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Presentation of Specification to TSG SA Plenary

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Document for presentation: **TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing", Version 1.0.0 (Release 6)**

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Abstract of document:

The present document specifies the digital test sequences and conformance criteria for the Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec.

An electronic copy of the ANSI-C code for the Fixed-point Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec is included in TS 26.273. Alternatively, a floating-point ANSI-C code is specified in 3GPP TS 26.304. The fixed-point codec/encoder/decoder or the fixed-point codec/encoder/decoder may be used depending on if the implementation platform is better suited for a floating-point or a fixed-point implementation. It has been verified that the fixed-point and floating-point codecs interoperate with each other without any artifacts.

Standard conformance of the Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec is enforced by meeting the conformance criteria defined in this document.

The present document includes information applicable to network operators, service providers and manufacturers.

Changes since last presentation:

This specification is presented to TSG SA Plenary for the first time (for information).

Outstanding Issues:

None.

Contentious Issues:

None.

Comment(s):

None.

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Technical Specification

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Contents

Foreword

This Technical Specification has been produced by the 3rd 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:

Version x.y.z

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- x the first digit:
  - 1 presented to TSG for information;
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- 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

The present document specifies test procedures and digital test sequences to be used for conformance testing of implementations of the Extended Adaptive Multi-Rate Wideband (AMR-WB+) codec.

2 Normative references

This document incorporates, by dated and undated reference, provisions from other publications. These normative references are cited in the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this document only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] 3GPP TS 26.290: Extended AMR Wideband speech codec; Transcoding functions.

[2] 3GPP TS 26.304: ANSI-C code for the floating point Extended AMR Wideband codec.

[3] 3GPP TS 26.273: ANSI-C code for the fixed point Extended AMR Wideband codec.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 26.290 [1], TS 26.304 [2] and TS 26.273 [3] apply.

3.2 Abbreviations

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

ACELP	Algebraic Code Excited Linear Prediction
AMR	Adaptive Multi-Rate
AMR-WB	Adaptive Multi-Rate Wideband
AMR-WB+	Extended Adaptive Multi-Rate Wideband
CELP	Code Excited Linear Prediction
TCX	Transform coded excitation
WB	Wideband

4 General

Test procedures and test sequences are necessary to test for correct implementations of the Extended Adaptive Multi-Rate Wideband (AMR-WB+) codec.

Clause 5 explains the procedure for conformance testing and the detailed requirements.

Annex A explains the digital test sequences and scripts to be executed for conformance testing ofAMR-WB+ codec implementations. The test sequences and scripts are attached to this specification.

5 Conformance

Conformance testing of fixed-point encoder and decoder is done by showing bit-exactness to the fixed-point reference C-code implementation (given in TS 26.273 [3]) or by meeting a set of minimum objective performance requirements by means of objective measures or by subjective testing.
The bit-exact approach should be preferred over applying objective measures if it can be achieved without undue penalty on computational complexity.
Conformance may also be concluded by subjective tests, in which performance not worse than that of the reference codec (TS 26.273) is achieved. Details are given in section 5.3.

Floating-point implementations of encoder or decoder should be done by utilizing (compiling) the reference floating-point source code in specification (given in TS 26.304 [2]). In addition, as the exact behaviour of executables derived from floating-point code may depend on the platform onto which it was compiled, for implementations used in mobile equipment the objective measures shall be used for verification that minimum objective performance requirements are met. For floating-point implementations, which are not used in mobile equipment the usage of the objective measures is recommended.
Conformance may also be concluded by subjective tests, in which performance not worse than that of the reference codec (TS 26.273) is achieved. Details are given in section 5.3.

The minimum performance requirements (objective measures) are the same for all implementations (fixed- and floating-point).

If an implementor chooses to implement only mono encoder functionality (or other functionality ffs), then conformance of only this functionality shall be tested. As above, conformance shall be shown by applying the bit-exact approach (fixed-point encoders), or by applying objective measures, or by subjective testing.

