OPL1000

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

BLE to WiFi Application Development Guide

OPULINKS

REVISION HISTORY

Date	Version	Contents Updated
2018/4/1	0.1	• Initial Release
2018/6/19	0.2	• Add message chart and add new command IDs
2018/6/20	0.3	• Modify WIFI status part
2018/7/19	0.4	• Add document application scope, abbr., reference etc.
2018/8/01	0.5	• Add OTA
2018/9/07	0.6	• Add WiFi OTA
2019/7/10	0.7	• Modify blewifi example path
2020/8/10	1.0	• Update chap 3-1 • Organization typesetting

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Scope of Document Application

This document outlines the process of WIFI AP connection through BLE, the API port used and message procedure. Corresponding to the demonstration project, "SDK\APS_PATCH\examples\system\blewifi", of OPL1000 SDK Package.

About the BLE config WIFI AP Demo is described in "OPL1000-Demo-BLE-setup-network-guide.pdf" document ,a document located in the Demo\BLE_Config_AP directory.

1.2. Abbreviations

Abbr.	Explanation
BLE	Bluetooth Energy
WIFI	Wireless Fidelity

1.3. References

[1] 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

Bytes	2	2	1	1
	cmd_id	data_length	show_hidden	scan_type
	Header		Data	

- 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), active+passive(2).

Example for frame format:

Bytes	2	2	1	1
	cmd_id	data_length	show_hidden	scan_type
Value	0x0000	0x0002	01	00

3.2. SCAN REPORT RESPONSE

Bytes	2	2	1	1~32	6	1	1	1
	cmd_id	data_length	Ssid_length	ssid	bssid	Auth_mode	Rssi	Connected
	Header			Data				

- 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

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	0x1002	0x0001	00

3.6. DISCONNECT REQUEST

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	0x0002	0x0000

3.7. DISCONNECT 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	0x1003	0x0001	00

3.8. RECONNECT REQUEST

Byte	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:

Byte	2	2

	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

Byte	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:

Byte	2	2
	cmd_id	data_length
Value	0x0004	0x0000

3.11. READ DEVICE INFORMATION RESPONSE

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	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

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	0x1007	0x0020	01	08	44 2d 4c 69 6e 6b 5f 44	74 DA DA E7 08 F1

	4	4	4
	IP	mask	Gateway
Value	C0 A8 00 72	FF FF FF 00	C0 A8 00 FF

3.16. RESET 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	0x0007	0x0000

3.17. RESET RESPONSE

Bytes	2	2	1
	cmd_id	data_length	status
	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 (1)

Example for frame format:

Bytes	2	2	1
	cmd_id	data_length	status
Value	0x1008	0x0001	00

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

Byte	2	2	2	64
	cmd_id	data_length	Max_rx	FW_Header
	Header			

- 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

Byte	2	2	1
	cmd_id	data_length	status
	Header		

- CMD_ID : command ID, please refer to section of Command ID.
- Data_Length : size of data
- Status : return success (0) or failed reason code

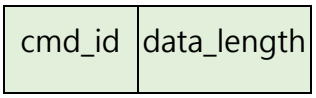
3.22. BLE OTA RAW DATA REQUEST

Byte	2	2	1 ~ 256
	cmd_id	data_length	Raw data
	Header		

- 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

Byte 2 2

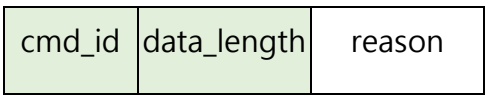


Header

- CMD_ID : command ID, please refer to section of Command ID.
- Data_Length : size of data

3.24. BLE OTA END REQUEST

Byte 2 2 1

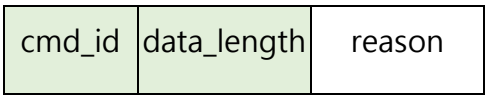


Header

- 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

Byte 2 2 1



Header

- 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

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	0x200	0x0000

3.27. WiFi OTA TRIGGER RESPONSE

Bytes	2	2	1
	cmd_id	data_length	status
	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 (1)

