Airoha IoT SDK for BT Audio Release Notes

Version: 2.11.0.AB1565_AB1568

Release date: 16 March 2022

Document Revision History

Revision	Date	Description
1.0.0	1 July 2019	Initial release
1.0.1	15 July 2019	Fixed software issues
1.1.0	6 September 2019	• Added new features • Fixed software issues
1.2.0	28 September 2019	• Added new features
1.2.1	21 October 2019	• Fixed software issues
1.3.0	15 November 2019	• Added new features • Added a migration guide to migrate applications from SDK v1.2.1 to SDK v1.3.0
1.3.1	2 December 2019	• Fixed software issues
1.3.2	23 December 2019	• Fixed software issues
1.4.0	22 January 2020	• Added new features • Added a migration guide to migrate applications from SDK v1.3.2 to SDK v1.4.0 • Fixed software issues
1.5.0	1 March 2020	• Added new features • Fixed software issues
1.6.0	22 April 2020	• Added new features • Fixed software issues
2.0.0.AB1565	30 September 2020	• Support AB1565A/AB1565 earbuds • Fixed software issues
2.1.0.AB1565_AB1568	2 November 2020	• Support AB1568 earbuds/headset • Added new features • Fixed software issues • Added a migration guide to migrate applications from SDK v2.0.0.AB1565 to SDK v2.1.0.AB1565_AB1568
2.2.0.AB1565_AB1568	30 November 2020	• Support for 1565M and 1565AM • Added new features • Fixed software issues
2.2.1.AB1565_AB1568	16 December 2020	• Fixed software issues • Fixed software features typo in the section for SDK Version 2.2.0.AB1565_AB1568.
2.3.0.AB1565_AB1568	5 February 2021	• Added new features • Fixed software issues • Added a migration guide to migrate applications from SDK v2.2.1.AB1565_AB1568 to SDK v2.3.0.AB1565_AB1568
2.3.1.AB1565_AB1568	6 April 2021	• Fixed software issues
2.4.0.ULL_TWS	29 April 2021	• Added new features

Revision	Date	Description
2.5.0.AB1565_AB1568	31 May 2021	• Added new features • Fixed software issues
2.5.1.AB1565_AB1568	9 June 2021	• Fixed software issues
2.6.0.ULL_TWS_Headset	30 June 2021	• Added new features • Fixed software issues
2.6.1.ULL_TWS_Headset	9 July 2021	• Fixed software issues
2.7.0.ULL_TWS_Headset	2 August 2021	• Added new features • Fixed software issues • Added a migration guide to migrate applications from SDK v2.6.1.ULL_TWS_Headset to SDK v2.7.0.ULL_TWS_Headset
2.7.1.ULL_TWS_Headset	30 August 2021	• Fixed software issues
2.8.0.AB1565_AB1568	29 October 2021	• Added new features • Fixed software issues
2.9.0.ULL_TWS_Headset	26 November 2021	• Added new features • Fixed software issues
2.10.0.AB1565_AB1568	26 January 2022	• Added new features • Fixed software issues
2.10.1.AB1565_AB1568	28 January 2022	• Fixed software issues
2.11.0.AB1565_AB1568	16 March 2022	• Added new features • Fixed software issues

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Figure 1. Architecture layout of the SDK for AB155x EVK 1
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1. Introduction

The Airoha IoT SDK for BT Audio provides a comprehensive software solution. The SDK supports hardware abstraction layers (HAL), peripheral drivers, FreeRTOS, Lightweight IP (lwIP), and other features.

1.1. Architecture layout of the SDK

The three-layer architecture layout of the SDK for AB155x EVK includes Applications, Middleware, and BSP, as shown in Figure 1.

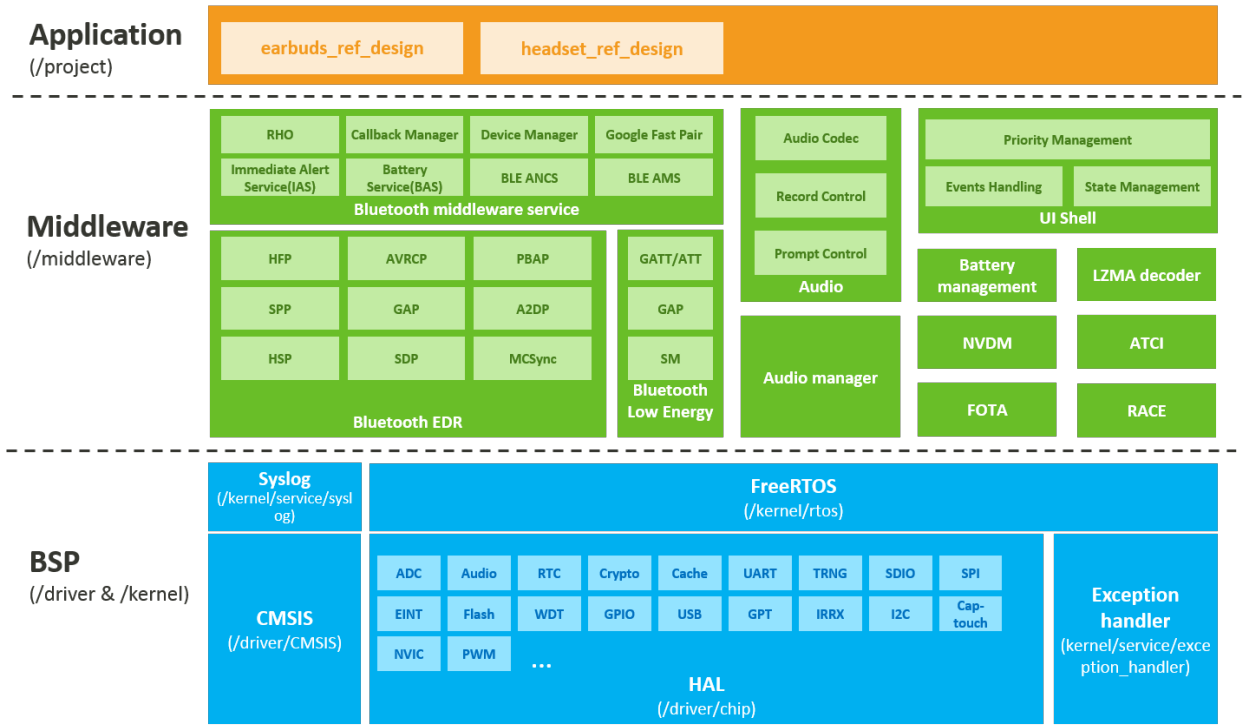

Figure 1. Architecture layout of the SDK for AB155x EVK

The three-layer architecture layout of the SDK for AB1565/AB1568 EVK includes Applications, Middleware and BSP, as shown in Figure 2.

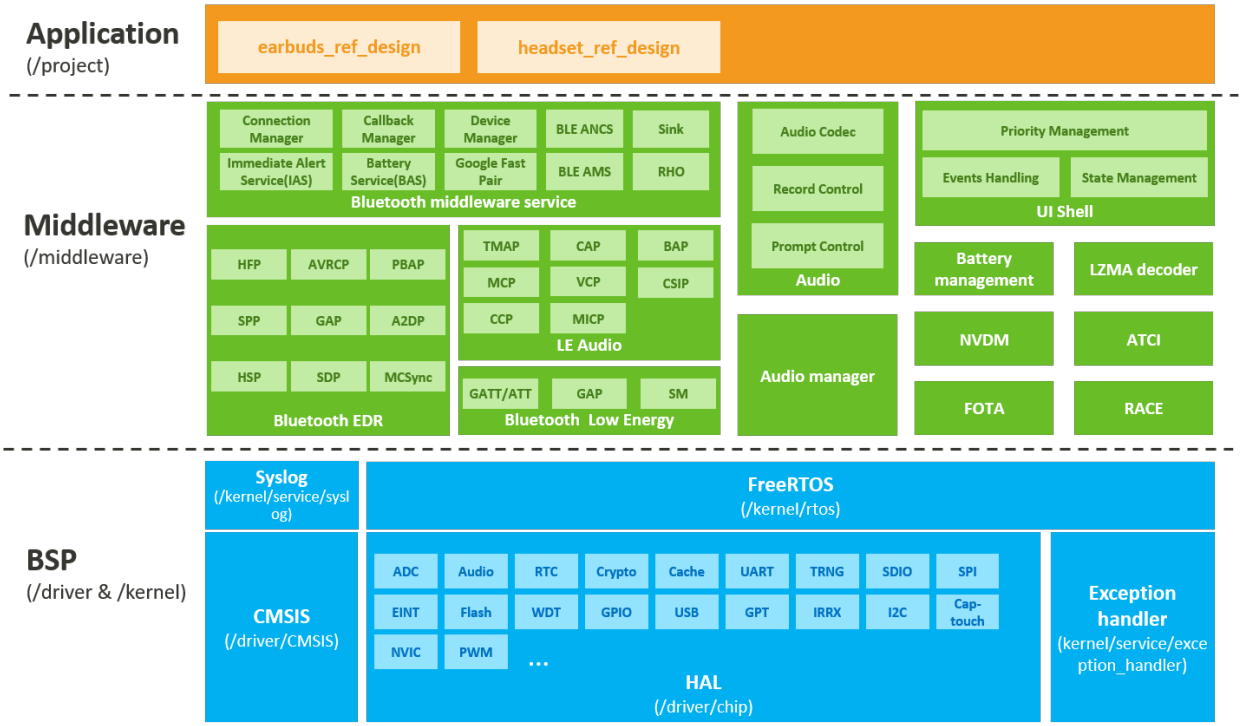

Figure 2. Architecture layout of the SDK for AB1565/AB1568 EVK

The top layer includes the application projects running on the SDK. They are based on the Middleware, OS, and HAL layers. These layers provide rich features for application development. For example, the Middleware layer provides the Bluetooth Low Energy Stack, FOTA, and ATCI. The FreeRTOS layer provides the underlying real-time operating system.

1.2. Knowledge base

The released SDK includes documentation to guide developers through each module and to explain the features in a convenient and developer-oriented approach.

The following documentation is made available with the SDK.

