OPL1000

ULTRA-LOW POWER 2.4GHZ WI-FI + BLESMART SOC

BLE Setup Network and BLE OTA Guide

OPULINKS

REVISION HISTORY

Date	Version	Contents Updated
2018-05-18	0.1	• Initial Release
2018-10-29	0.2	• Update APK, the flowchart of setup network.
2018-11-28	0.3	• Add BLE OTA function
2018-12-27	0.4	• Modify the app's interface
2019-07-09	0.5	• Add section 3.3 and 4.2.3 to introduce IOS APP operation on ; change BLEWIFI example location file path from BLEto System
2019-07-26	0.6	• Add Wechat mini-program introduction
2019-07-30	0.7	• Download at.bin directly instead of compiling blewifi example
2020-7-20	1.0	• Update Chap2.3.2

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1. INTRODUCTION

1.1. Application Scope

OPL1000 integrates the 2.4G WIFI and BLE4.2 Bluetooth functions and thus supports BLE Wifi setup. This document describes procedure by which OPL1000 DEVKIT and at.bin realize BLE Wifi setup and OTA firmware update using BLE Wifi setup APK routine provided by Opulinks. There is also a description on how the users can realize BLE Wifi setup in their own application.

1.2. Abbreviations

Abbr.	Explanation
AP	Wireless Access Point
APK	Android Package
APP	APPlication
APS	Application Sub-system, refers to M3 MCU in this document
BLE	BLE Low Energy
DevKit	Development Kit
OTA	Over-the-Air

1.3. References

[1] DEVKIT Quick Start Guide OPL1000-DEVKIT-getting-start-guide.pdf

[2]Transparent transmission Guide:

OPL1000-Reference-transparent-transmission-application-guide.pdf

[3] OPL1000 User Guide for Firmware Download Tool OPL1000-patch-download-tool-user-guide.pdf

2. EXAMPLE OF OPL1000 NETWORK CONNECTION

2.1. Overview

OPL1000 supports both WIFI and BLE 2.4G program. OPL1000 WIFI is only used as STA mode. Therefore, in complex environment, the user needs to configure name and password of WIFI AP using BLE to realize the network connection function of OPL1000 WIFI.

OPL1000 SDK provides at.bin, Android APK (opulinks_iot_app) , ios app and WeChat mini programs, helping the users to realize the function of BLE network connection rapidly.

2.2. BLE Wifi Setup Procedure for Android

2.2.1. Hardware and Software Requirements

Hardware includes:

- A set of OPL1000 DEVKIT
- A PC with OPL Download Tool
- An Android phone or a smart tablet running on Android operating system. It is suggested that the operating system has a version above 6.0.

Software includes:

- Download at.bin under the FW_Binary directory to DEVKIT.
- Ensure opulinks_iot_app is running on the Android phone

2.2.2. Install Android APP

OPL1000 SDK provides the BLEWIFI APP, it can be obtained from Demo\BLE_Config_AP in SDK.

