# ETSI TS 126 450 V17.0.0 (2022-05)

**TECHNICAL SPECIFICATION**

Universal Mobile Telecommunications System (UMTS);
LTE;
Codec for Enhanced Voice Services (EVS);
Discontinuous Transmission (DTX)
(3GPP TS 26.450 version 17.0.0 Release 17)

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# Contents

# Foreword

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

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

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where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the document.

# 1 Scope

This document specifies the system level aspects of the Discontinuous Transmission (DTX) function of the EVS codec.

# 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. 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]     3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]     3GPP TS 26.445: "Codec for Enhanced Voice Services (EVS); Detailed Algorithmic Description ".

[3]     3GPP TS 26.442: " Codec for Enhanced Voice Services (EVS); ANSI C code (fixed-point)".

[4]     3GPP TS 26.443: " Codec for Enhanced Voice Services (EVS); ANSI C code (floating-point)".

[5]     3GPP TS 26.444: " Codec for Enhanced Voice Services (EVS); Test Sequences".

[6]     3GPP TS 26.446: " Codec for Enhanced Voice Services (EVS); AMR-WB Backward Compatible Functions".

[7]     3GPP TS 26.447: " Codec for Enhanced Voice Services (EVS); Error Concealment of Lost Packets".

[8]     3GPP TS 26.448: " Codec for Enhanced Voice Services (EVS); Jitter Buffer Management".

[9]     3GPP TS 26.449: " Codec for Enhanced Voice Services (EVS); Comfort Noise Generation (CNG) Aspects".

[10]     3GPP TS 26.441: " Codec for Enhanced Voice Services (EVS); General Overview".

[11]     3GPP TS 26.451: " Codec for Enhanced Voice Services (EVS); Voice Activity Detection (VAD)".

[12]     3GPP TS 26.114: "Multimedia Telephony; Media handling and interaction".

[13]     3GPP TS 26.131: "Terminal acoustic characteristics for telephony; Requirements ".

[14]     3GPP TR 26.952: "Codec for Enhanced Voice Services (EVS); Performance Characterization".

[15]     3GPP TS 26.452: "Codec for Enhanced Voice Services (EVS); ANSI C code; Alternative fixed-point using updated basic operators".

# 3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

| | |
|---|---|
| ACELP | Algebraic Code-Excited Linear Prediction |
| AMR-WB | Adaptive Multi Rate Wideband (codec) |
| CNG | Comfort Noise Generator |
| DTX | Discontinuous Transmission |
| EVS | Enhanced Voice Services |
| FB | Fullband |
| FEC | Frame Erasure Concealment |
| IP | Internet Protocol |
| JBM | Jitter Buffer Management |
| MSB | Most Significant Bit |
| MTSI | Multimedia Telephony Service for IMS |
| NB | Narrowband |
| PS | Packet Switched |
| PSTN | Public Switched Telephone Network |
| SAD | Signal Activity Detection |
| SC-VBR | Source Controlled - Variable Bit Rate |
| SID | Silence Insertion Descriptor |
| SWB | Super Wideband |
| VAD | Voice Activity Detection |
| WB | Wideband |
| WMOPS | Weighted Millions of Operations Per Second |

# 4 General

## 4.1 Background

The present document specifies the system level aspects of the Discontinuous Transmission (DTX) function of the EVS codec. Specific codec functions that implement the DTX and other EVS functionalities are described in TS 26.445 [2], TS 26.446 [6], TS 26.447 [7], TS 26.448 [8], TS 26.449 [9] and TS 26.451 [11]. The corresponding fixed-point reference C code is specified in TS 26.442 [3] and TS 26.452 [15] using two different sets of basic operators. The corresponding floating-point reference C code is specified in TS 26.443 [4]. The EVS test sequences are given in TS 26.444 [5] and the EVS codec is characterized in TR 26.952 [14].

Discontinuous transmission (DTX) is a mechanism for the EVS Codec to encode the input signal at a lower average rate by taking speech inactivity into account. The DTX scheme is useful for the following purposes:

- to conserve UE power,

- to improve network capacity.

DTX in the transmitting path (uplink) shall be in operation in UEs if commanded so by the network. The UE shall handle DTX in the receiving path (downlink) at any time, regardless of whether DTX in the transmitting path is commanded or not.

## 4.2 General organization

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

- a Signal Activity Detector (SAD) 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 transmission is switched off.

The Signal Activity Detector (SAD) is defined in TS 26.451 [11] and the comfort noise functions in TS 26.449 [9]. Both are based partly on the EVS Codec and its internal variables defined in TS 26.445 [2].

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 shall be generated from substituted data in order to avoid seriously annoying effects for the listener. These functions are defined in TS 26.447 [7].

