SLOVENSKI STANDARD
SIST EN 300 723 V6.0.1:2003

01-december-2003

Digitalni celiļ ni telekomunikacijski sistem (faza 2+) ï Izboljġane polnohitrostne funkcije za obdelavo govora ï Sploġni opis (GSM 06.51, razliļ ica 6.0.1, izdaja 1997)

Digital cellular telecommunications system (Phase 2+) (GSM); Enhanced Full Rate (EFR) speech processing functions; General description (GSM 06.51 version 6.0.1 Release 1997)

Ta slovenski standard je istoveten z: EN 300 723 Version 6.0.1

ICS:

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

SIST EN 300 723 V6.0.1:2003 **en**

EN 300 723 V6.0.1 (1999-06)

European Standard (Telecommunications series)

Digital cellular telecommunications system (Phase 2+); Enhanced Full Rate (EFR) speech processing functions; General description (GSM 06.51 version 6.0.1 Release 1997)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Reference
DEN/SMG-020651Q6 (6p00300o.PDF)

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

ETSI

Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - 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

Internet
secretariat@etsi.fr
Individual copies of this ETSI deliverable
can be downloaded from
http://www.etsi.org

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 SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available **free of charge** 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 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).

The present document introduces the Enhanced Full Rate (EFR) speech traffic channels within 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 6.x.y

where:

6 indicates Release 1997 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.

Proposed national transposition dates	
Date of adoption of this EN:	05 June 1999
Date of latest announcement of this EN (doa):	30 September 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2000
Date of withdrawal of any conflicting National Standard (dow):	31 March 2000

1 Scope

The present document is an introduction to GSM 06.60 [6], GSM 06.61 [7], GSM 06.62 [8], GSM 06.81 [9] and GSM 06.82 [10] ENs dealing with the speech processing functions in the Enhanced Full Rate channel of the GSM system. A general overview of the speech processing functions is given, with reference to the ENs where each function is specified in detail.

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.

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

[2] GSM 03.50: "Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".

[3] GSM 05.03: "Digital cellular telecommunications system (Phase 2+); Channel coding".

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

[5] GSM 06.54: "Digital cellular telecommunications system (Phase 2+); Test vectors for the GSM Enhanced Full Rate (EFR) speech codec".

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

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

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

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

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

3 Definitions and abbreviations

3.1 Definitions

Definition of terms used in the present document can be found in GSM 06.60 [6], GSM 06.61 [7], GSM 06.62 [8], GSM 06.81 [9] and GSM 06.82 [10].

3.2 Abbreviations

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

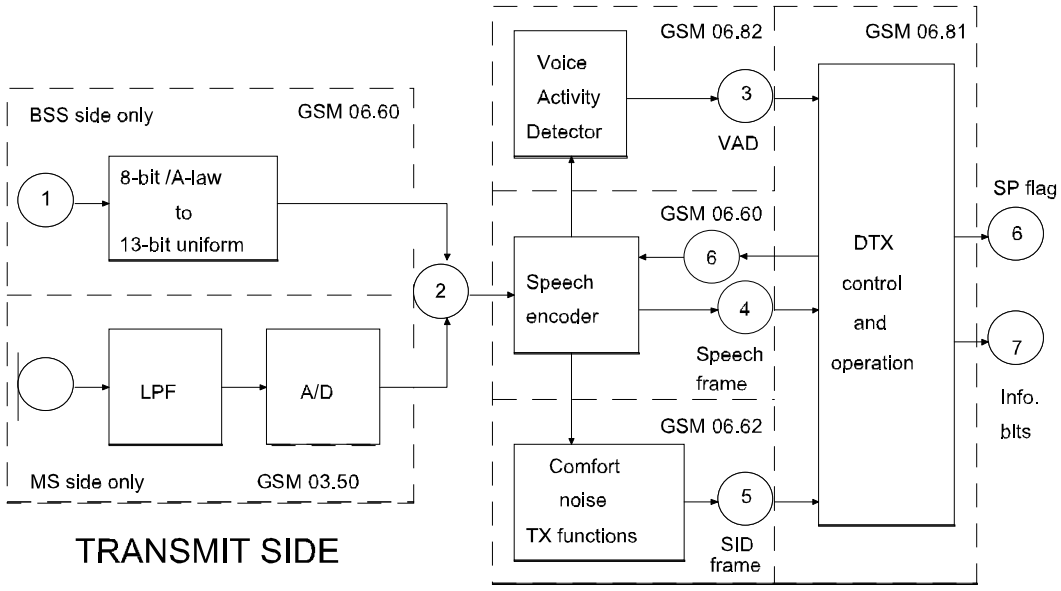
ACELP	Algebraic Code Excited Linear Prediction
BFI	Bad Frame Indication
BSS	Base Station System
CCITT	Comité Consultatif International Télégraphique et Téléphonique
DTX	Discontinuous Transmission
ETS	European Telecommunication Standard
GSM	Global System for Mobile communications
MS	Mobile Station
PCM	Pulse Code Modulated
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RSS	Radio SubSystem
RX	Receive
SACCH	Slow Associated Control CHannel
SID	SIlence Descriptor
SP flag	SPeech flag
TAF	Time Alignment Flag
TX	Transmit