5.1 Bit-exactness

The implementor should choose the bit-exact approach for fixed-point encoder/decoder implementations. For fixed-point encoder and decoder implementations, test sequences are used for conformance testing. The test sequenes consist of reference input audio files and corresponding reference encoder and decoder outputs. To meet the bit exact criterion all test sequences must give bit-exact result to the reference fixed-point C-code of TS 26.273 [3]. The accompanying scripts will run the encoder and decoder and check that the output (bit stream from encoder and decoded audio) is identical to the reference. Decoder only implementation conformance is checked using the reference encoder output and the reference decoder output test vectors. The test sequences are described in Annex A.

For the floating-point encoder and decoder implementations, executables should be derived by directly compiling the reference source code in the floating-point codec specification TS 26.304 [2]. Even though in that case the floating-point source code is identical to the reference code, different compilers and platforms may result in non bit-exact variations in the bit-streams produced by the encoder and decoder. Hence, in order to check for conformance of such implementations in mobile equipment the objective criteria given below shall be met. For other floating-point implementations, which are not used in mobile equipment the objective criteria given below should be tested and met

5.2 Objective quality measures

Objective measures are used for testing the fulfilment of minimum performance requirements. These measures are the same for all implementations (fixed- and floating-point). They shall be met by all implementations in mobile equipment (fixed-point and floating-point) and all other non-bit exact fixed-point implementations. Floating-point implementations not used in mobile equipment should meet the objective measures.

5.2.3 Encoder (ffs, informative)

Conformance of fixed-point encoder implementations is tested with “white-box” tests, which make use of specific structural knowledge of the AMR-WB+ codec. The tests verify the operation of various encoder parts, modules or modes such that when all tests are passed conformance can be concluded for the complete encoder implementation. Tests of the following codec parts/modules/modes must be passed in order to conclude conformance:

Test #	Mode	Module/Part	Reference configuration	Criterion
1.0 – 1.8	MI=0..8; DTX disabled	All	26.273 encoder 26.273 decoder	All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code
2.0 – 2.8	MI=0..8; DTX enabled	All	26.273 encoder 26.273 decoder	All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code
3.0 – 3.3	MI = x1, x2; ISF = y1, y2; Mono operation	ACELP	26.304 encoder	Weighted SNR
4.0 – 4.3	MI = x1, x2; ISF = y; Mono operation	TCX-256	26.304 encoder	Weighted SNR
5.0 – 5.3	MI = x1, x2; ISF = y1, y2; Mono operation	TCX-512	26.304 encoder	Weighted SNR
6.0 – 6.3	MI = x1, x2; ISF = y1, y2; Mono operation	TCX-1024	26.304 encoder	Weighted SNR
7.0-7.3	MI = 23 ISF = 0.5, 1.0, 1.5 Mono operation	ACELP/TCX	26.304 encoder	Weighted SNR
8.0	MI = x; ISF = y; Mono operation	ACELP/TCX closed-loop mode selection	26.304 encoder 26.273 decoder	Relative number of identical mode selection
9.0	MI = x; ISF = y; Mono operation Low complexity operation	ACELP/TCX open-loop mode selection	26.304 encoder 26.273 decoder	Relative number of identical mode selection
10.0 – 10.3	MI = x1, x2; ISF = y1, y2; Stereo operation	Forced low-band stereo mode	26.304 encoder 26.273 decoder	PEAQ
11.0	MI = x; ISF = y; Stereo operation	Low-band stereo mode selection	26.304 encoder 26.273 decoder	Relative number of identical mode selection
12.0	Switched mode operation controlled with configuration file	ACELP/TCX TCX/BWE/Stereo	26.304 encoder 26.273 decoder	Weighted SNR PEAQ

13	MI = 23 ISF = 1.0 Mono operation	TCX+BWE	26.304 encoder 26.304 decoder	PEAQ

5.2.3.1 AMR-WB mode compliance with DTX disabled

All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code. The implementation should comply with the test vectors given in 26.173.

5.2.3.2 AMR-WB mode compliance with DTX enabled

All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code. The implementation should comply with the test vectors given in 26.173.

