

ETSI TS 126 453 V16.0.0 (2020-11)



**Universal Mobile Telecommunications System (UMTS);
LTE;
Codec for Enhanced Voice Services (EVS);
Speech codec frame structure
(3GPP TS 26.453 version 16.0.0 Release 16)**



ReferenceRTS/TSGS-0426453vg00

KeywordsLTE,UMTS

ETSI

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Foreword

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

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1 Scope

The Enhanced Voice Services (EVS) Codec is specified in the series of Technical Specifications TS 26.441 [3], TS 26.442 [4], TS 26.443 [5], TS 26.444 [6], TS 26.445 [7], TS 26.446 [8], TS 26.447 [9], TS 26.448 [10], TS 26.449 [11], TS 26.450 [12], TS 26.451 [13] and TS 26.452 [15]. The EVS Codec is characterized in TR 26.952 [14].

The present document describes the "generic frame format" for the EVS Codec for the application in 3G Circuit-Switched Networks. This format is based on the RTP framing, as specified in TS 26.445 [7]. This generic frame format will be used as a common reference point, when interfacing speech frames between different elements of the 3G system. Appropriate mappings to and from this generic frame format will be used within and between each system element.

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 TR 41.001: "GSM Specification set".
- [3] 3GPP TS 26.441: "Codec for Enhanced Voice Services (EVS); General overview".
- [4] 3GPP TS 26.442: "Codec for Enhanced Voice Services (EVS); ANSI C code (fixed-point)".
- [5] 3GPP TS 26.443: "Codec for Enhanced Voice Services (EVS); ANSI C code (floating-point)".
- [6] 3GPP TS 26.444: "Codec for Enhanced Voice Services (EVS); Test Sequences".
- [7] 3GPP TS 26.445: "Codec for Enhanced Voice Services (EVS); Detailed algorithmic description".
- [8] 3GPP TS 26.446: "Codec for Enhanced Voice Services (EVS); Adaptive Multi-Rate - Wideband (AMR-WB) backward compatible functions".
- [9] 3GPP TS 26.447: "Codec for Enhanced Voice Services (EVS); Error concealment of lost packets".
- [10] 3GPP TS 26.448: "Codec for Enhanced Voice Services (EVS); Jitter buffer management".
- [11] 3GPP TS 26.449: "Codec for Enhanced Voice Services (EVS); Comfort Noise Generation (CNG) aspects".
- [12] 3GPP TS 26.450: "Codec for Enhanced Voice Services (EVS); Discontinuous Transmission (DTX)".
- [13] 3GPP TS 26.451: "Codec for Enhanced Voice Services (EVS); Voice Activity Detection (VAD)".
- [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 3GPP 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 3GPP TR 21.905 [1].

AMR-WB	Adaptive Multi-Rate - WideBand
CMR	Codec Mode Request (for AMR and AMR-WB and EVS)
CS	Circuit Switched
EVS	Enhanced Voice Services
EVS-CMR	CMR for EVS
EVS-SID	SID for EVS
FQC	Frame quality Classification
EVS AMR-WB IO	EVS AMR-WB Inter Operable (mode of operation)
MSB	Most Significant Bit
RTP	Real Time Protocol
SID	Silence Insertion Descriptor (for AMR and AMR-WB)
ToC	Table of Contents
WB-CMR	CMR for AMR-WB
WB-SID	SID for AMR-WB (and for EVS AMR-WB IO)

4 EVS Codec generic frame format in CS Networks

4.1 General

This clause describes the "generic frame format" of the EVS Codec in 3G CS networks for the Speech and SID frames of the primary modes of operation and the Speech and SID frames of the EVS AMR-WB IO mode of operation.

This generic frame format is illustrated in Figure 4.1-1 and it is based on the RTP format specified in TS 26.445 [7], Annex A, Figure A.3 (c), "Payload structure of Header-Full format with CMR + ToC single frame" and in TS 26.445 [7], Annex A, Figure A.6, "Payload structure for EVS AMR-WB IO SID (56 bit) payload" with the following modifications:

- The leading "1" bit, $d(0)$, in the CMR octet (MSB) is omitted in CS networks; bits $d(1) \dots d(7)$ are copied bit by bit in the same order. EVS-CMR has therefore 7 bits.
- The ToC octet is omitted (Table of Contents in RTP).
- The Speech data or SID of the EVS primary and the EVS AMR-WB IO modes are copied bit by bit. Each rate has its own, unique number of bits ($n+1$).
- The 40 bits of the AMR-WB SID, $d(0) \dots d(39)$, are copied bit by bit into the generic frame format.

Note that the order of Speech data or SID bits is the same as in in TS 26.445 [7].

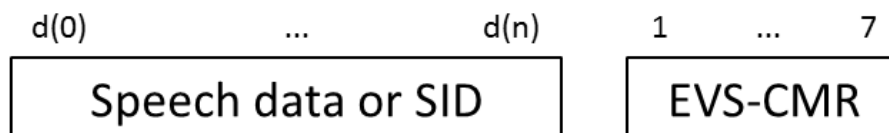


Figure 4.1-1: EVS Generic Frame Format in CS Networks

4.2 EVS payload sizes in CS Networks

Table 4.2-1 lists all EVS Primary rates for the application in CS Networks, including No_Data. These payload sizes are always integer multiples of 8 bits (excluding the 7-bit EVS-CMR).

Table 4.2-1: Payload sizes for EVS Primary Rates in CS Networks

Rate	Payload Size (bits)	Net bit rate for active speech (kbps)
No_Data	0	-
EVS Primary SID	48	-
EVS Primary 2.8	56	2,8
EVS Primary 7.2	144	7,2
EVS Primary 8.0	160	8,0
EVS Primary 9.6	192	9,6
EVS Primary 13.2	264	13,2
EVS Primary 16.4	328	16,4
EVS Primary 24.4	488	24,4

Table 4.2-2 lists all EVS AMR-WB IO rates for the application in CS Networks. In contrast to the payload sizes used in RTP, these payloads do not include any CMR overhead. These payload sizes are not always integer multiples of 8 bits (excluding the 7-bit EVS-CMR).

Table 4.2-2: Payload sizes for EVS AMR-WB IO modes in CS Networks

Rate	Payload Size (bits)	Net bit rate for active speech (kbps)
EVS-AMR-WB IO SID	40	-
EVS AMR-WB IO 6.6	132	6,6
EVS AMR-WB IO 8.85	177	8,85
EVS AMR-WB IO 12.65	253	12,65

4.3 EVS generic frame header

The EVS Codec generic frame format in CS networks has no header. The payload size defines the used Codec rate. Parameters inside this EVS payload differentiate the EVS audio bandwidth and the EVS mode of operation. For details, see TS 26.445 [7].

4.4 EVS frame quality classification

The EVS Codec generic frame format has no own Frame Quality Indicator. If transported on Iu and Nb the "Frame Quality Classification" (FQC) of the Iu and Nb framing protocol is used.

4.5 EVS codec mode request in CS Networks

The EVS Codec Mode Request (EVS-CMR) is specified in TS 26.445 [7], Annex A, Table A.3: Structure of CMR. The EVS-CMR has a size of 7 bits. The Header bit (MSB), specified in TS 26.445 [7], is omitted in CS networks.

Annex A (informative): Change history

Change history							
Date	TSG SA #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2016-03	70	SP-160071			Presented to TSG SA#71 Plenary (for approval)	-	1.0.0
2016-03					Approved at TSG SA#71	1.0.0	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

History

Document history		
V16.0.0	November 2020	Publication