ONE_ALPHA_122 ) >> 15 );
         lsf1_q[i + 1] = ( ( st->past_lsf_q[i + 1] *ALPHA* ALPHA_122 ) >> 15 ) +
( (
               mean_lsf_5[i + 1] *ONE_ALPHA* ONE_ALPHA_122 ) >> 15 );
      }
```

function dtx_dec

```
   /* convert exponent and mantissa to Word16 Q12 */
   /* Q12 */
   log_pg = ( log_pg_e - 15 ) << 12;
   /* saturate */
   if (log_pg < -32768) {
      log_pg = -32768;
   }

   log_pg = ( -( log_pg + ( log_pg_m >> 3 ) ) ) >> 1;
   st->log_pg_mean = ( Word16 )( ( ( 29491*st->log_pg_mean ) >> 15 ) + ( ( 3277
         * log_pg ) >> 15 ) );
```

function gc_pred_average_limited

```
static void gc_pred_average_limited( gc_predState *st, Word32 *ener_avg_MR122,
      Word32 *ener_avg )
{
   Word32 av_pred_en, i;


   /* do average in MR122 mode (log2() domain) */
   av_pred_en = 0;

   for ( i = 0; i < NPRED; i++ ) {
      av_pred_en = ( av_pred_en + st->past_qua_en_MR122[i] );
   }

   /* av_pred_en = 0.25*av_pred_en */
   av_pred_en = ( av_pred_en * 8192 ) >> 15;

   /* if (av_pred_en < -14/(20Log10(2))) av_pred_en = .. */
   if ( av_pred_en < MIN_ENERGY_MR122 ) {
      av_pred_en = MIN_ENERGY_MR122;
   }
   *ener_avg_MR122 = ( Word16 )av_pred_en;
```

```
   /* do average for other modes (20*log10() domain) */
   av_pred_en = 0;

   for ( i = 0; i < NPRED; i++ ) {
      av_pred_en = ( av_pred_en + st->past_qua_en[i] );
      if (av_pred_en < -32768)
         av_pred_en = -32768;
      else if (av_pred_en > 32767)
         av_pred_en = 32767;

   }

   /* av_pred_en = 0.25*av_pred_en */
   av_pred_en = ( av_pred_en * 8192 ) >> 15;

   /* if (av_pred_en < -14) av_pred_en = .. */
   if ( av_pred_en < MIN_ENERGY ) {
      av_pred_en = MIN_ENERGY;
   }
*ener_avg = av_pred_en;
}
```

function d_gain_code

```
static void d_gain_code( gc_predState *pred_state, enum Mode mode, Word32 index,
                         Word32 code[], Word32 *gain_code )
{
   Word32 g_code0, exp, frac, qua_ener_MR122, qua_ener;
   Word32 exp_inn_en, frac_inn_en, tmp, tmp2, i;
   const Word32 *p;


   /*
    * Decode codebook gain
    */
   gc_pred( pred_state, mode, code, &exp, &frac, &exp_inn_en, &frac_inn_en );
   p = &qua_gain_code[( ( index + index )+ index )];

   /* Different scalings between MR122 and the other modes */
   if ( mode == MR122 ) {
      /* predicted gain */
      g_code0 = Pow2( exp, frac );

      if ( g_code0 <= 2047 )
         g_code0 = g_code0 << 4;
      else
         g_code0 = 32767;
      *gain_code = ( ( g_code0 * *p++ ) >> 15 ) << 1;
      if (*gain_code & 0xFFFF8000)
         *gain_code = 32767;

   }
   else {
      g_code0 = Pow2( 14, frac );
      tmp = ( *p++ * g_code0 ) << 1;
      exp = 9 - exp;

      if ( exp > 0 ) {
         tmp = tmp >> exp;
      else
         tmp = tmp << ( -exp );}
```

```
      else {
         for (i = exp; i < 0; i++) {
            tmp2 = tmp << 1;
            if ((tmp ^ tmp2) & 0x80000000) {
               tmp = (tmp & 0x80000000) ? 0x80000000 : 0x7FFFFFFF;
               break;
            }
            else {
               tmp = tmp2;
            }
         }
      }
      *gain_code = tmp >> 16;
      if (*gain_code & 0xFFFF8000)
         *gain_code = 32767;
   }

   /*
    * update table of past quantized energies
    */
   qua_ener_MR122 = *p++;
   qua_ener = *p++;
   gc_pred_update( pred_state, qua_ener_MR122, qua_ener );
   return;
}
```

function Bgn_scd

