EC2x&EG9x&EG25-G Series QuecOpen ACDB Parameter Modification and Importing Guide

LTE Standard Module Series

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About the Document

Revision History

Version	Date	Author	Description
1.0	2020-07-30	Grady QUAN/ Colin CUI	Initial

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1 Introduction

Quectel LTE Standard EC2x&EG9x&EG25-G Series modules support QuecOpen®. This document mainly describes how to modify and save ACDB (Audio Calibration Database) parameters as well as import the modified ACDB files into the module file system through the Open SDK.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Series	Module
EC2x series	EC25 series
	EC21 series
	EC20 R2.1
EG9x series	EG95 series
	EG91 series
EG25-G	EG25-G

2 ACBD and QACT

2.1. ACBD

ACDB is used to adjust ADSP audio parameters. As shown in the figure below, there are currently 7 ACDB files available for use. The *workspaceFile.qwsp* shown below is a project file for the QACT tool to open the ACDB files.

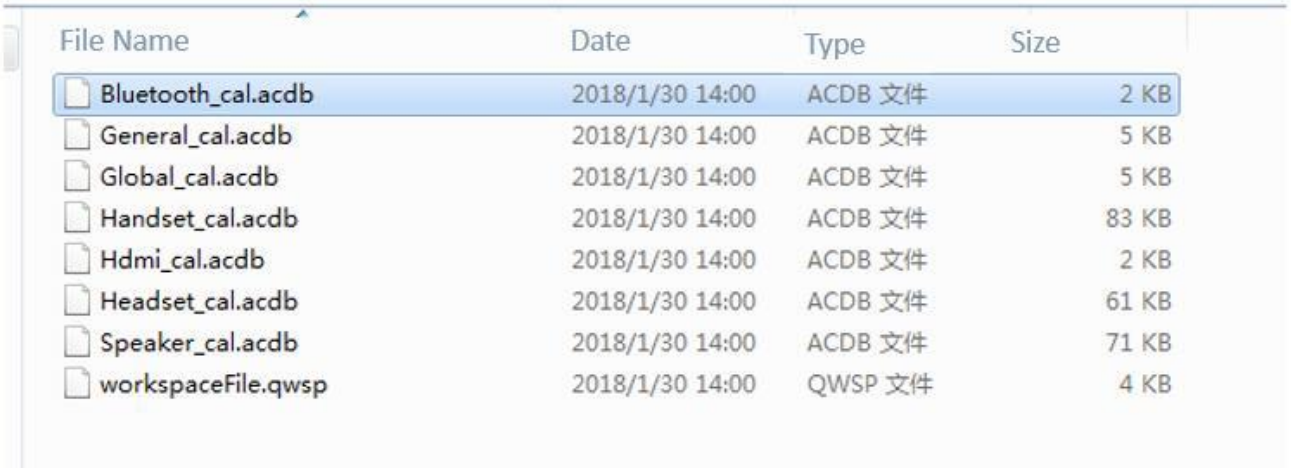

Figure 1: ACDB Files

2.2. QACT

QACT, a kind of audio parameters adjustment tool provided by Qualcomm, is used to calibrate ACDB.

NOTE

ACDB files are loaded into memory in the process of alsaucm_test. If the process is not enabled, online calibration mode cannot be used on QACT tool.

3 Modify and Save ACDB Files

QACT supports offline and online calibration mode. In offline calibration mode, after exporting the ACDB files locally, open the files with QACT, modify and save the ACDB parameters offline. Online calibration mode supports two ways to modify ACDB parameters. One is calibrating modules in DSP mode namely, modify ACDB parameters in real time (currently this way is only available for Voice) and the other is modifying the ACDB parameters in the Linux memory. After modifying the parameters, switch to the corresponding audio mode through **AT+QAUDMOD** to make the modified parameters take effect. Since the parameters will not take effect after the module is rebooted in online calibration mode, the modified ACDB parameters shall be saved. This chapter mainly describes two ways (in offline mode and online mode) to modify and save ACDB parameters. For more details about **AT+QAUDMOD** command, see ***document [1]***.

3.1. Offline Calibration Mode

3.1.1. Export ACDB Files to Local

In offline calibration mode, the ACDB files is in the module. You need to export the ACDB files from the module and save it to local, the steps are as follows:

1. Turn on the module, open QPST, load DM port, open QACT and click “Connect To Device” to connect to the module, as shown in the figure below.

Figure 2: Connect QACT to the Module

2. After connecting to the module, click "**Save As**" button on the top left corner to pop up the interface of saving ACDB files, as shown in the figure below. Click "**OK**" to save the ACDB and project file to local after selecting the ACDB files path.

