

# PoC Milestones and Work Breakdown (AASIG, AHAL, audio-control)

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## Description Of Work

curation of topics from : [List of prioritized topics for the Audio HAL](#)

PoC github repo : [android-external-audio-mixing repository](#)

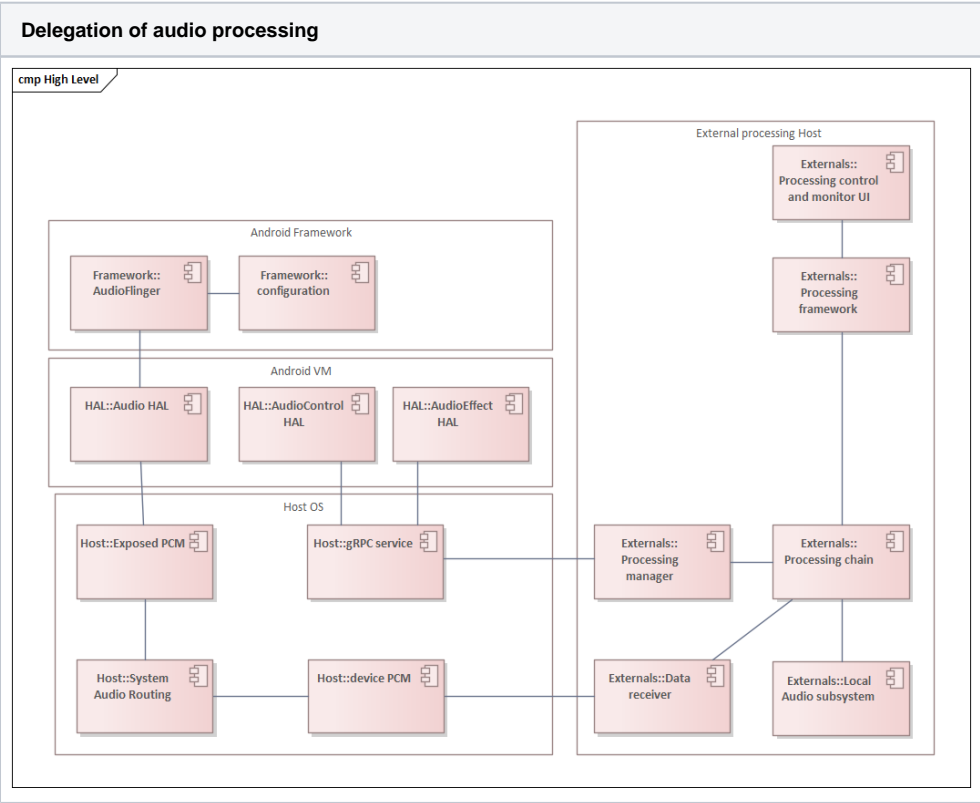
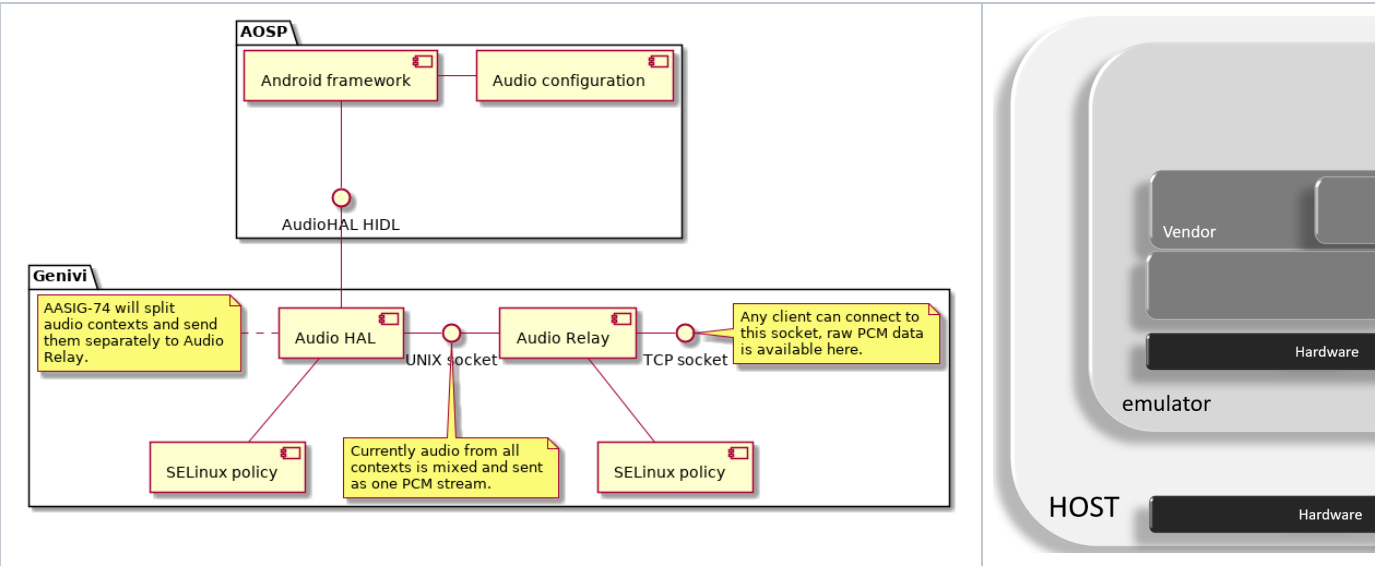
hint about progress steps