- Airoha IoT SDK for BT Audio Get Started Guide – This document explains the SDK features and shows the procedure for setting up the development environment and its usage.
- Airoha IoT SDK DSP Get Started Guide – This document provides the information that is necessary for using the DSP of the EVK, including details about the installation environment, downloading code, and building techniques.
- Airoha IoT SDK Open Source Components Guide – This document explains the open source modules and the features used in the SDK.
- Airoha IoT SDK for BT Audio Power Mode Developer's Guide – This document provides information about the MCU system's power mode configuration and power consumption measurement focused on the power modes provided by the Airoha IoT SDK.
- Airoha IoT SDK Memory Layout Developer's Guide – This document provides details on the memory layout of the SDK, and how to adjust the memory layout for custom applications.
- Airoha IoT SDK Firmware Update Developer's Guide – This document shows how FOTA operates and how you can adjust the memory usage of FOTA.

- Airoha IoT SDK for BT Audio Build Environment Guide – This document provides information about how to create and build a project, and how to create a module with the SDK in the BT Audio build environment.
- Airoha IoT SDK Bluetooth Developers Guide – This document guides you through the supported Bluetooth library and its usage with reference examples.
- Airoha IoT SDK MCSync Developers Guide – This document guides you through the supported MCSync library and its usage with reference examples.
- Airoha IoT SDK Application Developers Guide – This document provides information about how application layer modules work, and how to customize the keys, LEDs, and voice prompts.
- Airoha IoT SDK for `<chip>` API Reference Manual – This document provides detailed descriptions of the APIs in the SDK.

The documents related to a specific chipset are under <sdk_root>/mcu/doc and are shown in Table 1-1.

Table 1-1. Documentation for Chipsets

Document file name	Airoha IoT SDK for BT Audio
Airoha_IoT_SDK_for_BT_Audio_Release_Notes.pdf	√
Airoha_IoT_SDK_for_BT_Audio_Get_Started_Guide.pdf	√
Airoha_IoT_SDK_DSP_Get_Started_Guide.pdf	√
Airoha_IoT_SDK_Open_Source_Software_Guide.pdf	√
Airoha_IoT_SDK_for_BT_Audio_Power_Mode_Developers_Guide.pdf	√
Airoha_IoT_SDK_Memory_Layout_Developers_Guide.pdf	√
Airoha_IoT_SDK_Firmware_Update_Developers_Guide.pdf	√
Airoha_IoT_SDK_for_BT_Audio_Build_Environment_Guide.pdf	√
Airoha_IoT_SDK_Bluetooth_Developers_Guide.pdf	√
Airoha_IoT_SDK_MCSync_Developers_Guide.pdf	√
Airoha_IoT_SDK_Application_Developers_Guide.pdf	√
Airoha IoT SDK for <chip> API Reference Manual.html	√

2. SDK Version 2.11.0.AB1565_AB1568

2.1. Main Changes

- Software features:
  - [add-on] Microsoft Teams application, including LE Audio TWS earbuds, LE Audio headset, LE Audio dongle and Microsoft Teams protocol.
    - Added LE Audio headset support for Teams certification, includes functionality and audio performance (headset version).
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565M/AB1565AM/AB1568 gaming TWS, gaming headset, and AB1565/AB1565D gaming dongle. Key features are:
    - [add-on] [ULL] Support real-time DSP parameter tuning on dongle side for NR offload project by Config Tool.
  - [common] Added Microsoft Swift Pair support.
- Bug fixes:
  - [add-on] [LE Audio] [earbuds_ref_design]
    - Fixed an issue where there may have been temporary noise on HFP call/A2DP Music during a dongle link loss scenario.
- Note:
  - Changed USB dongle default setting as below for better compatibility:
    - Changed two audio devices to single audio device.
    - Changed high speed to full speed.

2.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- [add-on] [LE Audio] [earbuds_ref_design] There are several known issues in multipoint scenarios:
  - LE Audio + LE Audio
    - Each earbud may be occupied by different LE Audio sources when rapidly switching between two LE Audio sources.
  - LE Audio Call + EDR Call
    - Earbuds cannot handle call operation when there are two calls from each audio source in a multipoint scenario.

2.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.10.1.AB1565_AB1568 to version 2.11.0.AB1565_AB1568:

2.3.1. Example project – earbuds_ref_design

1) API changes for LE AUDIO set volume and call control.

- How to migrate:

Please follow the files change list in Table 2-1 Files Change List.

Table 2-1. Files Change List

API or Event Handle or Enum Structure in SDK_V2.10.1	API or Event Handle or Enum Structure in SDK_V2.11.0	Files and Function
le_audio_stream_type_t;	bt_sink_srv_le_stream_type_t (Need to include header file: bt_sink_srv_le_volume.h)	app_hfp_idle_activity.c ● app_hfp_idle_proc_aws_data() ● Replace LE_AUDIO_STREAM_TYPE_IN with BT_SINK_SRV_LE_STREAM_TYPE_OUT
		app_hfp_utils.c ● app_hfp_mute_mic() ● Replace LE_AUDIO_STREAM_TYPE_IN with BT_SINK_SRV_LE_STREAM_TYPE_OUT
		app_home_screen_idle_activity.c ● _tile_trigger_classic_bt_power_off_flow() ● _trigger_power_off_flow() ● homescreen_app_bt_connection_manager_event_proc()
		app_le_audio_bis_activity.c ● app_le_audio_bis_mute()
		app_smcharger_utils.c ● app_smcharger_mute_audio()
le_audio_set_mute(le_audio_stream_type_t type, bool mute)	bt_sink_srv_le_volume_set_mute(bt_sink_srv_le_stream_type_t type, bool mute)	app_hfp_idle_activity.c ● app_hfp_idle_proc_aws_data()
		app_hfp_utils.c ● app_hfp_mute_mic()
		app_home_screen_idle_activity.c ● _tile_trigger_classic_bt_power_off_flow() ● _trigger_power_off_flow() ● homescreen_app_bt_connection_manager_event_proc()
		app_le_audio_bis_activity.c ● app_le_audio_bis_mute()
		app_smcharger_utils.c ● app_smcharger_mute_audio()
BLE_VCS_VOLUME_STEP	BT_SINK_LE_VOLUME_VALUE_STEP (Need to include header file: bt_sink_srv_le_volume.h)	bt_app_common_at_cmd.c ● bt_app_comm_at_cmd_le_audio_volume_hdl()

API or Event Handle or Enum Structure in SDK_V2.10.1	API or Event Handle or Enum Structure in SDK_V2.11.0	Files and Function
ble_ccp_call_control_point_t	ble_tbs_call_control_point_t	bt_app_common_at_cmd.c ● bt_app_comm_at_cmd_le_audio_call_hdl()

3. SDK Version 2.10.1.AB1565_AB1568

3.1. Main Changes

- Bug fixes:
  - [add-on] Microsoft Teams application, including LE Audio TWS earbuds, LE Audio dongle and Microsoft Teams protocol.
    - Fixed an issue where the uplink audio latency was too long during a call over the LE link.

4. SDK Version 2.10.0.AB1565_AB1568

4.1. Main Changes

- Software features:
  - [add-on] Microsoft Teams application, including LE Audio TWS earbuds, LE Audio dongle and Microsoft Teams protocol.
    - Ready for Teams certification, includes functionality and audio performance (headset version).
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565M/AB1565AM/AB1568 gaming TWS, gaming headset, and AB1565/AB1565D gaming dongle. Key features are:
    - Support AINR on 1565M
    - Support AINR offload to dongle (for 1-mic only)
    - Support gaming mode switch
    - Dual chip mixing mode
      - Added multiple voice assistant (AMA and GSound) switch mechanism

4.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- [add-on] [LE Audio] [earbuds_ref_design] There are several known issues in multipoint scenarios:
  - LE Audio + LE Audio
    - Each earbud may be occupied by different LE Audio sources when rapidly switching between two LE Audio sources.
  - LE Audio Call + EDR Call
    - Earbuds cannot handle call operation when there are two calls from each audio source in a multipoint scenario.
  - There may be temporary noise on HFP call/A2DP Music during a dongle link loss scenario.
- [add-on] [ULL] [earbuds_ref_design]
  - If your project has NR offload to dongle, you must manually reset the dongle to apply any DSP tuning parameters after they are set by Config Tool.

4.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.9.0.ULL_TWS_Headset to version 2.10.0.AB1565_AB1568:

4.3.1. Example project – headset_ref_design

- Update the audio source control API and type definition.

- Replace the following files with the ones in the latest SDK.
  - mcu\project\ab1565_ab1568_evk\apps\headset_ref_design\src\apps\app_ama*.c
  - mcu\project\ab1565_ab1568_evk\apps\headset_ref_design\inc\apps\app_ama*.h
  - mcu\project\ab1565_ab1568_evk\apps\headset_ref_design\src\apps\app_line_in*.c
  - mcu\project\ab1565_ab1568_evk\apps\headset_ref_design\src\apps\app_usb_audio*.c
  - mcu\project\ab1565_ab1568_evk\apps\headset_ref_design\inc\apps\app_usb_audio*.h

5. SDK Version 2.9.0.ULL_TWS_Headset

5.1. Main Changes

- Software features:
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565M/AB1565AM/AB1568 gaming TWS, gaming headset, and AB1565/AB1565D gaming dongle. Key features are:
    - Support Xbox (hybrid wireless headset with ULL dongle)
    - Support dongle and A2DP standby mode
    - Support sidetone gain control via Windows app
    - Support silence detection for auto power off or external amplifier control
    - Dual chip mixing mode
      - Support 1-mic/2-mic AINR
      - Support 4-mic NR DSP framework (without NR algorithm)
      - Support ULL/BT/line-in mixing
- Note:
  - Xbox is not supported on AB1565A based TWS and headset

5.2. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.8.0.AB1565_AB1568 to version 2.9.0.ULL_TWS_Headset:

5.2.1. Example project – earbuds_ref_design & headset_ref_design

- Remove NVKEYID_DSP_PARA_TX_FIR_EQ_BOOMIC, and add NVKEYID_DSP_PARA_NB_TX_FIR_EQ_BOOMIC and NVKEYID_DSP_PARA_WB_TX_FIR_EQ_BOOMIC
  - How to migrate:
    - Modify the following content in inc/nvdm_config_factory_reset.h in the project folder.
      - Remove NVKEYID_DSP_PARA_TX_FIR_EQ_BOOMIC
      - Add NVKEYID_DSP_PARA_NB_TX_FIR_EQ_BOOMIC and NVKEYID_DSP_PARA_WB_TX_FIR_EQ_BOOMIC
    - Add 0xE198 item to config_bin/{board_type}/nvkey.xml
      - Can copy the content of 0xE197 for 0xE198 item

6. SDK Version 2.8.0.AB1565_AB1568

This SDK release is NOT for TWS earbuds and headset (single chip) with the ULL features.

Please do not apply the package to it.

