Airoha IoT SDK for BT Audio BT Source Dongle User Guide

Version: 1.1

Release date: 19 September 2023

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Document revision history

Revision	Date	Description
1.0	24 March 2023	Initial version
1.1	19 September 2023	Added section 2.9 Audio Front-End Input

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1 Introduction

The Airoha BT Source dongle conforms to the SIG BT Classic specification. It works as an A2DP Source and HFP AG can transmit audio streams to a remote device. It can connect with any remote device supported by BT classic

1.1 Platform Architecture

Airoha BT Source dongle platform consists of the application, middleware, and BT stack as shown in Figure 1. BT Source services are implemented in the middleware and the connection logic is implemented in the application dongle_ref_design.

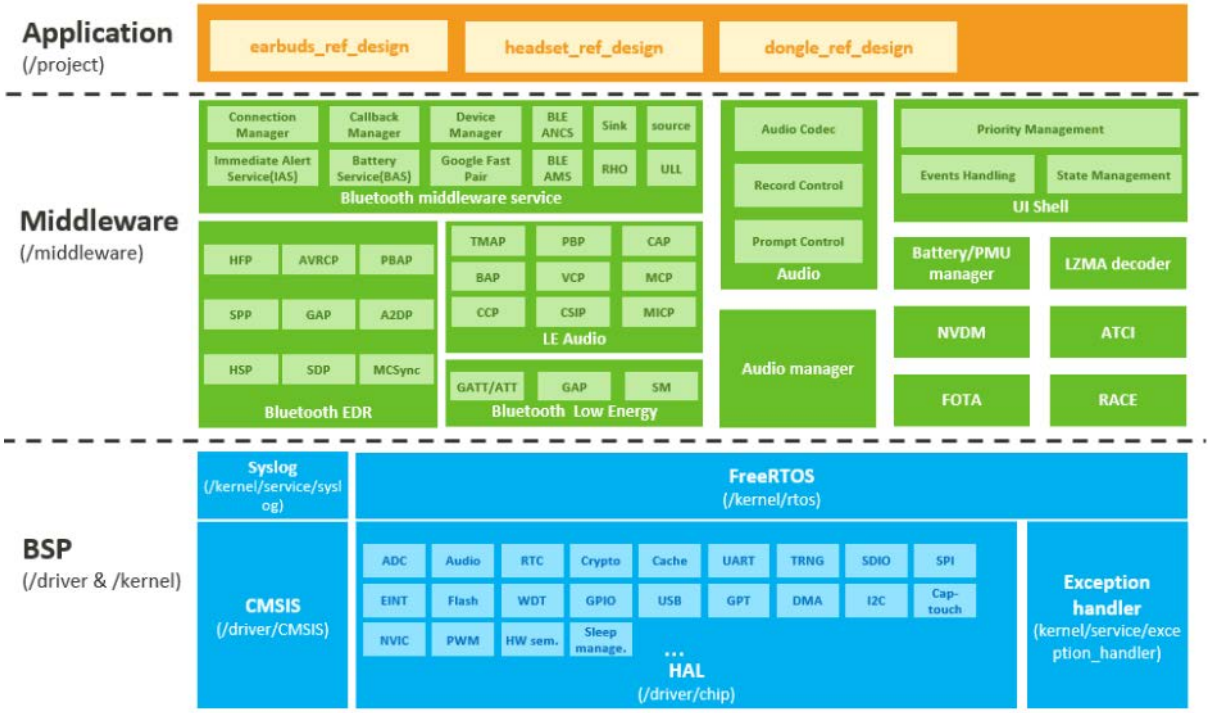

Figure 1. Software architecture

1.2 EVK Settings

Power is usually supplied to the BT Source dongle via the USB port. You can set the jumpers as shown Figure 2 to power the AB157x EVK via the USB port. You must then connect the USB port to a PC. Do not use the adaptor.