2.2.3. Connect APP to DEVKIT

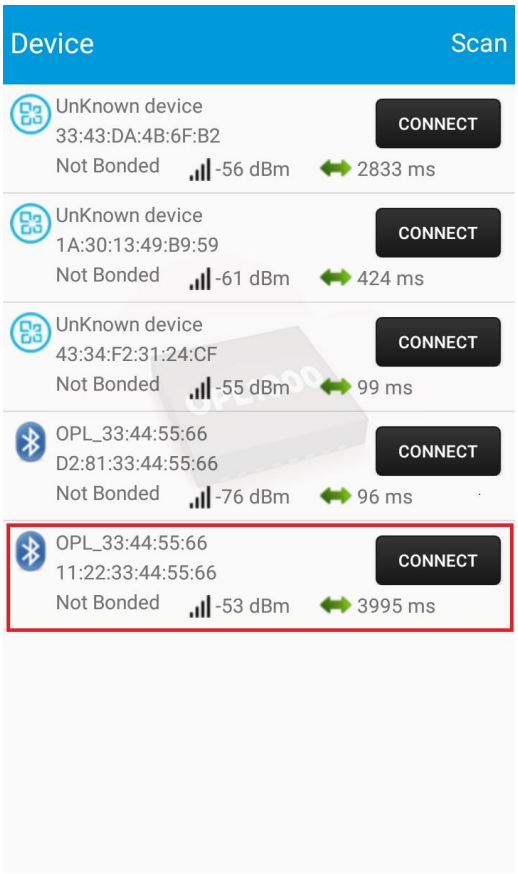
After the user installed BLEWIFI APP in the Android device and copied FW_Binary\opl1000_at.bin, reset DEVKIT. When using the phone APP to complete BLEWifi setup, at+cwmode = 0 is required to send OPL1000 into the IDLE state (no WI-FI state). This is followed by using at+cwmode = 4 to send it to the blewifi network connection mode. This mode will be saved in flash and restored after reboot. Please refer to References[2].

After DEVKIT is reset, it will send the BLE ADV message automatically when powered on. After opening the APP, DEVKIT will automatically scan for BLE ADV message from OPL1000.

Figure 1：Select BLE Tool to begin scanning

Select the right device and click on connect. The user will return to "OPL1000" function interface after successful connection.

Figure 2：Connect to Devkit



2.2.4. Set AP Password

After the successful connection, "OPL1000" enters a new function interface. The interface provides three functions namely, disconnect BLE, BLE Wifi setup and BLE OTA firmware update. The interface is as shown in Figure 3 below.

Figure 3：Function interface

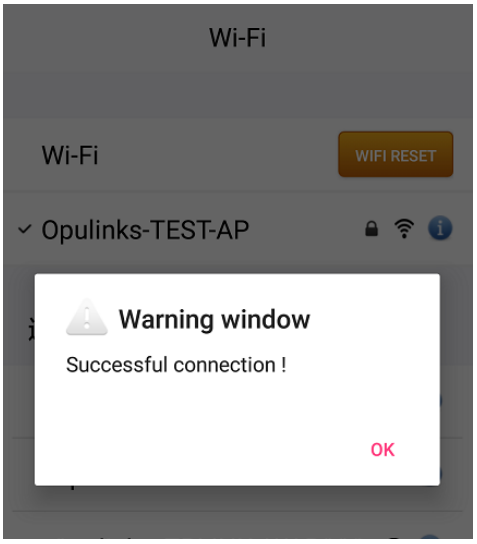
Select Wifi Setup and select the target AP from the list of available AP. Enter the password for that AP and press "join" to confirm connection.

Figure 4: Select the target AP and enter password

2.2.5. Connect to AP

If the password entered is correct, a warning window will pop up to indicate the successful connection as shown in Figure 5. This suggests that BLE has successfully configured OPL1000 to connect to that WIFI AP.

Figure 5：Successful connection to the AP



2.3. BLE Wifi Setup Procedure for iphone

2.3.1. Hardware and Software Requirements

Hardware includes：

- A set of OPL1000 DEVKIT
- A PC with OPL Download Tool
- An iphone or a smart tablet running on ios operating system. It is suggested that the operating system has a version above 12.0.

