

# OPL1000

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

## BLE to WiFi Application Development Guide



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2018/4/1	0.1	<ul style="list-style-type: none"><li>Initial Release</li></ul>
2018/6/19	0.2	<ul style="list-style-type: none"><li>Add message chart and add new command IDs</li></ul>
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# 1. 介绍

## 1.1. 文档应用范围

本文介绍了通过 BLE 配网 WIFI AP 的过程，使用的 API 调用接口以及消息流程。对应于 OPL1000 SDK Package 的示例工程 SDK\APS\_PATCH\examples\bluetooth\blewifi。

## 1.2. 缩略语

Abbr.	Explanation
BLE	Bluetooth Energy 低功耗蓝牙
WIFI	Wireless Fidelity 无线局域网

## 1.3. 参考文献

[1] BLE 配网 WIFI AP 演示说明 OPL1000-Demo-BLE-setup-network-guide.pdf

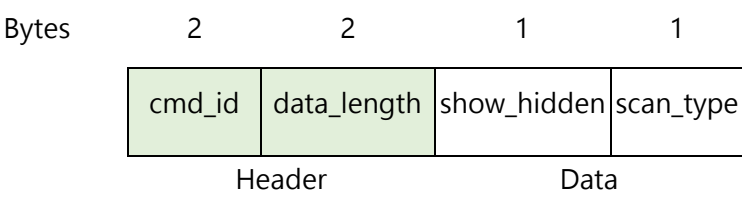
## 2. List of Command ID

Name	Value	Description
BLEWIFI_REQ_SCAN	0x0000	The app sends a request of scan command to driver.
BLEWIFI_REQ_CONNECT	0x0001	The app sends a request of connect command to driver.
BLEWIFI_REQ_DISCONNECT	0x0002	The app sends a request of disconnect command to driver.
BLEWIFI_REQ_RECONNECT	0x0003	The app sends a request of reconnect command to driver.
BLEWIFI_REQ_READ_DEVICE_INFO	0x0004	The app sends a request of get device information.
BLEWIFI_REQ_WRITE_DEVICE_INFO	0x0005	The app sends a request of set device information.
BLEWIFI_REQ_WIFI_STATUS	0x0006	The app send a request of get Wi-Fi status
BLEWIFI_REQ_RESET	0x0007	The app send a request of reset Wi-Fi record
BLEWIFI_RSP_SCAN_REPORT	0x1000	Driver reports an event of scan results to app.
BLEWIFI_RSP_SCAN_END	0x1001	Driver reports an event of scan end to app, to notify app to stop to receive scan result events.
BLEWIFI_RSP_CONNECT	0x1002	Driver reports an event of connect to app.
BLEWIFI_RSP_DISCONNECT	0x1003	Driver reports an event of disconnect to app.
BLEWIFI_RSP_RECONNECT	0x1004	Driver reports an event of reconnect to app.
BLEWIFI_RSP_READ_DEVICE_INFO	0x1005	Driver reports data of device information.

Name	Value	Description
BLEWIFI_RSP_WRITE_DEVICE_INFO	0x1006	Driver reports an event about whether the data is set successfully or not.
BLEWIFI_RSP_WIFI_STATUS	0x1007	Driver report an event of Wi-Fi status of device to app.
BLEWIFI_RSP_RESET	0x1008	Driver report an event reset results to app.
BLEWIFI_REQ_OTA_VERSION	0x100	The app sends a request of get device FW information
BLE_RSP_OTA_VERSION	0x1100	Device FW information
BLE_REQ_OTA_UPGRADE	0x101	The start of upgrade
BLE_RSP_OTA_UPGRADE	0x1101	Response of upgrade request
BLE_REQ_OTA_RAW	0x102	Patch image raw data
BLE_RSP_OTA_RAW	0x1102	Response of OTA raw request
BLE_REQ_OTA_END	0x103	The end of upgrade
BLE_RSP_OTA_END	0x1103	Response of OTA end request
WIFI_REQ_OTA_TRIGGER	0x200	Start WiFi OTA
WIFI_RSP_OTA_TRIGGER	0x1200	Response WiFi OTA request
WIFI_REQ_OTA_DEVICE_VERSION	0x201	Device FW information
WIFI_RSP_OTA_DEVICE_VERSION	0x1201	Response Device FW information
WIFI_REQ_OTA_SERVER_VERSION	0x202	Server Device FW information
WIFI_RSP_OTA_SERVER_VERSION	0x1202	Response Server Device FW information
IP STATUS NOTIFY	0x2000	IP Status Notify

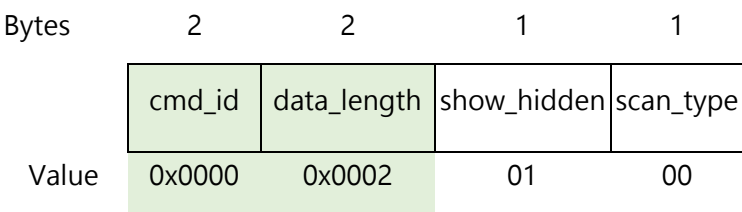
### 3. The Usage of Command ID

#### 3.1. SCAN REQUEST

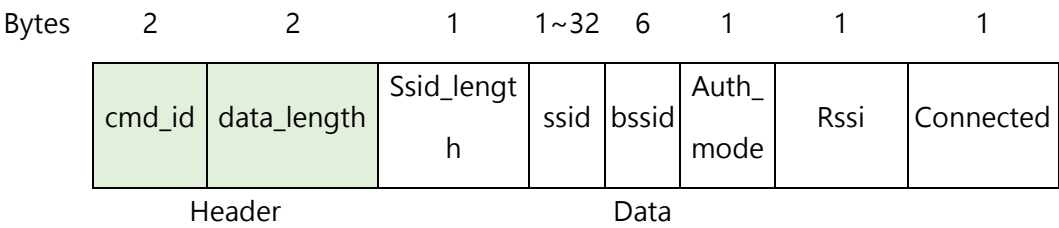


- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Show\_hidden: Enable to scan AP whose SSID is hidden; enable (1), disable (0).
- Scan\_type: Scan type, active or passive; active (0), passive (1).

Example for frame format:



#### 3.2. SCAN REPORT RESPONSE



- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.



- Ssid\_length: Length of the SSID.
- Ssid: Stores the predefined SSID.
- Bssid: AP's MAC address.
- Auth\_mode: This defines the wireless authentication mode to indicate the Wi-Fi device authentication attribute. Open (0), WEP (1), WPA\_PSK (2), WPA2\_PSK (3), WPA\_WPA\_2\_PSK (4), WPA2\_ENTERPRISE (5).
- Rssi: Records the RSSI value when probe response is received.
- Connected: AP was connected before. (0 not connected before, 1 connected before)

Example for frame format:

Bytes	2	2	1	1~32	6	1	1
	cmd_id	data_length	Ssid_length	ssid	bssid	Auth_mode	Rssi
Value	0x1000	0x0017	08	44 2d 4c 69 6e 6b 5f 44	74 DA DA E7 08 F1	03	1E

1

Connected

01

3.3. SCAN RESPONSE END

Bytes	2	2
	cmd_id	data_length
	Header	

- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.

Example for frame format:

Bytes	2	2
	cmd_id	data_length
Value	0x1001	0x0000

3.4. CONNECT REQUEST

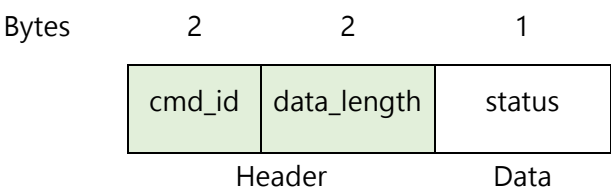
Bytes	2	2	6	1	1	8~63
	cmd_id	data_length	bssid	Connected	password_length	password
	Header			Data		

- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Bssid: AP's MAC address.
- Password\_length: The length of the password.
- Password: The password of the target AP.
- Connected: AP was connected before. (0 not connected before, 1 connected before)

Example for frame format:

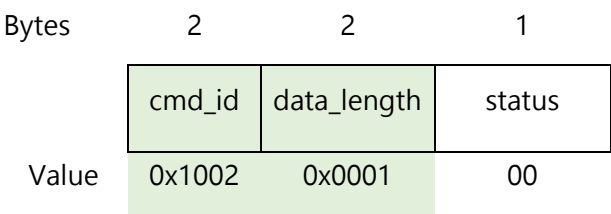
Bytes	2	2	6	1	1
	cmd_id	data_length	bssid	Connected	password_length
Value	0x0001	0x00F0	74 DA DA E7 08 F1	01	08
	8~63				
	password				
	01 02 03 04 05 06 07 08				

3.5. CONNECT RESPONSE

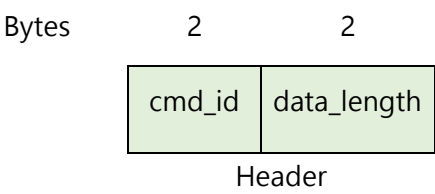


- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Status: Return success (0) or failed reason code (1).