6.1. Main Changes

- Software features:
  - [add-on] Added enterprise applications support
    - LE Audio TWS earbuds
      - Support role UMR (Unicast Media Receiver), CT (Call Terminal) and BMR (Broadcast Media Receiver).
      - Support multipoint with LE Audio or Classic Audio.
      - This feature is only tested with LE Audio dongle and MTK smartphone.
    - LE Audio dongle
      - Support role UMS (Unicast Media Sendor), CG (Call Gateway) and BMS (Broadcast Media Sendor) when LE Audio feature is enabled.
    - Microsoft Teams protocol
      - Teams invocation, Teams notification and call control (answer, end, reject)
      - CFU (Component Firmware Update)
  - Added speaker reference design
    - Support MCSync broadcast speaker
  - Added dual chip mixing mode
  - Added support for more audio formats with the voice prompt
    - Support WAV format
    - Support OPUS format
  - Airoha Tool Kit (ATK)
    - Config tool
      - New settings on the Audio_HWIO page
        - pure line-in config
        - I2S sampling rate
      - New pages
        - USB settings
    - FOTA package tool
      - Support CFU bin file generation
  - Windows App

- New pages
  - DFU
  - PEQ
  - MMI
  - KEY_ACTION
  - HANDLE_PHONE
  - GAME/CHAT VOLUME BALANCE

- Bug fixes:
  - Fixed the following three issues that occurred when a Bluetooth headset connected to Nintendo Switch with firmware V13.1.0:
    1. The headset may have had sound glitches when playing music on Nintendo Switch.
    2. The headset may have become silent after reconnecting after power off then power on.
    3. The headset may have become silent after link loss and reconnecting to Nintendo Switch.

- Note:
  - This version of the SDK does not include the following Microsoft Teams features:
    - Supported for call hold/unhold and multiple HID devices (transferring calls to a different Microsoft Teams device).
  - Microsoft Teams on Mac is not fully tested in this version of the SDK and it is necessary to modify the default value of the USB VID/PID/manufacture string to make it work because Microsoft Teams on Mac checks these settings.

6.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- [add-on] [LE Audio] [earbuds_ref_design] There are several known issues related to the dongle in multipoint scenarios:
  - Earbuds cannot hang up on a classic call when connected via LE Audio.
  - Earbuds are easily disconnected from an LE Audio dongle when performing a classic audio outgoing call.
  - Earbuds cannot accept, reject or terminate a call with the 1st LE Audio dongle after reconnecting to a 2nd LE Audio dongle.
- [add-on] [LE Audio] [dongle_ref_design] Uplink voice becomes distorted if user modifies the LE Audio dongle microphone sampling rate on the PC during a call.

6.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.7.1.ULL_TWS_Headset to version 2.8.0.AB1565_AB1568:

6.3.1. Example project – earbuds_ref_design & headset_ref_design

1) Refine API bt_status_t bt_cm_set_max_connection_number(uint8_t number, bt_bd_addr_t *keep_list, uint8_t list_size) in bt_connection_manager_internal.h.

    - How to migrate:
        - Find the file <project>/src/apps/app_idle/app_bt_emp_service.c, and modify the parameter of bt_cm_set_max_connection_number. The API now is bt_status_t bt_cm_set_max_connection_number(uint8_t number, bt_bd_addr_t *keep_list, uint8_t list_size, bool if_recon).
            - **if_recon** set to true means you want to reconnect the smart phone, otherwise set false.

2) Refine API void race_dsprealtime_anc_adaptive_response(bool success, bool enable) in race_cmd_dsprealtime.h

    - How to migrate:
        - Find the file <project>/src/apps/app_adaptive_anc/app_adaptive_anc_idle_activity.c, and modify the parameter of race_dsprealtime_anc_adaptive_response. The API now is void race_dsprealtime_anc_adaptive_response(bool success, bool enable).
            - **enable**: set to true means this response corresponds to starting user trigger, otherwise is canceling user trigger.

3) Remove unused mp3 codec task in task_def.c

    - How to migrate:
        - Delete the related code of ‘mp3_codec_task_main’ in the file ‘task_def.c’. The file path is <project_name>/src/task_def.c.
        - Delete code:
            - Line 108: extern void mp3_codec_task_main(void *arg);
            - Line 125: { mp3_codec_task_main, MP3_CODEC_TASK_NAME, MP3_CODEC_TASK_STACKSIZE, NULL, MP3_CODEC_TASK_PRIO},

4) Refine bt_sink_srv_am_result_t am_audio_side_tone_set_volume(int32_t side_tone_gain) and int32_t am_audio_side_tone_get_volume(void); SDK APIs in bt_sink_srv_ami.h

    - How to migrate:

- Find the file <project>/src/apps/app_hfp/app_hfp_idle_activity.c, and rename the API to bt_sink_srv_am_result_t am_audio_side_tone_set_volume_by_scenario(sidetone_scenario_t scenario, int32_t side_tone_gain) and int32_t am_audio_side_tone_get_volume_by_scenario(sidetone_scenario_t scenario);.

5) **[only for earbuds_ref_design]** Remove unused volume offset control service (VOCS)
   - How to migrate:
     - Delete &ble_vocs_service_channel_2 in bt_if_leaudio_gatt_server of the file earbuds_ref_design/src/bt_app_utility/gatt_service.c.

6) **[only for earbuds_ref_design]** Refine bt_status_t ble_csis_get_psri(uint8_t *psri) SDK API in ble_csis.h
   - How to migrate:
     - Find the file earbuds_ref_design\src\apps\app_le_audio\app_le_audio.c, and rename the API to bt_status_t ble_csis_get_rsi(uint8_t *rsi) in the function app_le_audio_get_adv_data.

7. SDK Version 2.7.1.ULL_TWS_Headset

7.1. Main Changes

- Software features:
  - [add-on] [ULL] [dongle_ref_design] Support USB features for USB 2.0 certification, including USB suspend/resume, low power optimization, compliance tool check and other related changes.
- Bug fixes:
  - [common] Fixed an issue where headset/earbuds could not detect a charger out event after VBUS plug-out.
  - [earbuds_ref_design] Fixed an issue where earbuds crashed after factory reset.

8. SDK Version 2.7.0.ULL_TWS_Headset

8.1. Main Changes

- Software features:
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565AM gaming TWS, AB1568 gaming headset, and AB1565/AB1565D gaming dongle. Key features are:
    - Support dongle and HFP standby mode for TWS earbuds
    - Support THD+N performance improvement for uplink voice
    - Support TWS RF performance improvement
    - Support dongle OTA for headset
    - Support logging via USB HID
    - Support media control (play/pause/backward/forward/microphone mute) for PC application
    - Support call control commands (answer/end/reject) on PC side
    - Support individual left/right gain setting for headset
    - Support for automatically reducing the volume of game audio when chat audio is present
  - [GSound] remove iOS features
  - [Language model generator] No need to configure the address and length of the flash partition for the language model. Language model generator will read the configuration from the ld file and parse the related flash partition information (address and length) from ld file. But please make sure that the partition name in the configure file is matched with the ld file.
    - Means if the language model name in the ld file is ROM_LM, then the partition name of config.xml file also should be ROM_LM.
- Note:
  - The 1-Wire Logging tool only supports UART board with 1.8v VCCIO and 2M baud rate.

8.2. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.6.1.ULL_TWS_Headset to version 2.7.0.ULL_TWS_Headset:

8.2.1. Example project – earbuds_ref_design with ULL

7) Removed unsupported iOS features for GSound in app layer.

- How to migrate:
  - Replace the following files with the ones in the latest SDK.

    mcu\<project>\src\apps\app_gsound\app_gsound_multi_va.c
    mcu\<project>\src\apps\app_gsound\app_gsound_service.c
    mcu\<project>\src\bt_app_utility\ble_ancs_ios_notification\ble_ancs_app.c
    mcu\<project>\src\bt_app_utility\ble_ancs_ios_notification\ble_ancs_common.c
    mcu\<project>\src\bt_app_utility\gatt_service.c

8) Change configuration for the language model generator.

- How to migrate:
  - Copy the following code and insert it into the Makefile of the project.

```
############################################################
# Transfer the feature option to the LM generator
# Check AMA and AMA WWE enabled or not
AMA_WWE_ENABLED = n
GVA_HOTWORD_ENABLED = n
ifeq ($(MTK_AMA_ENABLE)_$(AMA_TRIGGER_MODE_WWD_ENABLE),y_y)
AMA_WWE_ENABLED = y
endif
# Check GVA and GVA Hotword enabled or not
ifeq ($(GSOUND_LIBRARY_ENABLE)_$(GSOUND_HOTWORD_ENABLE),y_y)
GVA_HOTWORD_ENABLED = y
endif
############################################################
```

  - Add the parameter of ld file and feature option for the language model generator to generate the language model binary file.
    - Search for the following text in the Makefile of the project.

```
$(SOURCE_DIR)/$(LM_BIN_GENERATOR) -i
$(CONFIG_BIN_PATH)/language_model/config.xml -o $(OUTPATH)
```

    - And replace it with the following:

```
$(SOURCE_DIR)/$(LM_BIN_GENERATOR) -i
$(CONFIG_BIN_PATH)/language_model/config.xml -o $(OUTPATH) -l
$(LINKER_SCRIPT_FILE) -a $(AMA_WWE_ENABLED) -g
$(GVA_HOTWORD_ENABLED); \
```

  - Re-configure the config.xml.

    Refer to the main changes for language model generator. The partition name in the file must be configured: earbuds_ref_design/config_bin/ab1565_evk/language_model/config.xml to be ROM_LM as below:

```
<partition name="ROM_LM">
```

Note: It is no longer necessary to configure the address and length.

9. SDK Version 2.6.1.ULL_TWS_Headset

This SDK release is only for TWS earbuds and headset with the ULL feature.

Please do not apply the package to earbuds/headset without the ULL feature.

9.1. Main Changes

- Bug fixes:
  - [add-on] [ULL] [headset_ref_design] Fixed an issue where the uplink audio was sometimes distorted during a call over the ULL link.
  - [add-on] [ULL] [headset_ref_design][earbuds_ref_design] Fixed an issue where there was sometimes no sound during music playback over the ULL link.
- Note:
  - Please note that to resolve the issue with the distorted uplink audio, the system adds an additional 2mA of current during game audio and chat audio scenarios.
  - The statement “[add-on] [ULL] [headset_ref_design] Add approximately 1mA current for game audio and chat audio scenarios” is a known issue carried over from version 2.6.0. It is caused by the AFH function on the Headset side and it is now considered reasonable and no longer an issue with this release.

