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Codec for Immersive Voice and Audio Services
- Test sequences
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Contents

Foreword

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

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Version x.y.z

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  - 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.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the digital test sequences for the Immersive Voice and Audio Services (IVAS) codec. These sequences shall be used in conformance testing for implementations of the IVAS codec (3GPP TS 26.253), Rendering (3GPP TS 26.254), Error Concealment of Lost Packets (3GPP TS 26.255) and Jitter Buffer Management (JBM) (3GPP TS 26.256) and its reference C code specification 3GPP TS 26.258 (floating-point). In addition, the present document specifies procedures for conformance testing.

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 26.250: "Codec for Immersive Voice and Audio Services - General overview".

[3] Void

[4] 3GPP TS 26.253: "Codec for Immersive Voice and Audio Services - Detailed Algorithmic Description incl. RTP payload format and SDP parameter definitions".

[5] 3GPP TS 26.254: "Codec for Immersive Voice and Audio Services - Rendering".

[6] 3GPP TS 26.255: "Codec for Immersive Voice and Audio Services - Error concealment of lost packets".

[7] 3GPP TS 26.256: "Codec for Immersive Voice and Audio Services - Jitter Buffer Management".

[8] 3GPP TS 26.258: "Codec for Immersive Voice and Audio Services - C code (floating point)".

[9] 3GPP TS 26.444: "Codec for Enhanced Voice Services - Test Sequences".

[10] ETSI TS 103 634 V1.4.1 (2023-03), "Digital Enhanced Cordless Telecommunications (DECT); Low Complexity Communication Codec plus (LC3plus)".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

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

3.2 Symbols

Void

3.3 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].

AMR-WB	Adaptive Multi Rate Wideband (codec)
EVS	Enhanced Voice Services (codec)
IVAS	Immersive Voice and Audio Services (codec)
ISAR	Immersive Audio for Split Rendering Scenarios
JBM	Jitter Buffer Management

4 General

4.1 Introduction

This specification provides digital test sequences that shall be used to test conformance for an implementation of the IVAS codec (TS 26.253 [4]), Rendering (TS 26.254 [5]), Error Concealment of Lost Packets (TS 26.255 [6]) and Jitter Buffer Management (JBM) (TS 26.256 [7]), and its reference C code specification in TS 26.258 [8] (floating-point). An overview of the IVAS Codec specifications is found in TS 25.250 [2].

A standard compliant implementation of the above specifications shall pass the conformance tests according to clause 7. The necessary test sequences can be found in the corresponding ZIP files according to the attached Readme.txt file.

NOTE: The test sequences apply to specific version(s) of the IVAS codec as indicated by the name of the ZIP file, e.g., IVAS-FL-1.0. The codec version number is used to have consistent numbering across reference C code specifications.

Clause 5 describes the format of the files, which contain the digital test sequences. Clause 6 describes the test sequences for the IVAS codec, including rendering, error concealment of lost packets, and jitter buffer management. Clause 7 describes the conformance testing procedure for implementations of the IVAS codec.

5 Test sequence format

5.1 Introduction to test sequence format

This clause provides information on the format of the digital test sequences for the IVAS codec (TS 26.253 [4]), Rendering (TS 26.254 [5]), Error Concealment of Lost Packets (TS 26.255 [6]) and Jitter Buffer Management (JBM) (TS 26.256 [7]) and its reference C code specification in TS 26.258 [8] (floating-point).

5.2 File format

The test sequence data is provided in PC (little-endian byte order) files, according to table 1.

Table 1: Overview of test sequence files

File type	File extensions
Audio input to the encoder and output from the decoder and renderer	*.wav
ISM metadata, Head rotation trajectories	*.csv
MASA metadata	*.met
Rate switching	*.bin
IVAS bitstreams	*.192
ISAR bitstreams	*.bit
IVAS bitstreams with frame errors	*.fer
Renderer configuration (text format or binary format)	*.cfg, *.dat
Renderer scene description	*.txt

6 IVAS codec test sequences including error concealment of lost packets

6.1 Introduction to test sequences

This clause provides information on the test sequences designed to exercise the IVAS codec.