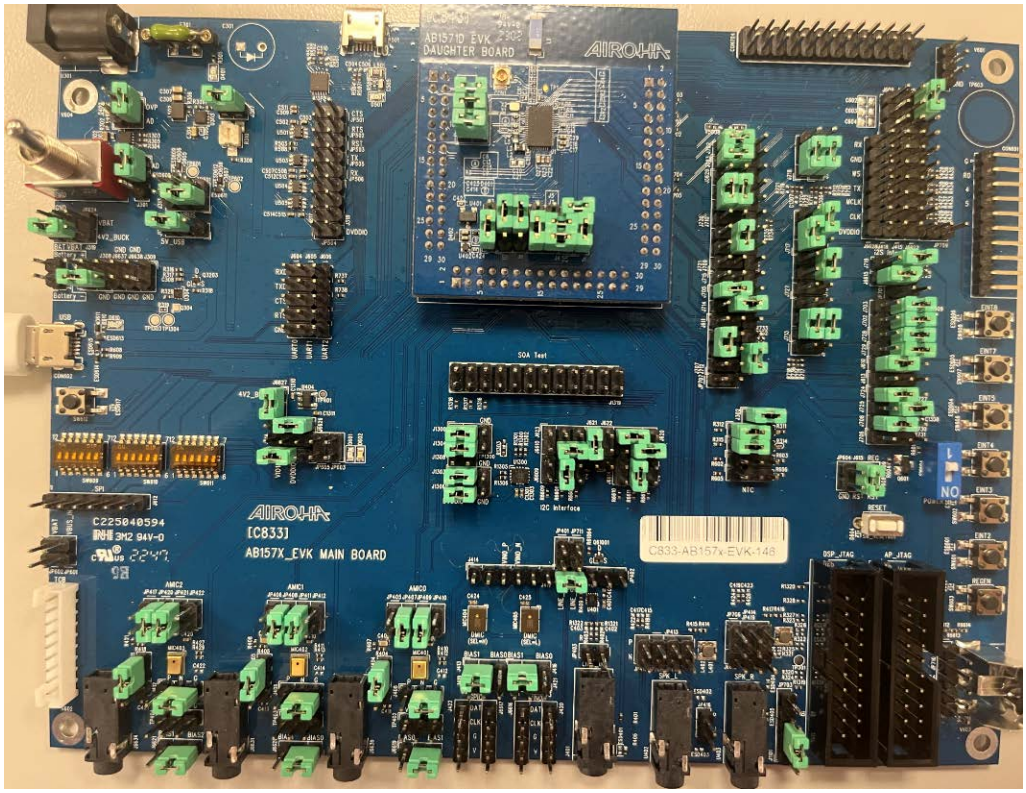

Figure 2. EVK settings

2 BT Source Dongle

The BT source dongle acts as A2DP source and HFP AG which scans and initiates connections to sync a remote device.

2.1 Feature Options

Set the feature options below to 'y' in the feature makefiles of the DSP project and MCU project to enable BT source dongle.
Feature makefile path for DSP project:

- dsp\project\ab157x\apps\[DSP_project_name]\XT-XCC

Feature makefile path for MCU project:

- mcu\project\ab157x\apps\[MCU_project_name]\GCC

Table 1. BT Source Dongle Feature Options

Feature option	Note
AIR_USB_AUDIO_HID_ENABLE = y	Set this option to y for MCU project to enable the Human interface Device (HID).
AIR_BT_AUDIO_DONGLE_ENABLE = y	Set this option to y for both DSP project and MCU project to enable BT Source dongle features. Dependency: AIR_USB_AUDIO_HID_ENABLE must be enabled when this option is set to y.

2.2 Environment

2.2.1 Build command project

You can check the build command in "./build list". This command is now for building the coexisting packet BT source dongle & LE audio for 157x dongle as shown in Figure 3.

```
./build.sh ab1571d_evk dongle_ref_design_bt
```

Figure 3 build command

2.2.2 Codec support

Airoha BT source dongle only supports SBC codec.