10. SDK Version 2.6.0.ULL_TWS_Headset

This SDK release is only for TWS earbuds and headset with the ULL feature.

Please do not apply the package to earbuds/headset without the ULL feature.

10.1. Main Changes

- Software features:
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565AM gaming TWS, AB1568 gaming headset, and AB1565/AB1565D gaming dongle. Key features are:
    - Support AINR premium (official version) with AB1565AM and AB1568
    - Support Low latency data transmission for uplink
    - Support AB1565D for gaming dongle
    - Support dongle and HFP/A2DP standby mode
- Bug fixes:
  - [add-on] [ULL] [headset_ref_design] [earbuds_ref_design] Fixed an issue where there was a bad uplink sound after a long call.
  - [add-on] [ULL] [headset_ref_design] [earbuds_ref_design] Fixed an issue where there was sometimes noise when playing music after ending a voice recording.
  - [add-on] [ULL] [headset_ref_design] [earbuds_ref_design] Fixed an issue where there was sometimes no sound when playing music after ending a voice recording.
- Note:
  - There is an error in version 2.5.0 of the Release Notes. The statement “[add-on] Ultra Low Latency (ULL) for AB1565A/AB1565AM gaming and headset dongle” should say AB1568 gaming headset and AB1565 dongle. That is “[add-on] Ultra Low Latency (ULL) for AB1568 gaming headset and AB1565 dongle.

10.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- [add-on] [ULL] [headset_ref_design] Add approximately 1mA current for game audio and chat audio scenarios.
- [add-on] [ULL] [headset_ref_design] On rare occasions, the uplink sounds distorted during a call over the ULL link.

11. SDK Version 2.5.1.AB1565_AB1568

11.1. Main Changes

- Bug fixes:
  - [Common] Bluetooth stack of earbuds and headset projects (with or without ULL) may overflow when a smart phone tries to connect GSound and LE audio. This issue only occurs when the AMA features are disabled in the project.
  - [add-on] [dongle_ref_design] Fixed an issue where FOTA is always disabled in ULL dongle_ref_design project.

12. SDK Version 2.5.0.AB1565_AB1568

12.1. Main Changes

- Software features:
  - [add-on] Ultra Low Latency (ULL) for AB1565A/AB1565AM gaming headset and dongle. Key features are:
    - <20 ms latency audio downlink with a well-matched dongle (latency measurement: dongle received -> headset audio output)
    - Game audio and chat audio volume balance
    - Dongle/HPF standby mode
    - Support for USB HID (only in/out report)
    - USB FW update for dongle and headset
    - Support for USB HID feature report (new for version 2.5.0)
    - Line-in/out with A2DP/HFP mixing (new for version 2.5.0)
    - USB-in/out with A2DP/HFP mixing (new for version 2.5.0)
    - AINR premium (demo version, new for version 2.5.0)
      - The limitation for the AINR demo version “Before 1 min”/“After 30 min” is no sound for uplink (dongle, HFP, AUX, and USB).
      - Support machine learning NR that can identify unwanted noise from speech.
      - Enhance uplink SNR
  - AB1565/AB1568 earbuds and headset
    - MCSync business (multipoint) - connection behavior changed
    - Added wind noise detection (WND) for ANC. To improve user experience of ANC/passthrough, it can detect and suppress the noise caused by strong wind when ANC/passthrough is enabled.
  - [add-on] Added LE Audio CIS music
    - This feature is only tested with AB1565M source platform and MTK smartphone.
    - Sink API is ready. But it may be changed because the final LE Audio specification has not been adopted.
    - Added API to turn on/off LE Audio feature. It will cause a disconnection when this feature is disabled when LE Audio link is connected.
  - Airoha Tool Kit (ATK)
    - Config tool
      - New settings on the Audio_Volume page
        - Line-in/USB-in ratio
        - DSP_PARA_AUDIO_VOLUME_2.gain3_sample_per_step
      - New pages
        - General purpose software gain settings

        - USB_IN_Level_Settings
        - USB/Line_OUT_Level_Settings
    - FOTA package tool
      - New header info in FOTA bin
        - Chip name and device type
  - Android applications and SDK
    - New page
      - LE Audio UT
        - LE Audio On/Off

- Bug fixes:
  - [FreeRTOS security hole] Fixed the integer overflow or wraparound issue in memory management API functions (MemMang, Queue, Streambuffer).
  - [SDK v2.4.0.ULL_TWS known issue] [Android applications] Fixed an issue where the online log was sometimes abnormal after the force system assert.
  - [SDK v2.4.0.ULL_TWS known issue] Fixed an issue where volume change did not work for Sony PlayStation 4/5.
  - [SDK v2.4.0.ULL_TWS known issue] Fixed an issue where there was no connected voice prompt in L channel after connecting dongle (seldom).
  - [SDK v2.4.0.ULL_TWS known issue] Fixed an issue where there sometimes was no voice prompt when disconnecting and reconnecting from a smartphone.
  - [SDK v2.4.0.ULL_TWS known issue] Fixed an issue where the PEQ setting did not operate as expected by using the button to switch PEQ.
  - [Common] Fixed an issue where there was an error when MUX BT was sending data.
  - [Common] Fixed an issue where the RF tester could not connect with DUT after entering the DUT mix mode.
  - [MCSync business (multipoint)] Fixed an issue that set highlight device or codec error after RHO.
- Note:
  - The AB1568 does not support one-wire UART in this release.
  - This SDK release does not include the AB1565A/AB1565AM ULL gaming TWS project.
  - Since the final LE Audio specification is not yet adopted, the SDK APIs provided in this release are a draft version. Please be aware that changes may occur in future when the LE Audio specification is officially announced.

12.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

  - MCSync business (multipoint) has the following issues if one of BT source devices is the Teams APP on PC or laptop. The major reason is that the PC/laptop usually does not inform the clients of the changing call state and the Teams APP uses A2DP to play the incoming ring tone on many PC/laptop OSs. For example:
    - Smartphone music does not automatically resume playing after PC's Teams call has ended.

- Smartphone incoming ringtone and audio cannot be heard when Teams is making an ongoing call on PC.
- Smartphone incoming call ringtone can still be heard when Teams is receiving an incoming call on PC.

12.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.3.1.AB1565_AB1568 to version 2.5.0.AB1565_AB1568:

12.3.1. Example project – earbuds_ref_design & headset_ref_design

1) Remove unused header file “bt_sink_srv_gsound.h”
    - How to migrate:
        - Remove the header file reference in project
2) Initialize the firmware_revision of the structure bt_fast_pair_init_parameters_t when calling bt_fast_pair_init()
    - How to migrate:
        - Find the function “app_fast_pair_init” in <project>\src\apps\app_fast_pair\app_fast_pair_idle_activity.c, and find the line “bt_fast_pair_init_parameters_t init_param;”
        - Add the content “memset(&init_param, 0, sizeof(init_param));” below the line which you find in last step.

13. SDK Version 2.4.0.ULL_TWS

This SDK release is only for TWS earbuds with the ULL feature.

Please do not apply the package to earbuds without ULL feature.

Earbuds feature.mk with ULL feature
• feature_65_8m_cell_ull.mk • feature_65_8m_evk_ull.mk • feature_65_evk_ull_va.mk • feature_65_evk_ull_xiaowei.mk • feature_65_evk_ull.mk • feature_68_evk_ull.mk

13.1. Main Changes

- Software features:
  - [add-on] Ultra Low Latency (ULL) for AB1565 gaming dongle and AB1568 earbuds (TWS)
    - [Earbuds] Support ULL for dongle and earbud connections
    - [Dongle] USB FW update
    - [Dongle] Set real time PEQ to Earbuds via Dongle
- Note:
  - RF performance for distance and interference environment is under improvement.

13.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- [Android applications] The online log may be abnormal after the force system assert.
  - Recovery Method: Exit APP and open again if you cannot set log config.
- Volume change does not work for Sony PlayStation 4/5.
- No connected voice prompt in L channel after connecting dongle (seldom).
- No voice prompt when disconnect and reconnect from smartphone (seldom).
- The PEQ setting does not operate as expected by using Earbuds button to switch PEQ.

14. SDK Version 2.3.1.AB1565_AB1568

14.1. Main Changes

- Bug fixes:
  - [Common] Fixed an issue where the system would power off during the RF performance test.
  - [Common] Fixed an issue where there was approximately 3.5mA current leakage of BT RF from earbuds that were fully charged and in the charging case.
  - [Common] Fixed an issue where the system would crash after speaker link loss and reconnect to eSCO.
  - [Common] Fixed an issue where there was no sound during the A2DP SBC streaming test.
  - [Common] Fixed an issue where the system would hang, possibly under the BT sniff or system idle scenario.
  - [Common] Fixed an issue that would probably cause the USB module to violate the USB standard.
  - [Common] Fixed an issue in the Over Current Protection (OCP) flow to avoid an unexpected system shutdown under charge mode.
  - [Common] Fixed an issue to avoid unstable charger current and then impact battery life when the system would wake up from RTC mode.
  - [Common] Fixed an issue where earbuds could not boot-up under charge mode if the battery was under 3.2v.