5.2.3.3 ACELP mode compliance

ACELP mode compliance is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in forced-mode operation where the mode selection is disabled and the encoder is forced to ACELP mode. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows operation only in ACELP mode. Further, the function segsnr() is used to compute the wsegSNR. The test encoder implementation operated in a test mode, is modified in the same manner (forced to ACELP mode and enabled to compute wsegSNR). [Some ore details: segment length, formula, where in the code, etc.]

This setup is used for all items out of the test set (TBA) and all configurations given in the following table.

Test #	Encoder command line
3.0	(MI=23, ISF=0.5)
3.1	(MI=23, ISF=1.0)
3.2	(MI=23, ISF=1.5)

ACELP mode compliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 2% (tbc) is observed
- no more than 2% of frames shall have a wSNR more than 4 dB lower than the reference

5.2.3.4 TCX-256 mode compliance

TCX-256 mode compliance is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in forced-mode operation where the mode selection is disabled and the encoder is forced to TCX-256 mode. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows operation only in TCX-256 mode. Further, the function segsnr() is used to compute the wsegSNR. The test encoder implementation operated in a test mode, is modified in the same manner (forced to TCX-256 mode and enabled to compute wsegSNR).

This setup is used for all items out of the test set (TBA,) and all configurations given in the following table.

Test #	Encoder command line
3.0	(MI=23, ISF=0.5)
3.1	(MI=23, ISF=1.0)
3.2	(MI=23, ISF=1.5)

TCX-256 mode compliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 1%(tbc) is observed
- no more than 2% of frames shall have a wSNR more than 4 dB lower than the reference

5.2.3.5 TCX-512 mode compliance

TCX-512 mode compliance is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in forced-mode operation where the mode selection is disabled and the encoder is forced to TCX-512 mode. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows operation only in TCX-512 mode. Further, the function segsnr() is used to compute the wsegSNR. The test encoder implementation operated in a test mode, is modified in the same manner (forced to TCX-512 mode and enabled to compute wsegSNR).

This setup is used for all items out of the test set (TBA,) and all configurations given in the following table.

Test #	Encoder command line
3.0	(MI=23, ISF=0.5)
3.1	(MI=23, ISF=1.0)
3.2	(MI=23, ISF=1.5)

TCX-512 mode compliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 1%(tbc) is observed
- no more than 2% of frames shall have a wSNR more than 4 dB lower than the reference

5.2.3.6 TCX-1024 mode compliance

TCX-1024 mode compliance is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in forced-mode operation where the mode selection is disabled and the encoder is forced to TCX-1024 mode. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows operation only in TCX-1024 mode. Further, the function segsnr() is used to compute the wsegSNR. The test encoder

implementation operated in a test mode, is modified in the same manner (forced to TCX-1024 mode and enabled to compute wsegSNR).

This setup is used for all items out of the test set (TBA,) and all configurations given in the following table.

Test #	Encoder command line
3.0	(MI=23, ISF=0.5)
3.1	(MI=23, ISF=1.0)
3.2	(MI=23, ISF=1.5)

TCX-1024 mode compliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 1%(tbc) is observed
- no more than 2% of frames shall have a wSNR more than 4 dB lower than the reference

5.2.3.7 ACELP/TCX switching compliance

Compliance of switching between ACELP and TCX modes is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in free-mode operation where the closed-loop mode selection is is used. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows the computation of the wsegSNR. The test encoder implementation operated in a test mode, which allows forcing the mode usage to the saved mode selections of the reference encoder and computing the wsegSNR

This setup is used for all items out of the test set (TBA,) and all configurations given in the following table.

Test #	Encoder command line
3.0	(MI=23, ISF=0.5)
3.1	(MI=23, ISF=1.0)
3.2	(MI=23, ISF=1.5)

TCX-1024 mode compliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 1%(tbc) is observed
- no more than 2% of frames shall have a wSNR more than 4 dB lower than the reference

