Technical Specification Group Services and System Aspects **TSGS#26(04)0837**
Meeting #26, Athens, Greece
13-16 December 2004

Source: **TSG-SA WG4**

Title: CRs TS 26.235 and TS 26.243 on Speech Enabled Services (Release 6)

Document for: **Approval**

Agenda Item: **7.4.3**

The following CRs, agreed at the TSG-SA WG4 meeting #33, are presented to TSG SA #26 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	011		Rel-6	Add reference to TR 26.943	D	6.2.0	S4	TSG-SA WG4#33	S4-040814
26.243	001	1	Rel-6	Software bug correction: Removal of Basicops simulation of ìCî shift operator	F	6.0.0	S4	TSG-SA WG4#33	S4-040804
26.243	002	1	Rel-6	Software bug correction: Initialization of the variables lwc and i2aScale	F	6.0.0	S4	TSG-SA WG4#33	S4-040805
26.243	003	1	Rel-6	Software bug correction: Wrong assignment of the variables *piReliableFlag and *pcQPIndex	F	6.0.0	S4	TSG-SA WG4#33	S4-040806
26.243	004	2	Rel-6	Software bug correction: Use of incorrect variable fRefPeriod instead of iRefPeriod	F	6.0.0	S4	TSG-SA WG4#33	S4-040823
26.243	005		Rel-6	Add reference to test sequences document	D	6.0.0	S4	TSG-SA WG4#33	S4-040813

3GPP TSG-SA4 Meeting #33
Helsinki, Finland, 22-26 November 2004

Tdoc ⌘ S4-04814

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.235** **CR** **011** ⌘ **rev** ⌘ Current version: **6.2.0** ⌘

*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 ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Add reference to TR 26.943
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
Category:	⌘	**D**
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:	⌘	To add reference to TR 26.943
Summary of change:	⌘	Update to the references
Consequences if not approved:	⌘	There will be no reference to the TR

Clauses affected:	⌘	2, 6.5, Annex D

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

Other comments: ⌘

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] IETF RFC 3261: "SIP: Session Initiation Protocol".

[2] IETF RFC 2327: "SDP: Session Description Protocol".

[3] IETF RFC 2429: "RTP Payload Format for the 1998 Version of ITU-T Rec. H.263 Video (H.263+)".

[4] IETF RFC 1889: "RTP: A Transport Protocol for Real-Time Applications".

[5] IETF RFC 3016: "RTP Payload Format for MPEG-4 Audio/Visual Streams".

[6] ITU-T Recommendation H.263 (02/98): "Video coding for low bit rate communication".

[7] 3GPP TS 26.110: "Codec for Circuit Switched Multimedia Telephony Service; General Description".

[8] 3GPP TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324".

[9] 3GPP TS 26.071: "Mandatory Speech Codec speech processing functions; AMR Speech Codec; General description".

[10] 3GPP TS 26.090: "Mandatory Speech Codec speech processing functions; AMR Speech Codec; Transcoding functions".

[11] 3GPP TS 26.073: "Adaptive Multi-Rate (AMR); ANSI C source code".

[12] 3GPP TS 26.104: "ANSI-C code for the floating-point AMR speech codec".

[13] ISO/IEC 14496-2 (2004): "Information technology - Coding of audio-visual objects - Part 2: Visual".

[14] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP".

[15] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP".

[16] 3GPP TS 26.171 (Release 5): "AMR speech codec, wideband; General description".

[17] 3GPP TS 26.190 (Release 5): "Mandatory Speech Codec speech processing functions AMR Wideband speech codec; Transcoding functions".

[18] 3GPP TS 26.201 (Release 5): "AMR speech codec, wideband; Frame structure".

[19] ITU-T Recommendation H.263 ñ Annex X (03/04): "Annex X: Profiles and levels definition".

[20] 3GPP TS 23.228: "IP multimedia subsystem; stage 2".

[21] 3GPP TS 23.107: "QoS Concept and Architecture".

[22] 3GPP TS 23.207: "End to end quality of service concept and architecture".

[23] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[24] IETF RFC 2793: "RTP Payload for Text Conversation".

[25] ITU-T Recommendation T.140 (1998): "Protocol for multimedia application text conversation" (with amendment 2000).

[26] 3GPP TS 26.101: "Mandatory Speech Codec speech processing functions; AMR Speech Codec; Frame Structure".

[27] IETF RFC 2119: "Key words for use in RFCs to Indicate Requirement Levels".

[28] 3GPP TS 26.093: "Mandatory Speech Codec speech processing functions; AMR Speech Codec; Source Controlled Rate operation".

