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TECHNICAL SPECIFICATION

Digital cellular telecommunications system (Phase 2+) (GSM);
Full rate speech;
Transcoding
(3GPP TS 46.010 version 14.0.0 Release 14)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

A GLOBAL INITIATIVE

Reference
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The present document specifies the full rate speech transcoding within the digital cellular telecommunications system.

NOTE: The present document is a reproduction of recommendation T/L/03/11 "13 kbit/s Regular Pulse Excitation - Long Term Prediction - Linear Predictive Coder for use in the digital cellular telecommunications system".

Archive en_300961v080101p0.ZIP which accompanies the present document, contains test sequences, as described in clause 6 and annex A.3.

The archive contains the following:

Disk1.zip	Annex B: Test sequences for the GSM Full Rate speech codec; Test sequences SEQ01.xxx to SEQ05.xxx. (Disk1.zip contains LHA compressed files.)
Disk2.zip	Annex B: Test sequences for the GSM Full Rate speech codec with homing frames; Test sequences SEQ01H.* to SEQ02H.*.
Disk3.zip	Annex B: Test sequences for the GSM Full Rate speech codec with homing frames; Test sequences SEQ03H.* to SYNC159.COD.
Disk4.zip	Annex B: 8 bit A-law test sequences for the GSM Full Rate speech codec with and without homing frames (Disk4.zip contains self-extracting files).
Disk5.zip	Annex B: 8 bit μ-law test sequences for the GSM Full Rate speech codec with and without homing frames (Disk5.zip contains self-extracting files).

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1 Scope

The transcoding procedure specified in the present document is applicable for the full-rate Traffic Channel (TCH) in the digital cellular telecommunications system. The use of this transcoding scheme for other applications has not been considered.

In GSM 06.01, a reference configuration for the speech transmission chain of the digital cellular telecommunications system is shown. According to this reference configuration, the speech encoder takes its input as a 13 bit uniform PCM signal either from the audio part of the mobile station or on the network side, from the PSTN via an 8 bit/A- or μ-law (PCS 1900) to 13 bit uniform PCM conversion. The encoded speech at the output of the speech encoder is delivered to a channel encoder unit which is specified in GSM 05.03. In the receive direction, the inverse operations take place.

The present document describes the detailed mapping between input blocks of 160 speech samples in 13 bit uniform PCM format to encoded blocks of 260 bits and from encoded blocks of 260 bits to output blocks of 160 reconstructed speech samples. The sampling rate is 8000 sample/s leading to an average bit rate for the encoded bit stream of 13 kbit/s. The coding scheme is the so-called Regular Pulse Excitation - Long Term prediction - Linear Predictive Coder, here-after referred to as RPE-LTP.

The present document also specifies the conversion between A- and μ-law (PCS 1900) PCM and 13 bit uniform PCM. Performance requirements for the audio input and output parts are included only to the extent that they affect the transcoder performance. The present document also describes the codec down to the bit level, thus enabling the verification of compliance to the present document to a high degree of confidence by use of a set of digital test sequences. These test sequences are described and are contained in archive en_300961v080101p0.ZIP which accompanies the present document.

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

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

[3] GSM 06.01: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Processing functions".

[4] GSM 11.10: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformity specification".

[5] Void.

[6] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

[7] ITU-T Recommendation G.712: "Transmission performance characteristics of pulse code modulation".

[8] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM)".

[9] ITU-T Recommendation Q.35: "Technical characteristics of tones for the telephone service".