Example for frame format:

Bytes	2	2	1
	cmd_id	data_length	status
Value	0x1200	0x0001	00

3.28. WiFi OTA DEVICE 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	0x201	0x0000

3.29. WiFi OTA DEVICE 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	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:

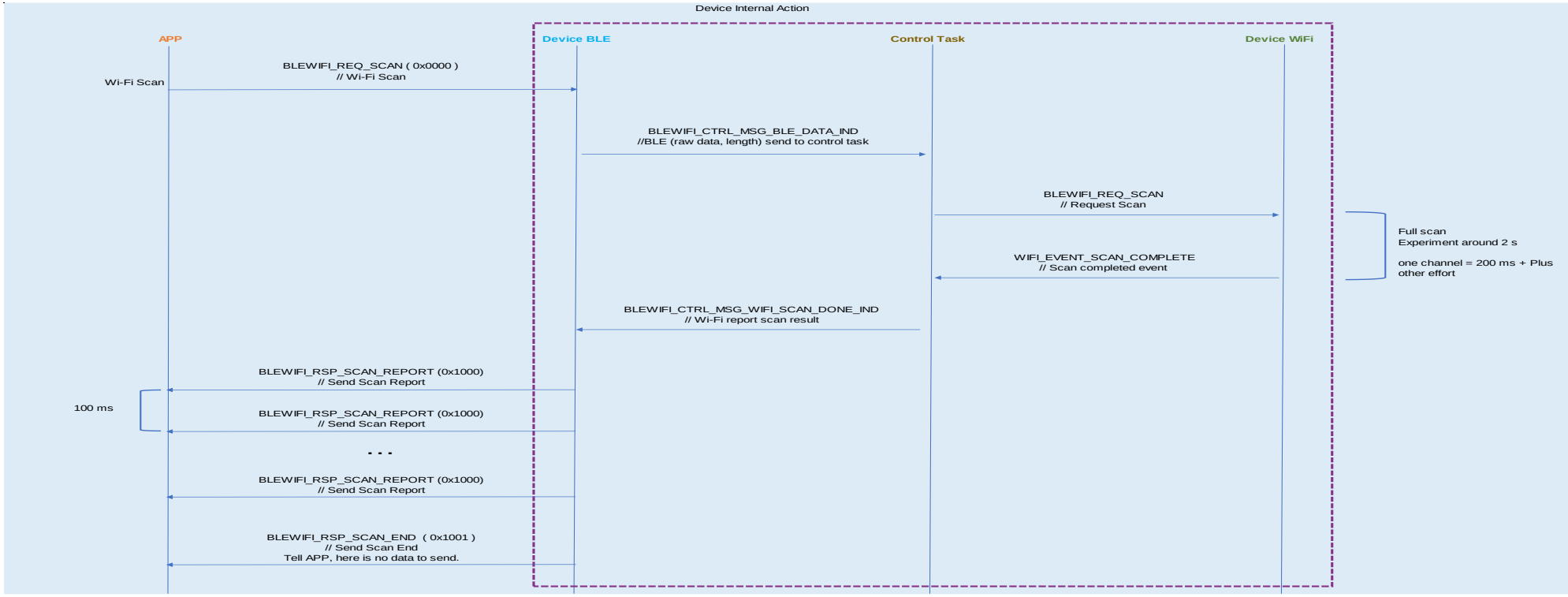
Bytes	2	2	1	1	1~32	6
	cmd_id	data_length	status	ssid length	ssid	bssid
Value	0x2000	0x0020	00	08	44 2d 4c 69 6e 6b 5f 44	74 DA DA E7 08 F1