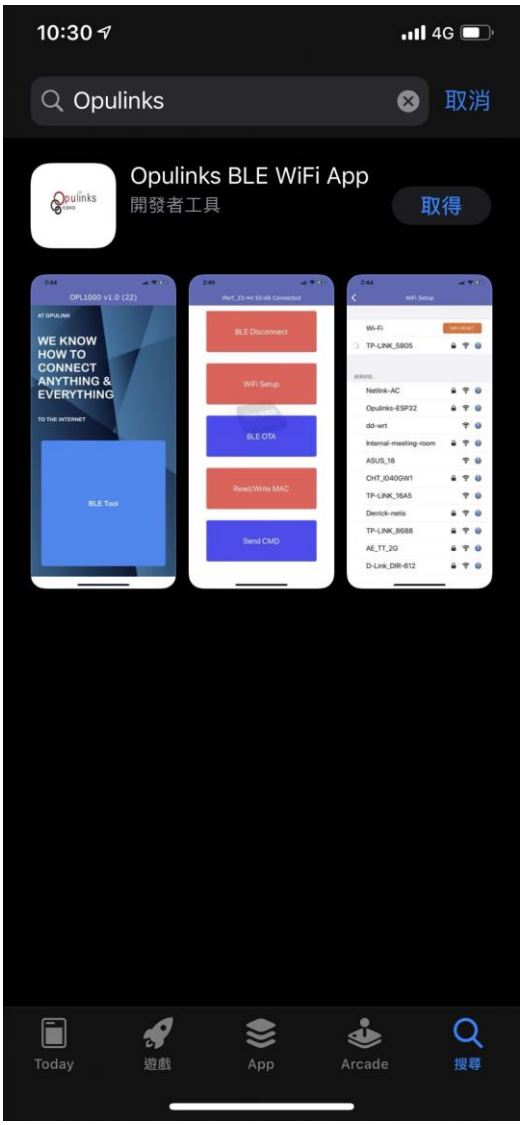
Software includes：

- Download at.bin under the FW_Binary directory to DEVKIT.
- iphone operating system

2.3.2. Install IOS APP

- In APP store to download Opulinks
- Click "install"

Figure 6：Install OpulinksBWApp



2.3.3. Connect APP to DEVKIT

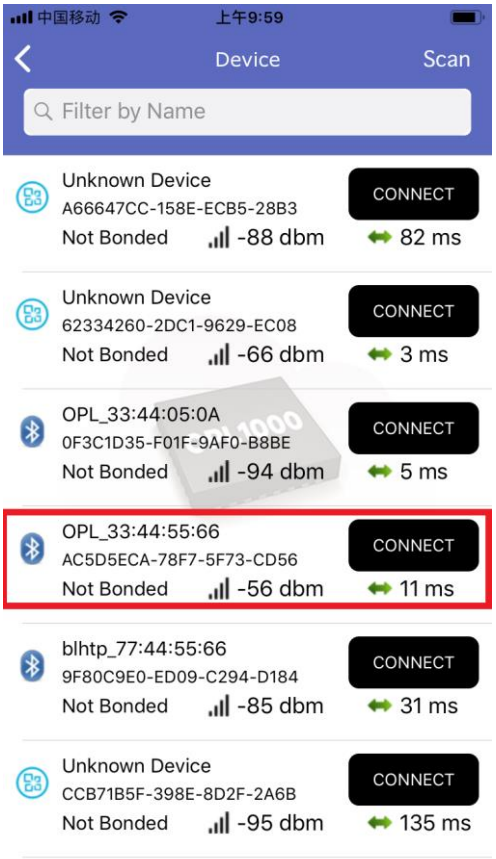
After the user installed BLEWIFI APP in the Android device and copied FW_Binary\opl1000_at.bin, reset DEVKIT. When using the phone APP to complete BLEWifi setup, at+cwmode = 0 is required to send OPL1000 into the IDLE state (no WI-FI state). This is followed by using at+cwmode = 4 to send it to the blewifi network connection mode. This mode will be saved in flash and restored after reboot. Please refer to Reference [2]

After DEVKIT is reset, it will send the BLE ADV message automatically when powered on. After opening the APP, DEVKIT will automatically scan for BLE ADV message from OPL1000.

Figure 7：Select BLE Tool to begin scanning

Select the right device and click on connect. The user will return to "OPL1000" function interface after successful connection.