Example for frame format:



3.6. DISCONNECT REQUEST

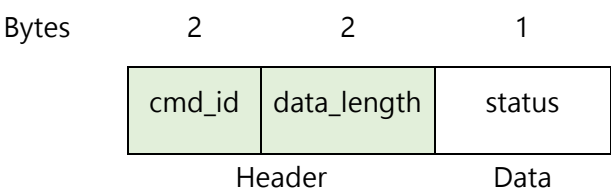


- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.

Example for frame format:

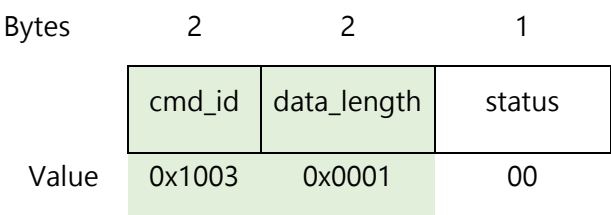
Bytes	2	2
	cmd_id	data_length
Value	0x0002	0x0000

3.7. DISCONNECT RESPONSE

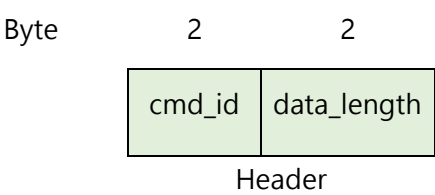


- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Status: Return success (0) or failed reason code (1).

Example for frame format:



3.8. RECONNECT REQUEST



- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.

Example for frame format:



	cmd_id	data_length
Value	0x0003	0x0000

## 3.9. RECONNECT RESPONSE

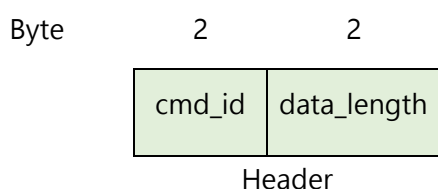
Byte	2	2	1
	cmd_id	data_length	status
	Header		Data

- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Status: Return success (0) or failed reason code (1).

Example for frame format:

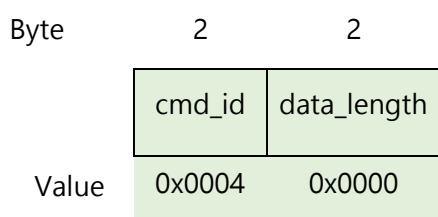
Byte	2	2	1
	cmd_id	data_length	status
Value	0x1004	0x0001	00

### 3.10. READ DEVICE INFORMATION REQUEST

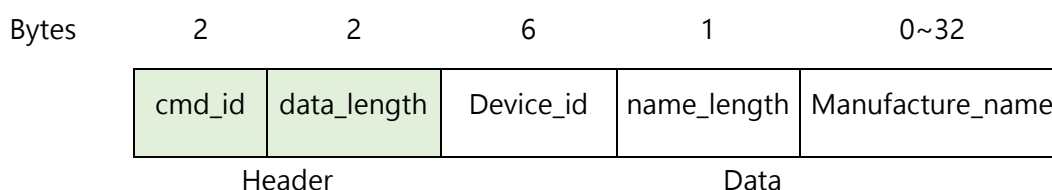


- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.

Example for frame format:



### 3.11. READ DEVICE INFORMATION RESPONSE



- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Device\_Id: The device MAC address.
- Name\_Length: The length of the manufacture name.
- Manufacture Name: The device manufacture name.

Example for frame format:

Bytes	2	2	6	1	7
	cmd_id	data_length	Device_id	name_length	Manufacture_name
Value	0x1005	0x000E	AA BB CC DD EE FF	07	Example

## 3.12. WRITE DEVICE INFORMATION REQUEST

Bytes	2	2	6	1	0~32
	cmd_id	data_length	Device_id	name_length	Manufacture_name
	Header		Data		

- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Device\_Id: The device MAC address.
- Name\_Length: The length of the manufacture name.
- Manufacture\_Name: The device manufacture name.

Example for frame format:

Bytes	2	2	6	1	8
	cmd_id	data_length	Device_id	name_length	Manufacture_name
Value	0x0005	0x000F	AA BB CC DD EE FF	08	Example2

## 3.13. WRITE DEVICE INFORMATION RESPONSE

Bytes	2	2	1
	cmd_id	data_length	status
	Header		Data



- CMD\_ID: Command ID, please refer to Command ID section.
- Data\_Length: Size of data.
- Status: Return success (0) or failed reason code (1).

Example for frame format:

Bytes	2	2	1
	cmd_id	data_length	status
Value	0x1006	0x0001	00

3.14. WIFI STATUS REQUEST

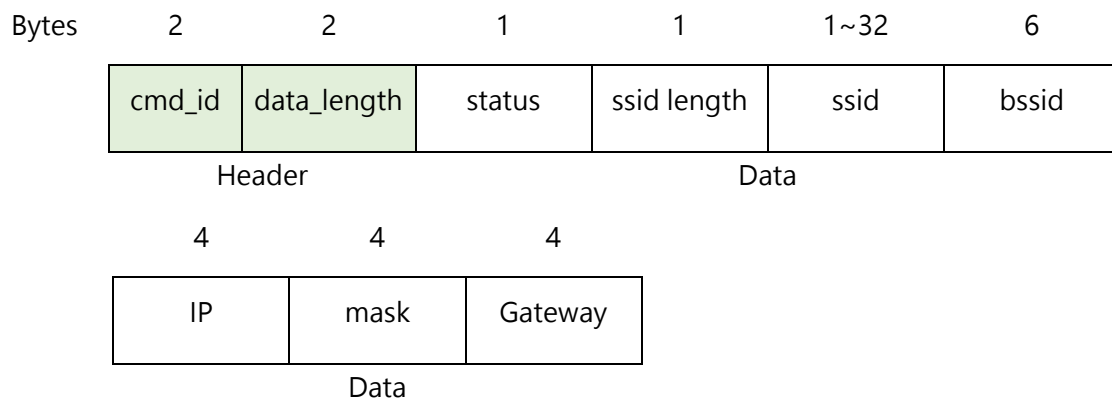
Bytes	2	2
	cmd_id	data_length
	Header	

- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

Example for frame format:

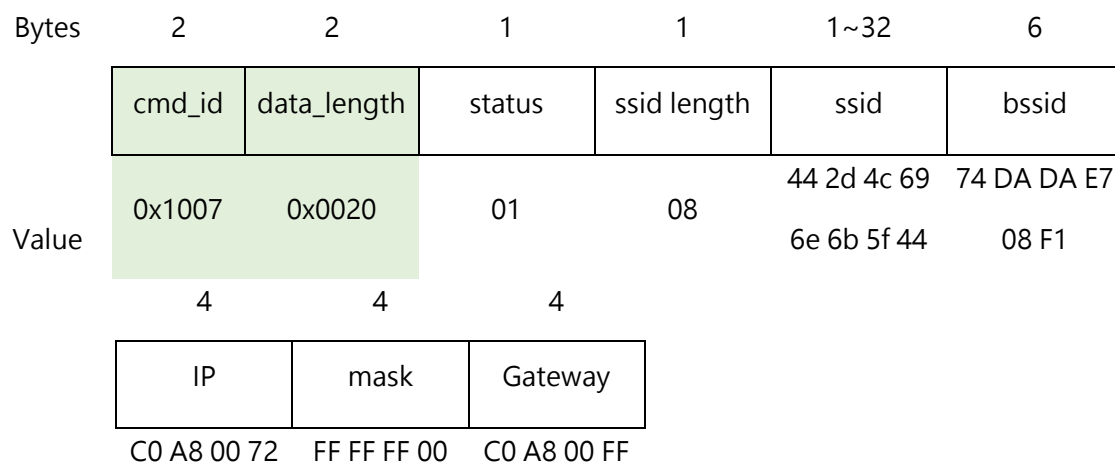
Bytes	2	2
	cmd_id	data_length
Value	0x0006	0x0000

## 3.15. WIFI STATUS RESPONSE

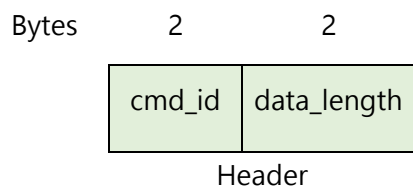


- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code (1)
- Ssid\_length: Length of the SSID.
- Ssid: Stores the predefined SSID.
- Bssid: AP's MAC address.
- IP: The IP address of device.
- Mask: The mask IP address of device.
- Gateway: The gateway IP address which get to device.