4	4	4

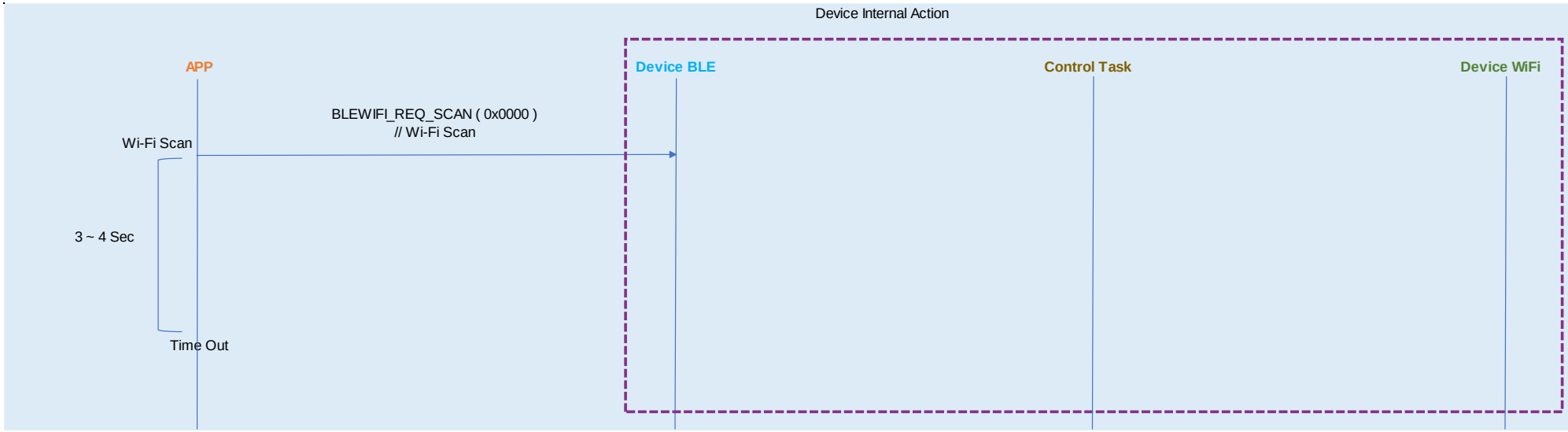
IP	mask	Gateway
C0 A8 00 72	FF FF FF 00	C0 A8 00 FF