6.2 Codec configuration

The codec shall be configured according to the instructions in Readme_IVAS_{enc, dec, rend, JBM_dec, ISAR_dec, ISAR_post_rend}.txt for each test case respectively in accordance with clause 6.3. For the bit-exact EVS compatibility mode of IVAS, including the AMR-WB interoperable function, the codec shall be configured in accordance with TS 26.444 [9].

6.3 IVAS codec test sequences

6.3.1 Mono operation test sequences

For mono operation (utilizing the bit-exact EVS compatibility mode of IVAS, including the AMR-WB interoperable function) the encoder and decoder shall be tested using test sequences and instructions in accordance with TS 26.444 [9].

6.3.2 Encoder test sequences

To test an IVAS encoder (beyond mono operation, see clause 6.3.1), test sequences and instructions provided in Readme_IVAS_enc.txt shall be used.

6.3.3 Decoder test sequences

To test an IVAS decoder (beyond mono operation, see clause 6.3.1), test sequences and instructions provided in Readme_IVAS_dec.txt shall be used. To test the IVAS decoder for split rendering (ISAR pre-renderer), test sequences and instructions provided in Readme_IVAS_ISAR_dec.txt shall be used.

6.3.4 Renderer test sequences

To test an IVAS renderer, test sequences and instructions provided in Readme_IVAS_rend.txt shall be used.

6.3.5 Jitter buffer management test sequences

To test jitter buffer management (JBM) for an IVAS decoder, test sequences and instructions provided in Readme_IVAS_JBM_dec.txt shall be used.

7 Conformance Testing

7.1 Bit-exact Conformance

For an implementation to be declared conformant according to the bit-exact conformance test procedure, the output sequences of the corresponding feature being implemented (IVAS encoder, IVAS decoder, IVAS renderer, JBM, ISAR pre-renderer, ISAR post-renderer) shall match bit-exactly the reference test sequences provided in the corresponding ZIP files in accordance with clause 6, including clause 6.3.1 for mono operation of the IVAS encoder and IVAS decoder. This applies for all implementations of the IVAS codec (TS 26.253 [4]), Rendering (TS 26.254 [5]), Error Concealment of Lost Packets (TS 26.255 [6]) and Jitter Buffer Management (JBM) (TS 26.256 [7]), and its reference C code specification in TS 26.258 [8] (floating-point).

If optional features are implemented, the corresponding conformance tests shall pass.

7.2 Non-Bit-exact Conformance

For IVAS mono operation (of and IVAS encoder or IVAS decoder), if an implementation under test is based on floating–point code (TS 26.258 [8]) and the output sequences are not bit-exact to the test sequences according to clause 6, the non-bit-exact conformance testing procedure defined in TS 26.444 [9] shall be used to test the conformance.

If optional features are implemented, the corresponding conformance tests shall pass.

7.3 LC3plus Conformance

For IVAS/ISAR split rendering operation utilizing LC3plus, the LC3plus encoder and decoder implementation shall pass all required conformance tests in accordance with the conformance procedure specified in [10] for the corresponding LC3plus codec version [10].

NOTE: Further details on the conformance configuration is TBD.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2023-11	SA4#126	S4-231880				Initial version	0.0.1
2023-11	SA4#126	S4-231994				Presented to SA4 plenary	0.1.0
2023-12	SA#102	SP-231302				Version 1.0.0 created by MCC	1.0.0
2024-02	SA4#127	S4-240343				Added initial test sequences for TS 26.258	1.1.0
2024-03	SA#103	SP-240028				Version 2.0.0 created by MCC	2.0.0
2024-03						Version 18.0.0 created by MCC	18.0.0
2024-06	SA#104	SP-240693	0001	2	B	Updated IVAS test sequences	18.1.0
2024-06						Title changed, abbreviation "IVAS" added per TSG SA decision	18.1.0

History

Document history		
V18.0.0	May 2024	Publication
V18.1.0	July 2024	Publication