Realtek Ameba DSP F/W Upgrade Tool and verify function

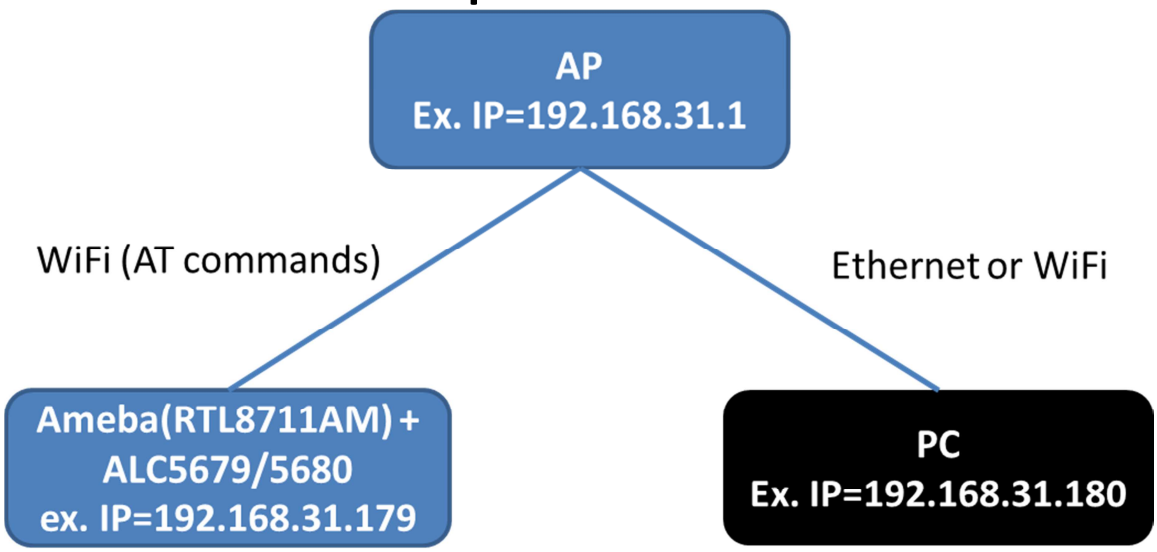
Alc5680

Version 1.1

Table of Contents

1 Firmware upgrade from TFTP

1.1 Environment Setup



- We need to make sure that the network is connection for each other. We do the follow steps to confirm it.
- Connect PC to AP: either Ethernet or Wi-Fi connecting is ok.
- Connect Ameba+codec to AP using AT commands.
  ATW0=SSID
  ATW1=password
  ATWC
  ATW? to show IP information:

```
WIFI  wlan0 Setting:
==========================
      MODE => STATION
      SSID => IOT_demo
   CHANNEL => 2
  SECURITY => AES
  PASSWORD => 12345678

Interface (wlan0)
==========================
       MAC => 28:c2:dd:dd:42:ab
       IP  => 192.168.31.179
       GW  => 192.168.31.1
```

- PC can ping Ameba

```
C:\Users\changyi.tsai>ping 192.168.31.179 -t

Ping 192.168.31.179 (使用 32 位元組的資料):
回覆自 192.168.31.179: 位元組=32 時間=108ms TTL=255
回覆自 192.168.31.179: 位元組=32 時間=114ms TTL=255
回覆自 192.168.31.179: 位元組=32 時間=35ms TTL=255
```

- Ameba can ping PC

```
#ATWI=192.168.31.180
[ATWI]: _AT_WLAN_PING_TEST_

[ping_test] PING 192.168.31.180 32(60) bytes of data

[ping_test] 32 bytes from 192.168.31.180: icmp_seq=1 time=3 ms
[ping_test] 32 bytes from 192.168.31.180: icmp_seq=2 time=6 ms
[ping_test] 32 bytes from 192.168.31.180: icmp_seq=3 time=3 ms
```

1.2 Generate the codec bin file

- There are three voice trigger versions. The first is Alexa, the second is hello blue genie, and the last is Zhimakaimen (Open! "Sesame!"). Please get the file from Ameba web site.

