SLOVENSKI STANDARD
SIST EN 300 725 V8.0.1:2003

01-december-2003

Digitalni celiļ ni telekomunikacijski sistem (faza 2+) ï Zaporedje preskusov za izboljģani polnohitrostni govorni kodek sistema GSM (GSM 06.54, razliļ ica 8.0.1, izdaja 1999)

Digital cellular telecommunications system (Phase 2+) (GSM); Test sequences for the GSM Enhanced Full Rate (EFR) speech codec (GSM 06.54 version 8.0.1 Release 1999)

Ta slovenski standard je istoveten z: EN 300 725 Version 8.0.1

ICS:

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)

SIST EN 300 725 V8.0.1:2003 **en**

ETSI EN 300 725 V8.0.1 (2000-11)

European Standard (Telecommunications series)

Digital cellular telecommunications system (Phase 2+); Test sequences for the GSM Enhanced Full Rate (EFR) speech codec (GSM 06.54 version 8.0.1 Release 1999)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Reference
REN/SMG-110654Q8

Keywords
Digital cellular telecommunications system,
Global System for Mobile communications (GSM)

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at http://www.etsi.org/tb/status/

If you find errors in the present document, send your comment to:
editor@etsi.fr

Copyright Notification

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://www.etsi.org/ipr).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

Test sequences for a bit exact implementation of the Enhanced Full Rate (EFR) speech transcoder are contained in the archive en_300725v080001p0.ZIP which accompanies the present document.

The archive contains ZIP compressed files, as follows:

Disk1_8	Clause 10: Test sequences for the GSM Enhanced Full Rate (EFR) speech codec; Speech test sequences TEST0.xxx to TEST8.xxx.
Disk2_8	Clause 10: Test sequences for the GSM Enhanced Full Rate (EFR) speech codec; Speech test sequences TEST09.xxx to TEST16.xxx.
Disk3_8	Clause 10: Test sequences for the GSM Enhanced Full Rate (EFR) speech codec; Speech test sequences TEST17.xxx to TEST20.xxx, Codec homing and synchronisation sequences.
Disk4_8	Clause 10: Test sequences for the GSM Enhanced Full Rate (EFR) speech codec; DTX test sequences.
Disk5_8 to	Clause 10: Test sequences for the GSM Enhance Full Rate (EFR) speech codec; 8 bit
Disk8_8	A- and µ-law compressed test sequences for alternative TRAU testing.

The present document specifies the digital test sequences for the GSM enhanced full rate speech codect for the digital cellular telecommunications system.

The contents of the present document is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will be re-released with an identifying change of release date and an increase in version number as follows:

Version 8.x.y

where:

8 indicates Release 1999 of GSM Phase 2+.

x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated in the specification.

National transposition dates	
Date of adoption of this EN:	3 November 2000
Date of latest announcement of this EN (doa):	28 February 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2001
Date of withdrawal of any conflicting National Standard (dow):	31 August 2001

1 Scope

The present document specifies the digital test sequences for the GSM enhanced full rate speech codec. These sequences test for a bit exact implementation of the enhanced full rate speech transcoder (GSM 06.60 [2]), Voice Activity Detection (GSM 06.82 [6]), comfort noise (GSM 06.62 [4]) and the discontinuous transmission (GSM 06.81 [5]).

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

[1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 06.60: "Digital cellular telecommunications system (Phase 2+); Enhanced Full Rate (EFR) speech transcoding".

[3] GSM 06.61: "Digital cellular telecommunications system (Phase 2+); Substitution and muting of lost frames for Enhanced Full Rate (EFR) speech traffic channels".

[4] GSM 06.62: "Digital cellular telecommunications system (Phase 2+); Comfort noise aspects for Enhanced Full Rate (EFR) speech traffic channels".

[5] GSM 06.81: "Digital cellular telecommunications system (Phase 2+); Discontinuous Transmission (DTX) for Enhanced Full Rate (EFR) speech traffic channels".