```
static Word16 Bgn_scd( Bgn_scdState *st, Word32 ltpGainHist[], Word32 speech[],
      Word32 *voicedHangover )
{
   Word32 temp, ltpLimit, frame_energyMin, currEnergy, noiseFloor, maxEnergy,
         maxEnergyLastPart, s, i;
   Word16 prevVoiced, inbgNoise;


   /*
    * Update the inBackgroundNoise flag (valid for use in next frame if BFI)
    * it now works as a energy detector floating on top
    * not as good as a VAD.
    */
   s = 0;

   for ( i = 0; i < L_FRAME; i++ ) {
      s += speech[i] * speech[i];
   }

   if ( s < 0xFFFFFFF(s < 0xFFFFFFF) & (s >= 0) )
      currEnergy = s >> 13;
   else
      currEnergy = 32767;
   frame_energyMin = 32767;
…
```

function ph_disp

```
…
    * compute total excitation for synthesis part of decoder
    * (using modified innovation if phase dispersion is active)
    */
   for ( i = 0; i < L_SUBFR; i++ ) {
```

```
      /* x[i] = gain_pit*x[i] + cbGain*code[i]; */
      temp2temp1 = x[i] * pitch_fac + inno[i] * cbGain;
      temp2 = temp2temp1 << tmp_shift;
      x[i] = ( temp2 + 0x4000 ) >> 15;
      if (labs(x[i]) > 32676)
32767)
      {
         if ((temp1 ^ temp2) & 0x80000000) {
            x[i] = (x[i](temp1 & 0x80000000) ? -32768: 32767;
         }
         else {
            x[i] = (temp2 & 0x80000000) ? -32768: 32767;
         }
      }

   }
   return;
}
```

function decoder_amr

…

```
        /*
         * copy unscaled LTP excitation to exc_enhanced (used in phase
         * dispersion below) and compute total excitation for LTP feedback
         */
      memcpy( exc_enhanced, st->exc, L_SUBFR <<2 );

      for ( i = 0; i < L_SUBFR; i++ ) {
         /* st->exc[i] = gain_pit*st->exc[i] + gain_code*code[i]; */
         temp2 = ( st->exc[i] * pitch_fac ) + ( code[i] * gain_code );
         temp2 = ( temp2 << tmp_shift );
         if (((temp2 >> 1) ^ temp2) & 0x40000000)
0x40000000) {
            if ((temp ^ temp2) & 0x80000000) {
               temp2 = (temp & 0x80000000) ? (-1073741824L) : 1073725439;
            }
            else {

               temp2 = (temp2 & 0x80000000) ? (-1073741824L) : 1073725439;
            }
         }

         st->exc[i] = ( temp2 + 0x00004000L ) >> 15;
      }
…
```

2. rom_dec.h

```
…
#define ALPHA     29491
#define ONE_ALPHA 3277
/* LSF means (not in MR122) */
static const Word32 mean_lsf_3[10] =
{
   1546,
   2272,
   3778,
   5488,
```

```
   6972,
   8382,
   10047,
   11229,
   12766,
   13714
};

#define ALPHA_122     31128
#define ONE_ALPHA_122 1639

/* LSF means ->normalize frequency domain */
static const Word32 mean_lsf_5[10] =
{
   1384,
   2077,
   3420,
   5108,
   6742,
   8122,
   9863,
   11092,
   12714,
   13701
};
…
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0408R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **006** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction of decoder operation in error consealement of lost frames
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073
Summary of change:	⌘	• LSF values are moved toward their mean in mode 12.2 k/bits differently than on other modes: ALPHA -> ALPHA_122, ONE_ALPHA -> ONE_ALPHA_122 • Saturations added to decoder_amr, dtx_dec, gc_pred_average_limited, d_gain_code, ph_disp and Bgn_scd
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 Approximately 6s of NO_DATA frames causes high-level noise.

Clauses affected:	⌘	sp_dec.c, rom_dec.h
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] 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/3G_Specs/CRs.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.

How the code is changed

1. sp_dec.c

function D_plsf_5

```
   /* if bad frame */
   if ( bfi != 0 ) {
      /* use the past LSFs slightly shifted towards their mean */
      for ( i = 0; i < M; i += 2 ) {
         /* lsfi_q[i] = ALPHA*st->past_lsf_q[i] + ONE_ALPHA*meanLsf[i]; */
         lsf1_q[i] = ( ( st->past_lsf_q[i] * ALPHA_122 ) >> 15 ) + ( (
mean_lsf_5[i]
               * ONE_ALPHA_122 ) >> 15 );
         lsf1_q[i + 1] = ( ( st->past_lsf_q[i + 1] *ALPHA* ALPHA_122 ) >> 15 ) +
( (
               mean_lsf_5[i + 1] *ONE_ALPHA* ONE_ALPHA_122 ) >> 15 );
      }
```