Example for frame format:

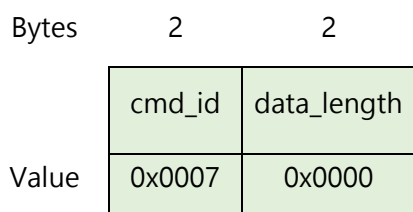


## 3.16. RESET REQUEST

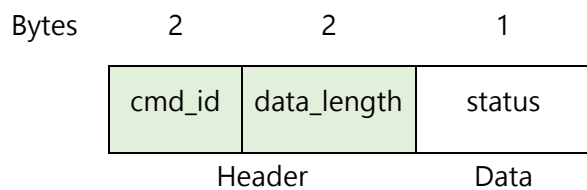


- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

Example for frame format:

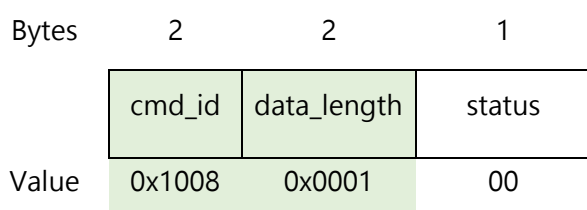


## 3.17. RESET RESPONSE



- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code (1)

Example for frame format:



### 3.18. BLE OTA VERSION REQUEST

Byte                      2                      2

cmd_id	data_length
--------	-------------

Header

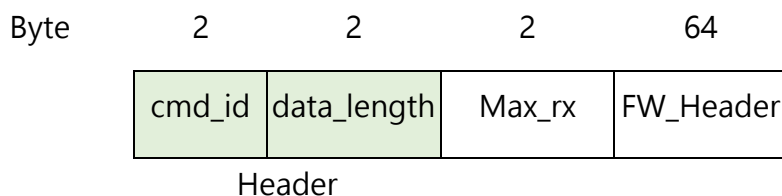
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

### 3.19. BLE OTA VERSION RESPONSE

Byte	2	2	1	2	2	2	2	4
	cmd_id	data_length	status	Project ID	Chip ID	FW ID	FW checksum	FW size
	Header			Data				

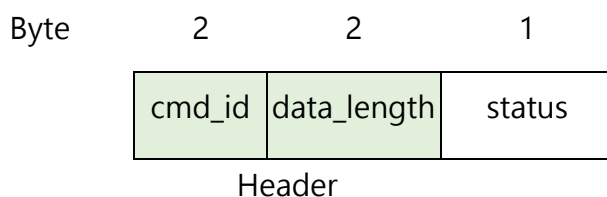
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code
- Project ID:
  - OPL1000: 1000
  - OPL2000: 2000
  - OPL3000: 3000
- Chip ID:
  - A0: 0
  - A1: 1
  - A2: 2
  - B0: 1000
  - B1: 1001
- FW ID: serial number (1 ~ 65535)
- Checksum: checksum of patch image (Not include header)
- FW size: size of patch image

### 3.20. BLE OTA UPGRADE REQUEST



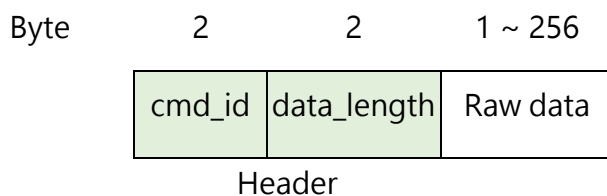
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Max\_rx: The maximum rx packet count.
- FW\_Header: Firmware Header

### 3.21. BLE OTA UPGRADE RESPONSE



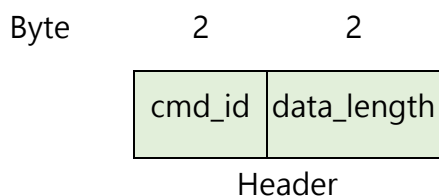
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code

### 3.22. BLE OTA RAW DATA REQUEST



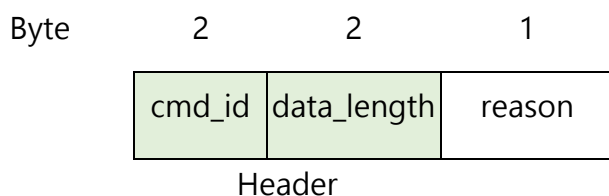
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Raw data : raw data of fw image that is include image header

### 3.23. BLE OTA RAW DATA RESPONSE



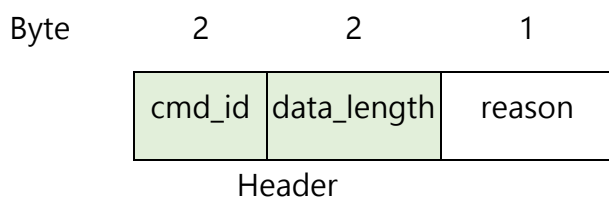
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

### 3.24. BLE OTA END REQUEST



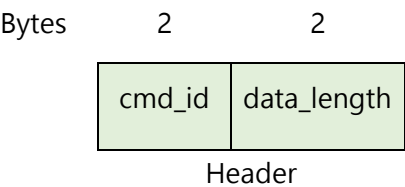
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Reason : The reason of stop OTA fw upgrade

### 3.25. BLE OTA END RESPONSE



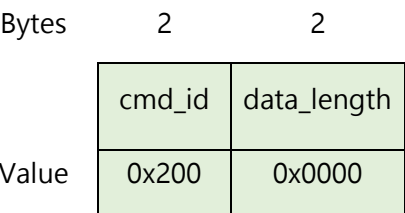
- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Reason : The reason of stop OTA fw upgrade

3.26. WiFi OTA TRIGGER REQUEST

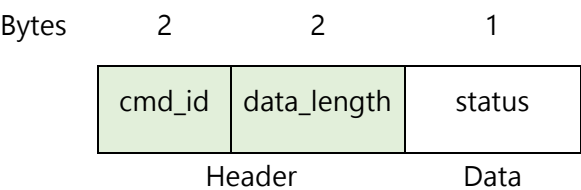


- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

Example for frame format:

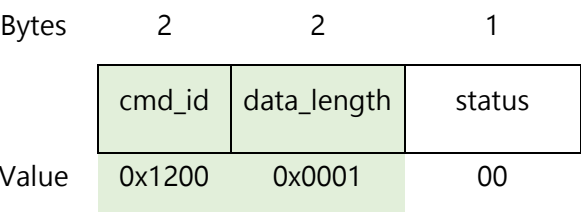


3.27. WiFi OTA TRIGGER RESPONSE

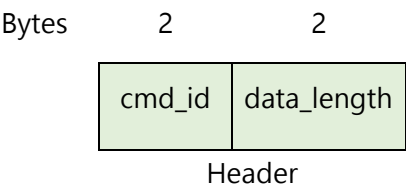


- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code (1)

Example for frame format:

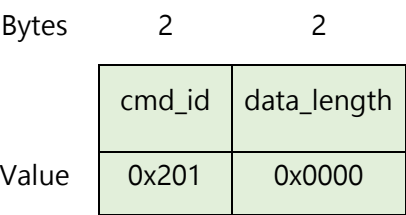


3.28. WiFi OTA DEVICE VERSION REQUEST

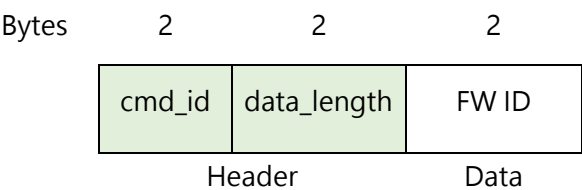


- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

Example for frame format:

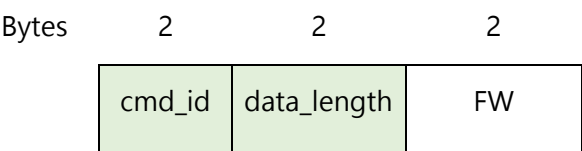


3.29. WiFi OTA DEVICE VERSION RESPONSE



- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- FW ID: serial number (1 ~ 65535)

Example for frame format:





Value	0x1201	0x0001	1
-------	--------	--------	---

## 3.30. WiFi OTA SERVER VERSION REQUEST

Bytes	2	2
	cmd_id	data_length
	Header	

- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data

Example for frame format:

Bytes	2	2
	cmd_id	data_length
Value	0x202	0x0000

## 3.31. WiFi OTA SERVER VERSION RESPONSE

Bytes	2	2	2
	cmd_id	data_length	FW ID
	Header		Data

- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- FW ID: serial number (1 ~ 65535)

Example for frame format:

Bytes	2	2	2
-------	---	---	---

	cmd_id	data_length	FW
Value	0x1202	0x0001	1

## 3.32. IP STATUS NOTIFY

Bytes	2	2	1	1	1~32	6
	cmd_id	data_length	status	ssid length	ssid	bssid
	Header		Data			
	4	4	4			
	IP	mask	Gateway			
	Data					

- CMD\_ID : command ID, please refer to section of Command ID.
- Data\_Length : size of data
- Status : return success (0) or failed reason code (1)
- Ssid\_length: Length of the SSID.
- Ssid: Stores the predefined SSID.
- Bssid: AP's MAC address.
- IP: The IP address of device.
- Mask: The mask IP address of device.
- Gateway: The gateway IP address which get to device.

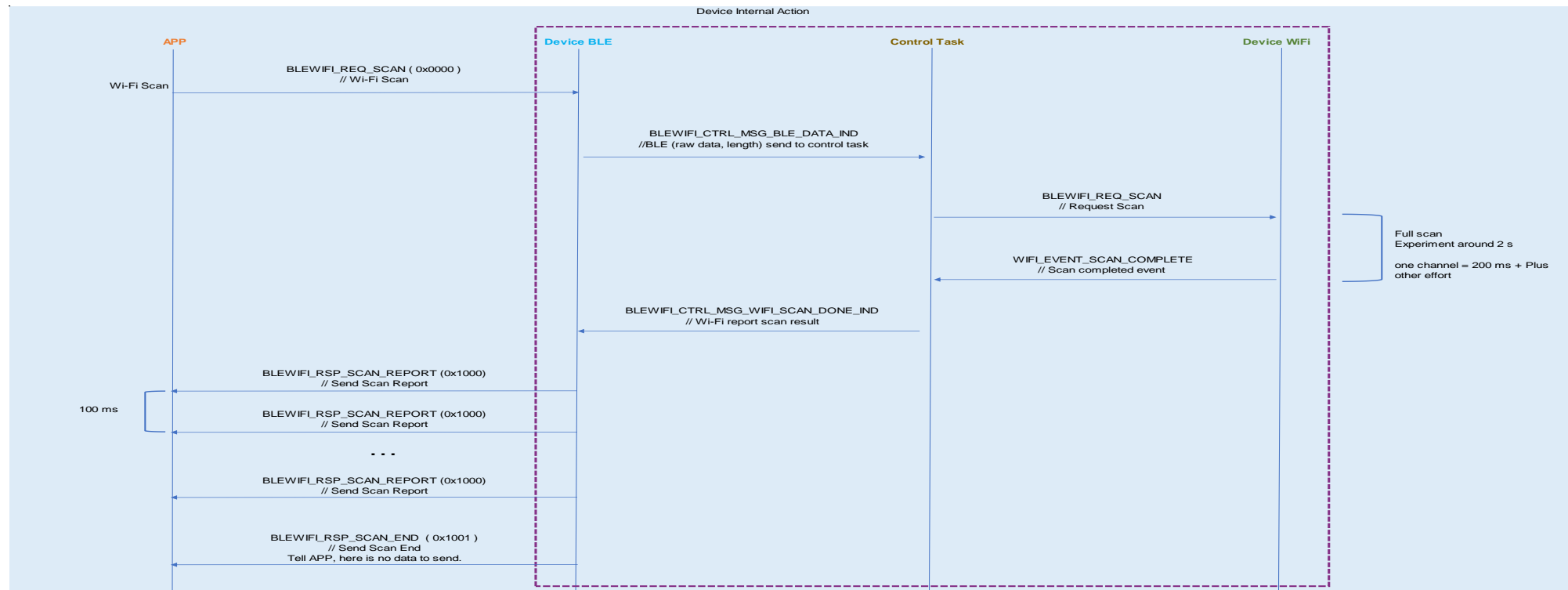
Example for frame format:

Bytes	2	2	1	1	1~32	6
	cmd_id	data_length	status	ssid length	ssid	bssid
Value	0x2000	0x0020	00	08	44 2d 4c 69 74 DA DA E7 6e 6b 5f 44	08 F1
	4	4	4			

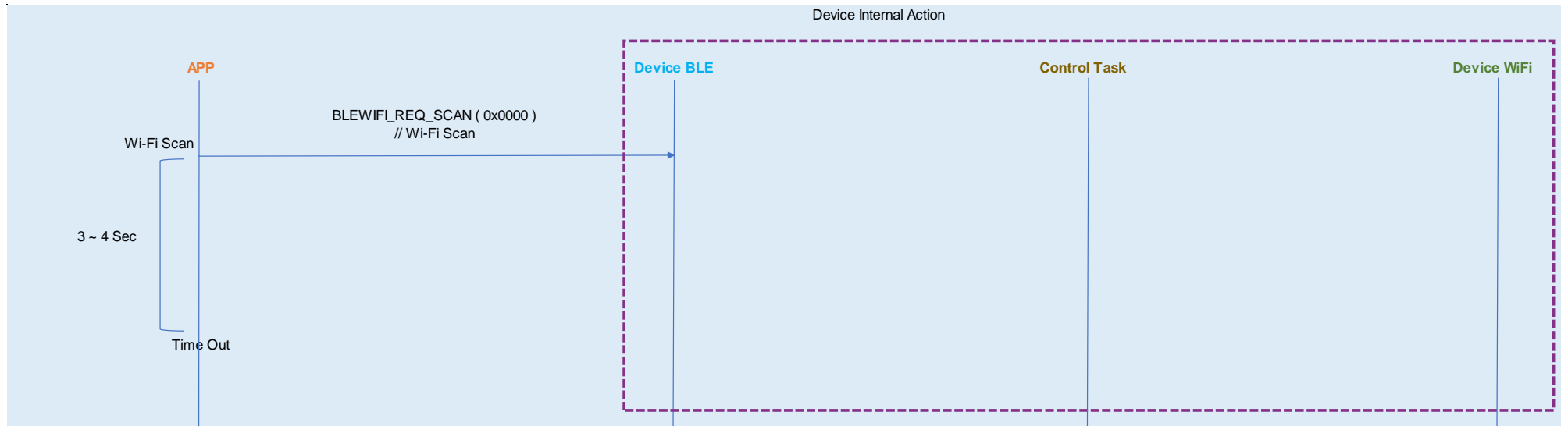
IP	mask	Gateway
C0 A8 00 72	FF FF FF 00	C0 A8 00 FF