[29] 3GPP TS 46.060: "Enhanced Full Rate (EFR) speech transcoding".

[30] TIA/EIA -136-Rev.A, part 410 - "TDMA Cellular/PCS ñ Radio Interface, Enhanced Full Rate Voice Codec (ACELP). Formerly IS-641. TIA published standard, 1998".

[31] ARIB, RCR STD-27H, "Personal Digital Cellular Telecommunication System RCR Standard".

[32] IETF draft-westberg-realtime-cellular-01.txt, "Realtime Traffic over Cellular Access Networks".

[33] IETF draft-larzon-udplite-03.txt, "The UDP Lite Protocol".

[34] 3GPP TS 26.092: "Mandatory Speech Codec speech processing functions; AMR Speech Codec; Comfort noise aspects".

[35] IETF RFC 3267: "RTP payload format and file storage format for the Adaptive Multi-Rate (AMR) Adaptive Multi-Rate Wideband (AMR-WB) audio codecs", March 2002.

[36] IETF RFC 2833: ì RTP Payload for DTMF Digits, Telephony Tones and Telephony Signalsî , May 2000.

[37] 3GPP TS 26.243: ì ANSI C code for the Fixed-Point Distributed Speech Recognition Extended Advanced Front-endî .

[38] RTP Payload Formats for European Telecommunications Standards Institute (ETSI) European Standard ES 202 050, ES 202 211, and ES 202 212 Distributed Speech Recognition Encoding draft-ietf-avt-rtp-dsr-codecs-00.txt.

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[39] 3GPP TS 26.173: "ANCI-C code for the Adaptive Multi Rate - Wideband (AMR-WB) speech codec".

[40] 3GPP TS 26.204: "ANSI-C code for the Floating-point Adaptive Multi-Rate Wideband (AMR-WB) speech codec".

[41] ITU-T Recommendation H.264 (2003): "Advanced video coding for generic audiovisual services" | ISO/IEC 14496-10:2003: "Information technology ñ Coding of audio-visual objects ñ Part 10: Advanced Video Coding".

[42] ISO/IEC 14496-10/FDAM1: "AVC Fidelity Range Extensions".

[43] IETF Internet Draft: "RTP payload Format for H.264 Video", Wenger S. et al, http://www.ietf.org/internet-drafts/draft-ietf-avt-rtp-h264-11.txt, August 2004.

[44] 3GPP TR 26.943: î Recognition performance evaluations of codecs for Speech Enabled Services(SES); (Release 6)î .

Next changed section

6.5 Speech Enabled Service

3G PS multimedia terminals offering speech enabled services should support the DSR Extended Advanced Front-end codec [37]

Speech enabled services may also be supported with AMR or AMR-WB audio codecs, however it is noted that there is a substantial performance advantage from DSR [44] ~~see Annex D]~~.

Next changed section

Annex D (Informative): Performance results from SES selection

Delete the whole of Annex D as it is now covered in the referenced SES TR.

3GPP TSG-SA4 Meeting #33
Helsinki, Finland, 22-26 November 2004

Tdoc ⌘S4-040804

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CHANGE REQUEST

⌘ **26.243** **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 ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Software bug correction: Removal of Basicops simulation of ìCî shift operator
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
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:	⌘	Correction of a software bug
Summary of change:	⌘	The change replaces the simulation of a forgotten ìCî shift ì>>î operator by the wanted basicops ìL_shrî operator. Differences between the ìCî shift ì>>î operator and ìL_shrî arise only for negative shift s : in this case the ìCî shift ì>>î leads to a right shift of 32-s position in place of a wanted left shift of ñs position. As s is very rarely negative, the change affects output very rarely (e.g. 4 among 15600 files tested)).
Consequences if not approved:	⌘	For very rare input, the DSR ouput is computed with poor resolution.

Clauses affected:	⌘	ParmInterface_B.c

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

Other comments:	⌘	

The change occurs at the interface between Noise Reduction module, and Waveform Processing module in `ParmInterface_B.c` . The input frame for Waveform Processing (size 201 samples) in the concatenation of several output sub-frames (size 80 samples) from Noise Reduction. As each output frame from Noise Reduction has its own scale factor (a power of two implemented by a shift), a global scale factor is computed for the Waveform Processing input frame. This global scale factor is computed by searching the absolute value maximum for the input frame and by normalizing this maximum.
The search for the maximum implies to remove for each sub-frame its own scale factor.
In the current Basic-ops version, scale factor removal is done by using the Basic-ops operator L_shr() and by simulation with Basic-ops of the forgotten ìCî right shift operator for negative shift.