function dtx_dec

```
   /* convert exponent and mantissa to Word16 Q12 */
   /* Q12 */
   log_pg = ( log_pg_e - 15 ) << 12;
   /* saturate */
   if (log_pg < -32768) {
      log_pg = -32768;
   }

   log_pg = ( -( log_pg + ( log_pg_m >> 3 ) ) ) >> 1;
   st->log_pg_mean = ( Word16 )( ( ( 29491*st->log_pg_mean ) >> 15 ) + ( ( 3277
         * log_pg ) >> 15 ) );
```

function gc_pred_average_limited

```
static void gc_pred_average_limited( gc_predState *st, Word32 *ener_avg_MR122,
      Word32 *ener_avg )
{
   Word32 av_pred_en, i;


   /* do average in MR122 mode (log2() domain) */
   av_pred_en = 0;

   for ( i = 0; i < NPRED; i++ ) {
      av_pred_en = ( av_pred_en + st->past_qua_en_MR122[i] );
   }

   /* av_pred_en = 0.25*av_pred_en */
   av_pred_en = ( av_pred_en * 8192 ) >> 15;

   /* if (av_pred_en < -14/(20Log10(2))) av_pred_en = .. */
   if ( av_pred_en < MIN_ENERGY_MR122 ) {
      av_pred_en = MIN_ENERGY_MR122;
   }
   *ener_avg_MR122 = ( Word16 )av_pred_en;
```

```
   /* do average for other modes (20*log10() domain) */
   av_pred_en = 0;

   for ( i = 0; i < NPRED; i++ ) {
      av_pred_en = ( av_pred_en + st->past_qua_en[i] );
      if (av_pred_en < -32768)
         av_pred_en = -32768;
      else if (av_pred_en > 32767)
         av_pred_en = 32767;

   }

   /* av_pred_en = 0.25*av_pred_en */
   av_pred_en = ( av_pred_en * 8192 ) >> 15;

   /* if (av_pred_en < -14) av_pred_en = .. */
   if ( av_pred_en < MIN_ENERGY ) {
      av_pred_en = MIN_ENERGY;
   }
*ener_avg = av_pred_en;
}
```

function d_gain_code

```
static void d_gain_code( gc_predState *pred_state, enum Mode mode, Word32 index,
                         Word32 code[], Word32 *gain_code )
{
   Word32 g_code0, exp, frac, qua_ener_MR122, qua_ener;
   Word32 exp_inn_en, frac_inn_en, tmp, tmp2, i;
   const Word32 *p;


   /*
    * Decode codebook gain
    */
   gc_pred( pred_state, mode, code, &exp, &frac, &exp_inn_en, &frac_inn_en );
   p = &qua_gain_code[( ( index + index )+ index )];

   /* Different scalings between MR122 and the other modes */
   if ( mode == MR122 ) {
      /* predicted gain */
      g_code0 = Pow2( exp, frac );

      if ( g_code0 <= 2047 )
         g_code0 = g_code0 << 4;
      else
         g_code0 = 32767;
      *gain_code = ( ( g_code0 * *p++ ) >> 15 ) << 1;
      if (*gain_code & 0xFFFF8000)
         *gain_code = 32767;

   }
   else {
      g_code0 = Pow2( 14, frac );
      tmp = ( *p++ * g_code0 ) << 1;
      exp = 9 - exp;

      if ( exp > 0 ) {
         tmp = tmp >> exp;
      else
         tmp = tmp << ( -exp );}
```

```
      else {
         for (i = exp; i < 0; i++) {
            tmp2 = tmp << 1;
            if ((tmp ^ tmp2) & 0x80000000) {
               tmp = (tmp & 0x80000000) ? 0x80000000 : 0x7FFFFFFF;
               break;
            }
            else {
               tmp = tmp2;
            }
         }
      }
      *gain_code = tmp >> 16;
      if (*gain_code & 0xFFFF8000)
         *gain_code = 32767;
   }

   /*
    * update table of past quantized energies
    */
   qua_ener_MR122 = *p++;
   qua_ener = *p++;
   gc_pred_update( pred_state, qua_ener_MR122, qua_ener );
   return;
}
```