alc_fw_upgrade.bat	2017/5/19 上午 1...	Windows 批次檔案	1 KB
alc_fw_upgrade.exe	2017/5/19 下午 0...	應用程式	50 KB
ALC5680FW_IoT_Sesame.7z	2017/5/19 上午 1...	7Z 檔案	169 KB
ALC5680FW_IoT_Alexa.7z	2017/5/19 上午 1...	7Z 檔案	185 KB
ALC5680FW_IoT_Hello_blue_genie.7z	2017/5/22 下午 0...	7Z 檔案	184 KB

- Get the codec file from web and put it in tool/alc_fw_upgrade_combine folder.
- Unzip the file and change your file name to All_in_one.dat in the same folder.
- Run alc_fw_upgrade.bat in the same path.
- Generate alc_fw_upgrade.bin
- It will add 12 bytes in file. Please see the below picture.

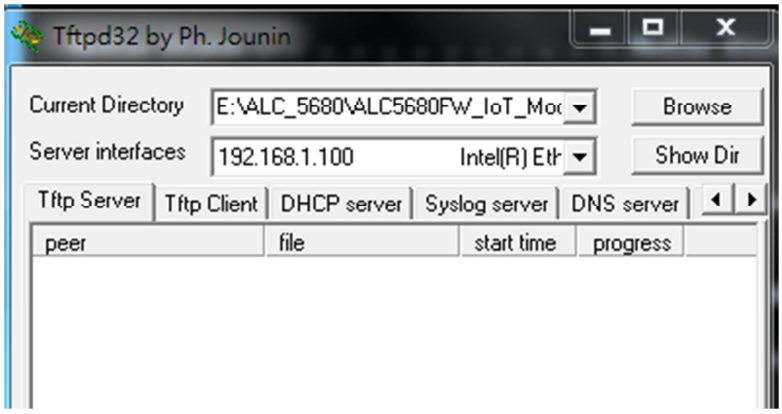
```
          0  1  2  3  4  5  6  7  8  9  a  b
00000000h: 00 04 CF 04 02 17 63 3C 00 00 00 05
```

alc_fw_upgrade.bat	2017/5/19 上午 1...	Windows 批次檔案	1 KB
alc_fw_upgrade.bin	2017/6/6 上午 09...	BIN 檔案	308 KB
alc_fw_upgrade.exe	2017/5/19 下午 0...	應用程式	50 KB
All_in_one.dat	2017/5/19 上午 1...	DAT - MPEG 視訊...	308 KB
ReleaseNote.txt	2017/5/19 上午 1...	文字文件	1 KB

```
E:\ALC5680_FW\Line_out\OLD\ALC5680FW_IoT_Sesame\alc_fw_upgrade.exe
total size = 4cf04 checksum = 217633c version = 5
convert finish
```

1.3 Open the TFTP server

- Execute TFTP
- Browse the alc_fw_upgrade.bin(file name can not be changed)
- Reminding to turn off firewall of PC or allow the TFTP tool running.



1.4 Upgrade codec firmware

1) Program Ameba f/w

- Enable the flag and modify the relative parameter.
  - Enable the example flag in platform_opt.h as below

```
/*Foe alc audio dsp firmware upgrade */
#define CONFIG_EXAMPLE_ALC_DSP_FW_UPGRADE     1
```

  - Modify the TFTP server IP in example_alc_fw_codec_upgrade.c

```
#define ALC_CODEC_FIRMWARE_NAME "alc_fw_upgrade.bin"
#define TFTP_HOST_IP_ADDR "192.168.1.100"
#define TFTP_HOST_PORT  69
```

  - We will check whether the codec firmware is in the flash, if the firmware exists, it will not be updated. If you want to force upgrade the firmware then set the follow define flag.(You need to disable the flag when you finish the codec upgrade or it will force upgrade again) .We recommend that you can add a button or use at command to replace the force upgrade.

```
#define FORCE_UPGRADE  1
```

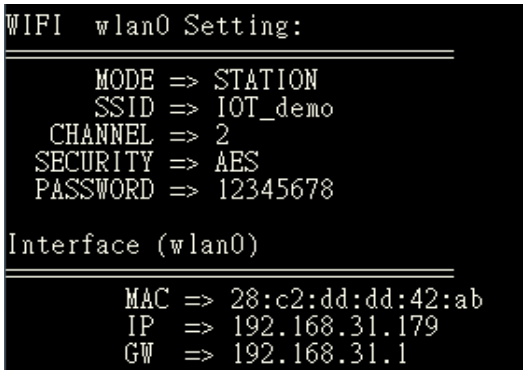
  - After compiler is finish, we burn the file into ameba flash.