- define the related sw component affected by changes
- define the interfaces (details discussed between those who change the components)
- define which tasks require a real HW and which ones can be deployed on emulator (which part of the code is HW dependent)

## Emulator Track Milestones

#	Summary	Due Date	Content Work Packages	Details Comments
1	Multiple devices management			<ul style="list-style-type: none"><li>• step 1 : AOSP Emulator, configure multiple devices that would be available in the car.</li><li>• step 2 : Car System Emulator : emulate multiple Android devices with one single host device (e.g. Android sees many headsets and speakers then the user can select which one plays on the single host real device)</li><li>• help test multi zone audio use cases</li><li>• multiple microphones management</li></ul>
2	HW acceleration Emulation			<ul style="list-style-type: none"><li>• run the same DSP HW accelerated algorithm in a PC x86 environment</li><li>• connect it to android emulator as an external HW accelerator</li><li>• prefer usage of standard libraries and interfaces e.g. Android audio effects / Open SL.</li><li>• how to add custom app effects</li><li>• how to abstract audio analysis algorithms e.g. Wake Up Word Detection or other.</li></ul>

Components overview	Host and emulator interact
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#	Component - main topics	Owners	JIRA sub-items	Implementation details
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<div>raw streams</div>	<div>Raw Stream Extraction</div> <div>(multizone audio, etc.)</div> <div>todo: detail it + use case</div> <div> <div>AASIG-70 - Getting issue details...</div> <div>STATUS</div> </div> <div>★ AMM demo</div>		<ul style="list-style-type: none"> <li>Overview picture with SW components <ul style="list-style-type: none"> <li> <div>AASIG-71 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>Audio HAL (open point: keep modified or rewrite it) <ul style="list-style-type: none"> <li> <div>AASIG-72 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>Config for multizone <ul style="list-style-type: none"> <li> <div>AASIG-73 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>Separate contexts for audio input PCM streams (open point: separation concept to be defined) <ul style="list-style-type: none"> <li> <div>AASIG-74 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> </ul>	
	<div>Input and Control of external streams</div> <div>(microphone, or external player)</div> <div>todo: detail it + use case</div> <div>todo: be more explicit and clear about for example what is "external"</div> <div> <div>AASIG-75 - Getting issue details...</div> <div>STATUS</div> </div> <div>★ AMM demo</div>		<ul style="list-style-type: none"> <li>Design Overview (pointing to the actual sw comp) <ul style="list-style-type: none"> <li> <div>AASIG-76 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>getting stream from Microphone (line in) <ul style="list-style-type: none"> <li>config in AOSP <div>AASIG-77 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>external player or other device (BT or other) <ul style="list-style-type: none"> <li> <div>AASIG-78 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> </ul>	
13	<div>Bluetooth Device Integration in Android System.</div> <div>As a user I have a BT headset (with speakers, microphone, control buttons, or even the car itself, etc.). I should be able to use it in an Android System.</div> <div> <div>AASIG-79 - Getting issue details...</div> <div>STATUS</div> </div>		<ul style="list-style-type: none"> <li>Overview design <ul style="list-style-type: none"> <li> <div>AASIG-80 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>Usage of a bluetooth headset with Android BT stack only <ul style="list-style-type: none"> <li> <div>AASIG-81 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>Microphone from Headset, audio on External Loudspeakers <ul style="list-style-type: none"> <li> <div>AASIG-82 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>No Bluetooth, both Microphone and Loudspeakers are used for telephony example such as skype or any other <ul style="list-style-type: none"> <li> <div>AASIG-83 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> <li>forward audio stream from external source (to connected BT device (speaker/headphone) via Android Audio subsystem <ul style="list-style-type: none"> <li> <div>AASIG-84 - Getting issue details...</div> <div>STATUS</div> </li> </ul> </li> </ul>	

