**Source: IVAS Rapporteur[[1]](#footnote-1)**

**Title: IVAS Permanent document IVAS-2b: IVAS\_Codec\_Ph2 Project Plan, v.1.4.0**

**Agenda Item: 7.5**

1. Introduction

The IVAS\_Codec\_Ph2 work item has been approved at the SA plenary #104 in document SP-241000, and further revised and approved at SA#107 in SP-250262. The work item has the following objectives:

1. A fixed-point C-code to be part of TS 26.251 having:
   * Same functionalities and equivalent performance as the floating-point C-code in TS 26.258.
   * Full interoperability with floating-point C-code in TS 26.258.
   * Comparable complexity as the floating-point C-code in TS 26.258.

This includes verification of 3rd party delivered code and necessary adaptation to the latest version of TS 26.258. This might include some alignment of floating-point C-code in TS 26.258.

1. Test vectors for bit-exact conformance testing of IVAS fixed-point implementations based on the fixed-point C-code to be part of TS 26.252.
2. Evaluate the decoder robustness to (undetected) corrupted bit streams and address arising issues.
3. Characterization of the IVAS codec based on the floating-point and fixed-point C-codes, and documentation of characterization results into TR 26.997.
4. Enhancements to codec conformance test procedures and criteria. Under this objective, a conformance process (including tools and test vectors) of IVAS for non-bit-exact floating-point implementations shall be developed, aligned with the conclusions of TR 26.843. More specifically, this work includes the following steps:
   * Specification of tools and conformance test vectors suitable for performing IVAS conformance testing.
   * Definition of relevant testing processes and criteria, based on the latest IVAS floating-point reference code.
     + The conformance testing processes and criteria shall be tight enough to ensure equivalent quality and interoperability with
       - implementation of the floating-point reference code that meets the bit-exact conformance requirements for this code specified in TS 26.252 and
       - implementation of the fixed-point reference code that meets the bit-exact conformance requirements for this code specified in TS 26.252.
     + At the same time, the coverage of the conformance testing processes and criteria shall be sufficient to avoid interoperability issues between implementations found conformant based on the non-bit-exact criteria and conformant implementations based on the bit-exact criteria.
   * Investigation on the applicability of the testing processes and criteria, which includes:
     + Robustness testing with validation that inadequate optimizations are properly detected while adequate optimizations still pass the criteria.
   * Definition of a mandatory non-bit-exact IVAS conformance testing process to be included in TS 26.252 using the tools, conformance criteria and conformance test vectors developed under this work item objective.
5. Investigate potential applicability of a similar non-bit exact conformance testing procedures for IVAS fixed-point implementations.
6. Definition of relevant tiers of functionality to be implementable on a wide range of UEs with different capabilities, balancing user experience and implementation complexity/cost.
7. Enhancements to the RTP payload format and SDP negotiation, including split rendering operation.
8. Update relevant system and service specifications.
9. Timeplan

The timeplan for the execution of the IVAS\_Codec\_Ph2 work item objectives is in the following table.