[6] GSM 06.82: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detection (VAD) for Enhanced Full Rate (EFR) speech traffic channels".

[7] GSM 06.53: "Digital cellular telecommunications system (Phase 2+); ANSI-C code for the GSM Enhanced Full Rate (EFR) speech codec".

[8] GSM 06.51: "Digital cellular telecommunications system (Phase 2+); Enhanced Full Rate (EFR) speech coding functions; General description".

3 Definitions and abbreviations

3.1 Definitions

Definition of terms used in the present document can be found in GSM 06.60 [2], GSM 06.61 [3], GSM 06.62 [4], GSM 06.81 [5] and GSM 06.82 [6].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ETS	European Telecommunication Standard
GSM	Global System for Mobile communications

For abbreviations not given in this subclause see GSM 01.04 [1].

4 General

Digital test sequences are necessary to test for a bit exact implementation of the enhanced full rate speech transcoder (GSM 06.60 [2]), Digital test Voice Activity Detection (GSM 06.82 [6]), comfort noise (GSM 06.62 [4]) and the discontinuous transmission (GSM 06.81 [5]).

The test sequences may also be used to verify installations of the ANSI C code in GSM 06.53 [7].

Clause 5 describes the format of the files which contain the digital test sequences. Clause 6 describes the test sequences for the speech transcoder. Clause 7 describes the test sequences for the VAD, comfort noise and discontinuous transmission.

Clause 8 describes the method by which synchronisation is obtained between the test sequences and the speech codec under test.

Clause 9 describes the alternative acceptance testing of the speech encoder and decoder in the TRAU by means of 8 bit A- or μ-law compressed test sequences on the A-Interface.

Electronic copies of the digital test sequences are provided as clause 10, these digital test sequences are contained in the archive en_300725v080001p0.ZIP which accompanies the present document.

5 Test sequence format

This clause provides information on the format of the digital test sequences for the GSM enhanced full rate speech transcoder (GSM 06.60 [2]), Voice Activity Detection (GSM 06.82 [6]), comfort noise (GSM 06.62 [4]) and the discontinuous transmission (GSM 06.81 [5]).

5.1 File format

The test sequence files are provided in archive en_300725v080001p0.ZIP which accompanies the present document.

Following decompression, four types of file are provided:

- files for input to the GSM enhanced full rate speech encoder: *.INP;
- files for comparison with the encoder output: *.COD;
- files for input to the GSM enhanced full rate speech decoder: *.DEC;
- files for comparison with the decoder output: *.OUT.

The *.DEC files are generated from the corresponding *.COD files.

Tables 1, 2, 3 and 4 define the formats of the four types of file.

Each speech parameter within the speech frame of 244 bits/20 ms is contained in a serial string of 16 bit words, where each word contains the value of one bit of the parameter. In each string of *n* 16 bit words containing the *n* bits of a parameter, the most significant bit of the parameter is written first, and the least significant bit is written last. The bit value contained in a single 16 bit word is either 0x0000 or 0x0001 (right justified) for the binary values of "0" and "1", respectively. See table 6 of GSM 06.60 [2] for the order of occurrence and bit allocation of speech parameters within the speech frame of 244 bits/20 ms.

The samples in the encoder input signal and in the decoder output signal are left justified.

5.2 Codec homing

Each *.INP file includes two homing frames at the start of the test sequence. The function of these frames is to reset the speech encoder state variables to their initial value. In the case of a correct installation of the ANSI-C simulation (GSM 06.53 [7]), all speech encoder output frames shall be identical to the corresponding frame in the *.COD file. In the case of a correct hardware implementation undergoing testing, the first speech encoder output frame is undefined and need not be identical to the first frame in the *.COD file, but all remaining speech encoder output frames shall be identical to the corresponding frames in the *.COD file.

Each *.DEC file includes two homing frames at the start of the test sequence. The function of these frames is to reset the speech decoder state variables to their initial value. In the case of a correct installation of the ANSI-C simulation (GSM 06.53 [7]), all speech decoder output frames shall be identical to the corresponding frame in the *.OUT file. In the case of a correct hardware implementation undergoing testing, the first speech decoder output frame is undefined and need not be identical to first frame in the *.OUT file, but all remaining speech decoder output frames shall be identical to the corresponding frames in the *.OUT file.