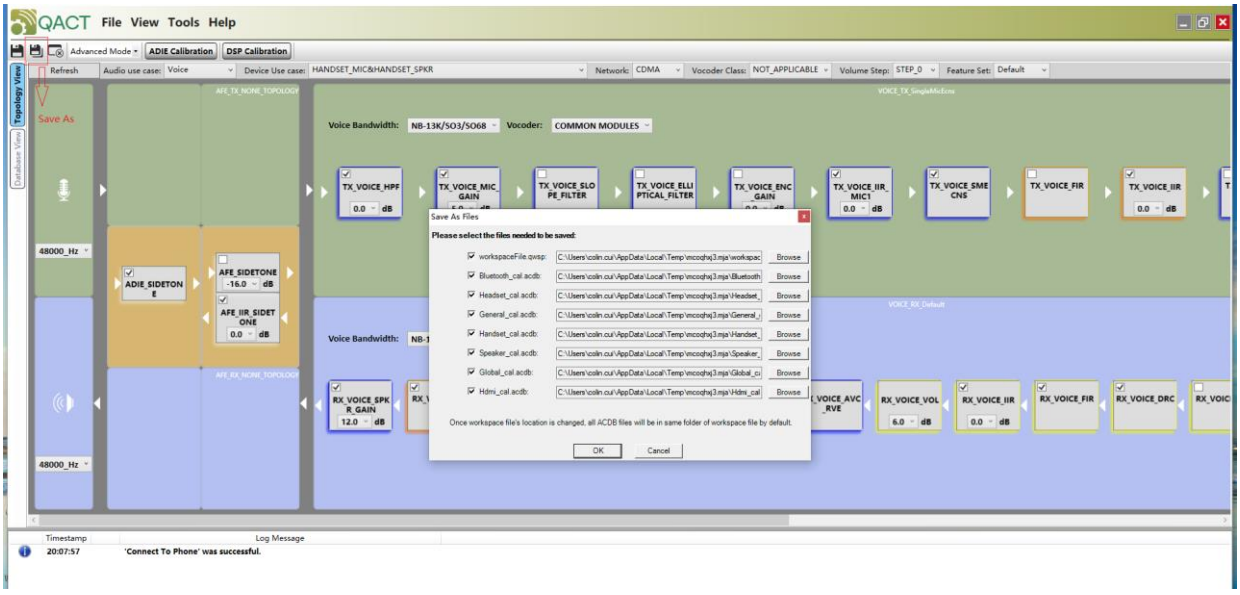

Figure 3: Save ACDB Files

3.1.2. Modify and Save Local ACDB Files

1. Turn on QACT tool again, choose offline mode and open the local *workspaceFile.qwsp* file, as shown below.

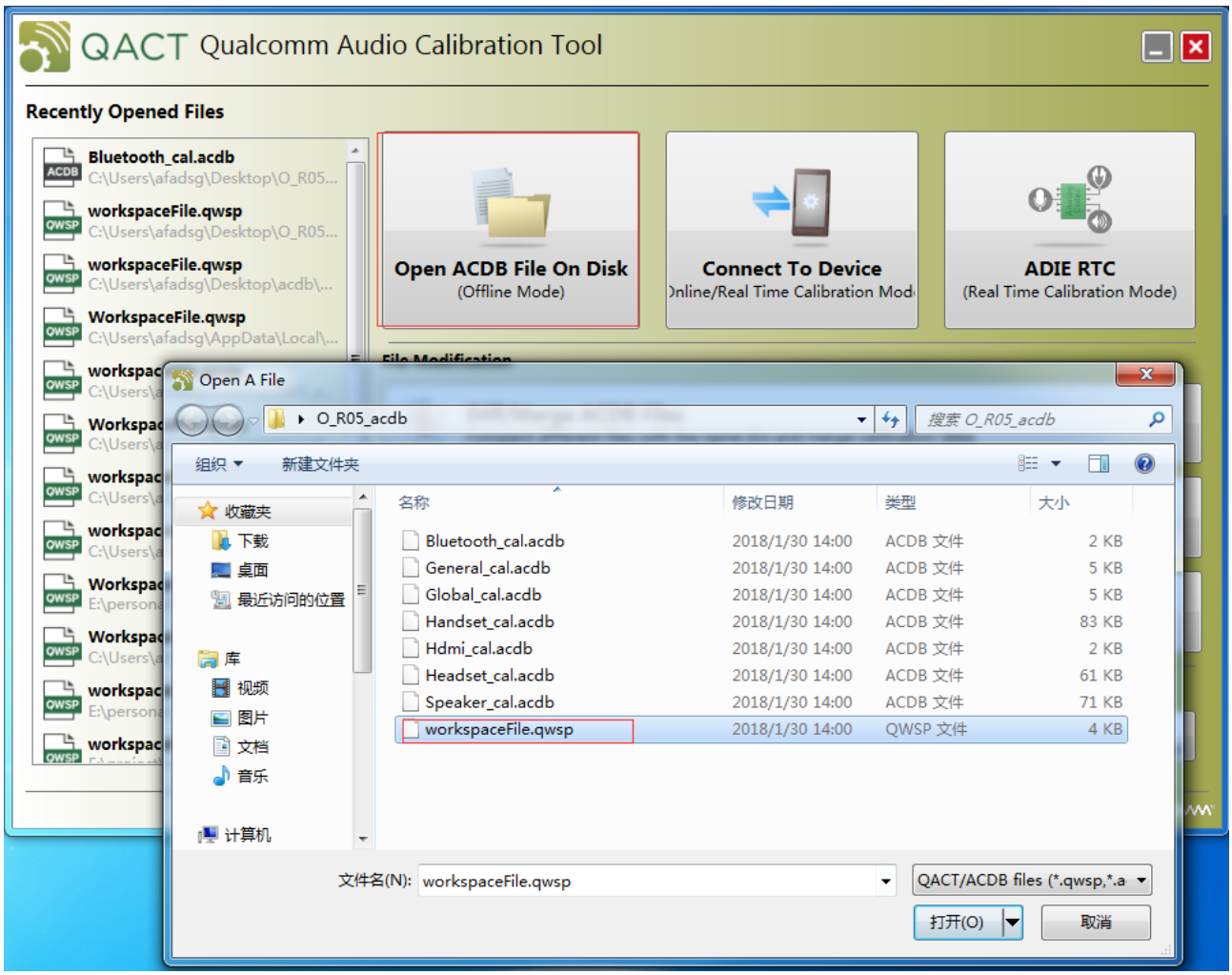

Figure 4: Open ACDB Files in Offline Mode

2. On QACT, there are 3 options under the "Audio use case" on the top left corner: Audio Recording, Audio Playback and Voice, as shown in ***Figure 5*** below. For example, the intercom uses Audio Recording and Audio Playback. ***Figure 6*** shows the options in "Device Use Case" corresponding to "Audio Use Case". Select the corresponding "Device use case" according to the current audio mode (set by **AT+QAUDMOD**). Take Audio Playback as an example, if **AT+QAUDMOD** is set to 0, "Device use case" should be HANDSET_SPKR, as shown in ***Figure 7*** below.