2) Connect Ameba to AP

- Network Connection:

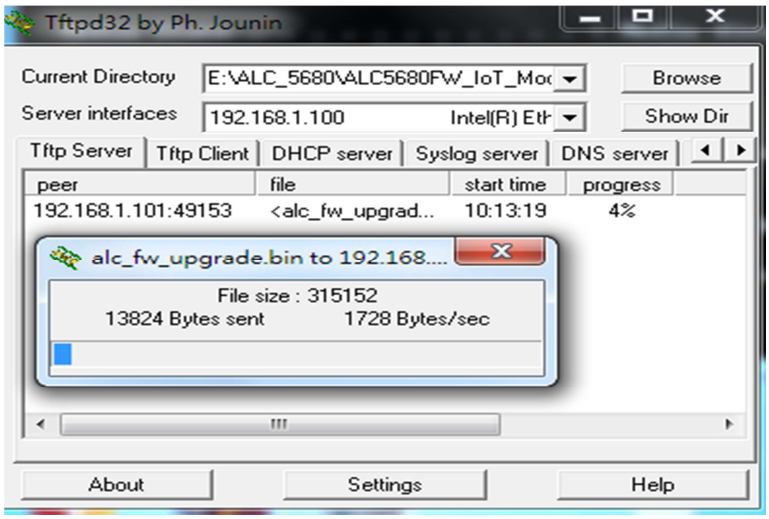
  AN0025 Realtek at command can be reference.

#ATW0=SSID
#ATW1=passphrase
#ATWC
#ATW? to show IP information:



3) Upgrade codec f/w through TFTP

- If we connect to the AP router the upgrade procedure will start.
- Erasing the flash firstly. It will take server seconds.
- Upgrading codec f/w:



- Checking CRC:

```
init_thread(53), Available heap 0x90f0wifi is connected
GPIO RESET
ALC568W_FW_UPGRADE_
codec id = 6385
status state = 1fc
VERSION:SESAMEE
The firmware already exist and force upgrade now...
Erase ..... 1
Erase ..... 1
Erase ..... 1
Erase finish 0
addr 0x70000000 = ffffffff
codec id = 6385
status state = 1fc
NON-DEFINE VERSION ADDR=0X7000A004 ff
upgrade file name = alc_fw_upgrade.bin
start to tftp client
The IP port pair for the host is: IP:192.168.1.100 Port:69
recv file
tftp_client_get
codec size = 4cf04 checksum = 217633c version = 0
 alc_addr_offset = 7004cf04 alc_len_offset = 4cf04
Last chunk detected (file chunk size: 272). exiting while loop
Sending ack # 0616 (length: 4)
The client has sent an ACK for packet
tget finish
Firmware upgrade successful
addr 0x70000000 = 6060000
checksum start
3%
```

- Process done:

```
checksum start
Checksum successful
bin_checksum 217633c alc_checksum = 217633c count = 315140
GPIO RESET
codec id = 6385
status state = 1fc
VERSION:SESAMEE
```

4) Write application image to Ameba

- Write to application image.