Table 1: Encoder input sequence (*.INP) format

Name	Description	No. of bits	Justification
s(n)	Encoder input signal	13	Left

Table 2: Encoder output sequence (*.COD) format

Name	Description	No. of bits	Justification
Speech parameters			
SPEECH	Serial stream of speech parameter bits to the channel encoder	244	Right
Additional information			
VAD	Voice activity detection flag	1	Right
SP	SP flag	1	Right

Table 3: Decoder input sequence (*.DEC) format

Name	Description	No. of bits	Justification
Additional information			
BFI	Bad Frame Indicator flag	1	Right
Speech parameters			
SPEECH	Serial stream of speech parameter bits to the channel encoder	244	Right
Additional information			
SID	Silence Descriptor flag	1	Right
TAF	Time Alignment Flag	1	Right

Table 4: Decoder output sequence (*.OUT) format

Name	Description	No. of bits	Justification
s'(n)	Decoder output signal	13	Left

6 Speech codec test sequences

This clause describes the test sequences designed to exercise the GSM enhanced full rate speech transcoder (GSM 06.60 [2]).

6.1 Codec configuration

The speech encoder shall be configured to operate in the non-DTX mode. The VAD and SP flags shall be set to 1 at the speech encoder output.

6.2 Speech codec test sequences

Table 5 lists the location and size of the speech codec test sequences.

6.2.1 Speech encoder test sequences

Twenty-one encoder input sequences are provided. Note that for the input sequences TEST0.INP to TEST3.INP, the amplitude figures are given in 13-bit precision. The active speech levels are given in dBov.

- TEST0.INP - Synthetic harmonic signal. The pitch delay varies slowly from 18 to 143,5 samples. The minimum and maximum amplitudes are -997 and +971.
- TEST1.INP - Synthetic harmonic signal. The pitch delay varies slowly from 144 down to 18,5 samples. Amplitudes at saturation point -4 096 and +4 095.

- TEST2.INP - Sinusoidal sweep varying from 150 Hz to 3 400 Hz. Amplitudes ±1 250.
- TEST3.INP - Sinusoidal sweep varying from 150 Hz to 3 400 Hz. Amplitudes ±4 000.
- TEST4.INP - Female speech, active speech level: -19,4 dBov, flat frequency response.
- TEST5.INP - Male speech, active speech level: -18,7 dBov, flat frequency response.
- TEST6.INP - Female speech, ambient noise, active speech level: -35,0 dBov, flat frequency response.
- TEST7.INP - Female speech, ambient noise, active speech level: -25,0 dBov, flat frequency response.
- TEST8.INP - Female speech, ambient noise, active speech level: -15,6 dBov, flat frequency response.
- TEST9.INP - Female speech, car noise, active speech level: -35,5 dBov, flat frequency response.
- TEST10.INP - Female speech, car noise, active speech level: -26,1 dBov, flat frequency response.
- TEST11.INP - Female speech, car noise, active speech level: -15,8 dBov, flat frequency response.
- TEST12.INP - Male speech, ambient noise, active speech level: -34,9 dBov, flat frequency response.
- TEST13.INP - Male speech, ambient noise, active speech level: -24,8 dBov, flat frequency response.
- TEST14.INP - Male speech, ambient noise, active speech level: -15,0 dBov, flat frequency response.
- TEST15.INP - Male speech, babble noise, active speech level: -34,1 dBov, flat frequency response.
- TEST16.INP - Male speech, babble noise, active speech level: -24,3 dBov, flat frequency response.
- TEST17.INP - Male speech, babble noise, active speech level: -14,4 dBov, flat frequency response.
- TEST18.INP - Female speech, ambient noise, active speech level: -26,0 dBov, modified IRS frequency response, with many zero frames.