4. Message Chart

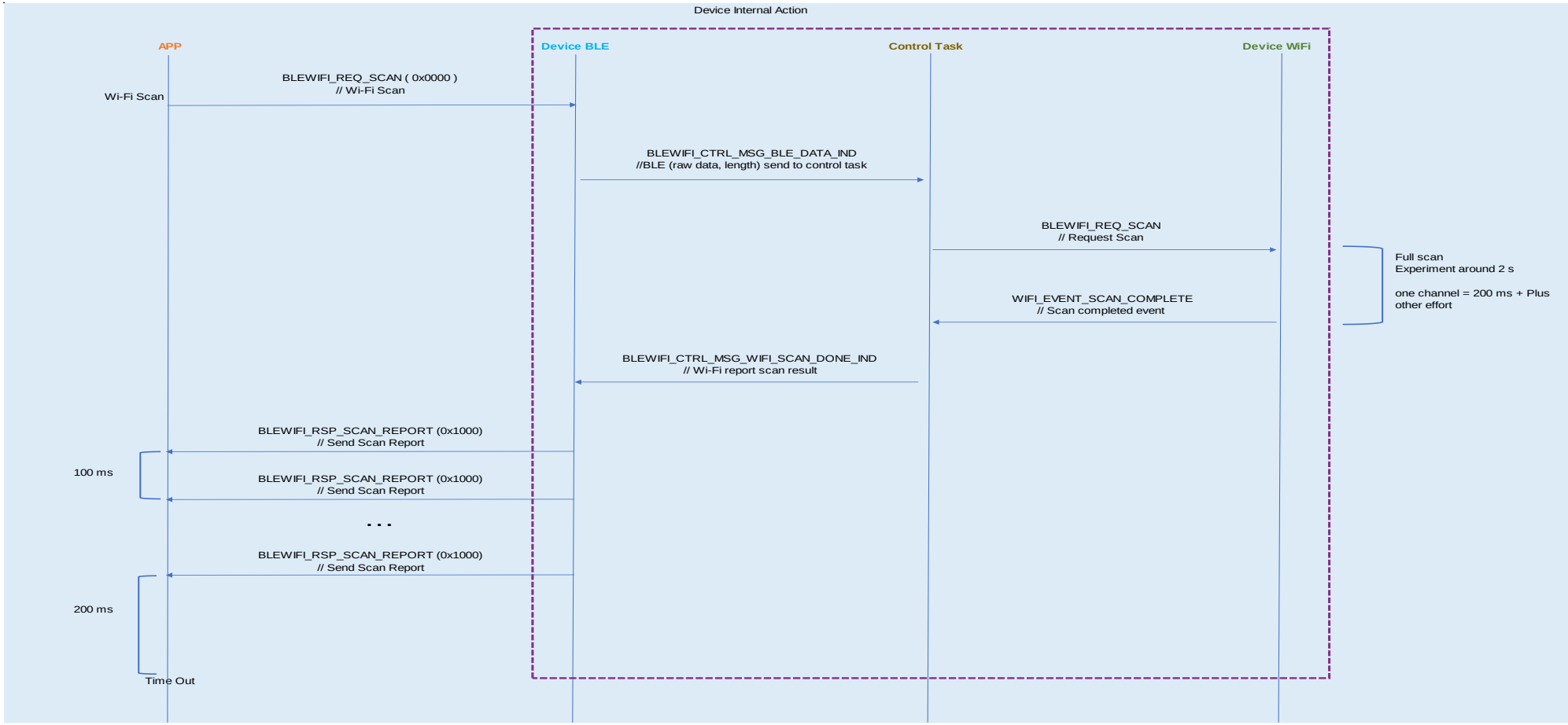
4.1. Wi-Fi Scan



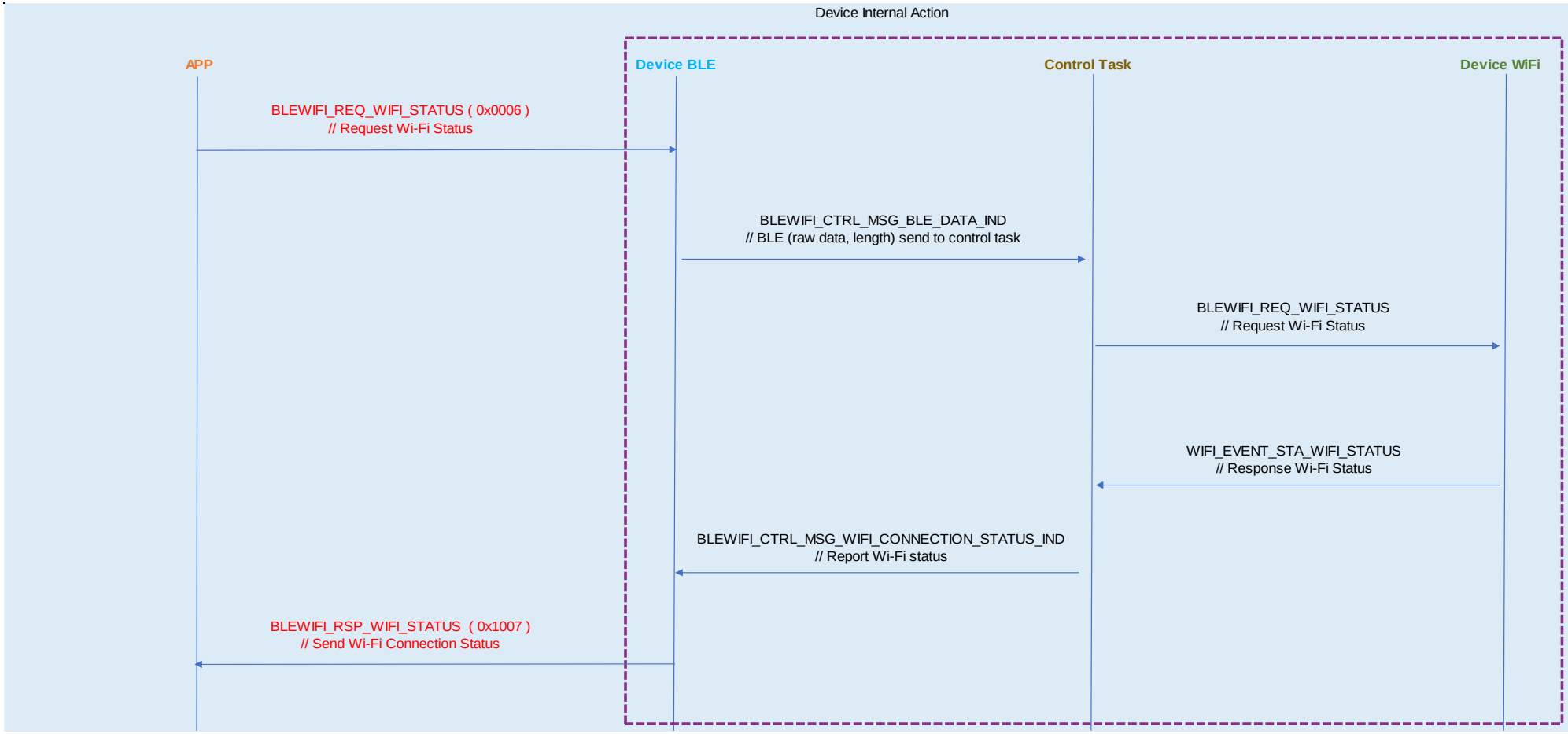
4.2. Wi-Fi Scan (TimeOut)