## 4. Message Chart

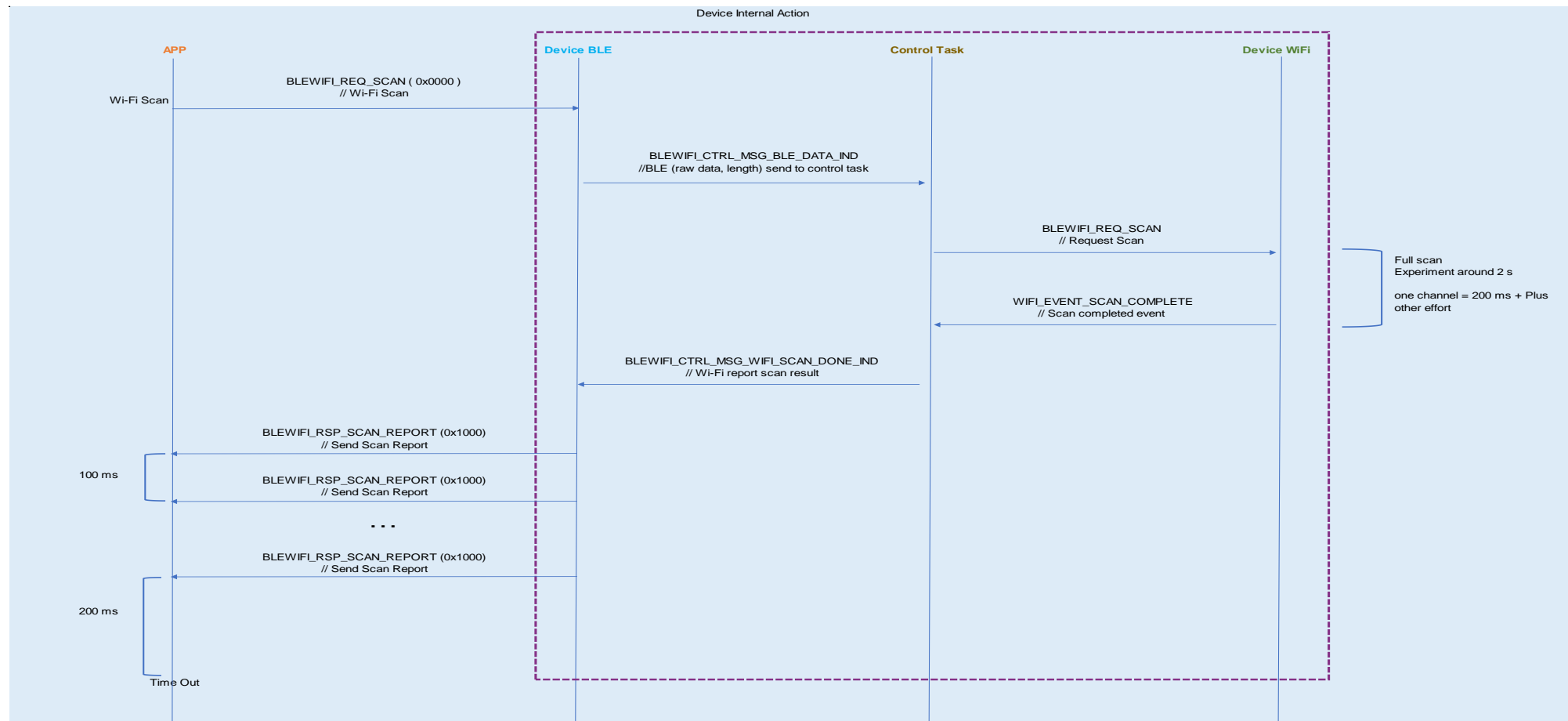
### 4.1. Wi-Fi Scan



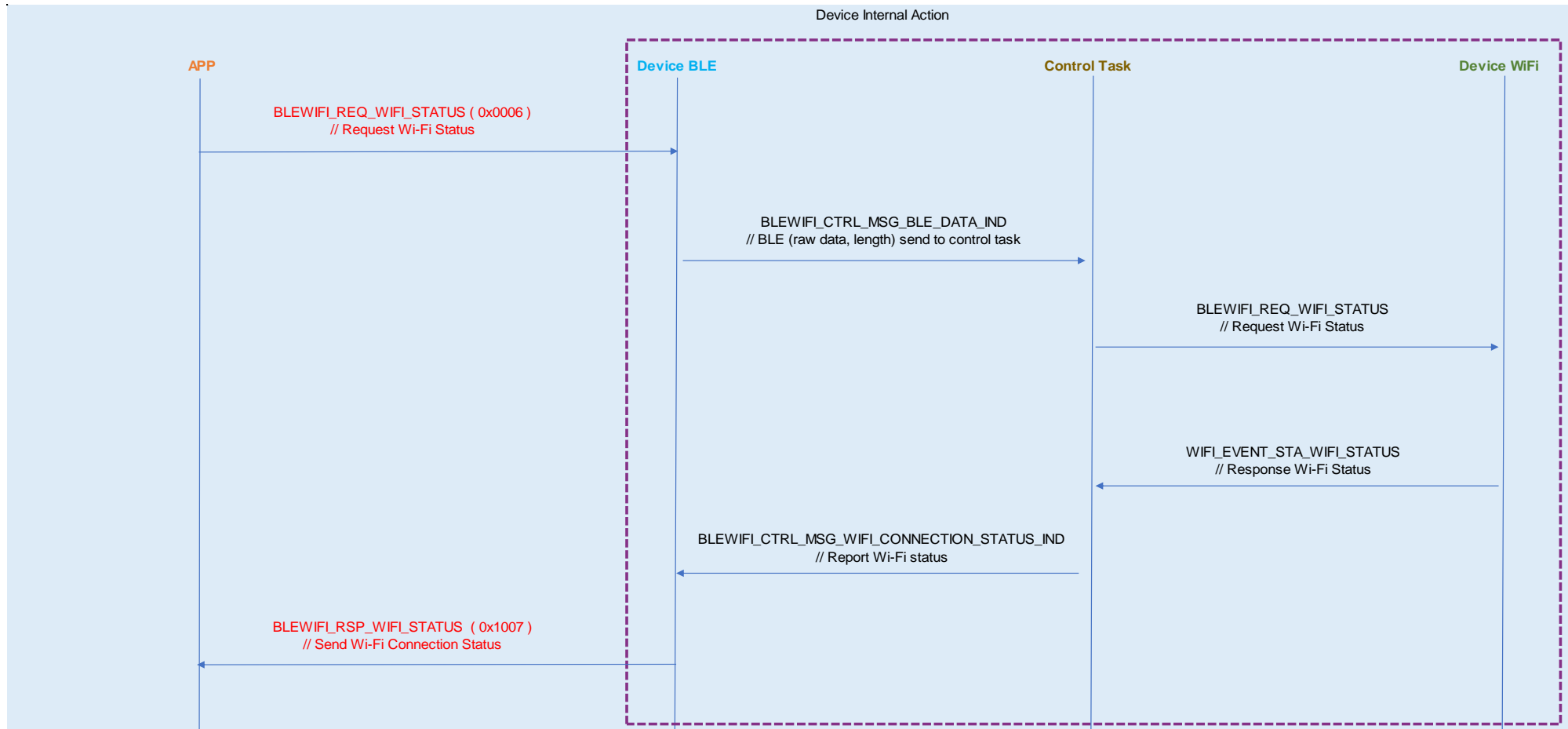
## 4.2. Wi-Fi Scan ( TimeOut)



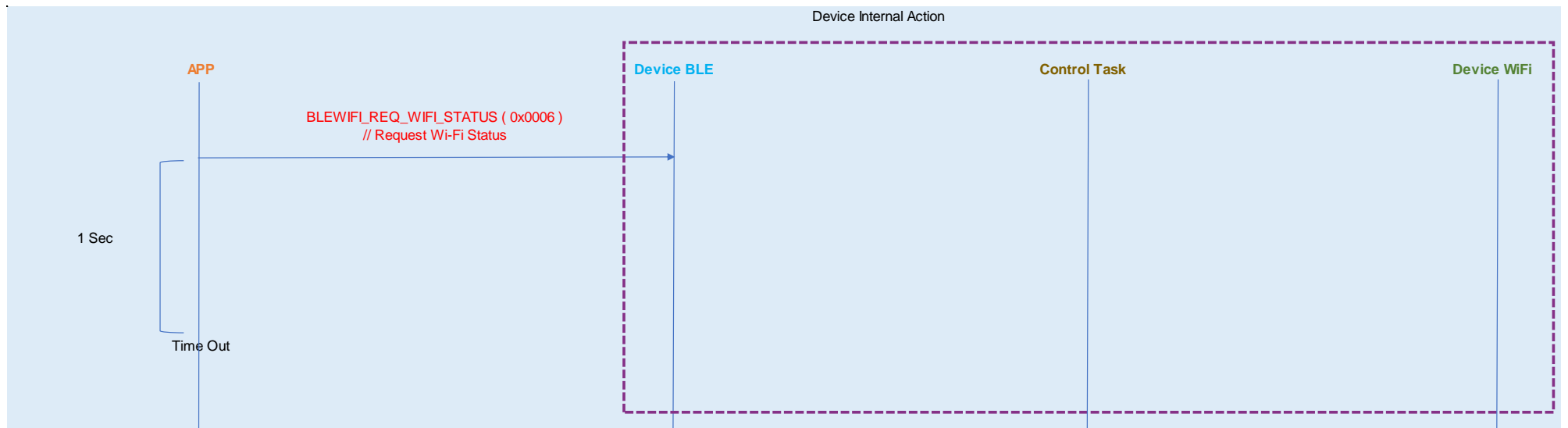
## 4.3. Wi-Fi Scan (REPORT TimeOut)