function Bgn_scd

```
static Word16 Bgn_scd( Bgn_scdState *st, Word32 ltpGainHist[], Word32 speech[],
      Word32 *voicedHangover )
{
   Word32 temp, ltpLimit, frame_energyMin, currEnergy, noiseFloor, maxEnergy,
         maxEnergyLastPart, s, i;
   Word16 prevVoiced, inbgNoise;


   /*
    * Update the inBackgroundNoise flag (valid for use in next frame if BFI)
    * it now works as a energy detector floating on top
    * not as good as a VAD.
    */
   s = 0;

   for ( i = 0; i < L_FRAME; i++ ) {
      s += speech[i] * speech[i];
   }

   if ( s < 0xFFFFFFF(s < 0xFFFFFFF) & (s >= 0) )
      currEnergy = s >> 13;
   else
      currEnergy = 32767;
   frame_energyMin = 32767;
…
```

function ph_disp

```
…
    * compute total excitation for synthesis part of decoder
    * (using modified innovation if phase dispersion is active)
    */
   for ( i = 0; i < L_SUBFR; i++ ) {
```

```
      /* x[i] = gain_pit*x[i] + cbGain*code[i]; */
      temp2temp1 = x[i] * pitch_fac + inno[i] * cbGain;
      temp2 = temp2temp1 << tmp_shift;
      x[i] = ( temp2 + 0x4000 ) >> 15;
      if (labs(x[i]) > 32676)
32767)
      {
         if ((temp1 ^ temp2) & 0x80000000) {
            x[i] = (x[i](temp1 & 0x80000000) ? -32768: 32767;
         }
         else {
            x[i] = (temp2 & 0x80000000) ? -32768: 32767;
         }
      }

   }
   return;
}
```

function decoder_amr

…

```
        /*
         * copy unscaled LTP excitation to exc_enhanced (used in phase
         * dispersion below) and compute total excitation for LTP feedback
         */
      memcpy( exc_enhanced, st->exc, L_SUBFR <<2 );

      for ( i = 0; i < L_SUBFR; i++ ) {
         /* st->exc[i] = gain_pit*st->exc[i] + gain_code*code[i]; */
         temp2 = ( st->exc[i] * pitch_fac ) + ( code[i] * gain_code );
         temp2 = ( temp2 << tmp_shift );
         if (((temp2 >> 1) ^ temp2) & 0x40000000)
0x40000000) {
            if ((temp ^ temp2) & 0x80000000) {
               temp2 = (temp & 0x80000000) ? (-1073741824L) : 1073725439;
            }
            else {

               temp2 = (temp2 & 0x80000000) ? (-1073741824L) : 1073725439;
            }
         }

         st->exc[i] = ( temp2 + 0x00004000L ) >> 15;
      }
…
```

2. rom_dec.h

```
…
#define ALPHA     29491
#define ONE_ALPHA 3277
/* LSF means (not in MR122) */
static const Word32 mean_lsf_3[10] =
{
   1546,
   2272,
   3778,
   5488,
```

```
   6972,
   8382,
   10047,
   11229,
   12766,
   13714
};

#define ALPHA_122     31128
#define ONE_ALPHA_122 1639

/* LSF means ->normalize frequency domain */
static const Word32 mean_lsf_5[10] =
{
   1384,
   2077,
   3420,
   5108,
   6742,
   8122,
   9863,
   11092,
   12714,
   13701
};
…
```

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0409R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **007** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction of mode state bug in AMR decoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	To maintain bitexactness with TS 26.073 after CR A025 Tdoc S4 (01)0216
Summary of change:	⌘	The bug is fixed by using a state variable that is used with AMR IF2
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073

Clauses affected:	⌘	interf_dec.c
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] 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/3G_Specs/CRs.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.

How the code is changed

1. interf_dec.c before the change (Blue lines are to be deleted)

```
525         bfi = 0;
526         frame_type = bits[0];
527         mode = bits[245];
528
529         switch ( frame_type ) {
530           case 0:
531             frame_type = RX_SPEECH_GOOD;
532             Bits2Prm( mode, &bits[1], prm );
533             break;
534
535           case 1:
536             frame_type = RX_SID_FIRST;
537             break;
538
539           case 2:
540             frame_type = RX_SID_UPDATE;
541             Bits2Prm( MRDTX, &bits[1], prm );
542             break;
543
544           case 3:
545             frame_type = RX_NO_DATA;
546             break;
547         }
```