An overall description of the speech processing parts can be found in TS 26.441 [10]. An overview of the DTX operation is shown in Figure 1.
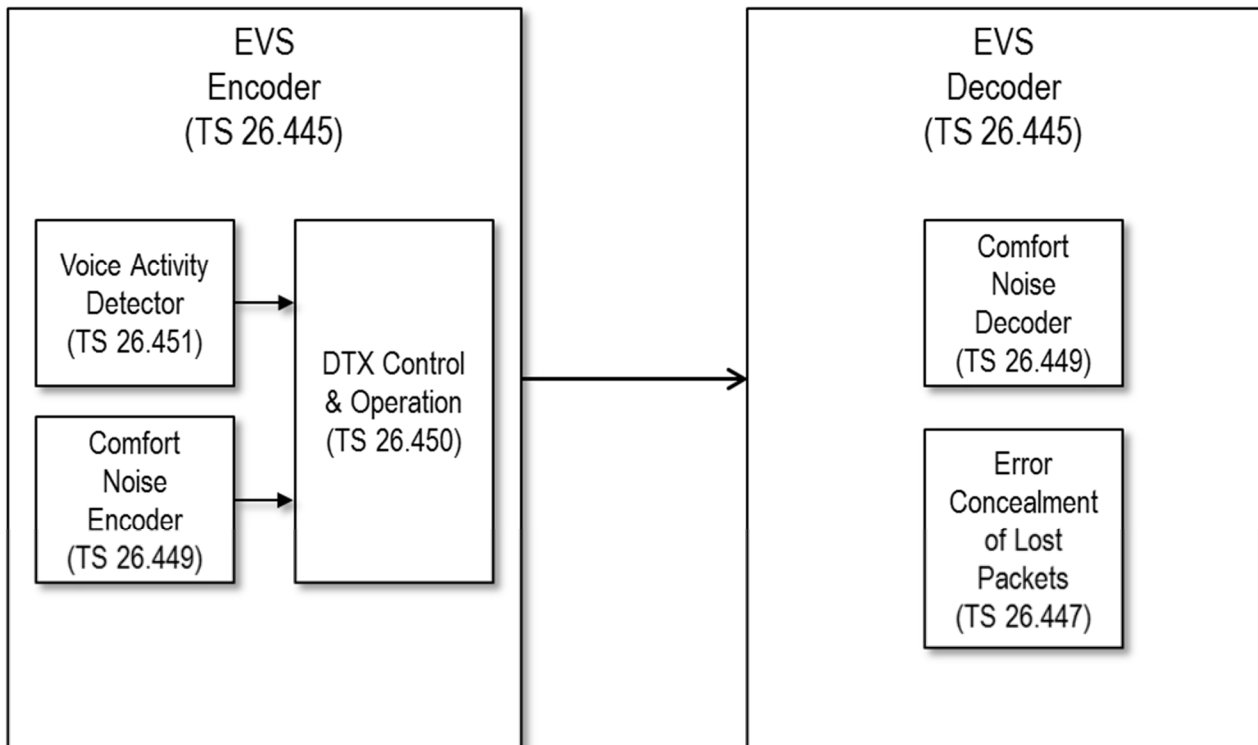


**Figure 1: Block diagram of DTX Operation**

# 5 EVS Codec DTX Operation

## 5.1 Transmit (TX) side

There are two algorithms for extending the DTX hangover period. One is a general hangover algorithm and other is specific to music. Both are defined in clause 5.1.12.5 of TS 26.445 [2].

The main specification of the DTX/CNG algorithms is contained in clause 5.6 of TS 26.445 [2].

The bit allocation of SID frames generated for DTX operation is defined in clause 7.2 of TS 26.445 [2].

## 5.2 Receive (RX) side

Operation of the EVS decoder, including decoding of SID frames generated during DTX operation is described in clause 6.7 of TS 26.445 [2].

# Annex A (informative):
# Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2014-09 | 65 | SP-140465 | | | Presented at TSG#65 for approval | | 1.0.0 |
| 2014-09 | 65 | | | | Approved at TSG SA#65 | 1.0.0 | 12.0.0 |
| 2015-12 | 70 | | | | Version for Release 13 | 12.0.0 | 13.0.0 |
| | | | | | | | |

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-03 | 75 | | | | | Version for Release 14 | 14.0.0 |
| 2018-06 | 80 | | | | | Version for Release 15 | 15.0.0 |
| 2019-03 | 83 | SP-190036 | 0001 | - | B | Addition of reference to Alt_FX_EVS implementation | 16.0.0 |
| 2022-04 | - | - | - | - | - | Update to Rel-17 version (MCC) | **17.0.0** |

# History

| Document history | | |
|---|---|---|
| V17.0.0 | May 2022 | Publication |
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