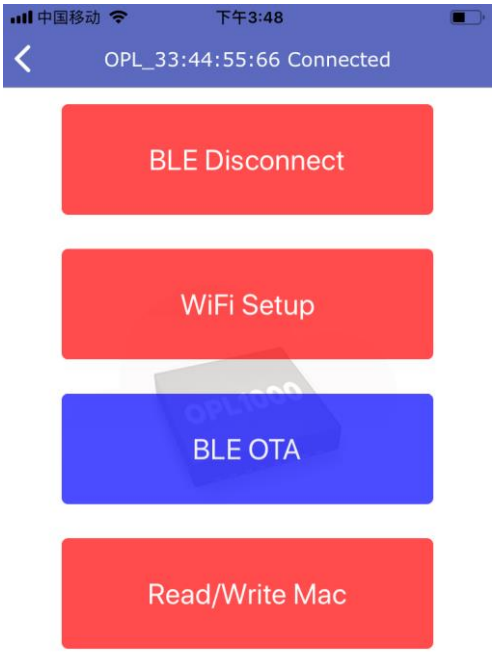
Figure 8：Connect to Devkit



2.3.4. Set AP Password

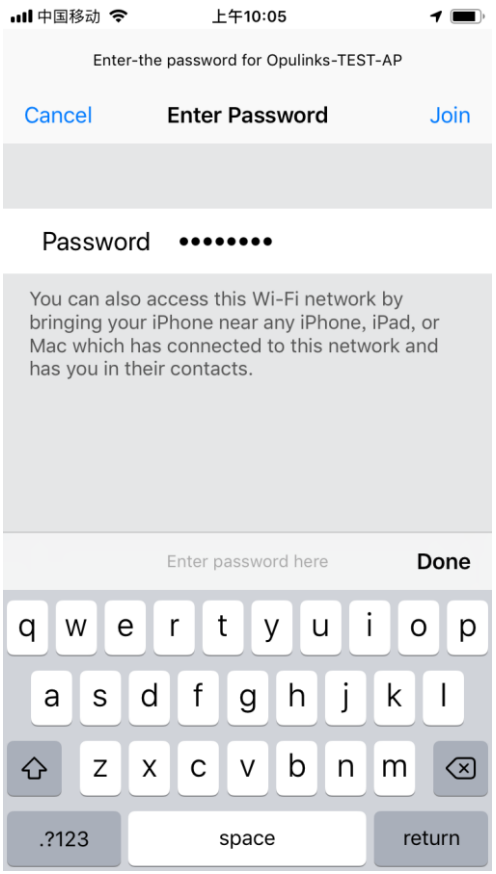
After the successful connection, "OPL1000" enters a new function interface. The interface provides three functions namely, disconnect BLE, BLE Wifi setup and BLE OTA firmware update. The interface is as shown in Figure 9 below.

Figure 9：Function interface



Select Wifi Setup and select the target AP from the list of available AP. Enter the password for that AP and press "join" to confirm connection.

Figure 10：Select the target AP and enter password



2.3.5. Connect to AP

If the password entered is correct, a warning window will pop up to indicate the successful connection as shown in Figure 11. This suggests that BLE has successfully configured OPL1000 to connect to that WIFI AP.

Figure 11：Successful connection to the AP

2.4. BLE Wifi Setup Procedure for WeChat Mini Programs

2.4.1. Hardware and Software Requirements

Hardware includes:

- A set of OPL1000 DEVKIT
- A PC with OPL Download Tool
- An Android phone or a smart tablet running on Android system. It is suggested that the system has a version above 6.0.

Software includes:

- Download at.bin under the FW_Binary directory to DEVKIT.
- Operating mini programs

2.4.2. Install WeChat Mini Programs

Provision Open WeChat and search for a mini program named Opulinks BLEWiFi Provision

Click on Opulinks BLEWifi Provision as shown in the figure below.