As the input frame overlaps 4 sub-frames, the change leads to remove

```
test();
if(curShft < 0) {
     curShft = add(32,curShft);
}
```

4 times :

- lines 335-338
- lines 344-347
- lines 353-356
- lines 362-365

```
          iEnd= add(add(pFEParX->FrameLength,pFEParX->offsetDenoisedFrame),1) ;
          curShft = sub(pFEParX->tabShiftNoiseToCep[0],MIN_NOISE_SHIFT);
line 335  test();
          if(curShft < 0) {
              curShft = add(32,curShft);
line 338  }
          for(i=40;i<FRAME_SHIFT;i++) {
             X_INT32 iabs = L_shr(L_abs(frameBuf32[iEnd-1-i]),curShft);
             iMax = iMax | iabs ; logic32();
          }
          curShft = sub(pFEParX->tabShiftNoiseToCep[1],MIN_NOISE_SHIFT);
line 344  test();
          if(curShft < 0) {
              curShft = add(32,curShft);
line 347  }
          for(i=3*FRAME_SHIFT;i<FRAME_BUF_SIZE;i++) {
              X_INT32 iabs = L_shr(L_abs(frameBuf32[iEnd-1-i]),curShft);
              iMax = iMax | iabs ; logic32();
          }
          curShft = sub(pFEParX->tabShiftNoiseToCep[2],MIN_NOISE_SHIFT);
line 353  test();
          if(curShft < 0) {
              curShft = add(32,curShft);
line 356  }
          for(i=FRAME_SHIFT;i<2*FRAME_SHIFT;i++) {
             X_INT32 iabs = L_shr(L_abs(frameBuf32[iEnd-1-i]),curShft);
             iMax = iMax | iabs ; logic32();
          }
          curShft = sub(pFEParX->tabShiftNoiseToCep[3],MIN_NOISE_SHIFT);
line 362  test();
          if(curShft < 0) {
              curShft = add(32,curShft);
line 365  }
          for(i=2*FRAME_SHIFT;i<3*FRAME_SHIFT;i++) {
              X_INT32 iabs = L_shr(L_abs(frameBuf32[iEnd-1-i]),curShft);
              iMax = iMax | iabs ; logic32();
          }
          /* Compute desired shift */
          shftMin = add(norm_l(iMax),MIN_NOISE_SHIFT - 1) ;
```

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Helsinki, Finland, 22-26 November 2004

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CHANGE REQUEST

⌘ **26.243** **CR** **002** ⌘ **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 ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Software bug correction: Initialization of the variables lwc and i2aScale
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
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:	⌘	Correction of a software bug
Summary of change:	⌘	Currently, the variables lwc and i2aScale are not assigned proper values within the ìifî clause of the ìif ñ elseî control statement between lines 2488 ñ 2521 of the source code file rvc_pitch_B.c. To assign proper values to these variables, (1) an assignment statement is added within the ìifî clause for the i2aScale variable and (2) the assignment statement within the ìelseî clause for the lwc variable is moved ahead of the ìif ñ elseî control statement.
Consequences if not approved:	⌘	The ìifî clause of the ìif ñ elseî control statement is rarely executed ñ in this event, the computation of a spectral peak amplitude is affected.

Clauses affected:	⌘	rvc_pitch_B.c

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

Other comments: ⌘

Existing code segment ñ lines 2488 through 2521

```
 if (lw2b == 0)
  {
  sw2b = 0;                move16();
  swX = 0;                 move16();
  }
 else
  {
  i2aScale = norm_l(lw2a);
  lwTmp = L_shl(lw2b, i2aScale);
  sw2b = round(lwTmp);
  lwTmp = L_shl(lw2a, i2aScale);
  sw2a = round(lwTmp);

  lwc = plwSqrAmp[i];              move32();

  swX = shr(sw2b, 1);
  test();
  if (sw2a < 0)
    {
    sw2a = negate(sw2a);
    swX = negate(swX);
    }
  test();
  if (swX < 0)
    {
    swX = negate(swX);
    swX = div_s(swX, sw2a);
    }
  else
    {
    swX = div_s(swX, sw2a);
    swX = negate(swX);
  }
 }
```