2 Verify the keyword trigger and lineout function

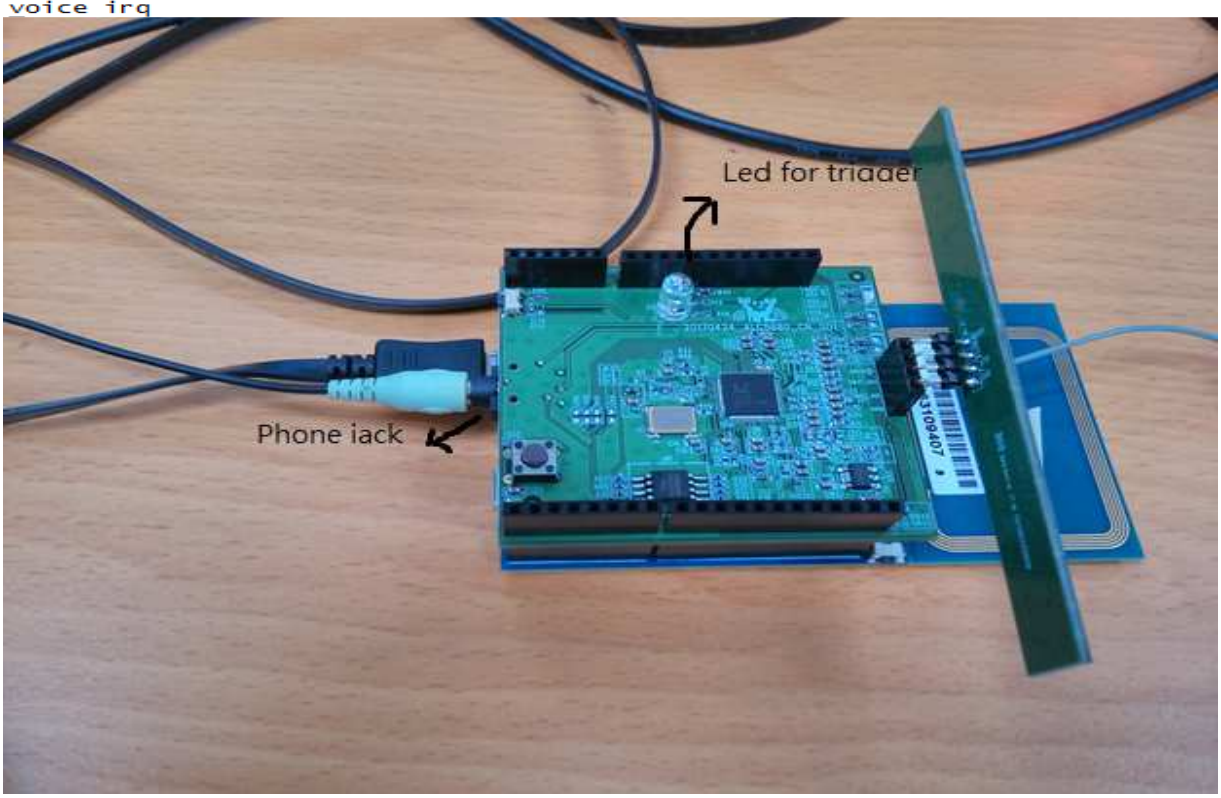
Run the i2s_alc5680_voice_recognition peripheral example to verify the function.

Please notice that the AM8711 don't have led response action, the led control pin is for AM8195.

1) Say the keyword, you will see the led flashing and print the voice irq log.
2) If you want to hear the voice from line out, you need to plug the earphone or speaker to phone jack.
3) Note: We can see the below log to check the voice trigger version

```
ROM Version: 0.3
Build Toolchain Version: gcc version 4.8.3 (Realtek ASDK-4.8.3p1 Build 2003)
============================================================
Check boot type form eFuse
SPI Initial
Image1 length: 0x3a28, Image Addr: 0x10000bc8
Image1 Validate OK, Going jump to Image1
BOOT from Flash:YES
===== Enter Image 1 ====
SDR Controller Init

load NEW fw 0
Flash Image2:Addr 0xb000, Len 28432, Load to SRAM 0x10006000
No Image3
Img2 Sign: RTKWin, InfaStart @ 0x10006051
===== Enter Image 2 ====
GPIO_INIT
VERSION:ALEXA
voice irq
```



3 Upload the PCM data to TFTP server

If you want to record the data into your computer, you can run the follow example.

Please modify the platform_opt.h file as below.

```
/*Foe audio pcm upload */
#define CONFIG_EXAMPLE_AUDIO_PCM_UPLOAD     1
```

Modify your host IP address in example_audio_pcm_upload.c for TFTP_HOST_IP_ADDR

```
#define RECORD_WAV_NAME "AMEBA"
#define TFTP_HOST_IP_ADDR "192.168.1.100"
#define TFTP_HOST_PORT  69
#define TFTP_MODE       "octet"
```

Open the TFTP server and select your folder, then say the keyword to record ten seconds PCM data. The sample rate is 48khz , 16bit and 2 channel.