2.4.3. Connect APP to DEVKIT

After the user installed BLEWIFI APP in the Android device and copied FW_Binary\opl1000_at.bin, reset DEVKIT. When using the phone APP to complete BLEWifi setup, at+cwmode = 0 is required to send OPL1000 into the IDLE state (no WI-FI state). This is followed by using at+cwmode = 4 to send it to the blewifi network connection mode. This mode will be saved in flash and restored after reboot. Please refer to Reference [2]

After DEVKIT is reset, it will send the BLE ADV message automatically when powered on. After opening the APP, DEVKIT will automatically scan for BLE ADV message from OPL1000.

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Figure 12：Select Start Scan to begin scanning

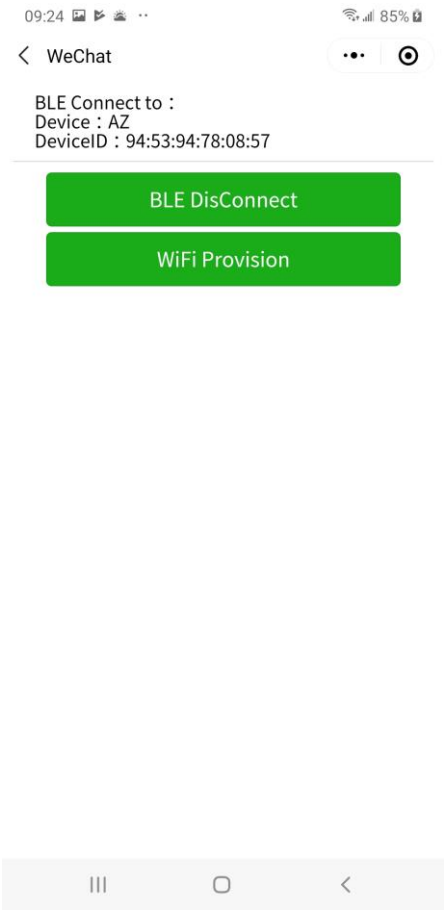
Select the right device and click on connect. The user will enter the function interface after successful connection.

Figure 13：Connect to Devkit

2.4.4. Set AP Password

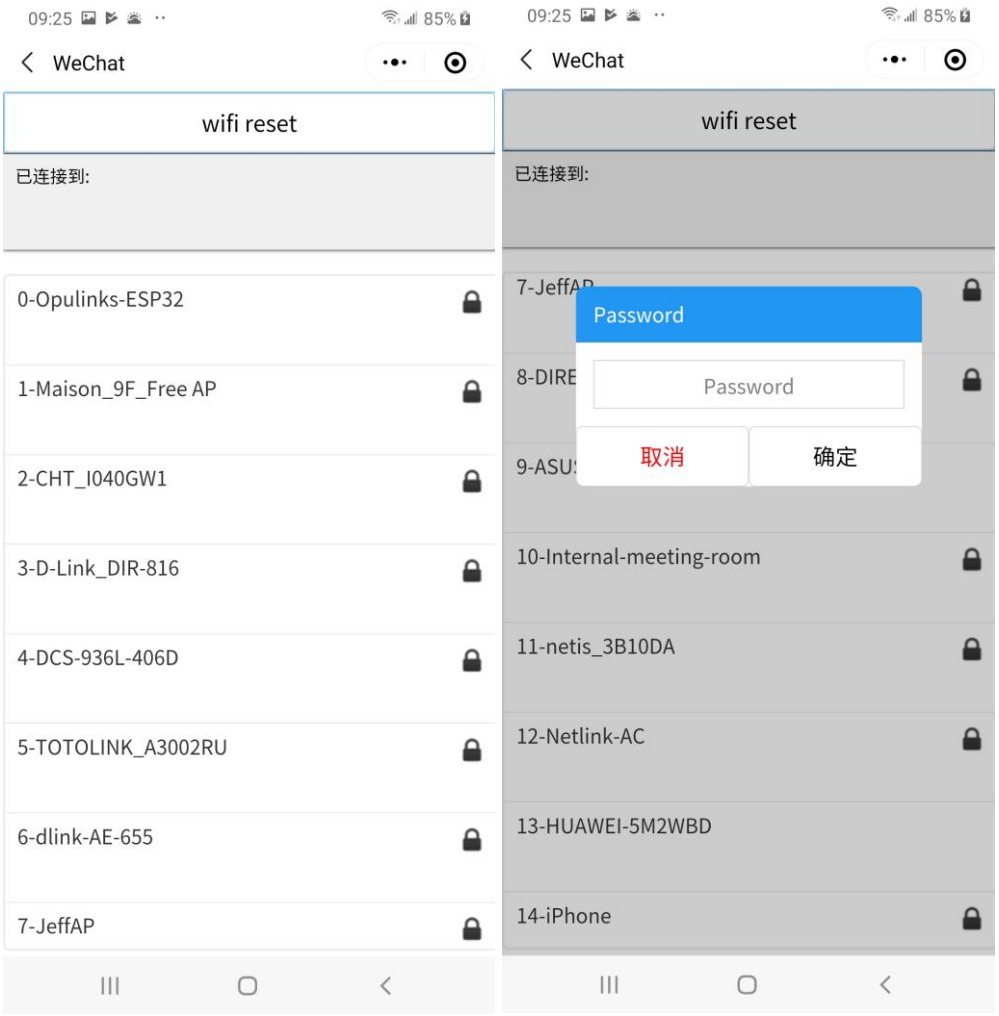
After the successful connection, "OPL1000" enters a new function interface. The interface provides two functions namely, disconnect BLE and BLE Wifi setup. The interface is as shown in **錯誤! 書籤的自我參照不正確。** below.

