OPL1000

ULTRA-LOW POWER 2.4GHZ WI-FI + BLUETOOTH SMART SOC

IOT Application Framework

User Guide

OPULINKS

Date	Version	Contents Updated
2018/7/26	0.1	● Initial Release

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1. INTRODUCTION

1.1. Scope of Document Application

This document outlines the changes and procedures of Wi-Fi and BLE State Machine, as users can understand the usage method of Wi-Fi and BLE state machine, hence developing various applications for the chips.
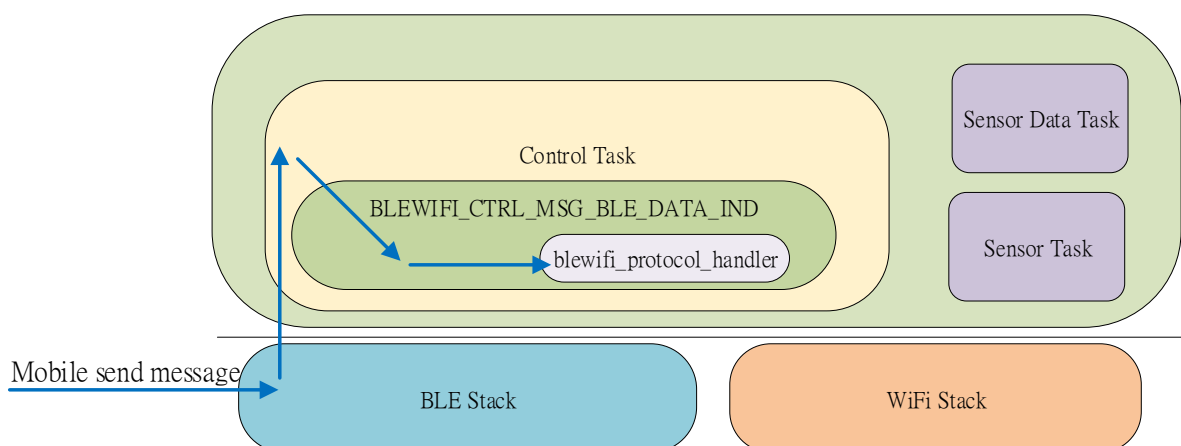
1.2. Abbreviations

Abbr.	Explanation
BLE	Bluetooth Energy
WI-FI	Wireless Fidelity
MAC	Media Access Control
SSID	Service Set Identifier
BSSID	Basic Service Set Identifier
IP ADDRESS	Internet Protocol Address

1.3. References

[1] OPL1000-BLEWIFI-Application-Dev-Guide

2. BLE EVENT HANDLER DESCRIPTION

2.1. BLE Command ID Processing

When mobile device APP sends messages to BLE Stack, the message would be uploaded to "BLEWIFI_CTRL_MSG_BLE_DATA_IND", before sent to "blewifi_protocol_handler", and then processed pending on the actions to be executed. As outlined below, this document is to describe and explain every message action to be processed by "blewifi_protocol_handler".

BLEWIFI_REQ_SCAN:

As mobile device APP will transmit this command ID in, it indicates that the message to be processed is to proceed with Wi-Fi AP scan. In it, it will notify Wi-Fi Stack the action to begin scanning all AP's. When Wi-Fi Stack receives the message notification, it will initiate Wi-Fi AP scan.

Subsequently, Wi-Fi Stack will transmit back the scan result through the command "BLEWIFI_RSP_SCAN_REPORT", and when all scanned AP's have been transmitted to mobile device APP, mobile APP shall be informed that the scan action has been completed.

BLEWIFI_REQ_CONNECT:

When mobile device APP transmits this command ID in, it indicates that the message to be processed currently is Wi-Fi AP connection. This command ID is to consolidate the MAC address, password, and password length of the connection-target AP, before transmitting to Devkit. Wi-Fi Stack will then connect with target AP.

Subsequently, Wi-Fi Stack will transmit the connection result, of success or failure, to mobile device APP through a "BLEWIFI_RSP_CONNECT". When the connection is successfully made, "0" will be transmitted back to mobile device APP. Conversely, when the connection has failed, "1" will be transmitted back to mobile device APP.