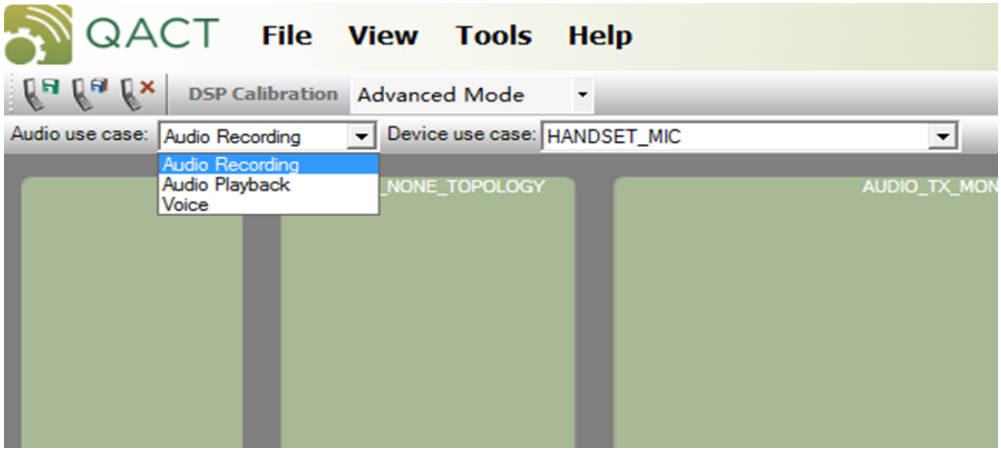

Figure 5: Audio Use Case

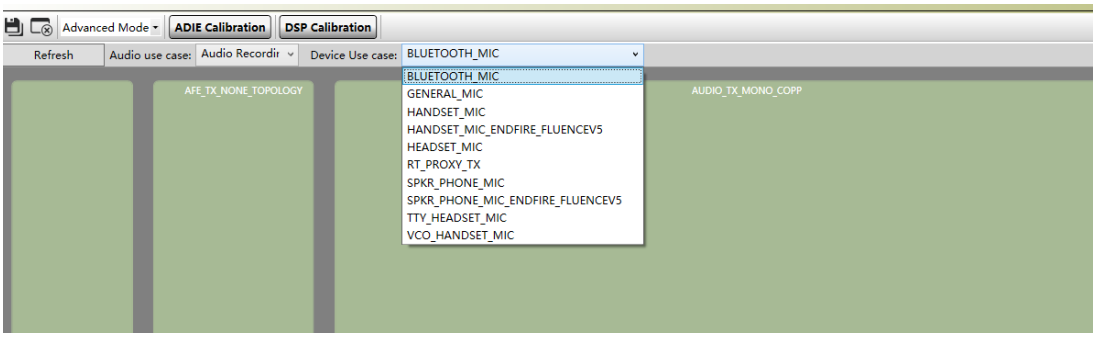

Figure 6: Device Use Case

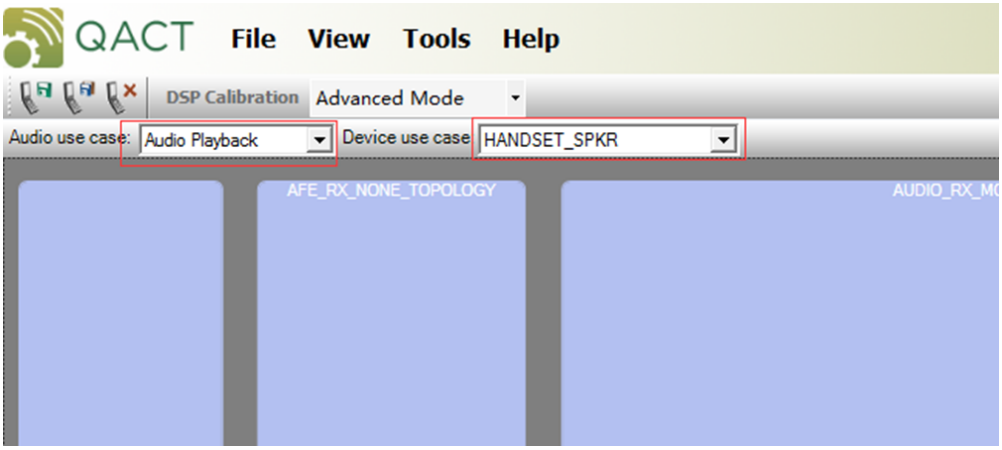

Figure 7: HANDSET_SPKR

3. Modify the parameters of each module in the corresponding mode. Take modifying the value of CODEC_GAIN in HANDSET_SPKR as an example, there are two ways to modify this value. One is to modify the value in the drop-down box shown in ***Figure 8*** below directly and the other is to click "Connect To Device" to connect to the device, enter the interface, and then double-click the corresponding module and modify the CODEC_GAIN value in the red box shown in ***Figure 9*** below. After that, click "**Set to ACDB**". After the modification, click "**Save**" or "**Save As**" on the upper left corner shown in ***Figure 10*** below to save ACBD files.