Figure 14：Function interface



Select Wifi Setup and select the target AP from the list of available AP. Enter the password for that AP and press "Confirm" to confirm connection.

Figure 15：Select the target AP and enter password



2.4.5. Connect to AP

If the password entered is correct, a warning window will pop up to indicate successful connection as shown in **錯誤! 書籤的自我參照不正確。**. This suggests that BLE has successfully configured OPL1000 to connect to that WIFI AP.

Figure 16：Successful connection to AP

3. BLE OTA FUNCTION

3.1. Overview

OTA can help products to update software through wireless means. OPL1000 supports firmware update using BLE. When OPL1000 updates through BLE, the user needs to ensure that the latest version of the software has been downloaded onto the mobile device (for example mobile phone, tablet computer). After that, the user can connect through BLE and send the latest software to OPL1000 device for update.

This chapter describes the procedure and method to perform wireless firmware update using BLE.

3.2. Process for OTA BLE to Realize Firmware Update

3.2.1. FIRMWARE in OPL1000

In order to support the OTA function, the software in OPL1000 needs to support the wireless update function. If the current firmware burnt in the kit does not include OTA function, the user needs to update OPL1000_OTA .bin once. The OPL1000_OTA .bin firmware is provided in the Demo\BLE_Config_AP directory.

3.2.2. Operation Procedure for Android Phone APP

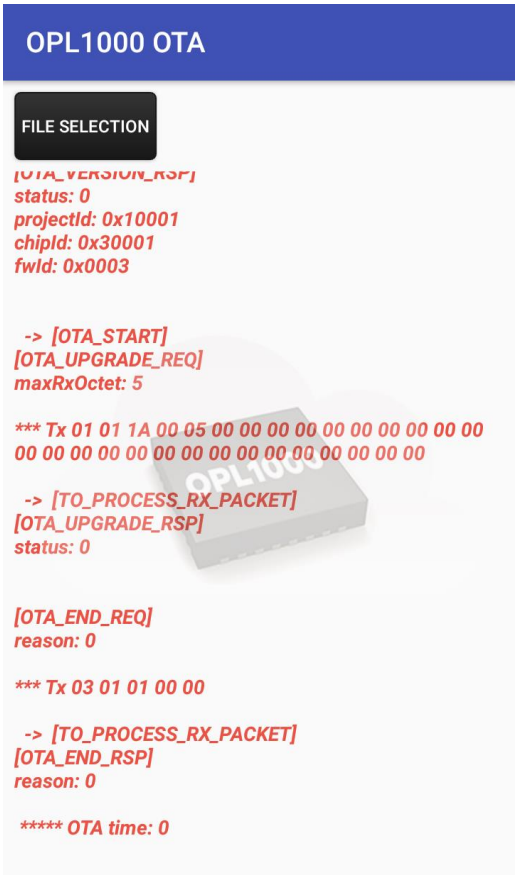
1. When the software supports OTA wireless update, click "connect". After the device is connected, enter the function interface and click "BLE OTA" to perform firmware update.

