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Digitalni celiļ ni telekomunikacijski sistem (faza 2+) ï Nezvezno oddajanje (DTX) pri prilagodljivih veļ hitrostnih (AMR) govornih prometnih kanalih (GSM 06.93, razliļ ica 7.2.1, izdaja 1998)

Digital cellular telecommunications system (Phase 2+) (GSM); Discontinuous Transmission (DTX) for Adaptive Multi-Rate (AMR) speech traffic channels (GSM 06.93 version 7.2.1 Release 1998)

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Foreword

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

The present document describes the general baseband operation of Adaptive Multi-Rate speech traffic channels in the transmitter and in the receiver of GSM Mobile Stations and Base Station Systems during Discontinuous Transmission (DTX) within the digital cellular telecommunications system.

The present document corresponds to GSM technical specification, GSM 06.93 AMR, version X.X.X.

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.

National transposition dates	
Date of adoption of this EN:	31 March 2000
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1 Scope

The present document gives a description of the general baseband operation of Adaptive Multi-Rate speech traffic channels in the transmitter and in the receiver of GSM Mobile Stations (MS)s and Base Station Systems (BSS)s during Discontinuous Transmission (DTX).

For clarity, the description is structured according to the block diagrams in figures 1 and 3. Except in the case described next, this structure of distributing the various functions between system entities is not mandatory for implementation, as long as the operation on the air interface and on the speech decoder output remains the same.

In the case of BSSs where the speech transcoder is located remote from the Base Transceiver Station (BTS), the implementation of the interfaces between the DTX handlers and the Radio Sub System (RSS) as described in the present document together with all their flags is mandatory, being part of the A-bis interface as described in GSM 08.60 and GSM 08.61.

The DTX functions described in this technical specification are mandatory for implementation in the GSM MSs. The receiver requirements are mandatory for implementation in all GSM BSSs, the transmitter requirements only for those where downlink DTX or Tandem Free Operation will be used.

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).

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

[2] GSM 04.08: "Digital cellular telecommunication system (Phase 2+); Mobile radio interface layer 3 specification".

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

[4] GSM 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[5] GSM 05.08: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[6] GSM 05.09: "Digital cellular telecommunication system (Phase 2+); Link adaptation".

[7] GSM 06.71: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate (AMR) speech processing functions; General description".

[8] GSM 06.73: "Digital cellular telecommunications system (Phase 2+); ANSI-C code for the GSM Adaptive Multi-Rate speech codec".

[9] GSM 06.74: "Digital cellular telecommunications system (Phase 2); Test vectors for the GSM Adaptive Multi-Rate speech codec".

[10] GSM 06.90: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate speech transcoding".

[11] GSM 06.91: "Digital cellular telecommunications system (Phase 2+); Substitution and muting of lost frame for Adaptive Multi-Rate speech traffic channels".

[12] GSM 06.92: "Digital cellular telecommunications system (Phase 2+); Comfort noise aspects for Adaptive Multi-Rate speech traffic channels".

[13] GSM 06.94: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detector (VAD) for Adaptive Multi-Rate speech traffic channels".

[14] GSM 08.60: "Digital cellular telecommunication system (Phase 2+); Inband control of remote transcoders and rate adaptors for Full Rate traffic channels".

[15] GSM 08.61: "Digital cellular telecommunication system (Phase 2+); Inband Control of Remote Transcoders and Rate Adaptors for Half Rate traffic channels".

[16] GSM 08.62: "Digital cellular telecommunications system; Inband Tandem Free Operation (TFO) of Speech Codecs".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

frame: Time interval of 20 ms, corresponding to the time segmentation of the Adaptive Multi Rate speech transcoder (GSM 06.90 [9]), also used as a short term for a traffic frame.

traffic frame: Block of 95..244 information bits transmitted on the TCH/AFS or TCH/AHS speech traffic channels.

SID frame: Frame characterised by the SID (Silence Descriptor) gross bit patterns. It may convey information on the acoustic background noise.

speech frame: Traffic frame that has been classified as a SPEECH frame.

VAD flag: Boolean flag, generated by the VAD algorithm defined in GSM 06.94 indicating the presence ("1") or the absence ("0") of a speech frame.

RX_TYPE: flag with eight values, generated by the RX radio subsystem, indicating to the RX DTX handler the type of data in the current frame. Refer to Table 2.

TX_TYPE: flag with eight values, generated by the TX DTX handler, indicating to the TX radio subsystem the type of data in the current frame. Refer to Table 1.

hangover period: A period of 7 frames added at the end of a speech burst in which VAD flag ="0" and TX_TYPE is "SPEECH".

3.2 Symbols

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

$N_{elapsed}$ Number of elapsed frames since the last updated SID frame.

3.3 Abbreviations

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

BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station
CHD	Channel Decoder
CHE	Channel Encoder
DTX	Discontinuous Transmission
ETS	European Telecommunication Standard
FACCH	Fast Associated Control CHannel
GSM	Global System for Mobile Telecommunications
MS	Mobile Station
RATSCCH	Robust Amr Traffic Synchronised Control CHannel
RSS	Radio Sub System
RX	Receive
SACCH	Slow Associated Control CHannel
SID	SIlence Descriptor
TX	Transmit
VAD	Voice Activity Detector

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

4 General

Discontinuous Transmission (DTX) is a mechanism, which allows the radio transmitter to be switched off most of the time during speech pauses for the following two purposes:

- to save power in the Mobile Station (MS);
- to reduce the overall interference level over the air interface.

DTX in uplink shall be in operation within the GSM MS, if commanded so by the network, see GSM 04.08. The MS shall handle DTX in downlink at any time, regardless, whether DTX in uplink is commanded or not.

4.1 General organisation

The overall DTX mechanism described in the present document requires the following functions:

- a Voice Activity Detector (VAD) on the transmit (TX) side;
- evaluation of the background acoustic noise on the transmit (TX) side, in order to transmit characteristic parameters to the receive (RX) side;
- generation on the receive (RX) side of a similar noise, called comfort noise, during periods where the radio transmission is switched off.

The Voice Activity Detector (VAD) is defined in GSM 06.94 and the comfort noise functions in GSM 06.92. Both are based partly on the speech transcoder and its internal variables, defined in GSM 06.90.

In addition to these functions, if the parameters arriving at the RX side are detected to be seriously corrupted by errors, the speech or comfort noise must be generated from substituted data in order to avoid seriously annoying effects for the listener. This function is defined in GSM 06.91.

An overall description of the speech processing parts can be found in GSM 06.71.

The description for Tandem Free Operation is given in GSM 08.62.