**Source: Xiaomi Technology Spain S.L**

**Title:** **Exponential sweep database for Four-Microphone Smartphone device 1**

**Document for: Discussion & Agreement**

**Agenda Item: 7.6**

# Introduction

New recording scenarios have been added based on the contributions and agreements from the SA4#131-bis-e meeting[1]. This contribution includes updates for the sweep signal recording scenarios. The corresponding recording signal for target device in [2] is attached in the file 'sweep.zip'.

# Changes to recording scenario 2

|  |  |
| --- | --- |
| **No** | **2** |
| **Sound source** | High quality loudspeaker |
| **Source signal** | Exponential sweep |
| **Signal characteristics** | **Range**: 20 Hz – 20 kHz **Length**: ≥4 s (10s recommended) |
| **Sound source calibration** | Loudspeaker is calibrated with pink noise at the UE position. Same playback settings are then used with the defined test signal  The level of the calibration signal in dBFS and produced sound level in dBSPL (A) should be documented. i.e. -18 dBFS and 70 dBSPL(A). |
| **Acoustic environment** | Anechoic chamber, free-field properties expected down to 200 Hz, Noise floor should comply with NR15. |
| **Detailed Positioning** | **Distance***:* 0.5 m ≤ dUE ≤3m  **Orientations**: for smartphone landscape, portrait and table(display-up)  **Height of UE**: H≥0.5m  **Source direction**: Main diaphragm towards the UE  **Source angles** (azi, ele): Required sound source directions :  - Every azimuth Φ with maximum step of 10°(5° or smaller step is recommended ): Φ = [0°, 10°, …,350°]  - All azimuth directions at the elevation θ = 0° shall be always recorded for all orientations  - For every 3rd azimuth step (Φ = [0°, 30°, …, 330°]), elevations θ with maximum step of 30°: θ = [-60°, -30°, 0°, 30°, 60°]  - In practice, actual elevation direction may differ slightly (e.g., due to recording facility limitations)  - Applied source directions shall be clearly documented  Space between the walls and sound source/UE should be at least 0.5 m |
| **Description/additional info** | Silence before and after the measured direction shall be at least 1 s  The recording SNR should be reasonably high (i.e., the playback volume should be reasonably high) but no clipping must occur in the microphone signals |

## Reason

**Length**: ≥4 s (10s recommended)

* Slow frequency sweeps maintain steady-state resolution curves
* Avoid clip since -3dBFS RMS pink noise is larger than 0dBFS. Refer to the the setup in TS 26.260

* In response to the comment from the last post-meeting, the sample rate and bit depth also be included in the database template. The detailed setup for playback will be described in the "Description/Additional Info" section of the database template, taking into account target device.

**Distance**: 0.5 m ≤ dUE ≤3m

* For larger speaker with better high frequency performance.

The level of the calibration signal in dBFS and produced sound level in dBSPL (A) should be documented. i.e. -18 dBFS and 70 dBSPL(A).

* For higher recording SNR

## Proposal for DaCAS Pdoc-1 :

The following should be considered when recording the databases:

* The raw microphone signals must be recorded, i.e., any noise reduction or other audio pre-processing of the DUT must be disabled or by-passed
* The turntable, stand, and DUT mounting should have only minimal acoustic effects (e.g., no microphones should be blocked, minimal acoustic footprint)
* The microphone channel ordering of the DUT, the DUT orientation, the turntable rotation direction, and the 0° position must be documented (if possible, with photos)

# Proposed database

The exponential sweep recording scenario demands a significant amount of time. Initially, we capture signals across the horizontal plane (azimuth 0° to 350° in 10° steps at 0° elevation) on horizontal orientation. The remaining data will be addressed in subsequent meetings.

## Database information

|  |  |
| --- | --- |
| **File name** | *e.g. SWEEP\_Horizontal\_0deg-01.wav* |
| **UE orientation / placement** | *The UE is on the same plane as speaker, with the UE's long edge is towards the ceiling and floor, and the screen is towards straight ahead at azi 0°.* |
| **Sample rate** | *48kHz* |
| **Bit depth** | *16bit* |
| **Audio format** | *.wav* |
| **Rec Duration** | *Overall length 12s, first and last 1s is silence* |
| **Number of channels and microphone mapping:** | *4 channels, ch1=mic1, ch2=mic2, ch3=mic3, ch4=mic4* |
| **Description/additional info** | *Source distance: d\_UE = 3m*  *The recordings cover 36 angelse (ele 0°, azi 0°~360°, step 10°) in total.*  *Source signal:Exponential sweep signal*  *Frequency range: 20Hz-20kHz*  *Length: 10s*  *Level: -18 dBFS*  *Sample rate: 96 kHz*  *Bit depth: 24bit*  *Fade-in and fade-out be implemented.* |

# Conclusion

This document proposes changes to Recording Scenario 2 for approval. And outlines the horizontal plane sweep signals for Target Device 1. We are seeking feedback on this configuration. The remaining angles will be revised based on the final agreement and submitted at the next meeting.

**References**

1. S4-250654 On DaCAS recording scenarios\_r2
2. S4aA250006: “Proposal of a target device”, Beijing Xiaomi Mobile Software