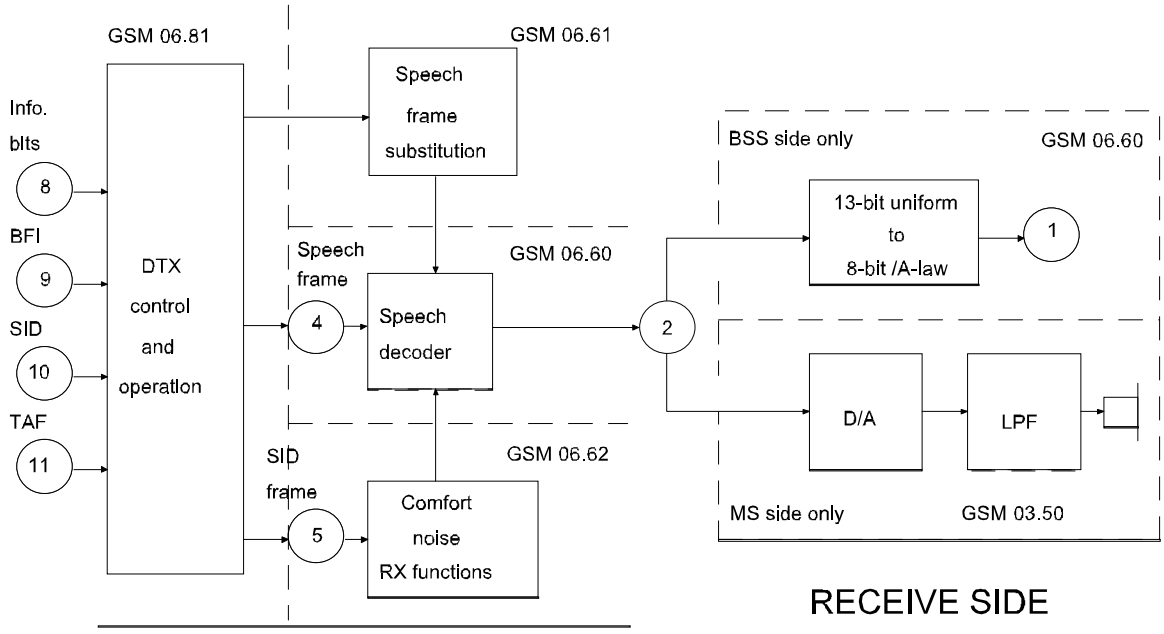
For abbreviations not given in this subclause, see GSM 01.04 [1].

4 General

Figure 1 presents a reference configuration where the various speech processing functions are identified. In this figure, the relevant Standards for each function are also indicated.

In figure 1, the audio parts including analogue to digital and digital to analogue conversion are included, to show the complete speech path between the audio input/output in the Mobile Station (MS) and the digital interface of the PSTN. The detailed specification of the audio parts are contained in GSM 03.50 [2]. These aspects are only considered to the extent that the performance of the audio parts affect the performance of the speech transcoder.





1) 8-bit /A-law PCM (CCITT recommendation G.711), 8 000 samples/s

2) 13-bit uniform PCM, 8 000 samples/s

3) Voice Activity Detector (VAD) flag

4) Encoded speech frame, 50 frames/s, 244 bits/frame

5) SIlence Descriptor (SID) frame, 244 bits/frame

6) SPeech (SP) flag, indicates whether information bits are speech or SID information

7) Information bits delivered to the radio subsystem

8) Information bits received from the radio subsystem

9) Bad Frame Indication

10) SIlence Descriptor (SID) flag

11) Time Alignment Flag (TAF), marks the position of the SID frame within the Slow Associated Control CHannel (SACCH) multiframe

Figure 1: Overview of audio processing functions

5 Enhanced Full Rate speech channel transcoding

As shown in figure 1, the speech encoder takes its input as a 13-bit uniform Pulse Code Modulated (PCM) signal either from the audio part of the Mobile Station or on the network side, from the Public Switched Telephone Network (PSTN) via an 8-bit/A-law to 13-bit uniform PCM conversion. The encoded speech at the output of the speech encoder is delivered to the channel coding function defined in GSM 05.03 [3] to produce an encoded block consisting of 456 bits leading to a gross bit rate of 22,8 kbit/s.

In the receive direction, the inverse operations take place. GSM 06.60 [6] describes the detailed mapping between input blocks of 160 speech samples in 13-bit uniform PCM format to encoded blocks of 244 bits and from encoded blocks of 244 bits to output blocks of 160 reconstructed speech samples. The sampling rate is 8 000 sample/s leading to a bit rate for the encoded bit stream of 12,2 kbit/s. The coding scheme is the so-called Algebraic Code Excited Linear Prediction, hereafter referred to as ACELP.

GSM 06.60 [6] describes the codec and GSM 06.53 [4] defines the C code, thus enabling the verification of compliance to GSM 06.60 [6] to a high degree of confidence by use of a set of digital test sequences given in GSM 06.54 [5].