2.2.3 Overview of the software

Table 2. BT Source Dongle Key Feature File Struct

Module name	File folder	Release policy
USB	mcu\middleware\airoha\usb\	source
BT source app	mcu\project\ab158x\apps\dongle_ref_design\src\apps\app_bt_source\	source
BT Source service	mcu\middleware\airoha\source\	source
HID Service	mcu\middleware\airoha\usb_hid_service\	source

2.3 Connection Setup

2.3.1 BT on

Airoha BT source dongle turns BT on when USB resumes and turns BT off when USB is suspended. For example, if the dongle is plugged into a notebook via USB, BT will be turned on at first. After a period of time, if the notebook goes into the sleep mode, BT is turned off.

2.3.2 Switch mode Behavior

The BT audio dongle scans headset or earbuds whenever a new connection is allowed. Now you can only scan with the PC Tool, so you must first connect the dongle to the PC Tool.

2.3.2.1 Connect with PC Tool

You must now choose “USERD DEFINF VID/PID” and set the device type as a dongle. You must manually complete the PID and VID. The PID is 08ED and the VID is 0824 by default. These are the values that are assigned to a device when it is manufactured and to the manufacturer of the device, respectively.

Then click the **Connect** button. It shows “Connect Success“ as shown in Figure 4.

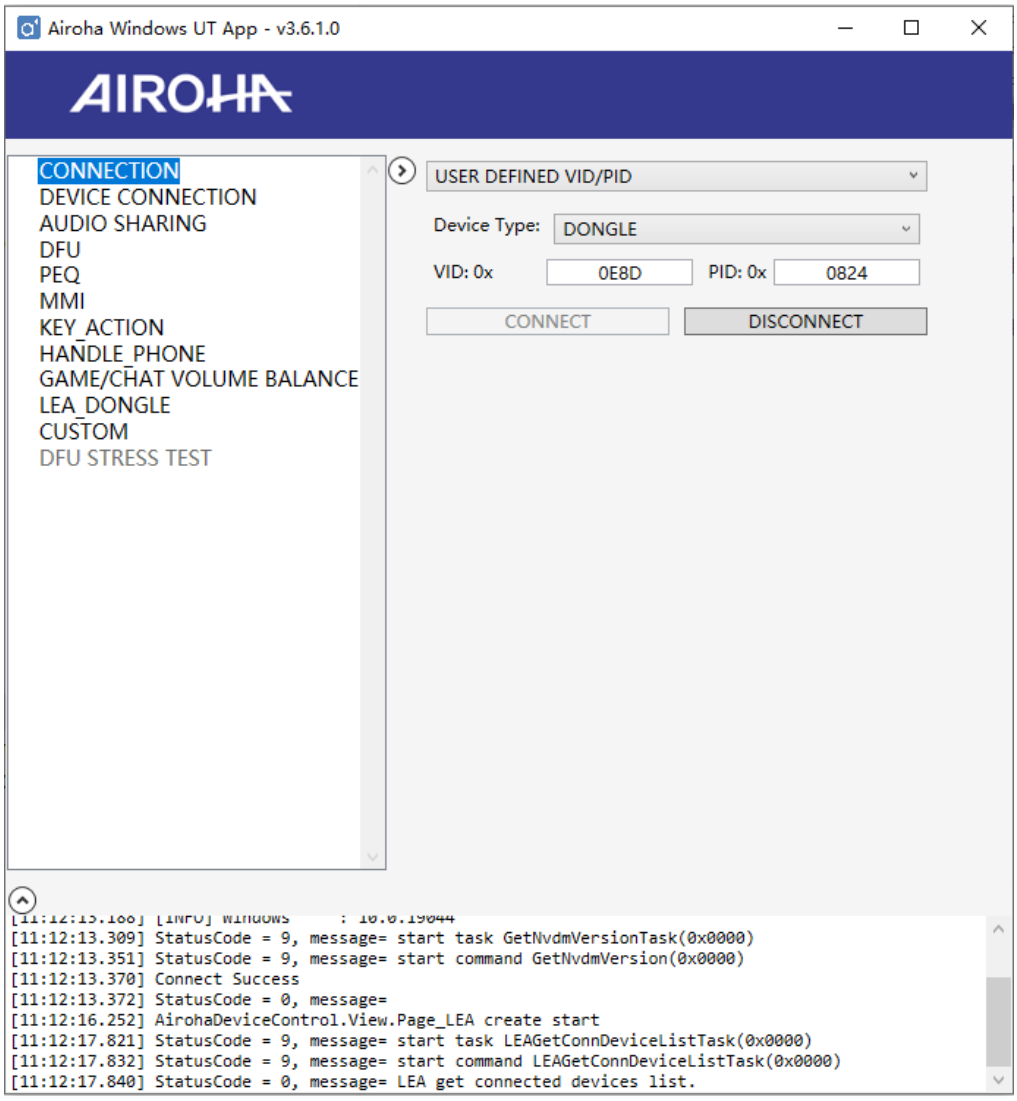

Figure 4 Connect with PC Tool

2.3.2.2 Switch mode

After the dongle is connected to the PC tool, you need to switch to the "Device Connection" option and select “Coexist Dongle”.