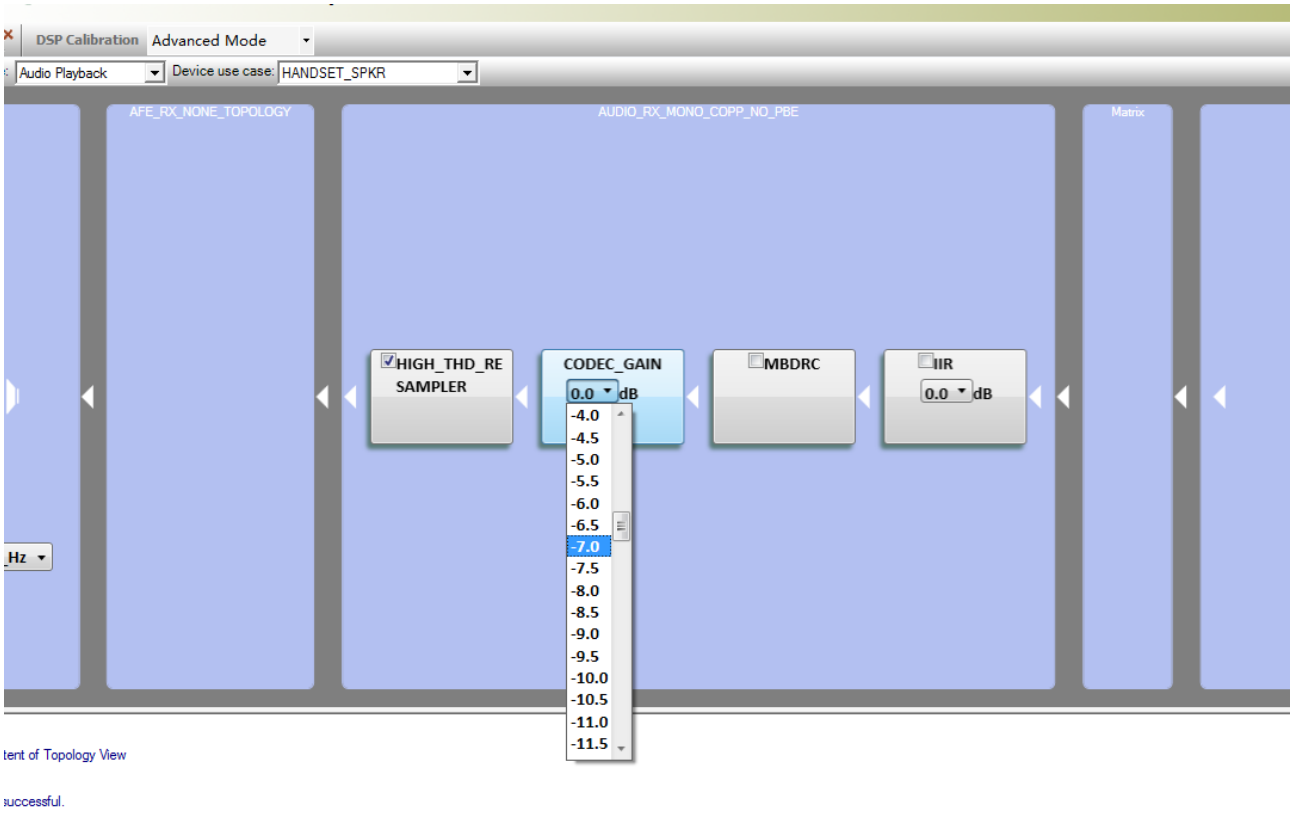

Figure 8: Set CODEC_GAIN

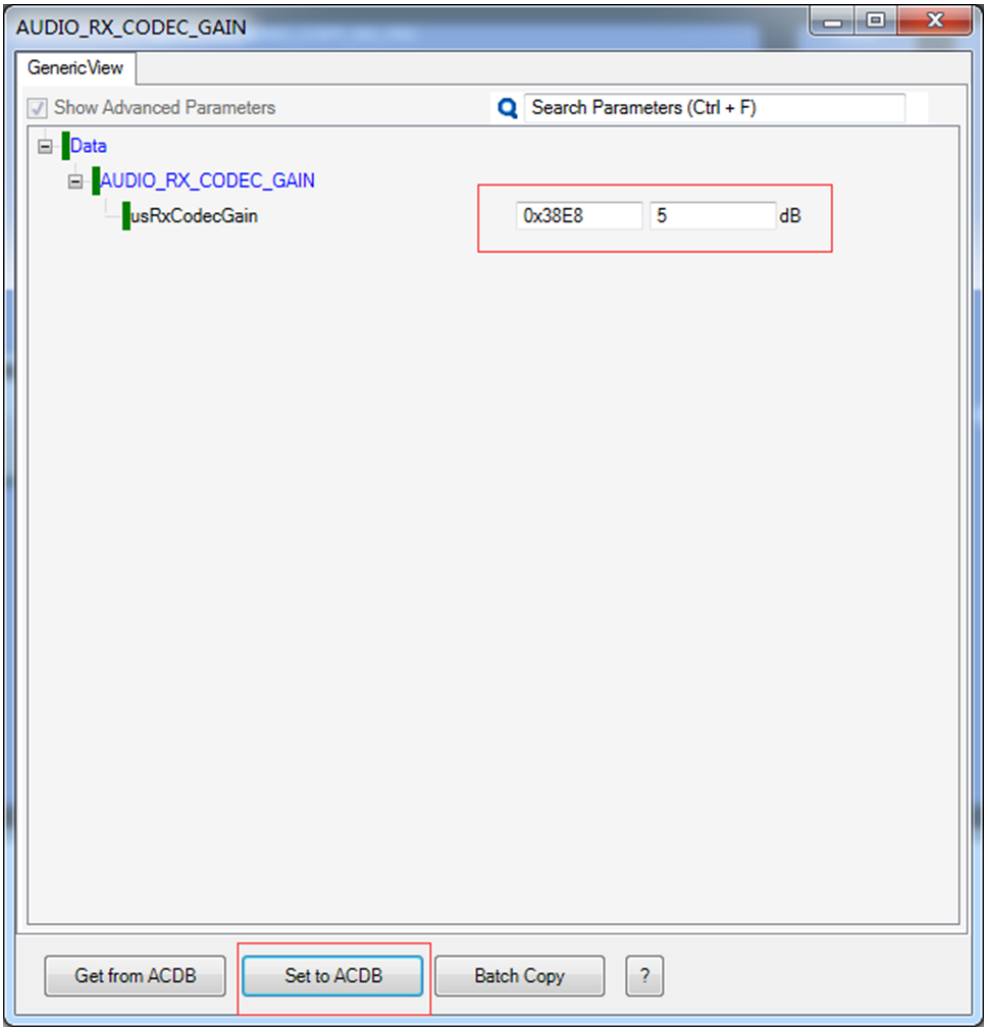

Figure 9: Set CODEC_GAIN

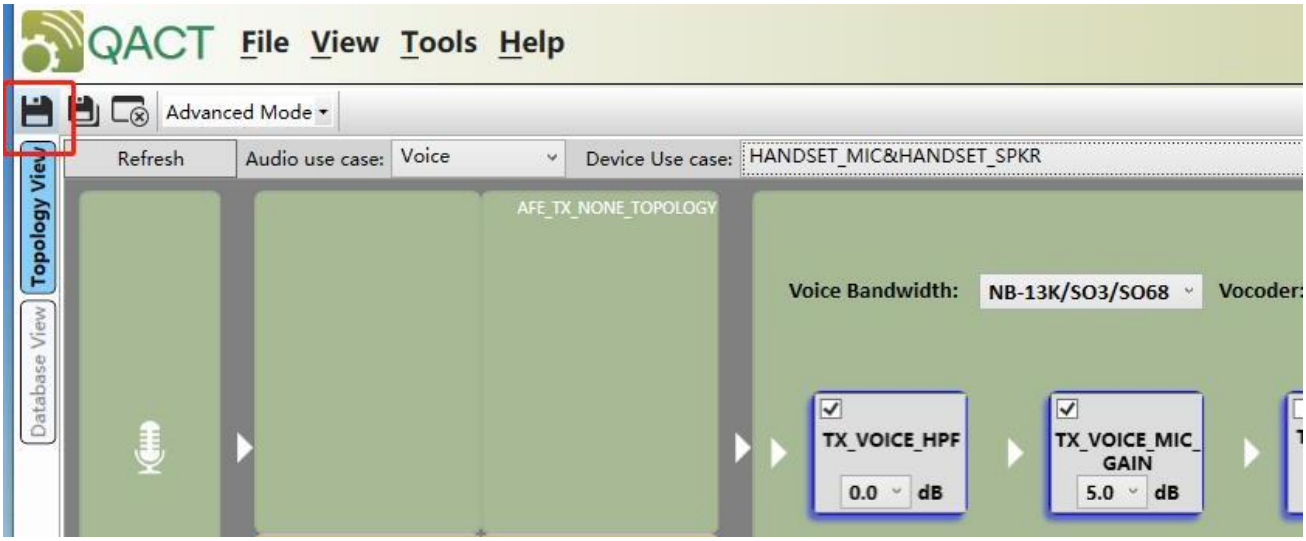

Figure 10: Save ACBD Files

3.2. Online Calibration Mode

3.2.1. Modify the ACDB Parameters in Linux Memory

In online calibration mode, directly modify the ACDB parameters inside the