15. SDK Version 2.3.0.AB1565_AB1568

15.1. Main Changes

- Software features:
  - AB1565/AB1568 earbuds and headset
    - MCSync business (multipoint)
      - Added support RHO when connected with two speakers at the same time in earbuds.
      - Added support take over. It allows the new link to take over the idle link as the rule.
    - Added personal wearing adaptive ANC for earbuds. It detect the personal wearing condition and calculates a new ANC filter to approach the best noise cancellation performance.
  - Google fast pair characteristic UUID changed from 16-bit to 128-bit format. Refer to https://developers.google.com/nearby/fast-pair/spec#CustomCharacteristics
  - [add-on] Added GSound sub-feature
    - Device action
  - [add-on] Added AMA sub-features
    - Spotify control using Alexa
    - Alexa for Apps (hands-free app launch using Alexa)
  - [add-on] Added MI XiaoAI
    - Added WWE
    - Support EMP and takeover feature
  - [add-on] Added Tencent Xiaowei
    - Support Xiaowei basic features (connect/tap to talk/recognize)
  - [add-on early release] Added Ultra Low Latency (ULL) for AB1565 gaming dongle and AB1568 headset
    - ULL headset can provide < 20ms latency audio downlink with a well-matched dongle (latency measurement: dongle received -> headset audio output). It also provides a good experience with gaming and TV.
    - [Dongle] ULL USB game chat/music (USB audio: 1Rx + 1Tx)
    - [Headset] Line-in
    - [Headset] 1 USB audio
  - [add-on early release] Added LE Audio for earbuds reference design
    - LE Audio supports two roles defined in telephony and media audio profile (TMAP).
      - Call Terminal (CT)
      - Unicast Media Receiver (UMR)
  - Airoha Tool Kit (ATK)
    - Config tool
      - New options in digital output gain tables

        - Mute(-120dB) and -80.5dB
      - New settings in Audio_HW/IO_Config page
        - Line-in filter and IIR HPF
      - New pages
        - VAD_Tuning
    - Android/iOS applications and SDK
      - Improved active FOTA speed
      - New settings in MMI UT page and SDK
        - Auto play pause (in ear detection)
        - Auto power off
      - New options in key action UT page and SDK
        - Voice assistant: Xiaowei AI
        - Single click: Share_Mode_Switch, Share_Mode_Follower_Switch
- Bug fixes:
  - [Common] Modified the NVDM driver to avoid the problem of device constantly restarting due to race conditions in the user's code.
  - [MCSync business (multipoint)] Fixed an issue where the user could not hear AMA/GSound's voice response correctly while playing music and when two smartphones were connected to the same earbuds/headset.
  - [MCSync business (multipoint)] Fixed an issue where the second connected smartphone could not activate AMA correctly.
  - [MCSync business (multipoint)] Fixed an issue where switching devices could result in a double Agent and crash.
  - [MCSync] Fixed a seldom link-disconnecting crash issue.
  - [MCSync] Improved MCSync connection stability.
  - [MCSync] Fixed an issue where Partner power on might not play music when Agent plays music for more than 30 minutes.
  - [MCSync] Fixed a seldom issue where the Partner with BLE link would crash during RHO.
  - [Music Sharing] Fixed an issue where Partner could not play/pause after receiving or ending a call.
  - [Music Sharing] Fixed an issue where Partner could not receive the call state when the Follower was attached.
  - [Earbuds] Fixed a seldom music playing issue that occurred when earbuds were quickly put in or taken out of the charger case.
  - [Earbuds with one-wire UART] Fixed some seldom issues to enhance the stability of the one-wire charging case interaction with earbuds.
  - [Voice assistant] Fixed some seldom issues that incorrectly set the voice assistant state when triggering voice recognition during A2DP streaming.
- Note:
  - LE Audio can co-exist with classic audio but cannot support RHO and role recovery in this release.

- Because the feature_65_8m_cell.mk is created, the feature_65_cell.mk is removed. If you used the feature_65_cell.mk as your base project, you can now refer to feature_65_8m_cell.mk.
- Removed the bsp_external_flash header file from the list of generated SDK files. Added Flash-related capacity and the starting address information of each flash type to the bsp_flash header file. It is recommended that users use bsp_flash uniformly.
- The following new features for Tencent VA - Xiaowei do not reach the MP quality: connect control, device control (only support ANC), custom skill, exchange serial number, RHO without disconnect, and support EMP.

15.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- For the firmware with 1Wire UART function, MP Tool cannot be executed normally when the PCBA is connected with the battery.
- For the product using AB1565/AB1568 built-in captouch and Class D amp, the captouch signal may be disturbed while playing music.
- For XiaoAI multi-point case, because XiaoAI APP does not notify the device of the session status, one speaker with the XiaoAI connection cannot voice reply normally when another speaker is playing music.
- When earbuds connected to two smart phones (EMP feature) and both phones are in call state, the earbuds may hear a false “disconnected” voice prompt. Then, if the BT connection is switched to the other phone, one earbud becomes silent.
- For Xiaowei:
  - When connecting Xiaowei with Pixel 4 (Android 11), after turning off the BT of Pixel 4, there are issues that cause the Xiaowei SPP link to not disconnect:
    - Cannot hear the “disconnected” voice prompt; and
    - Cannot connect to another smartphone.
  - When connected with an iPhone and playing music with a 3rd-party music application and then pausing it, the music will automatically play when the Xiaowei response is complete.
    - This is because the Xiaowei APP sends the resume command to request the device to send the AVRCP command with the play action to the iPhone.

15.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.2.1.AB1565_AB1568 to version 2.3.0.AB1565_AB1568:

15.3.1. Example project – earbuds_ref_design & headset_ref_design

2) Refine BT device manager power SDK APIs in bt_device_manager_power.h.
   - How to migrate:
     - Please find BT device manager power related API/event/macro in Table 2-1. Files Change List, do search in column SDK Version 2.2.1.AB1565_AB1568 and replace the mapping one in column SDK Version 2.3.0.AB1565_AB1568.

Table 2-1. Files Change List

SDK Version 2.2.1.AB1565_AB1568	SDK Version 2.3.0.AB1565_AB1568
BT_DEVICE_TYPE_BLE	BT_DEVICE_TYPE_LE
BT_DM_EVT_POWER_PREPARE_ACTIVE	BT_DEVICE_MANAGER_POWER_EVT_ PREPARE_ACTIVE
BT_DM_EVT_POWER_PREPARE_STANDBY	BT_DEVICE_MANAGER_POWER_EVT_ PREPARE_STANDBY
BT_DM_EVT_POWER_ ACTIVE_COMPLETE	BT_DEVICE_MANAGER_POWER_EVT_ ACTIVE_COMPLETE
BT_DM_EVT_POWER_STANDBY_COMPLETE	BT_DEVICE_MANAGER_POWER_EVT_ STANDBY_COMPLETE
bt_dm_event_t	bt_device_manager_power_event_t
bt_dm_callback_t	bt_device_manager_power_callback _t
BT_DM_POWER_RESET_PROGRESS_MEDIUM	BT_DEVICE_MANAGER_POWER_RESET_PROGRESS_MEDIUM
BT_DM_POWER_RESET_PROGRESS_COMPLETE	BT_DEVICE_MANAGER_POWER_RESET_PROGRESS_COMPLETE
bt_dm_power_reset_progress_t	bt_device_manager_power_reset_progress_t
bt_dm_power_reset_callback_t	bt_device_manager_power_reset_callback_t
BT_DM_POWER_STATE_OFF	BT_ DEVICE_MANAGER _POWER_STATE_STANDBY
BT_DM_POWER_STATE_OFF_PENDING	BT_DEVICE_MANAGER_POWER_STATE_STANDBY_PENDING
BT_DM_POWER_STATE_ON	BT_DEVICE_MANAGER_POWER_STATE_ACTIVE
BT_DM_POWER_STATE_ON_PENDING	BT_DEVICE_MANAGER_POWER_STATE_ACTIVE_PENDING
BT_DM_POWER_STATE_RESTING	BT_DEVICE_MANAGER_POWER_STATE_RESTING
bt_dm_power_state_t	bt_device_manager_power_state_t
bt_dm_dev_set_power_state()	bt_device_manager_dev_set_power_state()
bt_dm_dev_register_callback ()	bt_device_manager_dev_register_callback ()
bt_dm_register_callback()	bt_device_manager_register_callback()
bt_dm_deregister_callback ()	bt_device_manager_deregister_callback ()
bt_dm_power_active()	bt_device_manager_power_active()
bt_dm_power_standby()	bt_device_manager_power_standby()
bt_dm_power_reset()	bt_device_manager_power_reset()
bt_dm_power_set_hold_mode()	Delete
bt_dm_power_get_power_state()	bt_device_manager_power_get_power_state()

3) AMA language model management and specification change.

- How to migrate:
  - Copy folder mcu\project\ab1565_ab1568_evk\apps\xxxxx_ref_design\src\apps\app_ama and mcu\project\ab1565_ab1568_evk\apps\xxxxx_ref_design\inc\apps\app_ama from the new SDK and use it to replace the old SDK folder.

- Add the follow lines to the feature.mk of project.

```
AMA_TRIGGER_MODE_TTT_ENABLE = y
AMA_TRIGGER_MODE_PTT_ENABLE = y
AMA_TRIGGER_MODE_WWD_ENABLE = y
```

- Add the following lines to

  mcu\project\ab1565_ab1568_evk\apps\xxxxx_ref_design\src\apps\module.mk.

```
ifeq ($(AMA_IAP2_SUPPORT_ENABLE),y)
CFLAGS  += -DAMA_IAP2_SUPPORT_ENABLE
endif
ifeq ($(AMA_IAP2_APP_RELAY_ENABLE),y)
CFLAGS  += -DAMA_IAP2_APP_RELAY_ENABLE
endif
ifeq ($(AMA_IAP2_VIA_MUX_ENABLE),y)
CFLAGS  += -DAMA_IAP2_VIA_MUX_ENABLE
endif
ifeq ($(AMA_TRIGGER_MODE_TTT_ENABLE),y)
CFLAGS  += -DAMA_TRIGGER_MODE_TTT_ENABLE
endif
ifeq ($(AMA_TRIGGER_MODE_PTT_ENABLE),y)
CFLAGS  += -DAMA_TRIGGER_MODE_PTT_ENABLE
endif
ifeq ($(AMA_TRIGGER_MODE_WWD_ENABLE),y)
CFLAGS  += -DAMA_TRIGGER_MODE_WWD_ENABLE
endif
```

- Delete the following lines in

  mcu\project\ab1565_ab1568_evk\apps\xxxxx_ref_design\src\apps\app_ama_activity.c

```
#include "app_bt_takeover_service.h"
app_bt_takeover_service_user_register(APP_BT_TAKEOVER_ID_AMA,
app_ama_bt_takeover_handler);
```

- Delete the code in macro MTK_AMA_ENABLE of

  mcu\project\ab1565_ab1568_evk\apps\xxxxx_ref_design\src\apps\events\apps_events_bt_event.c.

4) Replace assert function by Airoha customized configASSERT().

- How to migrate:

  Please mask or remove the following lines in

  mcu\project\ ab1565_ab1568_evk\apps\xxxxx_ref_design\inc\FreeRTOSConfig.h

```
//#include “assert.h”
//extern void abord(void);
```

5) API changes for information in usbaudio_drv.h.

- How to migrate:

Please add the default value “0” for the new variable, port, when using the API as shown below.