You will see three modes, the default mode is Dual mode, in this mode, you can scan both LEA devices and BT devices. The other two modes are LEA mode, which means that in this mode, only LEA devices can be supported, and BT mode, which means only BT devices can be supported.

When you need to switch from Dual mode to LEA mode or BT mode, select the corresponding button. Note that when switching modes, the PC tool automatically switches to the "Connection" item and you must re-enter the PID and VID and then reconnect the dongle.

Note: LEA mode: the PID is 08ED and the VID is 0808; BT mode: the PID is 08ED and the VID is 0818

Figure 5 Switch

2.4 Scan Behavior

You can click **START SCAN** after entering the “DEVICE CONNETION” item. The device list appears with the **Scan Available Device** as shown in Figure 6.

Figure 6 Switch

2.5 Connection

The BT source dongle does not automatically initiate a BT classic connection when it discovers a target device.
In dual mode, if it has bonded list of BT & LEA, it automatically reconnects LEA &BT devices but once a device is connected, the other device cannot connect.
In BT mode, if it has bonded list of BT & LEA, it automatically reconnect only the BT device.
In LEA mode, if it has a bonded list of BT & LEA, it automatically reconnects the LEA device.

2.5.1 No Bonded list

Figure 7 shows that the connected device appears only in the Paired list by choosing the device and clicking the **Connect** button.