2 · After using Download Tool to complete the download of OTA Image file, the APP can be used to perform OTA update.

The MAC address in the diagram above is 11:22:33:44:55:66 and it is the OPL1000 device. OPL1000 will respond by returning information including projectID (identification for the project), chipId

(version of the chip), fwId (identification for firmware). As shown in **錯誤! 書籤的自我參照不正確。**, the current version of the firmware on thedevice is fwid = 3.

Figure 17: Firmware properties of opl1000

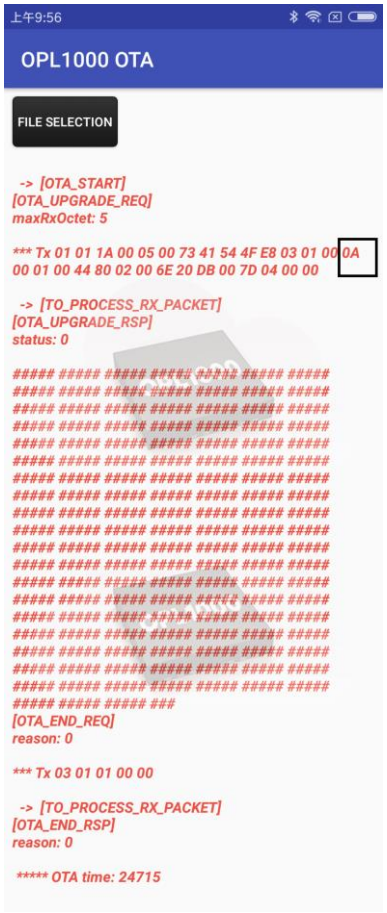


3．When the user needs to perform firmware update, click on “file selection” to access the stored files in the phone. Select the OTA firmware and the locally produced ota image file needs be stored in the phone. In this demonstration, wireless update was performed for the bin file stored in the phone as shown in Figure 18. In this case, fwid = 3 is updated to fwid = 10.

Figure 18：Select the stored firmware in the phone

4. Select firmware opl1000_ota10.bin. After successful selection, firmware update will be conducted automatically. The phone APP divides the firmware into several frames to send to OPL1000 through BLE. The continuous printing of # on the phone interface, as shown by **錯誤! 書籤的自我參照不正確。**, suggests that the data is being transmitted ,

Figure 19：OTA file transmission



After the completion of transmission, the interface should look like the figure and complete firmware update. The returned information regarding firmware version is boxed up in the diagram above. 0A means that the version of firmware displayed is 10.

3.2.3. Operation Procedure for iphone Phone APP

1. When software supports OTA wireless update, click "connect". After the device is connected, enter the function interface and click "BLE OTA" to perform firmware update