1. USB_Audio_Register_SetInterface_Callback(0, setinterface_cb)
2. USB_Audio_Register_Unplug_Callback(0, unplug_cb)
3. USB_Audio_Register_VolumeChange_Callback(0, volumechange_cb)
4. USB_Audio_Register_Mute_Callback(0, mute_cb)

16. SDK Version 2.2.1.AB1565_AB1568

16.1. Main Changes

- Bug fixes:
  - AB1565/AB1568 earbuds and headset
    - Fixed a phone call assert fail bug for earbuds and headset enabled the Airoha 2+1 NR algorithm.
    - Fixed a pass through assert fail caused by microphone input exceeding the maximum level.
    - Fixed a firmware bug to let config tool display ANC feedback microphone tuning UI correctly.
    - Revised 8M flash project memory layout to extend DSP partition. The modification did not affect the start address of any partition and it is FOTA compatible with v2.2.0.
    - Fixed a firmware bug to align CM4 and DSP with their multimic option MTK_AUDIO_SUPPORT_MULTIPLE_MICROPHONE of earbuds_ref_design/headset_ref_design project feature_65_8m_evk.mk to prevent parameter misalignment. This option must be enabled on 1565 and 1568.
  - Airoha Tool Kit (ATK)
    - Fixed a bug that ANC component gains of L channel could not be set separately with R channel.

17. SDK Version 2.2.0.AB1565_AB1568

17.1. Main Changes

- Software features:
  - Add support for 1565M and 1565AM, which have 8MB internal flash.
  - AB1565/AB1565A/AB1568/Ab1565M/AB1565AM earbuds reference design
    - MCSync share – Enable two sets of earbuds to share the music stream from one smartphone.
    - MCSync business (multipoint) – Earbuds can connect with two smartphones at the same time, and can play or manage music and calls from one of them.
  - AB1565/AB1565A/AB1568/Ab1565M/AB1565AM headset reference design
    - Multipoint – Headset can connect with two smartphones at the same time and can play or manage music and calls from one of them.
  - Airoha Tool Kit (ATK)
    - Config tool
      - New menu item: special_export
        - Export all/changed NVKeys to NVKEY_Setting.c and save bin
      - New option in export NV button
        - All_NV or Changed_NV
      - New option in compare NV button
        - Compare with bin or compare with bin + imported_nvr
      - New option in wireless tuning connection button
        - Agent, Partner, or Agent + Partner
      - New setting in Captouch page
        - Auto suspend
      - UI changed in A2DP PEQ page
        - PostPEQ buttons are changed to two buttons: ANC Off PostPEQ and ANC on PostPEQ
    - Android applications and SDK
      - New option in FOTA page
        - Adaptive FOTA
      - New option in KeyAction page
        - DLONG
      - New pages about FW debugging
        - Log config page
        - Combine offline log page and mini dump page to form the exception dump page
    - iOS applications and SDK

- Support AB155x and AB156x all series chip.
- New option in FOTA page
  - Adaptive FOTA
- New option in KeyAction page
  - DLONG

- Bug fixes:
  - Resolved SBC deviation on earbuds.
  - Resolved eSCO noise issues happened after talking 3 minutes in a phone call.
  - Improved the performance of ANC fitting detection and resolved an issue where the application reported it was good when the earbuds were not correctly worn.
  - Resolved a problem where GSound was not triggered when using the smartphone application to change the default VA from Alexa to GSound.
  - Corrected the A-Mic ADC mode setting to high performance mode for AB1565 and AB1568 series chips.
- Note:
  - AB1565/AB1565M earbuds memory layout was changed. We reorder the flash partitions to make the reserved size of cm4 and LM (language model) partition more flexible. Customer can reserve memory layout to reserve the unused LM area for CM4 using, and the result image file is still FOTA compatible with the image before revised. However, user could not upgrade firmware from v2.1.0 to v2.2.0 using default layout by FOTA. Please use the flashtool instead FOTA to upgrade 2.2.0 firmware from 2.1.0, or replace the new layout setting with old one.
  - Exception dump default configuration has changes with this version of the SDK. There are three changes:
    - Enable <Reset after dump>
      - The system will reboot after exception dump.
    - Enable <WDT configure as reset mode>
      - The system will reboot if it hangs for more than 60 seconds.
    - Disable <Mask IRQ too long>
      - Ignore abnormal cases in which the mask IRQ is too long. This is a debugging feature only.

    The customer must keep these configurations during mass production. For more details, please refer to “AB1565_AB1568_Config_Tool_Users_Guide.pdf” section 2.13.

17.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- The multipoint function enables the earbuds/headset to connect two smart phone at the same time. However, the voice assistant (GSound and Alexa) function from multiple smart phone connection may abnormal. We will fixed the issues on 2.3.0.
- Although the package includes the new features “device action” for Alexa and GSound. There are some bugs such as the result of device action did not display correctly on smart phone side. We will fix the issue on 2.3.0.

18. SDK Version 2.1.0.AB1565_AB1568

18.1. Main Changes

- Software features:
  - AB1565/AB1565A earbuds reference design
    - ANC – fit detection
    - One-wire DFU
    - Software Negative Temperature Coefficient (NTC)
    - MCSync share (early release)
    - MCSync business (early release)
  - Add AB1568 earbuds design
    - Software features are as same as AB1565A
  - Add AB1565/AB1565A/AB1568 headset reference design
    - eSco, A2DP
    - 1-mic/2-mic EC/NR
    - ANC
    - Programmable EQ (PEQ)
    - Voice prompt
    - Capacitive touch
    - Firmware-over-the-Air (FOTA)
    - Google fast pair 2.0
    - USB audio (downlink)
    - Audio line in
    - [add-on] GSound (Google Assistant device firmware implementation) / Google Hotwording
    - [add-on] Alexa Mobile Accessory (AMA) /AMA Wake Word Engine (WWE)
  - Airoha Tool Kit (ATK)
    - UartComportSetting
      - New port type: USB
    - Config Tool
      - New settings in Captouch_Settings page
        - Long press shut down/wake up time setting
        - SW debounce setting
      - New settings in Audio_HW/IO_Config page
        - VAD
      - New settings in A2DP_PEQ page

        - Post PEQ
      - New pages:
        - Dual_MIC_NR
        - Line-in_Level_Settings, Gain_Settings, PEQ, DRC_&_DBB, INS
      - Modify A2DP gain page:
        - Change A2DP digital gain resolution to 0.5db per step
    - Logging Tool
      - New log filter: log CPU filter
    - FOTA Package Tool
      - New UI option for FOTA bin generation settings by selecting a .cfg file
      - New UI option for reserved NVDM item update
    - Add one wire DFU Tool
  - Android applications and SDK
    - App
      - Support headset
      - Rename the “Antenna UT” page title to “Field Trial”
      - Add “Get A2DP info” in filed trial page
    - SDK
      - MMI
        - New API to get/set share mode
  - iOS applications and SDK
    - SDK
      - Change bundle name and framework name
      - FOTA
        - Refine progress bar percentage counting
      - MMI
        - New API to get/set share mode
- Bug fixes:
  - Resolved a reset issue that seldom occurred when using FCD to make L/R earbuds become a set.
  - Resolved an issue where a single earbud did not output the stereo channel in A2DP streaming mode.
  - Resolved Google hotwording – Long recording does not work correctly.
- Note:
  - We did not release the add-on features with the SDK official package. Please contact Airoha service team to request the add-on release.
  - Although the package includes the MCSync business/MCSync Share, the related features are not completely verified and do not yet reach the MP quality. We plan to officially release the feature in v2.2.0.

18.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- The earbuds may seldom not correctly start ANC fit detection triggered by iPhone 11 after RHO.
- [GSound] The earbuds/headset project did not completely pass BART.
  - Earbuds: The pass rate is 99% and 97% for Android and iOS respectively.
  - Headset: The pass rate is 99% and 99% for Android and iOS respectively.

  The known issues are as follows:
  - Google FOTA triggered by iOS devices may not recover from an interruption.
  - Google hotwording
    - Some languages are not correctly triggered with a keyword.
- Using the config tool to set audio line-in PEQ parameters for the headset project is not ready.

18.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 2.0.0.AB1565 to version 2.1.0.AB1565_AB1568:

18.3.1. Example project – earbuds_ref_design & headset_ref_design

- With the new release of support Software NTC, the earbuds automatically shut down when a temperature abnormal occurs.
- The feature was controlled by the NVKEY NVKEYID_NTC_NTC_PARA_CONFIG1. The default value is off in this release. Please turn on the NVKEYID_NTC_NTC_PARA_CONFIG1 if your hardware supports this feature.
- The ab1565 EVK v1.0 did not support the NTC feature by default. You can turn on the feature by reworking the EVK. Please contact the Airoha SA team for details.
- The NVKEYID_NTC_NTC_PARA_CONFIG1 setting in SDK v2.0.0.AB1565 is on. If your hardware does not support the battery detection feature such as ab1565 EVK, please change the NVKEYID_NTC_NTC_PARA_CONFIG1 to off before upgrading FW from 2.0.0.AB1565 to 2.1.0.AB1565_AB1568 by using the flash tool or FOTA.

19. SDK Version 2.0.0.AB1565

19.1. Main Changes

- Software features:
  - AB1565/AB1565A earbuds reference design
    - Multi Cast Synchronization (MCSync): It is an Airoha proprietary profile to support voice/audio over multiple Bluetooth Audio devices.
    - ANC
    - 2+1 mic EC/NR
    - Programmable EQ (PEQ)
    - Voice prompt
    - Capacitive touch
    - Firmware-over-the-Air (FOTA)
    - Google fast pair 2.0
    - [add-on] GSound (Google Assistant device firmware implementation) / Google Hotwording
    - [add-on] Alexa Mobile Accessory (AMA) /AMA Wake Word Engine (WWE)
  - Airoha Tool Kit (ATK)
    - Logging
    - Config
    - FOTA package
    - Lab test
    - OTA by dongle tool
  - Flash tool
  - Android applications and SDK
    - App
      - FOTA
      - PEQ
      - MMI
      - Antenna test
      - 2-mic Dump, Mini Dump, Online log, Offline log.
      - ANC index and gain settings.
      - ROFS update in FOTA page.
    - SDK
      - FOTA support new RHO event.
  - iOS applications and SDK

- App
  - FOTA
  - PEQ
  - MMI
  - ANC index and gain settings
  - ROFS update in FOTA page
- SDK
  - FOTA support new RHO event

- Note:
  - We did not release the add-on features with the SDK official package. Please contact Airoha service team to request the add-on release.
  - Although the package includes the AB1568 earbuds project, the related features are not completely verified and do not yet reach the MP quality. We plan to officially release AB1568 earbuds in v2.1.0.
  - Although the package includes AB1565/AB1565A headset, the related features do not satisfy the MP criteria. The headset project in the release is only for early development purpose. We plan to officially release AB1565/AB1565A headset in v2.1.0. The headset reference design includes the following features:
    - eSco, A2DP
    - 1-mic/2-mic EC/NR
    - Firmware-over-the-Air (FOTA)
    - Programmable EQ (PEQ)
    - Google fast pair 2.0
    - Audio line in
  - Although the package includes adaptive ANC – leakage detection feature, it does not satisfy the MP criteria.
  - Please go to the following folders to get the corresponding release notes for the tool.
    - ATK: <sdk_root>\mcu\tools\pc_tool\atk\ab1565_ab1568
    - Android package: <sdk_root>\mcu\tools\headset_app_android_eng\ab1565_ab1568
    - iOS package: <sdk_root>\mcu\tools\headset_app_ios_eng\ab1565_ab1568
    - EPT (Easy Pinmux Tool): Please search "Easy_Pinmux_Tool" from here, then download the latest version (v2.6.7 or higher) to use.

