**Source: Rapporteur (Dolby Sweden AB)**

**Title: Work Plan for the ISAR v0.5.0**

**Agenda Item: 14.10**

**Document for: Agreement**

1. Introduction

During SA4#122 the New Work Item on “Immersive Audio for Split Rendering Scenarios” in S4-230434 was agreed and afterwards approved in by SA#99 in SP-230167. The ISAR WID was further revised by SA#102 in SP-231291.

The overall objective of this work item is to develop solutions for immersive binaural audio on head-tracked devices. The following main objectives should be achieved:

* Identify and agree relevant requirements to be documented in a TR.
* Provide format specification for intermediate representation(s).
* Provide encoder, bitstream and decoder specification for intermediate representations including audio with and without post-rendering control metadata.
* Provide a specification for decoded intermediate representations to provide binaural audio output with and without head-tracker input and post-rendering control metadata.
* Consider potential solutions offered by the IVAS work item and specify the necessary interfaces.

The solution(s) will be characterized for the range of relevant interface characteristics between presentation engine and lightweight device. The case where the immersive audio is decoded and rendered within the end device should be considered as a reference.

The requirements will be documented in a first technical report. The developments under this work item shall lead to a new specification defining among others textual descriptions of the involved renderers and codec (incl. frame loss concealment) of the intermediate representation(s). The performance of the developed solutions in relation to the requirements will be documented in a second technical report. Parts of the solutions and performance evaluations results may be referenced through, e.g., IVAS codec specifications/technical report. The developed solutions should also be referenced in the MeCAR specification TS 26.119.

1. Proposed Time and Work Plan

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| **Meeting** | **Immersive Audio for Split Rendering Scenarios - #990025**  |
| **SA4#122 (20 – 24 Feb 2023 Athens)** | * Agree New Work Item “Immersive Audio for Split Rendering Scenarios” in S4-230434
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| **SA#99 (21 - 24 Mar 2023 Rotterdam)** | * Approve New Work Item “Immersive Audio for Split Rendering Scenarios” in SP-230167
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| **Joint Telco 3GPP SA4-Audio on eUET and ISAR: 27 March 2023, 16:00 – 18:00 CEST, submission deadline: 24 March 2023, 16:00 CET, host: HEAD acoustics** | * Agree skeleton and Scope for TR on ISAR requirements
* Agree initial Work Plan
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| **SA4#123-e (17 – 21 Apr 2023, e-meeting)** | * Initiate work on identification of relevant requirements, including
	+ Interfaces
	+ Physical Design Constraints
	+ Functional Design Constraints
	+ Performance requirements
 |
| **Post SA4#123-e Audio SWG telco on ISAR: May 8, 2023, 16:30-17:00 CEST, submission deadline: May 5, 2023, 14:00 CEST, host: Dolby** | * Progress work on identification of relevant requirements
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| **SA4#124 (22 – 26 May 2023, Berlin, Germany)** | * Progress work on identification of relevant requirements
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| **SA4#125 (21 – 25 Aug 2023, Sweden, Gothenburg)** | * Progress work on identification of relevant requirements
* Initiate work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item, including
	+ Format specification for intermediate representation(s)
	+ Provisioning of encoder, bitstream and decoder specification for intermediate representations
	+ Provisioning of binaural audio output
	+ Specification of necessary interfaces
* Initiate work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **Post SA4#125 Audio SWG telco#1 on ISAR:** 18 September 2023, 16:00 – 18:00 CEST, submission deadline: 15 September 2023, 16:00 CEST, host: Dolby | * Progress work on identification of relevant requirements
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **Post SA4#125 Audio SWG telco#2 on ISAR:** 20 October 2023, 15:00 – 18:00 CEST, submission deadline: 19 October 2023, 16:00 CEST, host: Dolby | * Progress work on identification of relevant requirements
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **Post SA4#125 Audio SWG telco#3 on ISAR:** Telco: 27 October 2023, 14:00 – 17:00 CEST, submission deadline: 26 October 2023, 14:00 CEST, host: Dolby | * Progress work on identification of relevant requirements
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **SA4#126 (13 – 17 Nov 2023, Chicago, USA)** | * At least 60% completion of work on identification of relevant requirements
	+ Agree on TR on ISAR requirements v.1.0.0 to be sent to SA plenary for information
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **Post SA4#126 Audio SWG telco#1 on ISAR:** Telco: 18 December 2023, 16:30 – 18:00 CET, submission deadline: 15 December 2023, 16:30 CET, host: Dolby | * Progress work on identification of relevant requirements
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **Post SA4#126 Audio SWG telco#2 on ISAR:** Telco: 15 January 2024, 16:30 – 18:00 CET, submission deadline: 12 January 2024, 16:30 CET, host: Dolby | * Progress work on identification of relevant requirements
* Progress work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Progress work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
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| **SA#102 (11 – 15 Dec 2023, Edinburgh, UK)** | * Present TR on ISAR requirements v.1.0.0 to be sent to SA plenary for information
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| **SA4#127 (29 Jan – 2 Feb 2024, Sophia Antipolis)** | * 100% completion of work on identification of relevant requirements
	+ Agree on TR on ISAR requirements v.2.0.0 to be sent to SA plenary for approval
* Progress matters related to selection testing of IVAS specific ISAR solutions under ISAR phase/track 2/a, according to detailed work plan in clause 3
* Submit exception sheet to SA#103
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| **Post SA4#127 Audio SWG telco#1 on ISAR:** Telco: 1 March 2024, 16:00 – 17:00 CET, submission deadline: 29 Feb 2024, 16:00 CET, host: Dolby | * Progress matters related to selection testing of IVAS specific ISAR solutions under ISAR phase/track 2/a, see clause 3
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| **Post SA4#127 Audio SWG telco#2 on ISAR:** Telco: 4 March 2024, 16:00 – 17:00 CET, submission deadline: 1 March 2024, 16:00 CET, host: Dolby | * Progress matters related to selection testing of IVAS specific ISAR solutions under ISAR phase/track 2/a, see clause 3
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| **Post SA4#127 Audio SWG telco#3 on ISAR:** Telco: 18 March 2024, 16:00 – 17:00 CET, submission deadline: 15 March 2024, 16:00 CET, host: Dolby | * Progress matters related to selection testing of IVAS specific ISAR solutions under ISAR phase/track 2/a, see clause 3
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| **SA#103 (19 – 22 Mar 2024, Maastricht, NL)** | * Present TR on ISAR requirements v.2.0.0 for approval
* Exception sheet for approval
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| **SA4#127-bis-e** | * Progress matters related to selection testing of IVAS specific ISAR solutions under ISAR phase/track 2/a, see clause 3
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| **SA4#128 (20 – 24 May 2024, Jeju, Korea)** | * At least 80% completion of work on solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
	+ Agree on TS on Immersive Audio for Split Rendering Scenarios v.1.0.0 to be sent to SA plenary for approval
	+ Creation and agreement of CRs to relevant IVAS TSs to include potential solutions offered by the IVAS work item if they meet ISAR requirements
	+ Creation and agreement of CR to TS 26.119 on Referencing of Immersive Audio for Split Rendering Scenarios
* At least 80% completion of work on performance characterization of solutions for Immersive Audio for Split Rendering Scenarios also considering potential solutions offered by the IVAS work item
* Agree on TR on ISAR performance characterization v.1.0.0 to be sent to SA plenary for approval
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| **SA#104 (18 – 21 June 2024, China)** | * Present TS on Immersive Audio for Split Rendering Scenarios v.1.0.0 for approval
* Approval of CRs to relevant IVAS TSs to include potential solutions offered by the IVAS work item
* Approval of CR to TS 26.119 on Referencing of Immersive Audio for Split Rendering Scenarios
* Present TR on ISAR performance characterization v.1.0.0 for approval
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1. Working Assumption on ISAR Milestones and Associated Deliverables