2. interf_dec.c after the change (Red lines are to be inserted)

```
525         bfi = 0;
526         frame_type = bits[0];
527
528         switch ( frame_type ) {
529           case 0:
530             frame_type = RX_SPEECH_GOOD;
531             mode = bits[245];
532             Bits2Prm( mode, &bits[1], prm );
533             break;
534
535           case 1:
536             frame_type = RX_SID_FIRST;
537             mode = s->prev_mode;
538             break;
539
540           case 2:
541             frame_type = RX_SID_UPDATE;
542             mode = s->prev_mode;
543             Bits2Prm( MRDTX, &bits[1], prm );
544             break;
545
546           case 3:
547             frame_type = RX_NO_DATA;
548             mode = s->prev_mode;
549             break;
```

```
}
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0409R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **008** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of mode state bug in AMR decoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	To maintain bitexactness with TS26.073 after CR A025 Tdoc S4 (01)0216
Summary of change:	⌘	The bug is fixed by using a state variable that is used with AMR IF2
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073

Clauses affected:	⌘	interf_dec.c
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. interf_dec.c before the change (Blue lines are to be deleted)

```
525         bfi = 0;
526         frame_type = bits[0];
527         mode = bits[245];
528
529         switch ( frame_type ) {
530           case 0:
531             frame_type = RX_SPEECH_GOOD;
532             Bits2Prm( mode, &bits[1], prm );
533             break;
534
535           case 1:
536             frame_type = RX_SID_FIRST;
537             break;
538
539           case 2:
540             frame_type = RX_SID_UPDATE;
541             Bits2Prm( MRDTX, &bits[1], prm );
542             break;
543
544           case 3:
545             frame_type = RX_NO_DATA;
546             break;
547         }
```

2. interf_dec.c after the change (Red lines are to be inserted)

```
525         bfi = 0;
526         frame_type = bits[0];
527
528         switch ( frame_type ) {
529           case 0:
530             frame_type = RX_SPEECH_GOOD;
531             mode = bits[245];
532             Bits2Prm( mode, &bits[1], prm );
533             break;
534
535           case 1:
536             frame_type = RX_SID_FIRST;
537             mode = s->prev_mode;
538             break;
539
540           case 2:
541             frame_type = RX_SID_UPDATE;
542             mode = s->prev_mode;
543             Bits2Prm( MRDTX, &bits[1], prm );
544             break;
545
546           case 3:
547             frame_type = RX_NO_DATA;
548             mode = s->prev_mode;
549             break;
```

```
}
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0411R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **011** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Decoder Reset
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 Decoder reset does not empty the values stored in Cb_gain_averState structure.

Summary of change:	⌘	• Following lines are added to Decoder_amr_reset:
		`/* Cb_gain_average_reset */`
		`memset(state->Cb_gain_averState->cbGainHistory, 0, L_CBGAINHIST << 2);`
		`state->Cb_gain_averState->hangVar = 0;`
		`state->Cb_gain_averState->hangCount= 0;`

Consequences if not approved:	⌘	TS 26.104 and TS 26.073 may not be bitexact after decoder reset.

Clauses affected:	⌘	sp_dec.c
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

sp_dec.c.c

Adding following lines to the beginning of Decoder_amr_reset-function in line 239

```
/* Cb_gain_average_reset */
   memset(state->Cb_gain_averState->cbGainHistory, 0, L_CBGAINHIST << 2);
   state->Cb_gain_averState->hangVar = 0;
   state->Cb_gain_averState->hangCount= 0;
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0411R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **012** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Decoder Reset
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 Decoder reset does not empty the values stored in Cb_gain_averState structure.

Summary of change:	⌘	• Following lines are added to Decoder_amr_reset:
		`/* Cb_gain_average_reset */`
		`memset(state->Cb_gain_averState->cbGainHistory, 0, L_CBGAINHIST << 2);`
		`state->Cb_gain_averState->hangVar = 0;`
		`state->Cb_gain_averState->hangCount= 0;`

Consequences if not approved:	⌘	TS 26.104 and TS 26.073 may not be bitexact after decoder reset.

Clauses affected:	⌘	sp_dec.c
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

sp_dec.c.c

Adding following lines to the beginning of Decoder_amr_reset-function in line 239

```
/* Cb_gain_average_reset */
   memset(state->Cb_gain_averState->cbGainHistory, 0, L_CBGAINHIST << 2);
   state->Cb_gain_averState->hangVar = 0;
   state->Cb_gain_averState->hangCount= 0;
```

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0412R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **013** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of comfort noise parameter interpolation bug of AMR decoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Comfort noise parameters of consecutive SID_UPDATE frames are interpolated incorrectly, This aligns 26.104 with the CR to 26.073 (Tdoc S4-010215, CR 024 to TS 06.73, R98)
Summary of change:	⌘	The function dtx_dec has to be changed in three lines
Consequences if not approved:	⌘	The comfort noise performance for certain types of noise is significantly worse than possible. Inconsistency between 3G TS 26.104 and 3G TS 26.073

Clauses affected:	⌘	sp_dec.c
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. sp_dec.c

1.1. sp_dec.c before the change