5.2.3.8 ACELP/TCX closed-loop mode selection compliance

5.2.3.9 ACELP/TCX open-loop mode selection compliance

Correct ACELP/TCX selection for the signal content (speech vs. music) has a major impact in overall quality. Therefore, the algorithm selection has a specific conformance rule. The open-loop classification of the fixed-

point encoder is tested comparing the ACELP/TCX selection. The reference source code in TS 26.273 contains functionality to output the coding mode selection. The MODE_SELECTION_CONFORMANCE needs to be defined in "cod_main_p_fx.c". The outcome is that the reference encoder produces a file called "mode_selection.dat." The file contains in ASCII format the ACELP/TCX selection (ACELP = 0 and TCX = 1). The conformance criterion P is calculated as follows:

$$P = \frac{N - \sum_{i=1}^{N} \left(\left| S_r(i) - S_i(i) \right| \right)}{N}$$

where N is the number of frames, $S_r(i)$ and $S_i(i)$ are the ACELP/TCX selection output vector for reference and implemented encoder, respectively.

Mode selection outputs are created running the reference and implemented fixed-point encoders with the test vector TBA. Since the bit-rate or the number of channels does not affect the open-loop classification, a test using only mono encoding with one bit rate is sufficient.

The fixed-point encoder open-loop classification is compliant to the specification when $0.99 \le P \le 1.00$.

5.2.3.10 Stereo operation compliance

Stereo operation conformance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration (codec in test) is composed of the encoder in test and the fixed-point decoder according to 3GPP TS 26.273.

Two sets of tests of the stereo operation are defined using the described configuration, one testing the low-band stereo operation and one testing the mid-band stereo. Common for these tests is that for the codec in test they apply an approach where the bit streams of the reference encoder and the encoder in test are merged before decoding. Specifically, the part of the bit stream generated by EiT belonging to the specific operation is merged into the bit stream of the reference encoder, thereby replacing the corresponding part generated by the reference encoder. The output files produced by reference configuration and such way composed test configurations are then compared using PEAQ.

For the test of the low-band stereo the bit stream is composed by using the bit groups [tbd] from the EiT and the rest from the reference encoder.

For the test of the mid-band stereo the bit stream is composed by using the bit groups [tbd] from the EiT and the rest from the reference encoder. In addition EiT operation must be modified such that the EiT uses the states of the anti-dithering logic of the reference encoder. (#define xyz)

This setup is used for all items out of the test set (TBA) and all configurations given in the following table.

Test #	Encoder command line	Decoder command line	PEAQ command line
10.0			
10.1			
10.2			
10.3			

Stereo operation compliance can be concluded if in each of the test configurations in above table

- For no item a PEAQ deviation of less than –0.2 is observed

- The mean of the PEAQ deviation scores is not below -0.05.

5.2.3.11 Mode switching operation compliance

Compliance of switching the bit rate and ISF is tested in an encoder configuration where the reference configuration is using the floating-point encoder according to 3GPP TS 26.304 and the test configuration is composed of the fixed-point encoder implementation to be verified.

The test is run in an operation using three configuration files in mono operation where in the first configuration the ISF is change from 0.5 to 1.5 at fixed FT=23, in the second configuration the FT is changed from 16 to 23 at fixed ISF=1.0, and the third configuration both FT and ISF are changed. The compliance is tested my means of comparing the weighted segmental SNR (wsegSNR) resulting from both reference and test encoders. To that purpose, a modified instance of the reference encoder is used, which allows the computation of the wsegSNR. The test encoder implementation operated in a test mode, which allows computing the wsegSNR.

This setup is used for all items out of the test set (TBA,) and all configurations given in the following table.

Test #	Encoder command line
3.0	Config file switch_fs.txt
3.1	Config file switch_mode.txt
3.2	Config file switch_allcat.txt

Switching ompliance can be concluded if in each of the test configurations in above table

- For no item a wsegSNR degradation of more than 1%(tbc) is observed

5.2.3.12 Overall mono compliance

Monoo operation compliance (including bandwidth extension) is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the floating-point decoder according to 3GPP TS 26.304. The test configuration is composed of the fixed-point encoder implementation to be verified and the floating-point decoder according to 3GPP TS 26.304.

In order to make the testing independent of possible deviations of ACELP/TCX it is run in forced-mode operation. To that purpose, a modified instance of the reference encoder is used, which allows merely operates in TCX modes and which prohibit ACELP mode use, and which allows for tracing TCX mode selection. The test encoder implementation operated in a test mode, which allows forcing the TCX mode usage to the saved mode selections of the reference encoder. The output files produced in reference and test configuration are then compared using PEAQ.

