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SECURE MICROPHONE

HP INC

Title: Secure microphone

This disclosure describes a secure microphone implementation based on four states (Idle, Ultrasonic frequency, Human audible frequency and Ultrasonic + Human audible frequency). The microphone state changes based on the use case (e.g. listen for connection parameters from SpaceX, enable Ultrasonic frequency state). It allows a fine grain access of a pre-defined set of audio frequency ranges (Figure 1 - Audio frequencies), allowing an application, for example, to request mic access with only ultrasonic frequency range (without providing the audible frequency signal) for data transfer communication. The main advantage of this implementation is to have the microphone in the correct state based on the use case and preserve privacy when mic is not in human audible state allowing the mic to be used in data transfer mode.

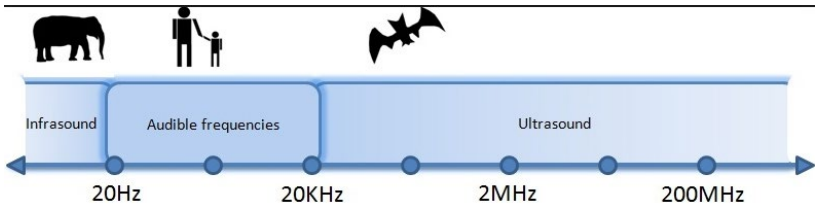

Figure 1 - Audio frequencies

The secure microphone implementation has four states/behavior/modes, as mentioned before:

- Ultrasound
- Ultrasound + Human audible
- Human audible
- Idle/Nothing

The sequence of operations starts when an application requests to the Audio driver the desired state/behavior/mode. The Audio driver returns to the app a success/error status code. The next step consists in the application call regular OS (Operating System) APIs (Application Programming Interfaces) to access the microphone. After this step, the application starts receiving the microphone data according to the state/behavior/mode requested initially. After the application is done with the microphone use, the last step is to use regular OS (Operating System) APIs (Application Programming Interfaces) to stop receiving microphone data (Figure 3 - Operations sequence diagram). The OS reports microphone in use depending on the requested state/behavior/mode as described in Table 1 - Mic state (report in use to OS).

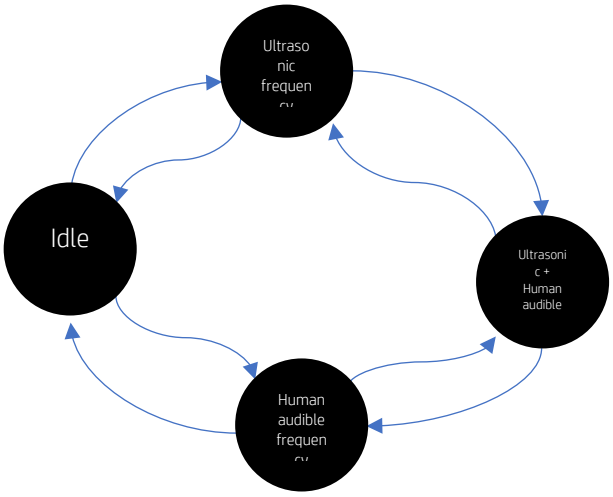

Figure 2 - Mic state machine

Mic state	Report mic in use to OS
Idle	
Ultrasonic frequency	
Human audible frequency	X
Ultrasonic + Human audible	X
Infrasonic???	

Table 1 - Mic state (report in use to OS)

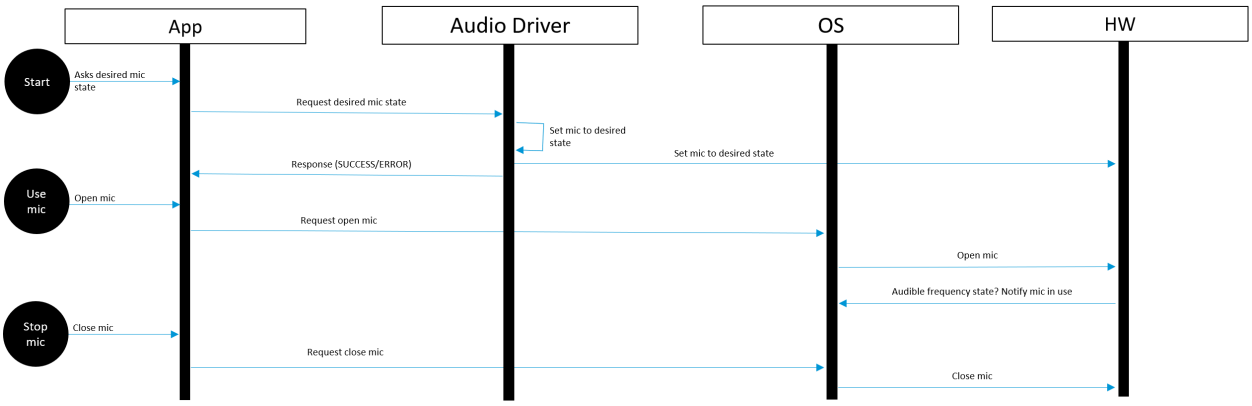

Figure 3 - Operations sequence diagram

There is another variation of this method that is referred as “Below the OS” which is configured at BIOS level when Ultrasonic is enabled/disabled. Both audio mute and global mute doesn’t affect the Ultrasonic. The F10 use case (Table 2 - F10 use case table), allows for a hierarchy state of control, where Ultrasound is “Below the OS” and configured by ITDM setting (and end user can not modify). The audio mute setting resides “Above the OS” and is accessible by the end user.

F10 State in BIOS	Mute in Windows	Behavior
Ultrasonic	Mute Enabled	Ultrasound Only
Ultrasonic	Mute Disabled	Ultrasound + Audio
Ultrasonic	Mute Disabled	Audio Only
Ultrasonic	Mute Enabled	Nothing

Table 2 - F10 use case table

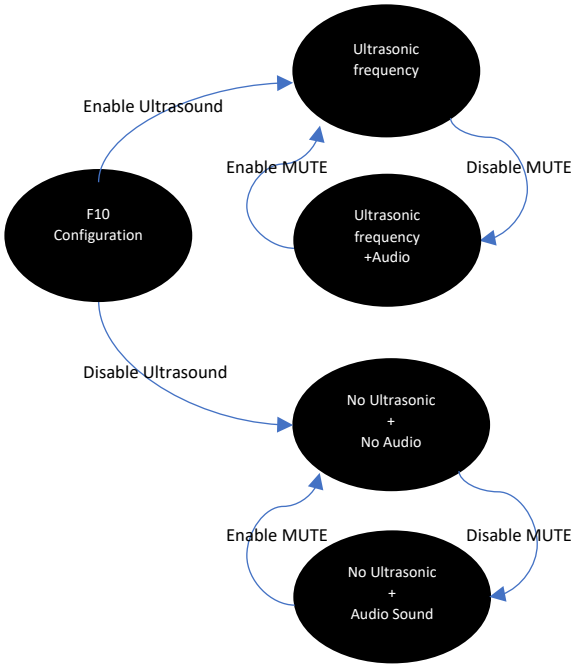

Figure 4 - F10 use case state machine

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