```
1550          /* Compute interpolation factor, since the division only works
1551           * for values of since_last_sid < 32 we have to limit the
1552           * interpolation to 32 frames
1553           */
1554            tmp_int_length = st->since_last_sid;
1555
1556            if ( tmp_int_length > 32 ) {
1557              tmp_int_length = 32;
1558            }

1629        /* Interpolate SID info */
1630        /* Q10 */
1631        if ( st->since_last_sid > 31 )
1632          int_fac = 32767;
1633        else
1634          int_fac = ( Word16 )( st->since_last_sid << 10 );
```

1.2. sp_dec.c after the change

```
1566          /* Compute interpolation factor, since the division only works
1567           * for values of since_last_sid < 32 we have to limit the
1568           * interpolation to 32 frames
1569           */
1570            tmp_int_length = st->since_last_sid;
1571            st->since_last_sid = 0;
1572
1573            if ( tmp_int_length > 32 ) {
1574              tmp_int_length = 32;
1575            }

1646        /* Interpolate SID info */
1647        /* Q10 */
1648        if ( st->since_last_sid > 30 )
1649          int_fac = 32767;
1650        else
1651          int_fac = ( Word16 )( (st->since_last_sid + 1) << 10 );
```

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4 Jun – 8 Jun 2001

Tdoc S4 (01)0412R

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **014** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of comfort noise parameter interpolation bug of AMR decoder
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Comfort noise parameters of consecutive SID_UPDATE frames are interpolated incorrectly This aligns 26.104 with the CR to 26.073 (Tdoc S4-010215, CR 024 to TS 06.73, R98)
Summary of change:	⌘	The function dtx_dec has to be changed in three lines
Consequences if not approved:	⌘	The comfort noise performance for certain types of noise is significantly worse than possible. Inconsistency between 3G TS 26.104 and 3G TS 26.073

Clauses affected:	⌘	sp_dec.c
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. sp_dec.c

1.1. sp_dec.c before the change

```
1550          /* Compute interpolation factor, since the division only works
1551           * for values of since_last_sid < 32 we have to limit the
1552           * interpolation to 32 frames
1553           */
1554            tmp_int_length = st->since_last_sid;
1555
1556            if ( tmp_int_length > 32 ) {
1557              tmp_int_length = 32;
1558            }

1629        /* Interpolate SID info */
1630        /* Q10 */
1631        if ( st->since_last_sid > 31 )
1632          int_fac = 32767;
1633        else
1634          int_fac = ( Word16 )( st->since_last_sid << 10 );
```

1.2. sp_dec.c after the change

```
1566          /* Compute interpolation factor, since the division only works
1567           * for values of since_last_sid < 32 we have to limit the
1568           * interpolation to 32 frames
1569           */
1570            tmp_int_length = st->since_last_sid;
1571            st->since_last_sid = 0;
1572
1573            if ( tmp_int_length > 32 ) {
1574              tmp_int_length = 32;
1575            }

1646        /* Interpolate SID info */
1647        /* Q10 */
1648        if ( st->since_last_sid > 30 )
1649          int_fac = 32767;
1650        else
1651          int_fac = ( Word16 )( (st->since_last_sid + 1) << 10 );
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0413R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **015** ⌘ ev **1** ⌘ Current version: **3.1.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Correction of the TX_TYPE and RX_TYPE identifiers
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**F**
Release:	⌘	R99

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:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	TX_TYPE and RX_TYPE identifiers are defined in two different ways in 3G TS 26.104 and 3G TS 26.073, This CR aligns the 26.104 with the CR A026 Tdoc S4 (01)0282, R98.
Summary of change:	⌘	TX_TYPE and RX_TYPE identifiers are modified to be consistent with 3G TS 06.73, major changes are: • RX_SPARE removed, RX_ONSET added • RX_SPEECH_PROBABLY_DEGRADED -> RX_SPEECH_DEGRADED • TX_SPEECH ->TX_SPEECH_GOOD
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 and 3G TS 26.104 and 3G TS 08.60/08.61

Clauses affected:	⌘	interf_enc.c, sp_dec.c, sp_dec.h
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] 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/3G_Specs/CRs.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.