This setup is used for all items out of the test set (TBA) and all configurations given in the following table.

Test #	Encoder command line	Decoder command line	PEAQ command line
13.0			
13.1			
13.2			
13.3			

Stereo operation compliance can be concluded if in each of the test configurations in above table

- For no item a PEAQ deviation of less than x is observed

- The mean of the PEAQ deviation scores is not below X.

5.2.4 Decoder

Conformance of decoder implementations is tested with "black-box" tests. Such tests verify the output of the given decoder implementation against the output of the reference decoder (26.273) for certain input test vectors and various codec operation modes and bit rates. The following tests must be passed in order to conclude conformance (exact test cases below tbc):

Test #	Encoder operation	Decoder condition	Reference configuration	Criterion
1.0 – 1.8	MI=0..8; DTX disabled	Without frame erasures	26.304 encoder 26.273 decoder	All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code
2.0 – 2.8	MI=0..8; DTX enabled	Without frame erasures	26.304 encoder 26.273 decoder	All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code
3.0 – 3.2	Rate = 12, 24, 36 kbps Mono	Without frame erasures	26.304 encoder 26.273 decoder	PEAQ
4.0 – 4.2	Rate = 12, 24, 36 kbps Mono	With frame erasures	26.304 encoder 26.273 decoder	PEAQ
5.0 – 5.2	Rate = 14, 24, 48 kbps Stereo	Without frame erasures	26.304 encoder 26.273 decoder	PEAQ
6.0 – 6.2	Rate = 14, 24, 48 kbps Stereo	With frame erasures	26.304 encoder 26.273 decoder	PEAQ
7.0 – 7.2	Rate = 14, 24, 48 kbps Stereo	Without frame erasures; Mono output	26.304 encoder 26.273 decoder	PEAQ
8.0 – 8.2	Rate = 14, 24, 48 kbps Stereo	With frame erasures; Mono output	26.304 encoder 26.273 decoder	PEAQ

5.2.4.1 AMR-WB mode compliance with DTX disabled

All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code. The implementation shall comply with the test vectors given in 26.174.

5.2.4.2 AMR-WB mode compliance with DTX enabled

All AMR-WB modes of AMR-WB+ are required to behave bit exactly to the FIP reference code. The implementation shall comply with the test vectors given in 26.174.

5.2.4.3 Extension mode compliance in mono operation without frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273[? 26.304?], respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test set [TBA].

Test #	Encoder command line options	Decoder command line options
3.0	-mi 16..23 –isf 1	None
3.1	–mi 17 –isf 3	None
3.2	–mi 18 –isf 5	None
3.3	–mi 19 –isf 7	None
3.4	–mi 20 –isf 8	None
3.5	–mi 21 –isf 9	None
3.6	–mi 22 –isf 11	None
3.7	–mi 23 –isf 13	None

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed
- The mean of the PEAQ deviation scores is not below [tbd].

5.2.4.4 Extension mode compliance in mono operation with frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test vector set [TBA].

Test #	Encoder command line options	Decoder command line options
4.0	-mi 16..23 –isf 1	None
3.1	–mi 17 –isf 3	None
3.2	–mi 18 –isf 5	None
3.3	–mi 19 –isf 7	None
3.4	–mi 20 –isf 8	None
3.5	–mi 21 –isf 9	None
3.6	–mi 22 –isf 11	None
3.7	–mi 23 –isf 13	None

The ferfile to be used is part of the test vector set [tba] an simulates a random frame loss of 10%.

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed

The mean of the PEAQ deviation scores is not below [tbd].

5.2.4.5 Extension mode compliance in stereo operation without frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test set [TBA].

Test #	Encoder command line options	Decoder command line options
5.0	–rate 14	None
5.1	–rate 24	None
5.2	–rate 48	None

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed
- The mean of the PEAQ deviation scores is not below [tbd].

5.2.4.6 Extension mode compliance in stereo operation with frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test vector set [TBA].