## 4.4. Wi-Fi Status

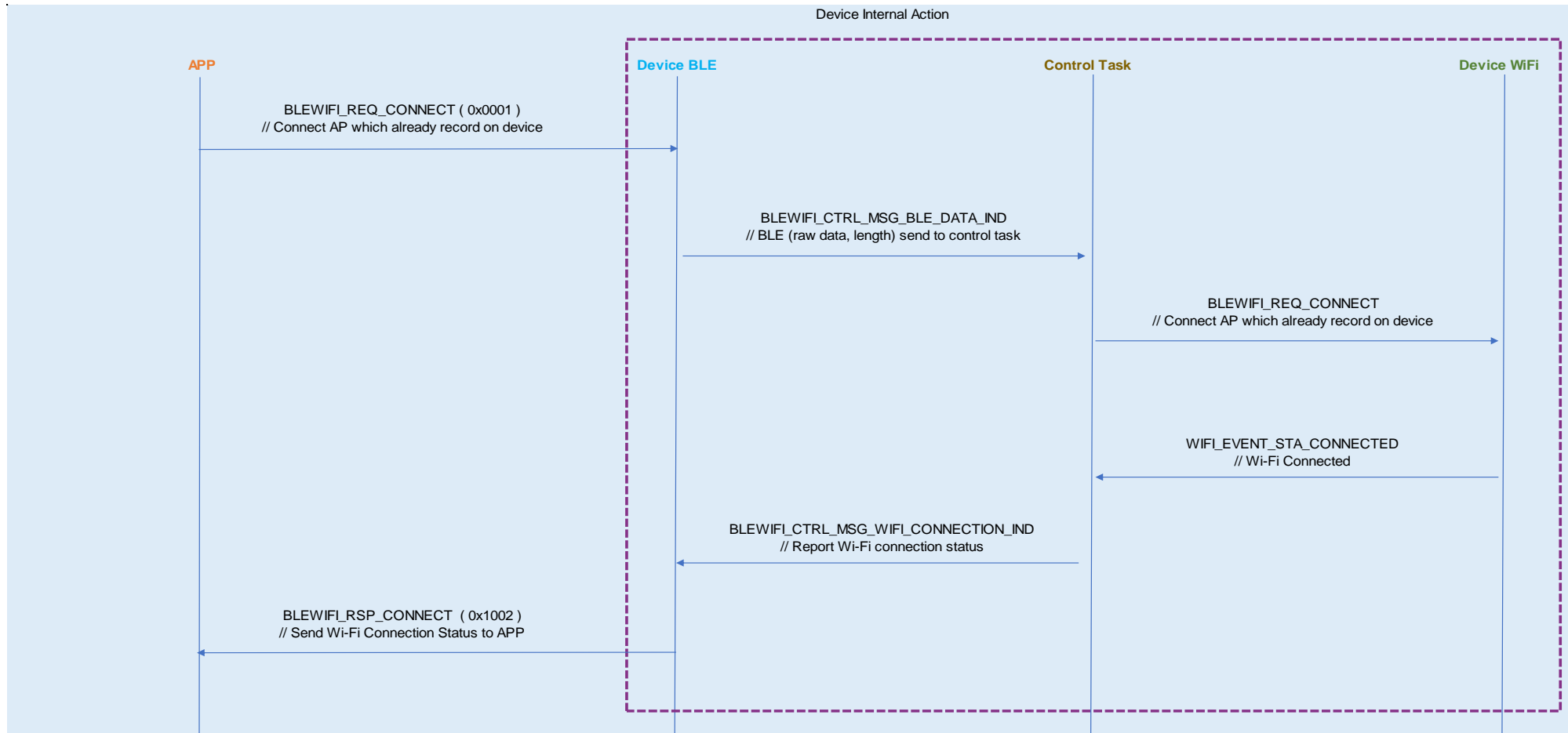


## 4.5. Wi-Fi Status (TimeOut)

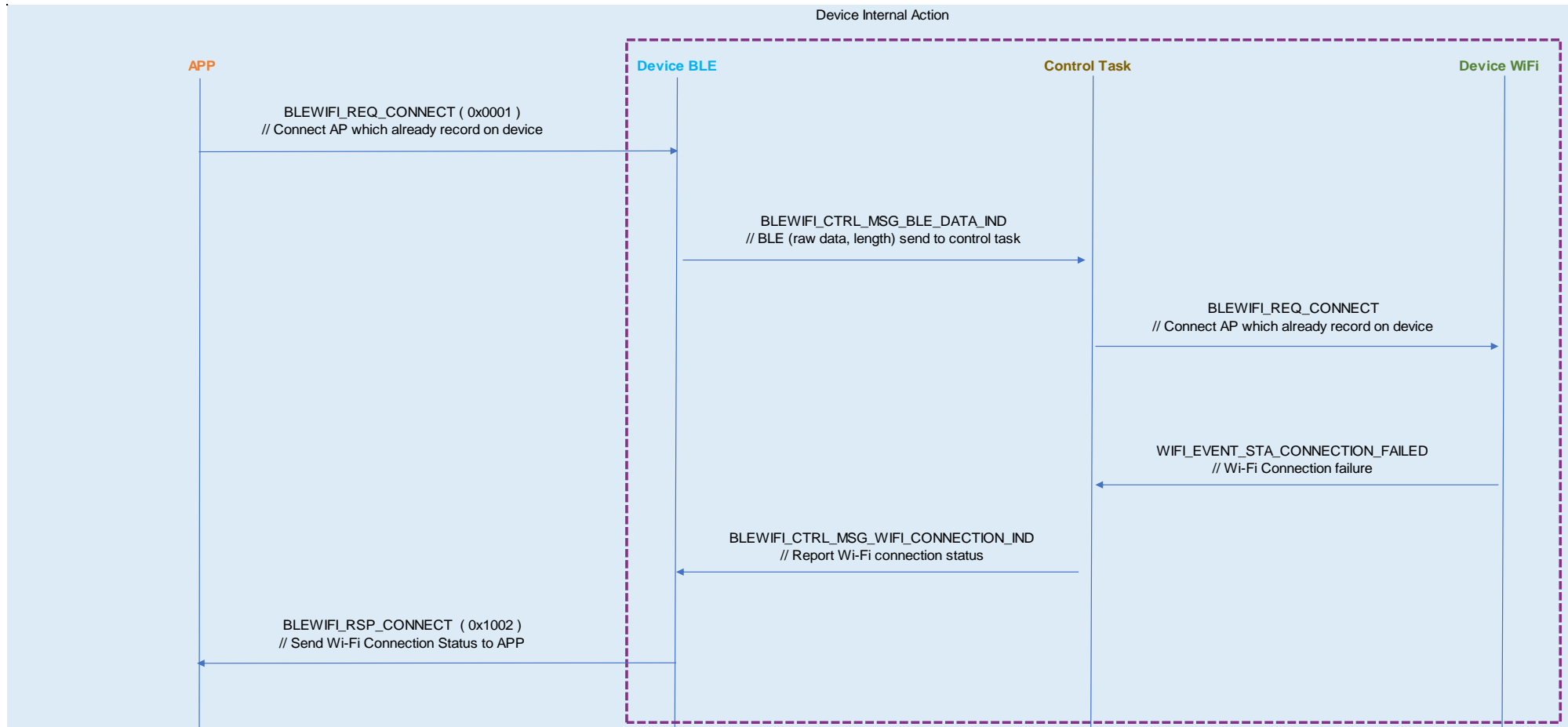