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| --- | --- |
| Meeting | Objectives |
| ~~TSG SA#104  (18~~~~th~~ ~~– 21~~~~st~~ ~~June 2024)~~ | * ~~IVAS\_Codec\_Ph2 Work Item approved by SA Plenary~~ |
| ~~SA4#129-e (16th – 23rd August 2024, online)~~ | * ~~Agree on initial time plan~~ |
| ~~31st August 2024~~ | * ~~Delivery of IVAS fixed-point Decoder and Renderer by Ittiam to SA4, fulfilling the FL-to-FX requirements~~ |
| ~~Audio SWG call~~  ~~(13th September 2024)~~ | * ~~Review progress of the fixed-point code conversion~~ |
| ~~30th September 2024~~ | * ~~Delivery of IVAS fixed-point Encoder by Ittiam to SA4, fulfilling the FL-to-FX requirements, covering the following operation modes:~~   + ~~Mono (EVS)~~   + ~~ISM (core coder)~~   + ~~Stereo~~   + ~~MCT~~ |
| ~~Audio SWG call~~  ~~(18th October 2024)~~ | * ~~Review progress of the fixed-point code conversion~~ |
| ~~31st October 2024~~ | * ~~Delivery of IVAS fixed-point Encoder by Ittiam to SA4, fulfilling the FL-to-FX requirements, covering the following operation modes:~~   + ~~MASA~~   + ~~SBA~~   + ~~Parametric modes~~ |
| ~~Audio SWG call, TBD~~ | * ~~Review progress of the fixed-point code conversion~~ |
| ~~SA4#130~~  ~~(18th – 22nd November 2024)~~ | * ~~Verification and Agreement by SA4 on Delivery by Ittiam of IVAS fixed-point Decoder and Renderer, fulfilling the FL-to-FX requirements~~ * ~~Agreement on definition of IVAS Levels~~ |
| ~~30th November 2024~~ | * ~~Delivery of IVAS fixed-point Encoder v1 to SA4, targeting fulfilment of FL-to-FX requirements~~ |
| ~~Audio SWG call, TBD~~ | * ~~Review progress of the fixed-point code conversion~~ |
| ~~TSG SA#106~~  ~~(10th – 12th December 2024)~~ | * ~~Approval by TSG SA (SA#106) of Delivery of IVAS fixed-point Decoder and Renderer, fulfilling the FL-to-FX requirements, based on agreement in SA4 (SP-241766)~~ |
| ~~Audio SWG call,~~  ~~(17th January 2025, 12:00-15:00 CET) (Canceled)~~ | * ~~Review progress of the fixed-point code conversion~~ |
| ~~31st January 2025~~ | * ~~Delivery of the fixed point Encoder v2, targeting fulfilment of FL-to-FX requirements, as basis for subjective verification~~ |
| ~~SA4#131~~  ~~(17th – 21st February 2025)~~ | * ~~Review the timeplan taking into account the status of fixed-point development~~ |
| ~~March 7th~~ | * ~~Delivery of Encoder v2.1~~ |
| ~~TSG SA#107~~  ~~(12th – 14th March 2025)~~ |  |
| ~~Email confirmation 14th March 2025~~ | * ~~Pre-verification of Encoder v2.1 to assess if it is ready for subjective verification~~   ~~Conclusion: it is ready for subjective verification for some operating points~~ |
| ~~Audio SWG call~~  ~~(21st March, 14:00-16:00)~~  ~~Submission deadline: March 20th, 14:00,  Host : Ericsson (cancelled)~~ | * ~~Progress IVAS\_Codec\_Ph2~~ |
| ~~SA4#131-bis-e~~  ~~(11th – 17th April 2025)~~ | * ~~Progress IVAS\_Codec\_Ph2~~ |
| ~~SA4#132~~  ~~(19th – 23rd May 2025)~~ | * ~~Verification by TSG SA WG 4 (SA4) on Encoder v2.1 (with potential additional bugfixes)~~ * ~~Delivery of the fixed point Encoder v3 (addressing most severe issues identified by the verification) – Determined to be unnecessary~~ * ~~Agreement by TSG SA WG 4 (SA4) on Delivery of Encoder, fulfilling FL-to-FX requirements – Agreed to be at 90%~~ * ~~Finalization of IVAS characterization permanent documents, including:~~   + ~~IVAS-7b Processing Plan for Characterization Phase~~   + ~~IVAS-8b Test Plan for Characterization Phase~~ * ~~Agree on CR for enhancements to the RTP payload format and SDP negotiation, including split rendering operation~~ * ~~Start investigating IVAS non-be conformance criteria and testing procedure~~   + ~~Start identifying potential tools for non-be conformance~~   + ~~Gather data based on test runs on various platforms and compilers~~ |
| ~~TSG SA#108~~  ~~(10th-13th June, 2025)~~ | * ~~Approval by TSG SA of Delivery of Encoder, fulfilling FL-to-FX requirements, based on agreement in SA4~~ |
| ~~18th July, 2025~~ | * ~~Delivery of Maintenance (further corrections and optimizations) to IVAS fixed-point Encoder/Decoder/Renderer~~ |