19.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- AMA sound may seldom play on smart phone speaker rather than earbuds after switching language mode.
- [GSound] The earbuds project did not pass BART complexly. The pass rate is 94% and 96% for Android and iOS respectively. The known issues are as follows:
  - Google FOTA triggered by iOS devices may not recover from interruption.

- Google hotwording
  - Long recording does not work correctly.
  - Some languages are not correctly triggered with a keyword.

20. SDK Version 1.6.0

20.1. Main Changes

- Software features and optimization:
  - [add-on] Added Xiaomi Xiaoai
  - [add-on] Added iAP2 for AMA
  - Added Google Fast Pair Service 2.0 optional feature
- Bug fixes:
  - [SDK v1.5.0 known issue] Fixed earbuds reconnection failure problem with Alexa application that occurred when user kills the Alexa application on iPhone.
  - [SDK v1.5.0 known issue] Fixed an issue to avoid user hearing the disconnected/connected voice prompt in the partner earbud after turning off the agent earbud.
  - [SDK v1.5.0 known issue] Fixed partner no sound issue when earbuds connect to FCD BT dongle.

21. SDK Version 1.5.0

21.1. Main Changes

- Software features and optimization:
  - [add-on] Added Tencent Xiaowei.
  - Added in-ear speech enhancement for call application.
- Bug fixes:
  - [SDK v1.4.0 known issue] Fixed an issue where an earbud disconnected then reconnected immediately, if user put another device in a charger case or turned off the device.
  - [SDK v1.4.0 known issue] Fixed an issue where a partner earbud may have no sound when FCD connects to earbuds and plays through A2DP.
- Note:
  - Change the name of feature.mk files.
    - In earbuds_ref_design:

Table 21-1. feature.mk Filename Change List

Old name	New name
feature_ab1552_asia.mk	feature_52_asia.mk
feature_ab1552_asia_anc.mk	feature_52_asia_anc.mk
feature_ab1552_asia_anc_mp_log.mk	feature_52_asia_anc_mp_log.mk
feature_ab1552_asia_bt_vendor_codec.mk	feature_52_asia_vendor_codec.mk
feature_ab1552_cnsy.mk	Removed
feature_ab1552_evk.mk	feature_52.mk
feature_ab1552_evk_airoha_aac_decoder.mk	feature_52_airoha_aac.mk
feature_ab1552_evk_bt_vendor_codec.mk	feature_52_vendor_codec.mk
feature_ab1552_evk_gsound.mk	feature_52_gsound.mk
feature_ab1552_evk_smart_charger.mk	feature_52_charger.mk
feature_ab1552_evk_smart_charger_1wire.mk	feature_52_charger_1wire.mk
feature_ab1555_evk.mk	feature_55.mk
feature_ab1555_evk_bt_vendor_codec.mk	feature_55_vendor_codec.mk
feature_ab1556_evk.mk	feature_56.mk
feature_ab1558_evk.mk	feature_58.mk
feature_ab1558_evk_fota_external_flash.mk	feature_58_ext_flash.mk

    - In headset_ref_design:

Table 21-2. feature.mk Filename Change List

Old name	New name
feature_ab1552_evk.mk	feature_52.mk

Old name	New name
feature_ab1552_evk_bt_vendor_1_codec.mk	Removed
feature_ab1552_evk_bt_vendor_codec.mk	Removed
feature_ab1552_evk_gsound.mk	feature_52_gsound.mk
feature_ab1552_evk_mp_log.mk	feature_52_mp_log.mk
feature_ab1552_line_in.mk	feature_52_line_in.mk
feature_ab1555_evk.mk	feature_55.mk
feature_ab1555_evk_bt_vendor_codec.mk	Removed
feature_ab1556_evk.mk	feature_56.mk
feature_ab1558_evk.mk	feature_58.mk
feature_ab1558_evk_fota_external_flash.mk	feature_58_ext_flash.mk

- Because the config tool reads an NVKey item (0x1001) to check the SDK version, if the customer uses FOTA to upgrade the FW, they must also update the NVKey during the FOTA upgrade procedure or the config tool cannot correctly show when it connects to the device.

21.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- None.

22. SDK Version 1.4.0

22.1. Main Changes

- Software features and optimization:
  - Added one-wire UART smart charger case.
  - Upgraded the GSound from version 30 to 36.
- Bug fixes:
  - Fixed an issue where the A2DP music becomes silent in the severe interference environment.
  - Reduced the power consumption of ANC function in the idle state.

22.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- The Bluetooth service on the iPhone unexpectedly switches on/off when the user performs the following actions when the earbuds are connected and the AMA is also connected: Kill the Alexa application on the iPhone; unpair the BLE and EDR links; reconnect the EDR link; and reopen the Alexa application.
- The EDR link of a partner earbud may be broken if user put the device in a charger case or turn off the device. The user may hear a reconnection voice prompt although the EDR link be reestablished immediately.
- FCD connects to earbuds and play A2DP, partner role may have no sound.

22.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 1.3.2 to version 1.4.0:

22.3.1. Example project – earbuds_ref_design

1) Update memory layout files.

- How to migrate:
  - Replace the following files with the ones in the latest SDK.

    mcu\project\ab155x_evk\apps\earbuds_ref_design\GCC\ab155x_flash_with_psram.ld
    mcu\project\ab155x_evk\apps\earbuds_ref_design\GCC\ab155x_flash.ld

22.3.2. Example project – headset_ref_design

1) Update memory layout files.

- How to migrate:
  - Replace the following files with the ones in the latest SDK.

    mcu\project\ab155x_evk\apps\headset_ref_design\GCC\ab155x_flash_with_psram.ld
    mcu\project\ab155x_evk\apps\headset_ref_design\GCC\ab155x_flash.ld

23. SDK Version 1.3.2

23.1. Main Changes

- Bug fixes:
  - Fixed an issue where the USB COM port (Modem Port/Debug Port) could not be identified.
- Note:
  - Upgraded the ATK tool from version 1.3.5 to 1.3.10 and fixed an error related to the audio channel setting. Please upgrade to the latest version.

24. SDK Version 1.3.1

24.1. Main Changes

- Bug fixes:
  - Fixed an issue where the voice prompt was not synchronized between L/R earbuds for noise-cancelling/pass through notifications.
  - Fixed the failed reconnection issue that occurred if users forced the Alexa application to quit on the smartphone.
  - Fixed connection problems that occurred when users switched between different voice assistants (e.g. Alexa, Google Assistant, or Siri).
  - Fixed some interoperability issues to improve the stability of the Bluetooth connection.
  - Fixed a bug and improved the functionality of the ATK tool and SDK for ANC tuning and RF gain setting.
- Note:
  - Corrected the migration section in chapter “SDK Version 1.3.0”.

24.2. Known issues

There is a known issue that occurs with this version of the SDK:

- The Bluetooth service on the iPhone unexpectedly switches on/off when the user performs the following actions when the earbuds are connected and the AMA is also connected: Kill the Alexa application on the iPhone; unpair the BLE and EDR links; reconnect the EDR link; and reopen the Alexa application.

25. SDK Version 1.3.0

25.1. Main Changes

- Software features and optimization:
  - [add-on] Added AMA (Alexa Mobile Accessory)
  - Added multiple voice assistant (AMA and GSound) switch mechanism
  - Added smart charging cases via VBUS
  - Added sync online log to smart phone app
  - Added Google Fast Pair Service 2.0 (mandatory feature only)
- Bug fixes:
  - Enhance FOTA stability for some Android smartphones.
- Notes:
  - Rename Airoha IoT SDK GCC Build Environment Guide to Airoha IoT SDK for BT Audio Build Environment Guide. We also added a script installation approach for both MCU and DSP in the guide.

25.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- On iPhone X (iOS 13.2), the ringtone is output from the iPhone X instead of the headphones when you use Amazon Alexa to start an outgoing call.
- When the headphones are connected to an iPhone 11 (iOS 13.2) and you use the Airoha application to switch between different voice assistants, after some time, the Alexa application shows the device connection status incorrectly (i.e. AMA is connected but it is shown as being offline).
- When the headphones are connected to an iPhone X (iOS 13.2), the Bluetooth connection can break after some time when you use the iPhone settings to unpair and pair the headphones with AMA connected.

25.3. Migration

Migrate the following module-based applications when upgrading the SDK from version 1.2.1 to version 1.3.0:

25.3.1. Example project – earbuds_ref_design

- API naming changed for audio_anc_force_disable().

- How to migrate:
  - Replace audio_anc_force_disable() with audio_anc_suspend().
    - Bootloader’s feature list updated for 'HAL_HW_SEMAPHORE_STATUS_OK' and 'HW_SEMAPHORE_APLL'.

- How to migrate:

- Add feature in bootloader's feature list.
  - <sdk_root>/project/ab155x_evk/apps/bootloader/inc/hal_feature_config.h

    #define HAL_HW_SEMAPHORE_MODULE_ENABLED
  - Race and FOTA API naming changed.

- How to migrate:
  - Replace the following files with the ones in the latest SDK.

    project\ab155x_evk\apps\earbuds_ref_design\src\race*
    project\ab155x_evk\apps\earbuds_ref_design\inc\race*
  - Replace project\ab155x_evk\apps\earbuds_ref_design\src\nvdm_config.c with the one in the latest SDK.
  - Remove race_init() block in task_def_init() defined in file project\ab155x_evk\apps\earbuds_ref_design\src\task_def.c
  - Replace fota_flash_bootup() with fota_init_flash()

25.3.2. Example project – headset_ref_design

- Bootloader's feature list updated for 'HAL_HW_SEMAPHORE_STATUS_OK' and 'HW_SEMAPHORE_APLL'.