Test #	Encoder command line options	Decoder command line options
6.0	–rate 12	–fer ferfile
6.1	–rate 24	–fer ferfile
6.2	–rate 36	–fer ferfile

The ferfile to be used is part of the test vector set [tba] an simulates a random frame loss of 10%.

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed

- The mean of the PEAQ deviation scores is not below [tbd].

5.2.4.7 Extension mode compliance in stereo to mono downmixing operation without frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test set [TBA].

Test #	Encoder command line options	Decoder command line options
7.0	–rate 14	-mono
7.1	–rate 24	-mono
7.2	–rate 48	-mono

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed
- The mean of the PEAQ deviation scores is not below [tbd].

5.2.4.8 Extension mode compliance in stereo to mono downmixing operation with frame erasures

Compliance is tested in an encoder – decoder configuration where the reference configuration is using the floating-point encoder and the fixed-point decoder according to 3GPP TS 26.304 and 3GPP TS 26.273, respectively. The test configuration is composed of the floating-point encoder according to 3GPP TS 26.304 and the fixed-point decoder implementation to be verified.

The output files produced in reference and test configuration are compared using PEAQ.

The following table list the tests to be carried out for all items of the test vector set [TBA].

Test #	Encoder command line options	Decoder command line options
6.0	–rate 12	–fer ferfile –mono
6.1	–rate 24	–fer ferfile –mono
6.2	–rate 36	–fer ferfile –mono

The ferfile to be used is part of the test vector set [tba] an simulates a random frame loss of 10%.

Compliance can be concluded if in each of the tests in above table

- For no item a PEAQ deviation of less than [tbd] is observed
- The mean of the PEAQ deviation scores is not below [tbd].

5.2.5 Additional objective criteria (valid for both fixed- and floating point versions)

- If the mobile equipment requires 16 kHz or 8 kHz output sampling rate, then the decoder implementation shall be able to provide 16 or 8 kHz output sampling rate, respectively. (TBA: Conformance specification shall contain test cases to check the functionality.)
- If the mobile equipment requires mono output, then the decoder implementation shall be able to provide mono output when the input bit stream is stereo. (TBA: Conformance specification shall contain test vectors to check the functionality.)
- The delay of implementations for decoders and encoders used in mobile equipment shall not exceed the reference decoder and encoder delay.
- Decoder implementation shall support all the modes and bit rates described in the specifications.
- Encoder shall be able to perform switching between AMR-WB and extension modes when operated at 16 kHz input sampling rate. Conformance specification contains test vectors and mode information file to check the functionality. Fixed-point and floating-point AMR-WB modes as well as VAD/DTX operation compliance is the same to TS 26.173 and TS 26.204, respectively.
- TBA

5.3 Subjective conformance testing

Conformance may be concluded by subjective testing in which in no test condition performance worse than the reference codec (26.273) is proven. Test plan: (characterization test plan ffs)

Subjective conformance testing is allowable for all extension modes. AMR-WB modes of AMR-WB+ shall conform according to respective AMR-WB specifications.

Annex A : Codec test sequences for AMR-WB+ (normative)

This Annex describes the test sequences designed to exercise the fixed-point implementation of the adaptive multi-rate wideband (AMR-WB) transcoder (TS 26.290 [8]).

[Editor's note: To be updated. Below text is just copied from AMR-WB with "speech" removed and spec numbers updated.]

A.1 Test sequence format

This clause provides information on the format of the digital test sequences for the AMR-WB+ codec.

A.1.1 File format

TBA

A.2 Codec test sequences for bit exact conformance

A.2.1 Encoder test sequences

TBA

A.2.2 Decoder test sequences

TBA

A.3 Codec test sequences for conformance according to objective measures

A.3.1 Encoder test sequences

TBA

A.3.2 Decoder test sequences

TBA

A.4 Error pattern for tests with frame erasures

TBA

A.5 Tools

A.5.1 Scripts

A.5.2 PEAQ

Annex B Change history (informative):

Change history							
Date	**TSG SA#**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2005-03	27	SP-050086			Presented to TSG SA#27 for information		1.0.0