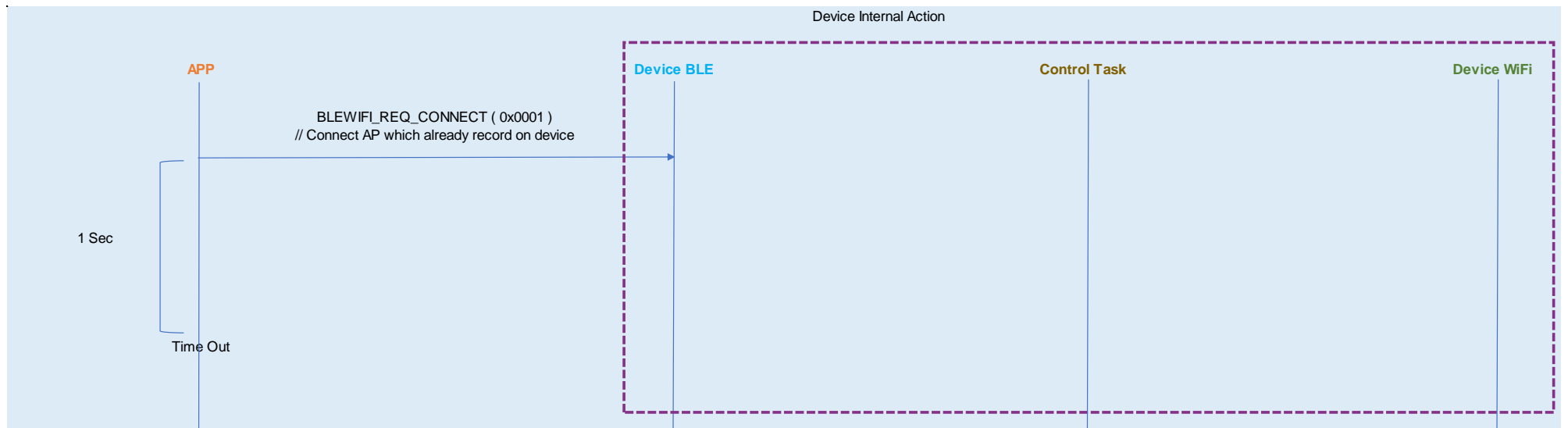
## 4.6. Wi-Fi Connect



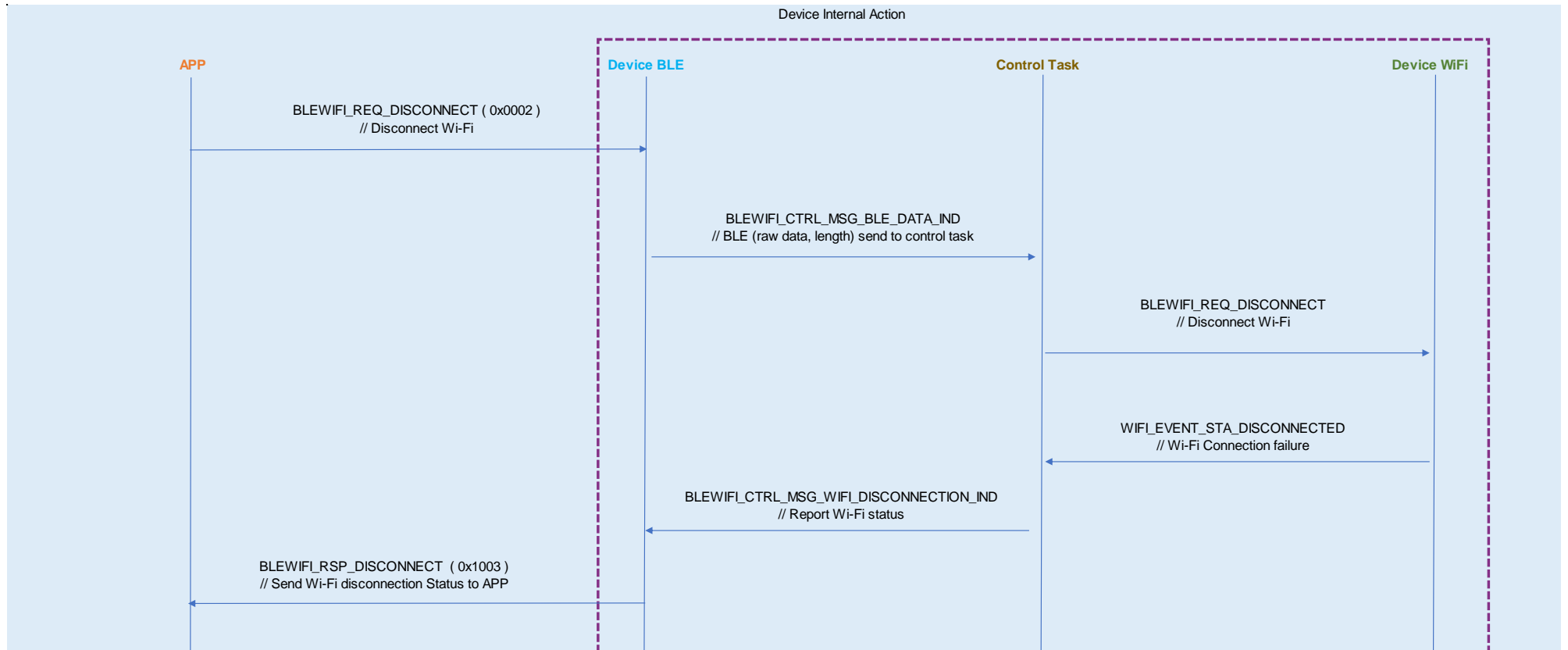
## 4.7. Wi-Fi Connect (Failure)