BLEWIFI_REQ_WIFI_STATUS:

When mobile device APP transmits this command ID in, it indicates that the message to be processed currently is to inquire the connection status and information of the current connection between Wi-Fi AP and Devkit. The inquiry status contains information such as the current connection status, SSID, BSSID, IP Address distributed to Devkit by the connected Wi-Fi AP, mask address , and Gateway.

When Devkit has packed all information, it will be sent to mobile device APP through a "BLEWIFI_RSP_WIFI_STATUS", notifying mobile device APP of the current connection status, SSID, BSSID, the IP Address distributed to Devkit via connected Wi-Fi AP, mask, and Gateway.

BLEWIFI_REQ_RESET:

When mobile device APP transmits this command ID in, it indicates that the message to be processed currently is to erase all records left by Wi-Fi AP on Devkit. If currently there are three successful connections made by Wi-Fi AP on Devkit, these 3 records shall be erased.

When Devkit receives this command ID, it shall erase all records of Wi-Fi AP on Devkit. Subsequently, it will transmit a "BLEWIFI_RSP_RESET" to mobile device APP, informing the current status of erasure is success or failure. When successful, it will transmit "0" to mobile device, and conversely, in the case of Failure, it will transmit "1" to mobile device APP.

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3. Wi-Fi EVENT HANDLER DESCRIPTION

3.1. Wi-Fi State Machine
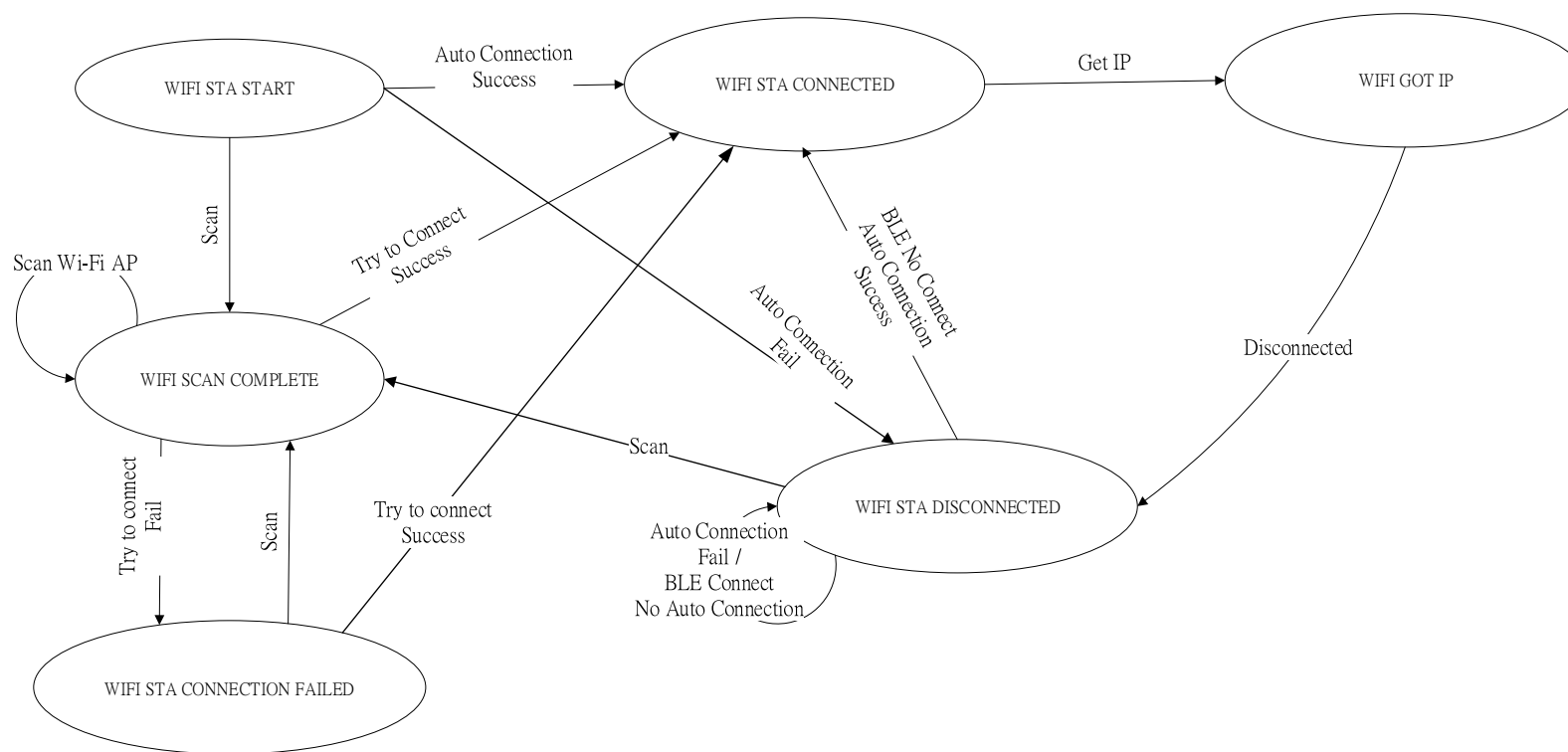
As Devkit is comprised of sections with AP record, and those without AP record, there is differentiation between those two circumstances, and then main difference is that, if Devkit has AP record, it will carry out the action of "Auto Connection", and in the texts below, there would be outline of these two circumstances.