| ~~Audio SWG call~~  ~~(17 June, 2025 14-16 CEST), Submission deadline 16 June, 2025 14:00 CEST, Host: Ericsson~~ | * ~~Progress IVAS fixed point code development~~ * ~~Progress IVAS characterization test planning~~ * ~~Continue to investigate IVAS non-be conformance criteria and testing~~   + ~~Identification of suitable tools for non-be conformance~~   + ~~Gather data based on test runs on various platforms and compilers~~ |
| SA4#133-e  (18th -25th July, 2025) | * Finalization of IVAS characterization permanent documents, including:   + IVAS-7b Processing Plan for Characterization Phase   + IVAS-8b Test Plan for Characterization Phase * Agreement by TSG SA WG 4 (SA4) on Delivery of Maintenance (further corrections and optimizations) to IVAS fixed-point Encoder/Decoder/Renderer * Decision on launching characterization tests * Continue to investigate IVAS non-be conformance criteria and testing procedure * Gather data based on test runs on various platforms and compilers |
| September – November 2025 | * IVAS characterization testing |
| TSG SA#109  (16th-19th September, 2025) | * Approval on Delivery of Maintenance (further corrections and optimizations) to IVAS fixed-point Encoder/Decoder/Renderer * CR to TS 26.250 with definition of relevant tiers for implementation of IVAS, for approval * CR to TS 26.253 on enhanced RTP Payload Format and SDP negotiation, including split rendering operation |
| SA4#134  (17th – 21st Nov 2025) | * Verification of IVAS fixed-point C-code for TS 26.251 having   + Same functionalities and equivalent performance as the floating-point C-code in TS 26.258.   + Full interoperability with floating-point C-code in TS 26.258.   + Comparable complexity as the floating-point C-code in TS 26.258. * Note: This includes necessary adaptation to the latest version of TS 26.258 on top of the delivery by Ittiam and might include some adaptation of the floating-point C-code in TS 26.258. * Agreement on TS 26.251 (IVAS fixed-point C-code) based on the verification reports.   + Agreement on related CR to 26.249, moving ISAR fixed-point code to 26.251.   + Agreement on CR to TS 26.258 on alignment between floating-point code and fixed-point code in TS 26.251 * Agreement on relevant CRs for:   + Test sequences for bitexact testing of TS 26.251 (TS 26.252) * Agreement on CRs for update of relevant system and service specifications (26.114, 26.117, 26.119) * Characterization test results available for analysis * Agreement on characterization test results to be incorporated into TR 26.997 * Evaluate the decoder robustness to (undetected) corrupted bit streams and address arising issues * Agree on enhanced conformance procedures and criteria, including tools and test vectors of IVAS for non-bit-exact floating-point implementations, aligned with the conclusions of TR 26.843. * Define IVAS non-be conformance criteria and testing procedure |
| TSG SA#110  (9th-12th December, 2025) | * CR to TR 26.997 on IVAS Codec characterization, for approval * CR to TS 26.252 on enhanced conformance procedures and criteria, for approval * TS 26.251 (IVAS fixed-point C-code), for approval * CR to TS 26.252 on Test sequences for TS 26.251, for approval * CR to 26.249, moving ISAR fixed-point code to 26.251, for approval * CR to TS 26.258 on alignment between floating-point code and fixed-point code in TS 26.251, for approval * CR to TS 26.114 on enhanced support for the IVAS Codec, for approval * CR to TS 26.117 with reference to TS 26.251, for approval * CR to TS 26.119 on enhanced support for the IVAS Codec, for approval |

1. Revision history

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| --- | --- | --- | --- | --- |
| **Date** | **Meeting** | **Subject/Comment** | **Old** | **New** |
| 2025-02-19 | SA4#131 | Initial version based on S4-250085 and edits during SA4#131 |  | 0.1.0 |
| 2025-04-08 | SA4#131-bis-e | Update prior to SA4#131-bis-e meeting | 0.1.0 | 1.1.1 |
| 2025-04-16 | SA4#131-bis-e | Update during the meeting to address comments received | 1.1.1 | 1.2.0 |
| 2025-05-22 | SA4#132 | Update during the meeting including adding time-plan for non-BE conformance | 1.2.0 | 1.3.0 |
| 2025-07-21 | SA4#133-e | Update during the meeting | 1.3.0 | 1.4.0 |

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