## 4.8. Wi-Fi Connect (TimeOut)



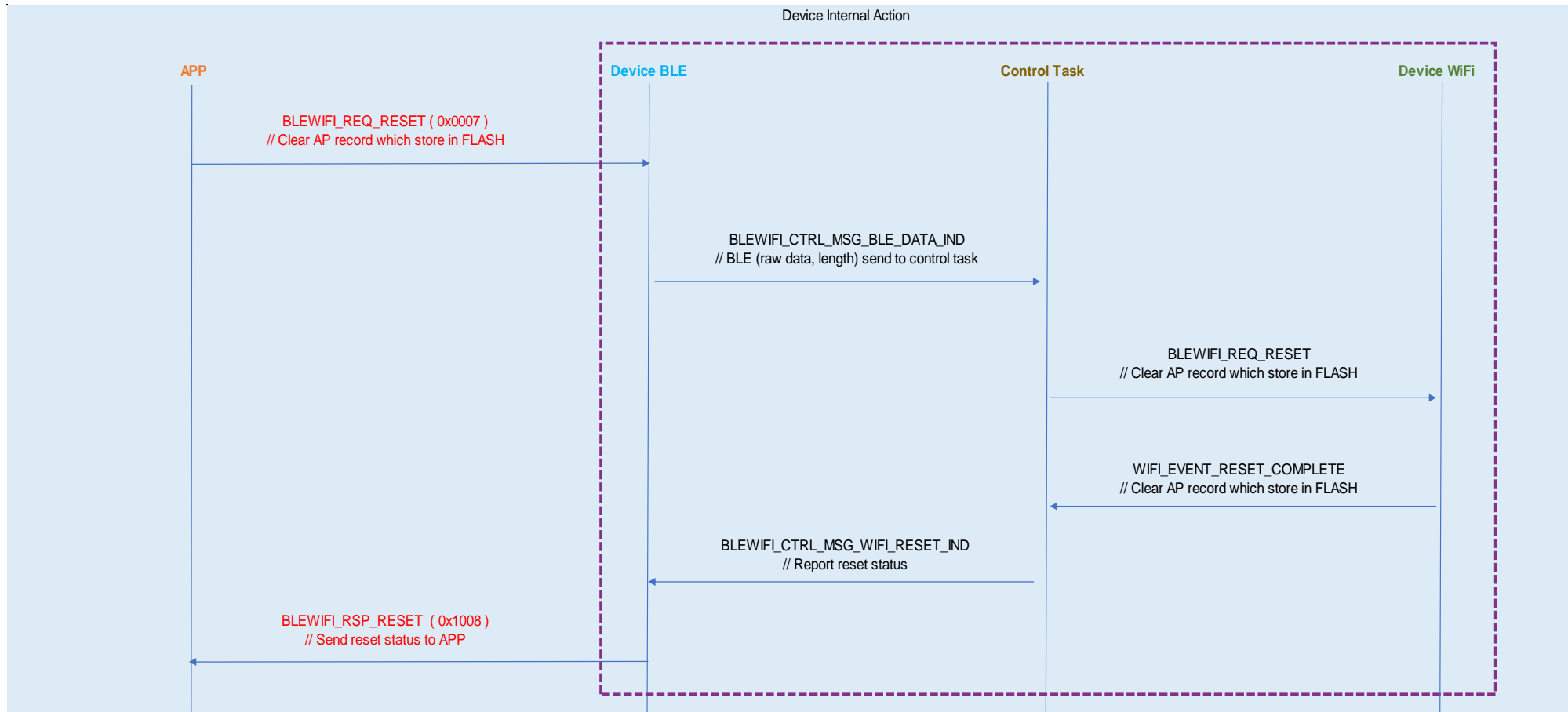
## 4.9. Wi-Fi Disconnect



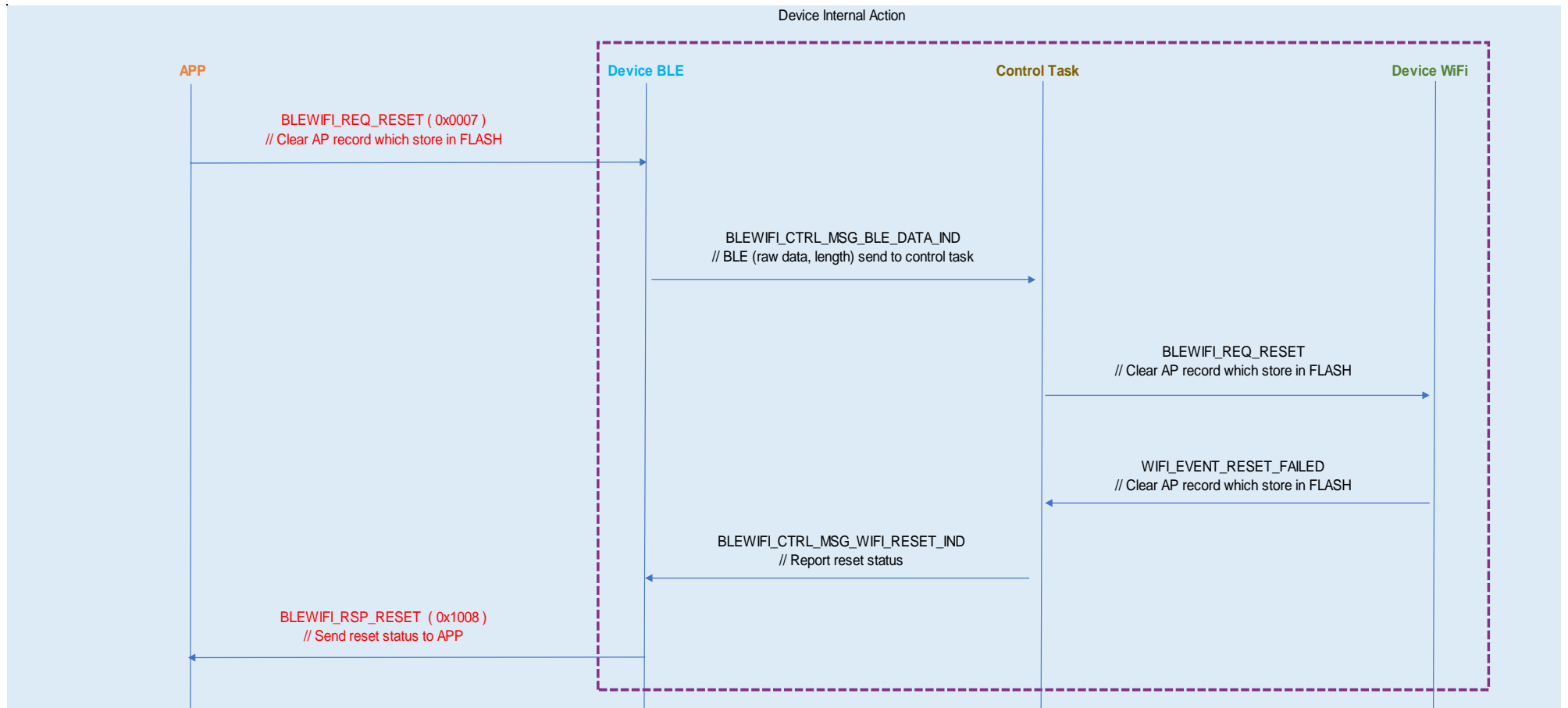
```
sequenceDiagram
    participant APP
    participant Device_BLE as Device BLE
    participant Device_Internal as Device Internal Action
    participant Control_Task as Control Task
    participant Device_WiFi as Device WiFi

    APP->>Device_BLE: BLEWiFi_REQ_DISCONNECT ( 0x0002 )  
// Disconnect Wi-Fi
    activate Device_BLE
    Device_BLE->>Device_Internal: 
    activate Device_Internal
    Device_Internal->>Control_Task: 
    activate Control_Task
    Control_Task->>Device_WiFi: 
    activate Device_WiFi
    Device_WiFi-->>Device_Internal: 
    deactivate Device_WiFi
    Device_Internal-->>Device_BLE: 
    deactivate Device_Internal
    Device_BLE-->>APP: 
    deactivate Device_BLE
    Note over Device_BLE: 1 Sec
```

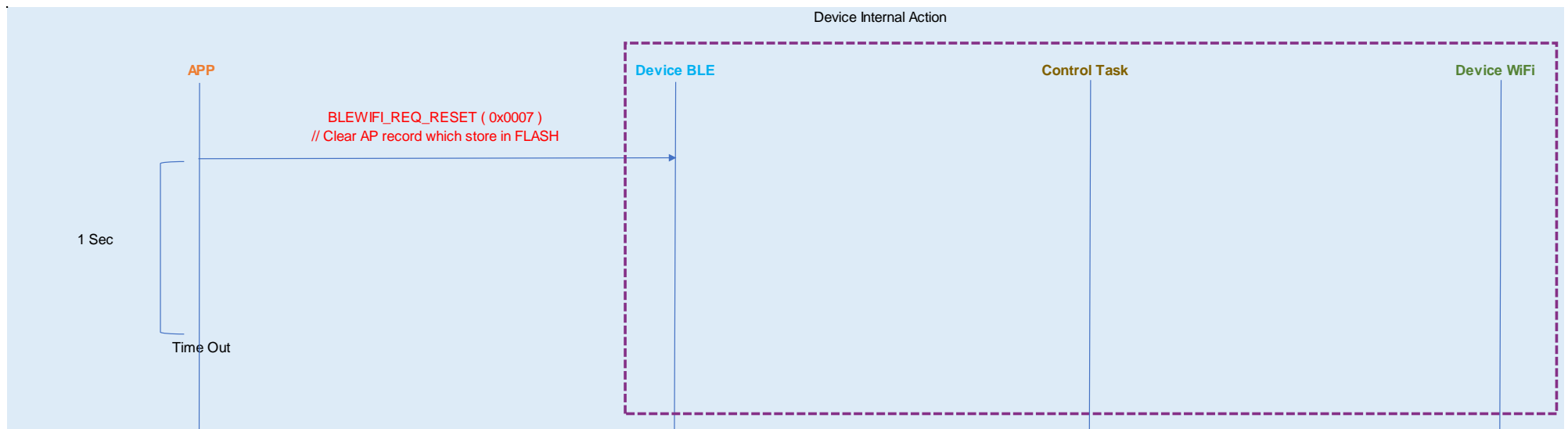
## 4.11. Wi-Fi Reset



## 4.12. Wi-Fi Reset (Failure)



## 4.13. Wi-Fi Reset (TimeOut)





## CONTACT

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