<p>08</p>	<p><b>Ensure measurability of full audio path latency</b></p> <p>As a user I would not want my audio connection to be delayed.</p> <p>Each delay measure will be split in modules, which module brings which delay, eg (Bluetooth delay, mixing delay, routing delay,...)</p> <div data-bbox="191 390 626 441"> <a href="#">AASIG-86 - Getting issue details...</a> <span>STATUS</span> </div> <p>★ AMM demo (TBC)</p>		<ul style="list-style-type: none"> <li>Overview design <ul style="list-style-type: none"> <li>components and APIs involved in the Audio path</li> <li>anti-jitter buffers configurations</li> </ul> <div data-bbox="919 222 1308 296"> <a href="#">AASIG-87 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Total delay for Telephony on external speakers use case <div data-bbox="919 342 1308 415"> <a href="#">AASIG-88 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Total delay for Video streaming where audio plays on an external speaker <div data-bbox="919 462 1308 535"> <a href="#">AASIG-88 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>add latency measurements means to quick audio solutions (AAudio)* <div data-bbox="919 581 1308 655"> <a href="#">AASIG-90 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>investigate PCM transport impact on latency, check alternatives (currently named sockets are being used, alternative shared memory or pipes) <div data-bbox="919 722 1308 795"> <a href="#">AASIG-91 - Getting issue details...</a> <span>STATUS</span> </div> </li> </ul>	
	<p><b>Offloading to external speakers or loopback to Android.</b></p> <p>(offloading examples, codecs MPEG,MP3, DSPs, transport e.g. AVB)</p> <div data-bbox="191 982 626 1033"> <a href="#">AASIG-92 - Getting issue details...</a> <span>STATUS</span> </div>		<ul style="list-style-type: none"> <li>Design Overview (pointing to the actual sw comp) <div data-bbox="919 877 1308 951"> <a href="#">AASIG-94 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Offloading part-1 (overview on concept, which APIs) <div data-bbox="919 976 1308 1050"> <a href="#">AASIG-95 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Offloading part-2 (usage) <div data-bbox="919 1075 1308 1148"> <a href="#">AASIG-96 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Offloading with loopback to Android <div data-bbox="919 1173 1308 1247"> <a href="#">AASIG-97 - Getting issue details...</a> <span>STATUS</span> </div> </li> </ul>	
<p>09</p>	<p><b>Offloading use case : Forwarding Multi-Channel audio</b></p> <p>efficiency by keeping</p> <div data-bbox="191 1417 626 1470"> <a href="#">AASIG-93 - Getting issue details...</a> <span>STATUS</span> </div>		<ul style="list-style-type: none"> <li>PCM 5.1 sample audio <div data-bbox="919 1333 1308 1407"> <a href="#">AASIG-98 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Guidelines for specific policy config to prevent downmixing <div data-bbox="919 1453 1308 1526"> <a href="#">AASIG-99 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>Example implementation <div data-bbox="919 1551 1308 1625"> <a href="#">AASIG-100 - Getting issue details...</a> <span>STATUS</span> </div> </li> <li>playing multichannels 5.1 audio from Netflix (any DRM issues) <div data-bbox="919 1671 1308 1745"> <a href="#">AASIG-100 - Getting issue details...</a> <span>STATUS</span> </div> </li> </ul>	

Additional build and run info

This info is to be moved in the repo readme, the current readme is not at the root of the repo to avoid aosp directory pollution, therefore this info will move once a new structure of repo is created with manifest and new readme

<ul style="list-style-type: none"><li>• can open Android Studio that will show logcat output</li><li>• Listen with command on another terminal window "nc -l 5000"</li><li>• emulator</li><li>• switch on from emulator power button</li><li>• play any sound from Alarm volume settings or other</li></ul>
repo init -u <a href="https://android.googlesource.com/platform/manifest">https://android.googlesource.com/platform/manifest</a> -b android-10.0.0_r40
repo sync
source build/envsetup.sh
lunch
m

## HW Track Milestones

#	Summary	Due Date	Content Work Packages	Details Comments
1	running demo on real HW <div><a href="#">AASIG-104</a> - Getting issue details... STATUS</div>			<ul style="list-style-type: none"><li>• compiling <a href="#">android-external-audio-mixing repository</a> for selected target HW (Renesas-H3)</li><li>• optional support for 2nd HW (Low cost HiKey)</li><li>• TODO define functions to be included (input streams)</li></ul> <div><a href="#">AASIG-107</a> - Getting issue details... STATUS</div> <ul style="list-style-type: none"><li>• At this stage, the function selection for Milestone 3 should be agreed upon</li></ul>
2	Full Audio Path on real HW <div><a href="#">AASIG-105</a> - Getting issue details... STATUS</div>			<ul style="list-style-type: none"><li>• support of full audio path<ul style="list-style-type: none"><li>◦ Raw streams extraction</li><li>◦ input external streams</li><li>◦ control of an external stream</li><li>◦ demo should showcase at least one function</li></ul></li></ul>
3	Selected Functions partitioned on HW <div><a href="#">AASIG-106</a> - Getting issue details... STATUS</div>			<ul style="list-style-type: none"><li>• All selected and prioritized functions running on the main target HW</li></ul>