- How to migrate:
  - Add feature in bootloader's feature list.

    <sdk_root>/project/ab155x_evk/apps/bootloader/inc/hal_feature_config.h
    #define HAL_HW_SEMAPHORE_MODULE_ENABLED
  - Race and FOTA API naming changed.

- How to migrate:
  - Replace the following files with the ones in the latest SDK.

    project\ab155x_evk\apps\headset_ref_design\src\race*
    project\ab155x_evk\apps\ headset _ref_design\inc\race*
  - Replace project\ab155x_evk\apps\headset_ref_design\src\nvdm_config.c with the one in the latest SDK.
  - Remove race_init() block in task_def_init() defined in file project\ab155x_evk\apps\headset_ref_design\src\task_def.c
  - Replace fota_flash_bootup() with fota_init_flash()

26. SDK Version 1.2.1

26.1. Main changes

- Bug fixes:
  - Resolved an issue where ANC/Pass Through could not be turned off when putting the earbuds into the charging case.

27. SDK Version 1.2.0

27.1. Main changes

- Software features and optimization:
  - [add-on] Added GSound (Google Assistant device firmware implementation)
  - Added Hybrid ANC

28. SDK Version 1.1.0

28.1. Main changes

- Software features and optimization:
  - Added support FOTA with external flash.
  - Added support background FOTA.
  - Added support sync offline log to smart phone app.
  - Added a new service “bt_aws_mce_report” to exchange information between Agent and Partner.
  - Defined an independent key behavior in left and right earbuds.
  - Increased A2DP volume step resolution.
- Bug fixes:
  - Fixed a problem where the uplink voice distorted after a long call.

28.2. Migration

Migrate the following module-based applications when upgrading the SDK from version 1.0.1 to version 1.1.0:

28.2.1. Example project - earbuds_ref_design

2) Add the new service bt_aws_mce_report to your project:
   - Add the following module.mk in your GCC project Makefile.

     include $(SOURCE_DIR)/middleware/MTK/bt_aws_mce_report/module.mk

3) API changes for information exchange between agent and partner.
   - How to migrate:

   Please follow the files change list in Table 28-1. Files Change List.

Table 28-1. Files Change List

API or Event Handle or Enum Structure in SDK_V1.0.1	API or Event Handle or Enum Structure in SDK_V1.1.0	Files and Function
bt_sink_srv_aws_mce_packet_t	bt_aws_mce_report_info_t	app_hfp_idle_activity.c ● app_hfp_aws_data_proc_proc()
bt_sink_srv_send_action(BT_SINK_SRV_ACTION_AWS_MCE_SEND_PACKET)	bt_aws_mce_report_send_event (bt_aws_mce_report_info_t* info)	app_battery_idle_activity.c ● partner_notify_battery_level_to_agent()
		app_fast_pair_idle_activity.c ● app_fast_pair_transfer_account_key()
		apps_aws_sync_event.c • apps_aws_sync_event_send()
		app_voice_prompt.c

API or Event Handle or Enum Structure in SDK_V1.0.1	API or Event Handle or Enum Structure in SDK_V1.1.0	Files and Function
		• app_voice_prompt_setLang()
		bt_app_common.c • bt_app_common_sync_random_add() • bt_app_common_sync_bonded_info()
bt_sink_srv_send_action(BT_SINK_SRV_ACTION_AWS_MCE_SEND_URGENT_PACKET)	bt_aws_mce_report_send_sync_event(bt_aws_mce_report_info_t* info)	app_voice_prompt.c • app_voice_prompt_aws_play() • app_voice_prompt_aws_stop()
BT_SINK_SRV_EVENT_AWS_MCE_PACKET_RECEIVED_IND	N/A (Note: BT_SINK_SRV_EVENT_AWS_MCE_PACKET_RECEIVED_IND has been removed in SDK V1.1.0.)	app_battery_idle_activity.c • battery_app_bt_event_proc()
		app_fast_pair_idle_activity.c • app_fast_pair_sink_event_handle()
		apps_events_bt_event.c • bt_sink_srv_event_callback()
		app_home_screen_idle_activity.c • homescreen_app_bt_sink_event_proc()
		app_music_utils.c • app_bt_music_porc_basic_state_event()
		bt_app_common.c • bt_app_common_sink_event_proc()
		race_app_aws_event_hdl.c • race_app_aws_event_handler()
N/A	bt_aws_mce_report_register_callback(bt_aws_mce_report_module_id module_id, bt_aws_mce_report_callback_t callback)	apps_events_bt_event.c • app_aws_report_event_init()
		apps_voice_prompt.c • app_voice_prompt_init()
		bt_app_common.c • bt_app_common_event_callback_register()
		race_app_bt_event_hdl.c • race_app_init()
N/A	Callback of the service bt_aws_mce_report; Typedef void (*bt_aws_mce_report_callback_t)(bt_aws_mce_report_info_t *param)	apps_voice_prompt.c • app_voice_prompt_sync_callback()
		bt_app_common.c • bt_app_common_aws_data_received_ind_handler()
		race_app_aws_event_hdl.c

API or Event Handle or Enum Structure in SDK_V1.0.1	API or Event Handle or Enum Structure in SDK_V1.1.0	Files and Function
		• bt_race_aws_report_handler() • bt_race_aws_report_handler_int() apps_events_bt_event.c • app_aws_report_event_callback()
typedef enum { EVENT_GROUP_UI_SHELL_APP_INTERACTION = EVENT_GROUP_UI_SHELL_APP_BASE, EVENT_GROUP_UI_SHELL_KEY, EVENT_GROUP_UI_SHELL_BATTERY, EVENT_GROUP_UI_SHELL_BT, EVENT_GROUP_UI_SHELL_BT_SINK, EVENT_GROUP_UI_SHELL_BT_CONN_MANAGER, EVENT_GROUP_UI_SHELL_FOTA, EVENT_GROUP_UI_SHELL_CHARGER_CASE, EVENT_GROUP_UI_SHELL_AWS, EVENT_GROUP_UI_SHELL_FINDME, EVENT_GROUP_UI_SHELL_BT_FAST_PAIR, } apps_event_group_t	typedef enum { EVENT_GROUP_UI_SHELL_APP_INTERACTION = EVENT_GROUP_UI_SHELL_APP_BASE, EVENT_GROUP_UI_SHELL_KEY, EVENT_GROUP_UI_SHELL_BATTERY, EVENT_GROUP_UI_SHELL_BT, EVENT_GROUP_UI_SHELL_BT_SINK, EVENT_GROUP_UI_SHELL_BT_CONN_MANAGER, EVENT_GROUP_UI_SHELL_FOTA, EVENT_GROUP_UI_SHELL_CHARGER_CASE, EVENT_GROUP_UI_SHELL_AWS, EVENT_GROUP_UI_SHELL_FINDME, EVENT_GROUP_UI_SHELL_BT_FAST_PAIR, #if defined(MTK_AWS_MCE_ENABLE) EVENT_GROUP_UI_SHELL_AWS_DATA, #endif } apps_event_group_t;	apps_events_event_group.h
N/A	app_fast_pair_report_event_callback()	app_fast_pair_idle_activitiy.c app_fast_pair_ilde_activity_proc()
N/A	_proc_aws_report_group()	app_battery_idle_activity.c app_battery_idle_activity_proc()
app_hfp_aws_data_proc_proc()	app_hfp_aws_data_proc_proc()	app_hfp_idle_activity.c app_hfp_idle_activity_proc()
N/A	homescreen_app_aws_data_proc()	app_home_screen_idle_activity.c app_home_screen_idle_activity_proc()
N/A	app_bt_music_porc_aws_data_event()	app_music_idle_activity.c app_music_idle_activity_proc()

4) API changes for information exchange cannot be include when MTK_AWS_MCE_ENABLE is not enabled.

- How to migrate:
  - Add “#ifdef MTK_AWS_MCE_ENABLE” and “#endif” to mask all of the contents of <your_project>\inc\apps\utils\apps_aws_sync_event.h

28.2.2. Example project - headset_ref_design

1) API changes for information exchange cannot be included when MTK_AWS_MCE_ENABLE is not enabled.

    - How to migrate:

      Add “#ifdef MTK_AWS_MCE_ENABLE” and “#endif” to mask all of the contents of <your_project>\inc\apps\utils\apps_aws_sync_event.h

29. SDK Version 1.0.1

29.1. Main changes

- Software features and optimization:
  - Stability enhancement for long time usage.
  - Enhanced voice quality during a phone call.
  - Increased the BT connection success rate.
- Bug fixes:
  - Resolved an issue where it took too long time for the device to connect to the smartphone. The device and smartphone now connect much more quickly when the device powers on.
  - Fixed a problem where the “incoming call” voice prompt was played at slightly different times by the left and right earbuds.
- Notes:
  - Corrected the Audio support descriptions in chapter “SDK Version 1.0.0”.

30. SDK Version 1.0.0

30.1. Main changes

- Software features and optimization
  - Bluetooth
    - Multi Cast Synchronization (MCSync): It's an Airoha proprietary profile to support voice/audio over multiple Bluetooth Audio devices.
    - A2DP(SINK) v1.3.1
    - AVRCP(CT) v1.6.1
    - HFP(HF) v1.7
    - HSP(HF) v1.2
    - Google fast pair v2.0
    - Air pairing
  - Bluetooth low energy
    - ANCS Client
    - AMS Client
  - Audio
    - 1 MIC/2 MIC noise reduction
    - Wind noise reduction
    - Echo cancellation
    - Voice prompt
    - Noise Dependent Volume Control (NDVC) for BT Voice
    - Hardware Sample Rate Converter (HWSRC)
    - EQ/DRC for A2DP
    - Codecs for A2DP (SBC/AAC) voice prompt (MP3) and BT voice (CVSD/mSBC)
    - audio passthrough
  - Charger
    - USB battery charging specification revision 1.2
    - Temperature detection (HW JEITA)
    - Fast charger Mode
  - Power Mode
    - Dynamic Voltage and Frequency Scaling (DVFS)
  - Other
    - UI Shell
    - Firmware-over-the-Air (FOTA)

- Notes:
  - The features in this SDK Package are supported on AB1552.

30.2. Known issues

There are known issues with this version of the SDK. Avoid the following:

- There may be some issues where the audio does not play smoothly on some smartphones when the A2DP stream has a very low bitrate.
- An eSCO link is not created when a BT headset connects for the first time to a specific smartphone with Android version 9.0, and it is in talking mode.