Devkit has AP record:

When it is powered up, Wi-Fi will enter into "WIFI STA START", and when Devkit has AP record, as Devkit can store 3 information items at most, it will proceed to carry out "Auto Connection" action.

Successful Auto Connection:

As Auto Connection is successful, it will enter into "WIFI STA CONNECTED" status, and then it will attempt to obtain IP Address, as DHCP of AP will distribute IP Address to Devkit. As it enters "WIFI STA GOT IP" status subsequently, it means that Devkit has obtained IP Address.

Auto Connection Failure:

When "Auto Connection" failed, it will enter into "WIFI STA DISCONNECTED" status, and keeps attempting the action of "Auto Connection".

In the case of consecutive failures, BLE would be subject to the following circumstances of "with connection" and "without connection".

BLE without connection:

At the time of AP power-down, it will enter into "WIFI STA DISCONNECTED" status, and as BLE is without connection, while AP has records, it will proceed to carry out "auto connection" action. If "auto connection" has successfully made connection, it will enter into "WIFI STA CONNECTED" status. If "auto connection" fails, it will again enter into "WIFI DISCONNECTED" status.

BLE with connection:

In the case of BLE with connection, it will remain in the "WIFI STA DISCONNECTION" status, until users give the "Scan" command, it shall then reach the "WIFI SCAN COMPLETE" status, and when it reaches that status, it will transmit the scanned AP list to mobile device APP, and display it in the Scan page in mobile device APP. When users press Scan button again, it will enter into "WIFI SCAN COMPLETE" status, while transmitting scanned information to mobile device APP again.

As users start to select AP List in the Scan page of mobile device APP, while attempting to establish connection, if the connection is successfully established, it will enter into "WIFI STA CONNECTED" status, while transmitting notification to mobile device APP, on which the status of whether connection is currently established or not will be displayed. When the connection is not established, it will enter into "WIFI STAT CONNECTION FAILED" status, while transmitting notification to mobile device APP, on which it will display the current connection status as "Not Connected".

Devkit without AP record:

At the time of power-up, Wi-FI will enter into "WIFI STA START" status, and since there is no AP record, it will remain in the "WIFI STA START" status. When users enter into Scan page of APP, it will start to carry out the action of scan Wi-Fi AP, the scanned AP will be transmitted to the Scan page on mobile device APP, before entering into "WIFI SCAN COMPLETE" status. As users keep scan Wi-Fi, scanned AP will continuously be transmitted to the Scan page on mobile device APP, while it will enter into "WIFI SCAN COMPLETE" status.

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When users start to attempt establishing connection, and as it fails, it will enter into "WIFI STA CONNECTION FAILED" status, and transmitting notification to mobile device APP, on which the current connection status will be displayed as "Connection Failed". As Devkit keeps attempting to establish connection, and as the connection is established successfully, Wi-Fi status will enter into "WIFI STA CONNECTED" mode.

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