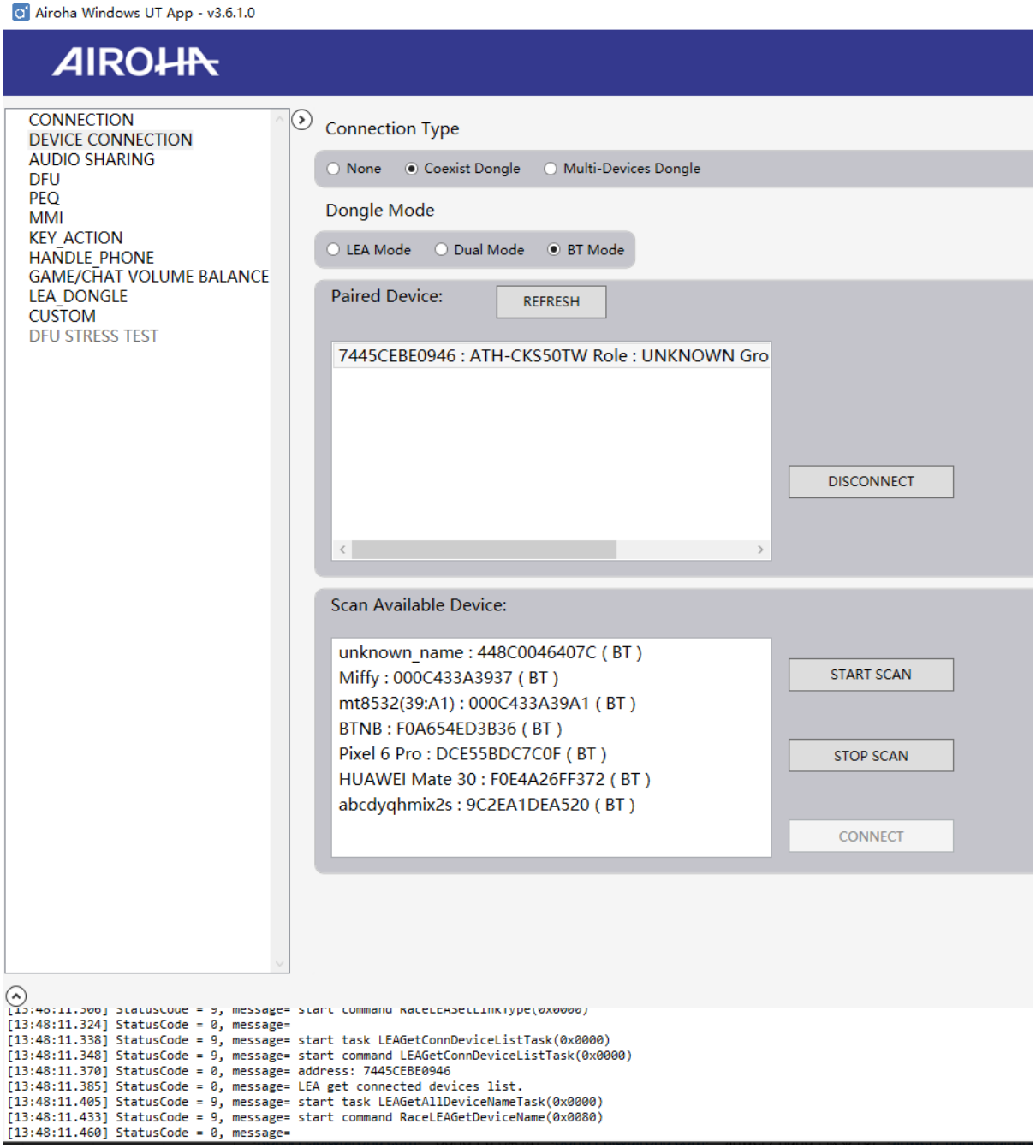

Figure 7 connected device

2.5.2 Bonded list

The dongle automatically reconnect to only the bonded device when it powers on.

2.6 Volume

This section shows the MMI functions related to increasing or decreasing the volume of the speaker and microphone. It also shows how to mute or unmute the microphone.
When connected, the BT source dongle synchronize the volume of the headphone side. If the volume level is different, it adjusts the volume of the PC to match that of the headphones so that the volume bar on the PC is updated.
The volume can be adjusted from the headphone side. At the same time, if the uplink or downlink with PC is through USB, you can fine-tune the volume on the PC.

Table 3. Volume

Functionality	Action	Result	Requirements
Volume up	Change PC volume bar	Set absolute volume to remote device	In call or playing music.
Volume down	Change PC volume bar	Set absolute volume to remote device	In call or playing music.

2.7 Call

The dongle can be used with any headset that supports BT classic. This also applies if the remote device is an Airoha headset. Refer to `mcu/doc/ Airoha_IoT_SDK_for_BT_Audio_Dongle_Reference_Design_User_Guide.pdf` for more information.

2.8 Music

Refer to `mcu/doc/ Airoha_IoT_SDK_for_BT_Audio_Dongle_Reference_Design_User_Guide.pdf` for more information.

2.9 Audio Front-End Input

The dongle can support an audio source from an audio front-end input, such as aux in, i2s master in, i2s slave in, mic in, etc.
Features:

- Single analog input: aux in or mic in
- Single i2s stream_0 input: i2s master input or i2s slave input
- Single i2s stream_1 input: i2s master input or i2s slave input
- Analog input mix with i2s stream in

Dongle supports 16k~192k sample rate for i2s slave input source.

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