module and save them to local. The steps are as follows:

1. Turn on the module, open QPST, load the DM port, then open the QACT tool and click “Connect To Device” to connect it to the module.
2. Modify ACDB parameters by referring to Step 2 and 3 in ***Chapter 3.1.2***;
3. After the modification, click "**Save As**" on the upper left corner of QACT shown in ***Figure 10*** above to save the ACDB files to local.

3.2.2. Calibrate Modules in DSP Mode

Click "DSP Calibration" in the figure below to enter the DSP calibration mode to adjust ACDB parameters in real time.

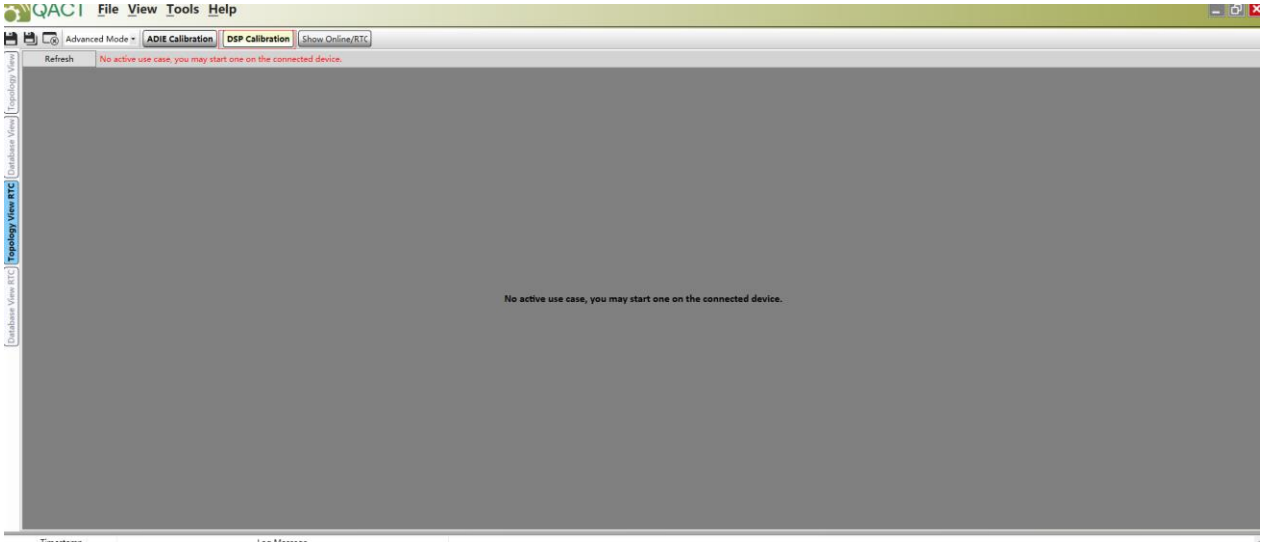

Figure 11: Enter the DSP Calibration Mode

Pay attention to the following points in DSP calibration mode:

- Adjusting ACDB models and parameters in DSP mode will change the current call state immediately. It is necessary to record the ACDB parameter value after configuration.
- The ACDB parameter debugged in DSP mode will not be saved and will be lost after the call ends (that is, the ACDB parameter configuration will resume to the default setting), hence it is necessary to select "Batch Copy To ACDB" to copy the debugged parameters to the corresponding ACDB files, as shown in the figure below.

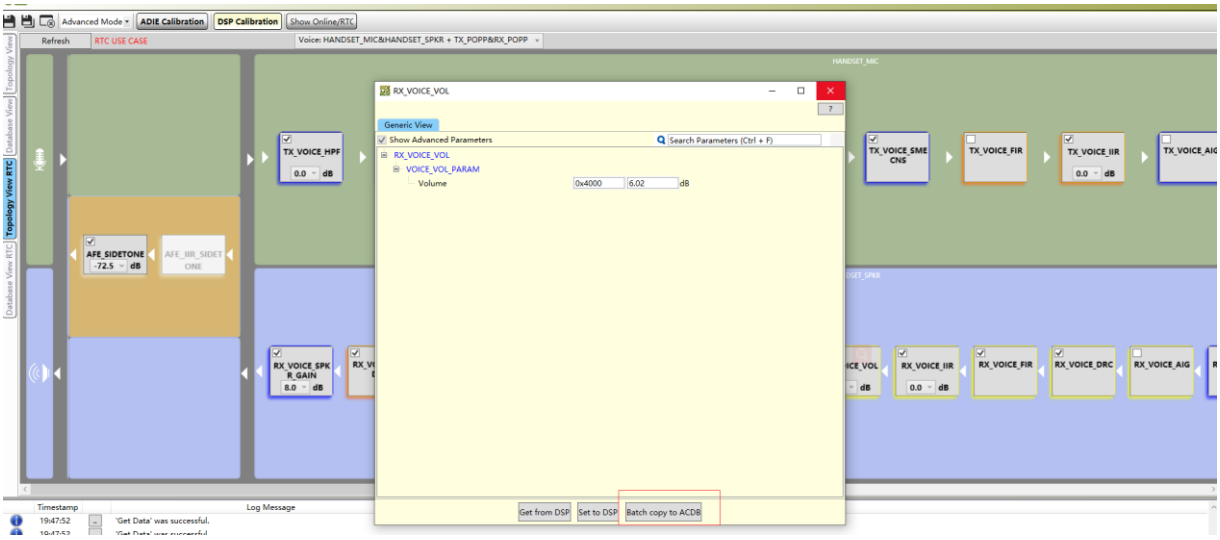

Figure 12: Adjust ACDB Parameter Location

- In DSP mode, the loaded ACDB information can only be viewed in a call and no information can be viewed in non-call state.

4 Import ACDB Files

This chapter describes how to import ACDB files to the file system.

4.1. Unzip SDK and Configure Compilation Environment

1. Copy the SDK to Linux and execute the following command to unzip the SDK.

```
Unzip sudo tar -jxvf EC20CETFDKR05A03V01M2G_OCPU_DJJ_SDK.tar.bz2
```

As shown in the figure below:

Figure 13: Unzip SDK

2. After unzipping the SDK, enter */ql-ol-sdk* directory and execute the following command to configure the compilation environment.

```
source ql-ol-crosstool/ql-ol-crosstool-env-init
```

As shown in the figure below:

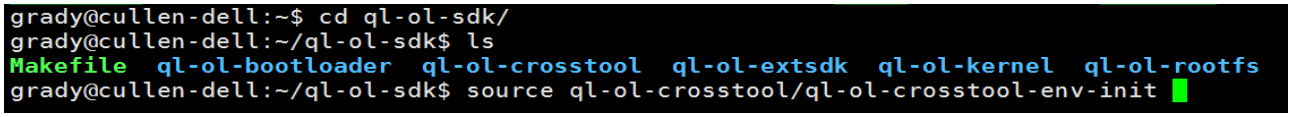

Figure 14: Configure Compilation Environment

4.2. Copy ACDB Files to the File System

ACDB files are located in the */etc* directory of module file system, as shown in the figure below:

```
network                         workspaceFile.qwsp
/etc # ls -l *.acdb
-rwxr-xr-x    1 root     root         26410 Jul 18  2020 Bluetooth_cal.acdb
-rwxr-xr-x    1 root     root         31270 Jul 18  2020 General_cal.acdb
-rwxr-xr-x    1 root     root          4440 Jul 18  2020 Global_cal.acdb
-rwxr-xr-x    1 root     root         86344 Jul 18  2020 Handset_cal.acdb
-rwxr-xr-x    1 root     root          1066 Jul 18  2020 Hdmi_cal.acdb
-rwxr-xr-x    1 root     root         61153 Jul 18  2020 Headset_cal.acdb
-rwxr-xr-x    1 root     root         72502 Jul 18  2020 Speaker_cal.acdb
/etc #
```

Figure 15: ACDB Files

Delete all ACDB files in the path *ql-ol-sdk/ql-ol-rootfs/etc*, then copy the modified ACDB files to the path except for the *workspaceFile.qwsp* file for the module does not need to use this file. Execute the following command to modify permissions:

```
sudo chown -R xxx:xxx *.acdb
sudo chmod 777 ./*.acdb
```

As shown in the figure below:

```
group-                          login.defs          quectel
colin@q-PowerEdge-R730:~/sdk/ql-ol-sdk/ql-ol-rootfs/etc$ ls -l *.acdb
-rwxr-xr-x 1 colin colin 26410 6月   3 17:19 Bluetooth_cal.acdb
-rwxr-xr-x 1 colin colin 31270 6月   3 17:19 General_cal.acdb
-rwxr-xr-x 1 colin colin  4440 6月   3 17:19 Global_cal.acdb
-rwxr-xr-x 1 colin colin 86344 6月   3 17:19 Handset_cal.acdb
-rwxr-xr-x 1 colin colin  1066 6月   3 17:19 Hdmi_cal.acdb
-rwxr-xr-x 1 colin colin 61153 6月   3 17:19 Headset_cal.acdb
-rwxr-xr-x 1 colin colin 72502 6月   3 17:19 Speaker_cal.acdb
colin@q-PowerEdge-R730:~/sdk/ql-ol-sdk/ql-ol-rootfs/etc$
```

Figure 16: Modify Permissions

4.3. Compile File System

Execute the following command in the *ql-ol-sdk* path to compile the file system.

```
make rootfs
```

As shown in the figure below:

```
grady@cullen-dell:~/ql-ol-sdk$ make rootfs
cd /home/grady/ql-ol-sdk ; chmod +x ./ql-ol-extsdk/tools/quectel_ubi/* ; ./ql-ol-extsdk/tools/quectel_ubi/mkfs.ubifs -r q
l-ol-rootfs -o mdm9607-perf-sysfs.ubifs -m 2048 -e 126976 -c 4292 -F ;  \
        ./ql-ol-extsdk/tools/quectel_ubi/ubinize  -o mdm9607-perf-sysfs.ubi -m 2048 -p 128KiB -s 2048 ql-ol-extsdk/tools/
quectel_ubi/ubinize.cfg ; \
        mv mdm9607-perf-sysfs.ubifs mdm9607-perf-sysfs.ubi target/
ubinize: volume size was not specified in section "ubifs", assume minimum to fit image "./mdm9607-perf-sysfs.ubifs"299663
36 bytes (28.6 MiB)
grady@cullen-dell:~/ql-ol-sdk$
```

Figure 17: Compile File System

After compilation, *target* folder is generated. New file system document will be in this folder, as shown in the figure below.

```
grady@cullen-dell:~/ql-ol-sdk$ ls
Makefile  ql-ol-bootloader  ql-ol-crosstool  ql-ol-extsdk  ql-ol-kernel  ql-ol-rootfs  target
grady@cullen-dell:~/ql-ol-sdk$ cd target/
grady@cullen-dell:~/ql-ol-sdk/target$ ls
mdm9607-perf-sysfs.ubi  mdm9607-perf-sysfs.ubifs
```

Figure 18: File System Document

Download the *mdm9607-perf-sysfs.ubi* file into the module, after that, reboot the module, and the new ACDB files will be loaded into the module.

5 Appendix A References

Table 2: Related Documents

SN	Document Name	Remark
[1]	Quectel_EC2x&EG9x&EG2xG&EM05_Series_AT_Commands_Manual	EC2x&EG9x&EG2xG&EM05 Series AT Commands Manual

Table 3: Terms and Abbreviations

Abbreviation	Description
ACDB	Audio Calibration Database
ADSP	Advanced Digital Signal Processor
DM	Device Manager
DSP	Digital Signal Processor
RTC	Real Time Clock
SDK	Software Development Kit
QACT	Qualcomm Audio Calibration Tool
QPST	Qualcomm Product Support Tool