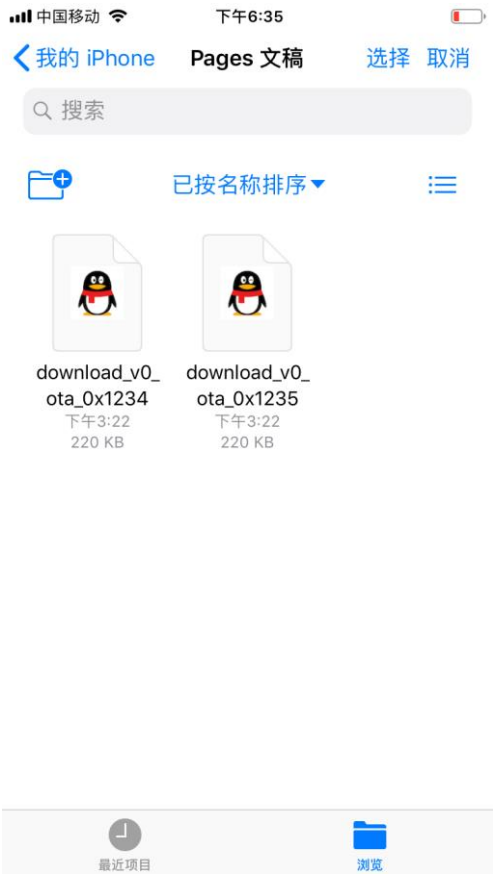
2 · After using Download Tool to complete the download of OTA Image file, the APP can be used to perform OTA update.

The MAC address in the diagram above is 11:22:33:44:55:66 and it is the OPL1000 device. OPL1000 will respond by returning information including projectID (identification for the project), chipId (version of the chip), fwId (identification for firmware). As shown in Figure 20, the current version of firmware on the device is fwid = 0001..

Figure 20：Firmware properties of opl1000

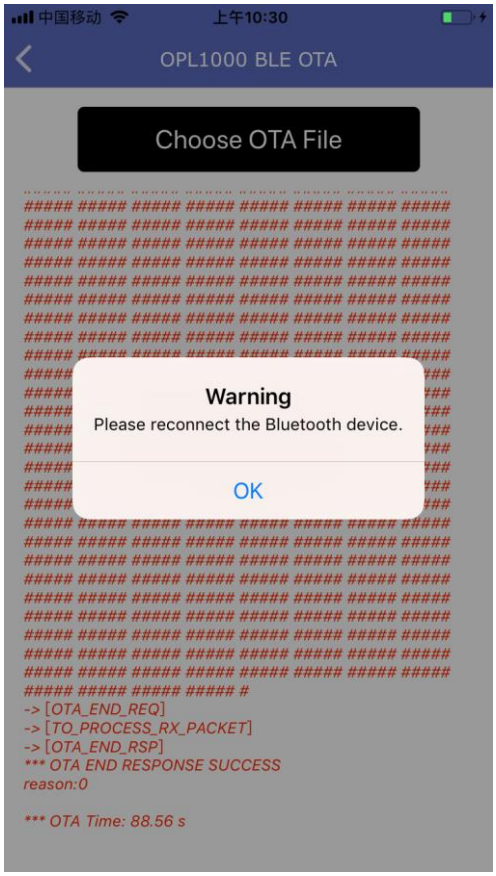
3 · When the user need to perform firmware update, click on “Choose OTA File” to access the stored files in the phone. Select the OTA firmware and the locally produced ota image needs be stored in the phone. In this demonstration, wireless update was performed for the bin file stored in the phone as shown in **錯誤！書籤的自我參照不正確。**Figure 18. In this case, fwid = 0001 is updated to fwid = 1235.

Figure 21：Select the stored firmware in the phone



4. Select download_v0_ota_0x1235.bin. After successful selection, firmware update will be conducted automatically. The phone APP divides the firmware into several frame to send to OPL1000 through BLE. The continuous printing of # on the phone interface, as shown by **錯誤! 書籤的自我參照不正確。** suggests that the data is being transmitted ,

Figure 22：OTA file transmission



The figure is shown after the completion of transmission, completing firmware update. After completion of transmission, the phone interface should look like the figure. It will remind you to reconnect to Bluetooth. After reconnecting to Bluetooth and enter the OTA function, the information regarding the firmware version will be shown like **錯誤! 書籤的自我參照不正確。**. The firmware version displayed is fwid = 1235.

Figure 23： Checking firmware version after OTA firmware update

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