How the code is changed

1. interf_enc.c

1.1. interf_enc.c before the change

```
34    /* Declaration transmitted frame types */
35    enum TXFrameType
36    {
37      TX_SPEECH = 0, TX_SID_FIRST, TX_SID_UPDATE, TX_NO_DATA, TX_N_FRAMETYPES
38          /* number of frame types */
39    };

381       static void Sid_Sync_reset( enc_interface_State *st )
382       {
383         st->sid_update_counter = 3;
384         st->sid_handover_debt = 0;
385         st->prev_ft = TX_SPEECH;
386       }

506         if ( used_mode == MRDTX ) {
507           s->sid_update_counter--;
508
509           if ( s->prev_ft == TX_SPEECH ) {
510             txFrameType = TX_SID_FIRST;
511             s->sid_update_counter = 3;

535         else {
536           s->sid_update_counter = 8;
537           txFrameType = TX_SPEECH;
538         }
```

1.2. interf_enc.c after the change

```
34    /* Declaration transmitted frame types */
35    enum TXFrameType { TX_SPEECH_GOOD = 0,
36                       TX_SID_FIRST,
37                       TX_SID_UPDATE,
38                       TX_NO_DATA,
39                       TX_SPEECH_DEGRADED,
40                       TX_SPEECH_BAD,
41                       TX_SID_BAD,
42                       TX_ONSET,
43                       TX_N_FRAMETYPES     /* number of frame types */
44    };

378       static void Sid_Sync_reset( enc_interface_State *st )
379       {
380         st->sid_update_counter = 3;
381         st->sid_handover_debt = 0;
382         st->prev_ft = TX_SPEECH_GOOD;
383       }

503         if ( used_mode == MRDTX ) {
504           s->sid_update_counter--;
505
506           if ( s->prev_ft == TX_SPEECH_GOOD ) {
507             txFrameType = TX_SID_FIRST;
```

```
508             s->sid_update_counter = 3;
509           }
```

```
532         else {
533           s->sid_update_counter = 8;
534           txFrameType = TX_SPEECH_GOOD;
535         }
```

2. sp_dec.c

2.1. sp_dec.c before the change

```
4572        /* SPEECH action state machine  */
4573        if ( table_speech_bad[frame_type] ) {
4574          bfi = 1;
4575
4576          if ( frame_type != RX_SPEECH_BAD ) {
4577            Build_CN_param( &st->nodataSeed, mode, parm );
4578          }
4579        }
4580        else if ( frame_type == RX_SPEECH_PROBABLY_DEGRADED ) {
4581          pdfi = 1;
4582        }
```

2.2. sp_dec.c after the change

```
4651        /* SPEECH action state machine  */
4652        if ( table_speech_bad[frame_type] ) {
4653          bfi = 1;
4654
4655          if ( frame_type != RX_SPEECH_BAD ) {
4656            Build_CN_param( &st->nodataSeed, mode, parm );
4657          }
4658        }
4659        else if ( frame_type == RX_SPEECH_DEGRADED ) {
4660          pdfi = 1;
4661        }
```

3. sp_dec.h

3.1. sp_dec.c before the change

```
41      /* Declaration recieved frame types */
42      enum RXFrameType { RX_SPEECH_GOOD = 0,
43                         RX_SPEECH_PROBABLY_DEGRADED,
44                         RX_SPARE,
45                         RX_SPEECH_BAD,
46                         RX_SID_FIRST,
47                         RX_SID_UPDATE,
48                         RX_SID_BAD,
49                         RX_NO_DATA,
50                         RX_N_FRAMETYPES     /* number of frame types */
51      };
```

3.2. sp_dec.c after the change

```
41      /* Declaration recieved frame types */
42      enum RXFrameType { RX_SPEECH_GOOD = 0,
```

```
43              RX_SPEECH_DEGRADED,
44              RX_ONSET,
45              RX_SPEECH_BAD,
46              RX_SID_FIRST,
47              RX_SID_UPDATE,
48              RX_SID_BAD,
49              RX_NO_DATA,
50              RX_N_FRAMETYPES     /* number of frame types */
51      };
```

3GPP TSG-SA WG4 Meeting #17 ***Tdoc S4 (01)0413R***
Naantali, Finland, 4 Jun – 8 Jun 2001

CR-Form-v4

CHANGE REQUEST

⌘ **26.104** **CR** **016** ⌘ ev **1** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Correction of the TX_TYPE and RX_TYPE identifiers
Source:	⌘	TSG-SA WG4
Work item code:	⌘	(Low bit rate) Codec for Multimedia Telephony
Date:	⌘	8.6.2001
Category:	⌘	**A**
Release:	⌘	Rel-4

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:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	TX_TYPE and RX_TYPE identifiers are defined in two different ways in 3G TS 26.104 and 3G TS 26.073, This CR aligns the 26.104 with the CR A026 Tdoc S4 (01)0282, R98.
Summary of change:	⌘	TX_TYPE and RX_TYPE identifiers are modified to be consistent with 3G TS 26.073, major changes are: • RX_SPARE removed, RX_ONSET added • RX_SPEECH_PROBABLY_DEGRADED -> RX_SPEECH_DEGRADED • TX_SPEECH ->TX_SPEECH_GOOD
Consequences if not approved:	⌘	Inconsistency between 3G TS 26.104 and 3G TS 26.073 and 3G TS 26.104 and 3G TS 48.060/48.061
Clauses affected:	⌘	interf_enc.c, sp_dec.c, sp_dec.h
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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/3G_Specs/CRs.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.