Changed code segment ñ 1 line moved (blue) and 1 line added (red)

```
 lwc = plwSqrAmp[i];              move32();

 if (lw2b == 0)
  {
  sw2b = 0;                move16();
  swX = 0;                 move16();
   i2aScale = 0;           move16();
  }
 else
  {
  i2aScale = norm_l(lw2a);
  lwTmp = L_shl(lw2b, i2aScale);
  sw2b = round(lwTmp);
  lwTmp = L_shl(lw2a, i2aScale);
  sw2a = round(lwTmp);

  swX = shr(sw2b, 1);
  test();
```

```
  if (sw2a < 0)
    {
    sw2a = negate(sw2a);
    swX = negate(swX);
    }
  test();
  if (swX < 0)
    {
    swX = negate(swX);
    swX = div_s(swX, sw2a);
    }
  else
    {
    swX = div_s(swX, sw2a);
    swX = negate(swX);
  }
}
```

3GPP TSG-SA4 Meeting #33
Helsinki, Finland, 22-26 November 2004

Tdoc ⌘ S4-040806

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CHANGE REQUEST

⌘ **26.243** **CR** **003** ⌘ **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 [ ]

Title:	⌘	Software bug correction: Wrong assignment of the variables *piReliableFlag and *pcQPIndex
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
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:	⌘	Correction of a software bug
Summary of change:	⌘	Currently, the variables *piReliableFlag and *pcQPIndex are not always assigned the correct values in the code section ranging from line 2474 to line 2739 of the source code file coder.c. To assign proper values to these variables, the assignment statements in lines 2542, 2571, 2606, 2624, 2625, 2665, 2702, and 2721 are changed.
Consequences if not approved:	⌘	The section of the code between lines 2474 and 2739 is not executed very often. However, not incorporating the change will lead to suboptimal performance of the pitch quantizer.

Clauses affected:	⌘	coder.c
Other specs affected:	⌘	Y N [ ] [X] Other core specifications [ ] [X] Test specifications [ ] [X] O&M Specifications
	⌘	
Other comments:	⌘	

Change the lines 2542, 2571, 2606, 2625, 2665, 2702, and 2721

FROM *piReliableFlag = TRUE; move16();

TO *piReliableFlag = FALSE; move16();

Change the line 2624

FROM *pcQPIndex = add(iCodeWord,NUM_MULTI_LEVELS_1);

TO *pcQPIndex = add(iCodeWord,NUM_MULTI_LEVELS_2);

3GPP TSG-SA4 Meeting #33
Helsinki, Finland, 22-26 November 2004

Tdoc ⌘ S4-040823

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.243** **CR** **004** ⌘ **rev** **2** ⌘ 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 ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Software bug correction: Use of incorrect variable fRefPeriod instead of iRefPeriod
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
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:	⌘	Correction of a software bug
Summary of change:	⌘	Currently, the incorrect variable fRefPeriod is used instead of the correct variable iRefPeriod at some places in the code section ranging from line 2374 to line 2500 of the source code file decoder.c. To fix the problem, lines 2396, 2400, and 2404 are changed to use the correct variable.
Consequences if not approved:	⌘	The section of the code between lines 2374 and 2500 is not executed very often. However, not incorporating the change will lead to suboptimal performance of the pitch inverse quantizer.

Clauses affected:	⌘	decoder.c

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

Other comments: ⌘

Change the line 2396

FROM if (fRefPeriod <= 1966080)

TO if (iRefPeriod <= 1966080)

Change the line 2400

FROM else if (fRefPeriod <= 3932160)

TO else if (iRefPeriod <= 3932160)

Change the line 2404

FROM else if (fRefPeriod <= 6225920)

TO else if (iRefPeriod <= 6225920)

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CHANGE REQUEST

⌘ **26.243** **CR** **005** ⌘ **rev** ⌘ 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 ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Add reference to test sequences document
Source:	⌘	TSG-SA WG4
Work item code:	⌘	SES
Date:	⌘	14/12/2004
Category:	⌘	**D**
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:	⌘	To add reference to the test sequences
Summary of change:	⌘	Update to the references
Consequences if not approved:	⌘	There will be no reference to the associated test vectors for the codec

Clauses affected:	⌘	2

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

Other comments:	⌘	

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

[1] ETSI standard ES 202 050 ì Distributed Speech Recognition; Advanced Front-end Feature Extraction Algorithm; Compression Algorithmî , Oct 2002

[2] ETSI Standard ES 202 212 ì Distributed Speech Recognition; Extended Advanced Front-end Feature Extraction Algorithm; Compression Algorithm, Back-end Speech Reconstruction Algorithmî , Nov 2003

[3] 3GPP TS 26.177 ì Speech Enabled Services: DSR Extended Advanced Front-end test sequences (release 6)î