The table below provides a detailed overview of the current working assumption of ISAR milestones, their relation to ISAR work phases/track, their scheduling and the associated deliverables.

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| --- | --- | --- | --- | --- |
| Phase/track | Subject | Milestone | SA4 meeting / Date | Deliverables |
| 1 | ISAR Requirements | Draft TR agreed to be presented for information to SA plenary  | SA4#126 | Draft TR 26.865 |
| TR agreed to be sent for approval to SA plenary  | SA4#127 | Final draft TR 26.865 |
| 2/a | Consider and specify IVAS specific solutions | Agree all relevant design constraints | Post SA4#126 telcos on ISAR #1 and #2 | pCR to draft TR 26.865 |
| Completion of Selection preparations | SA4#127 | Solution proponents declare interest to submit a candidate |
| PD on Processing and test plan including organization of tests |
| PD on Selection deliverables |
| PD on Selection rules |
| SA4 selection of candidate solution | SA4#127-bis-e(2024-04-08) | Solution proponents to provide selection deliverables |
| Evaluation results  |
| SA4 agreement of CRs to IVAS TSs on inclusion of selected ISAR solution | Proponent(s) of selected solution to provide all relevant CRs to IVAS TSs excluding fixed-point code  |
| SA4 agreement of CRs to IVAS fixed-point code TS 26.251 | SA4#128(2024-05-20) | Proponent(s) of selected solution to provide CR to IVAS fixed-point code TS and evidence of equivalence with solution in floating-point code |
| 2/b | Specify codec/renderer agnostic solutions | SA4 adoption of selected track-a solution as baseline solution of TS 26.249 | SA4#127-bis-e(2024-04-08) | Solution proponent of track-a solution to provide draft TS 26.249 on Immersive Audio for Split Rendering Scenarios  |
| Initial draft TR 26.996 | Post SA4#127-bis-e telco on ISAR | Draft TR 26.996 comprising track-a solution evaluation results including verification of end-to-end practicability |
| SA4 agreement of pCRs to TS 26.249 | SA4#128(2024-05-20) | Proponents to provide enhancement/added feature proposals for baseline solution in form of pCRs to draft TS 26.249 along with evaluation results including verification of end-to-end practicability  |
| TS 26.249 agreed to be sent for approval to SA plenary | Final draft TS 26.249 |
| TR 26.996 agreed to be sent for approval to SA plenary | Final draft TR 26.996 including evaluation results of accepted enhancement/added feature proposals for baseline solution |

1. Proposal

It is proposed to agree on the work plan as described in clauses 2 and 3.