How the code is changed

1. interf_enc.c

1.1. interf_enc.c before the change

```
34    /* Declaration transmitted frame types */
35    enum TXFrameType
36    {
37      TX_SPEECH = 0, TX_SID_FIRST, TX_SID_UPDATE, TX_NO_DATA, TX_N_FRAMETYPES
38          /* number of frame types */
39    };

381       static void Sid_Sync_reset( enc_interface_State *st )
382       {
383         st->sid_update_counter = 3;
384         st->sid_handover_debt = 0;
385         st->prev_ft = TX_SPEECH;
386       }

506         if ( used_mode == MRDTX ) {
507           s->sid_update_counter--;
508
509           if ( s->prev_ft == TX_SPEECH ) {
510             txFrameType = TX_SID_FIRST;
511             s->sid_update_counter = 3;

535         else {
536           s->sid_update_counter = 8;
537           txFrameType = TX_SPEECH;
538         }
```

1.2. interf_enc.c after the change

```
34    /* Declaration transmitted frame types */
35    enum TXFrameType { TX_SPEECH_GOOD = 0,
36                       TX_SID_FIRST,
37                       TX_SID_UPDATE,
38                       TX_NO_DATA,
39                       TX_SPEECH_DEGRADED,
40                       TX_SPEECH_BAD,
41                       TX_SID_BAD,
42                       TX_ONSET,
43                       TX_N_FRAMETYPES     /* number of frame types */
44    };

378       static void Sid_Sync_reset( enc_interface_State *st )
379       {
380         st->sid_update_counter = 3;
381         st->sid_handover_debt = 0;
382         st->prev_ft = TX_SPEECH_GOOD;
383       }

503         if ( used_mode == MRDTX ) {
504           s->sid_update_counter--;
505
506           if ( s->prev_ft == TX_SPEECH_GOOD ) {
507             txFrameType = TX_SID_FIRST;
```

```
508             s->sid_update_counter = 3;
509           }
```

```
532         else {
533           s->sid_update_counter = 8;
534           txFrameType = TX_SPEECH_GOOD;
535         }
```

2. sp_dec.c

2.1. sp_dec.c before the change

```
4572        /* SPEECH action state machine  */
4573        if ( table_speech_bad[frame_type] ) {
4574          bfi = 1;
4575
4576          if ( frame_type != RX_SPEECH_BAD ) {
4577            Build_CN_param( &st->nodataSeed, mode, parm );
4578          }
4579        }
4580        else if ( frame_type == RX_SPEECH_PROBABLY_DEGRADED ) {
4581          pdfi = 1;
4582        }
```

2.2. sp_dec.c after the change

```
4651        /* SPEECH action state machine  */
4652        if ( table_speech_bad[frame_type] ) {
4653          bfi = 1;
4654
4655          if ( frame_type != RX_SPEECH_BAD ) {
4656            Build_CN_param( &st->nodataSeed, mode, parm );
4657          }
4658        }
4659        else if ( frame_type == RX_SPEECH_DEGRADED ) {
4660          pdfi = 1;
4661        }
```

3. sp_dec.h

3.1. sp_dec.c before the change

```
41      /* Declaration recieved frame types */
42      enum RXFrameType { RX_SPEECH_GOOD = 0,
43                         RX_SPEECH_PROBABLY_DEGRADED,
44                         RX_SPARE,
45                         RX_SPEECH_BAD,
46                         RX_SID_FIRST,
47                         RX_SID_UPDATE,
48                         RX_SID_BAD,
49                         RX_NO_DATA,
50                         RX_N_FRAMETYPES     /* number of frame types */
51      };
```

3.2. sp_dec.c after the change

```
41      /* Declaration recieved frame types */
42      enum RXFrameType { RX_SPEECH_GOOD = 0,
```

```
43              RX_SPEECH_DEGRADED,
44              RX_ONSET,
45              RX_SPEECH_BAD,
46              RX_SID_FIRST,
47              RX_SID_UPDATE,
48              RX_SID_BAD,
49              RX_NO_DATA,
50              RX_N_FRAMETYPES     /* number of frame types */
51      };
```