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Digital cellular telecommunications system (Phase 2+) (GSM); Enhanced Full Rate (EFR) speech processing functions; General description (GSM 06.51 version 7.1.1 Release 1998)

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ETSI EN 300 723 V7.1.1 (2000-11)

European Standard (Telecommunications series)

**Digital cellular telecommunications system (Phase 2+);
Enhanced Full Rate (EFR) speech processing functions;
General description
(GSM 06.51 version 7.1.1 Release 1998)**

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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 7.x.y

where:

- 7 indicates Release 1998 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.

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National transposition dates

Date of adoption of this EN:	24 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 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.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

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- [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

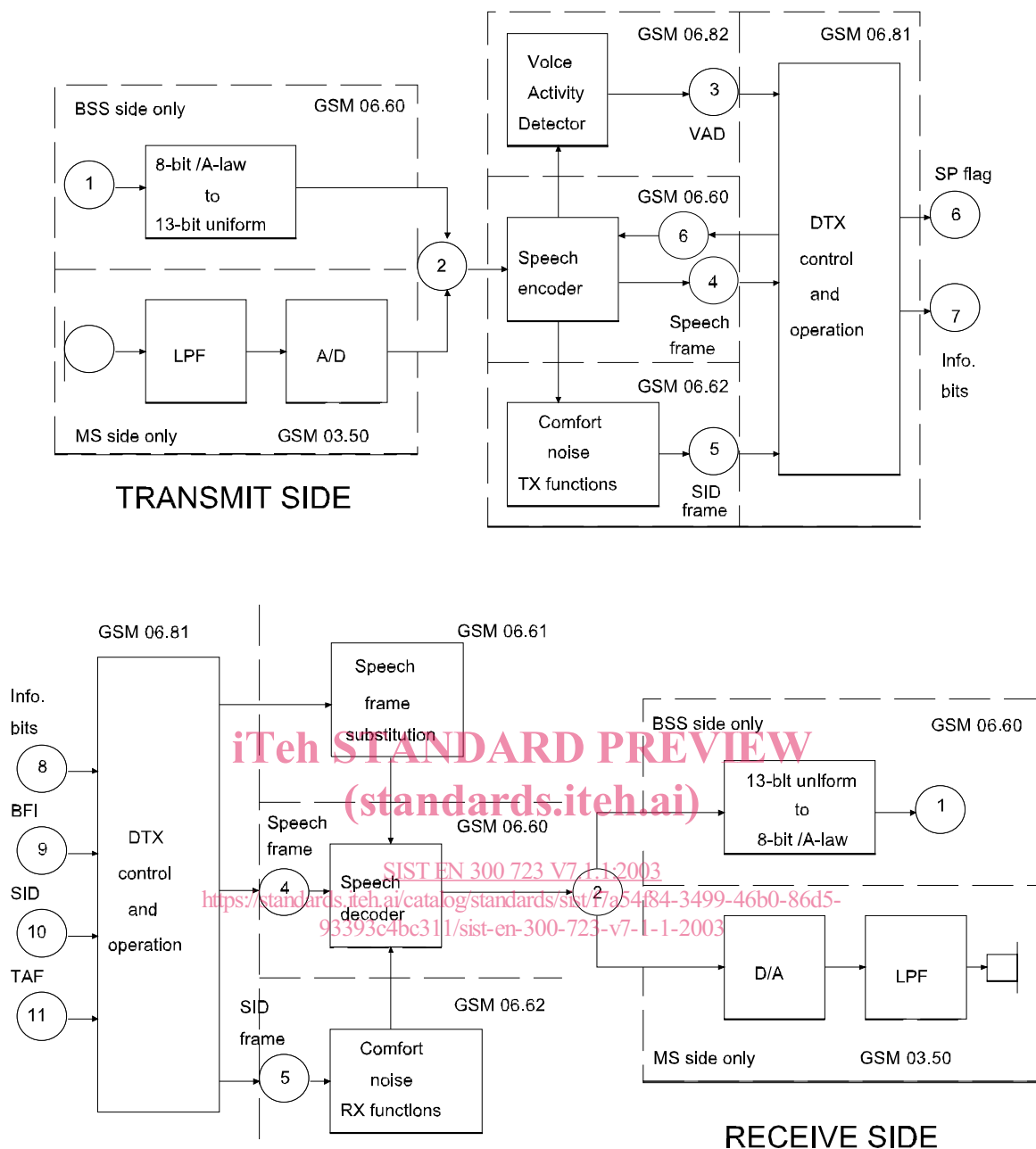
For abbreviations not given in this clause, see GSM 01.04 [1].

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.

An alternative and fully interoperable implementation using as a basis the 12.2 kbit/s mode of the Adaptive Multi Rate speech coder is described in clause 11.



- 1) 8-bit /A-law or μ -law (PCS 1900) 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