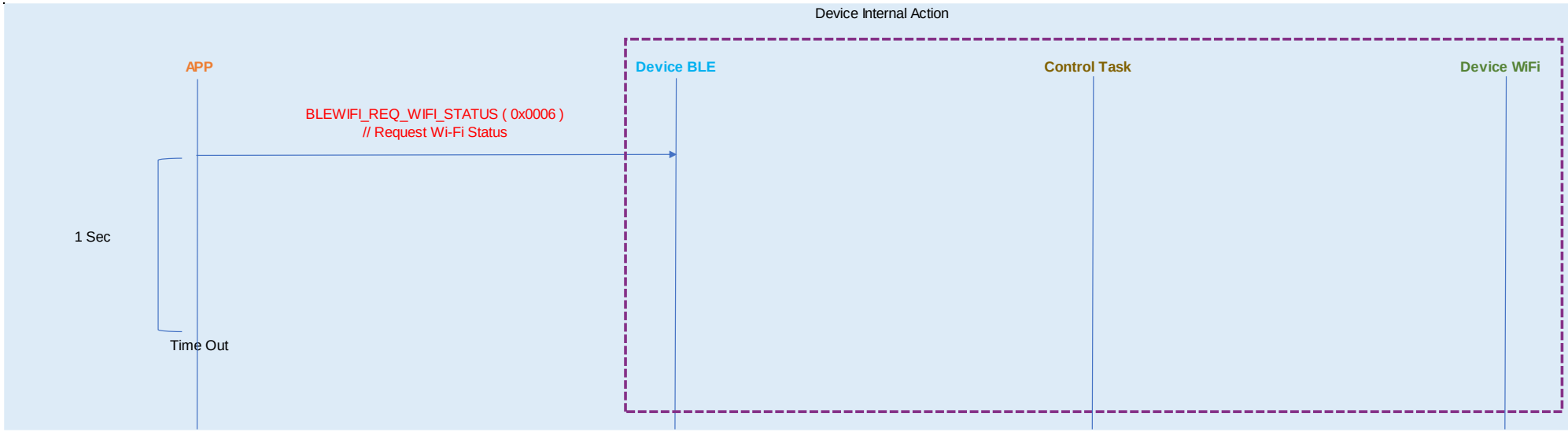
4.3. Wi-Fi Scan (REPORT TimeOut)



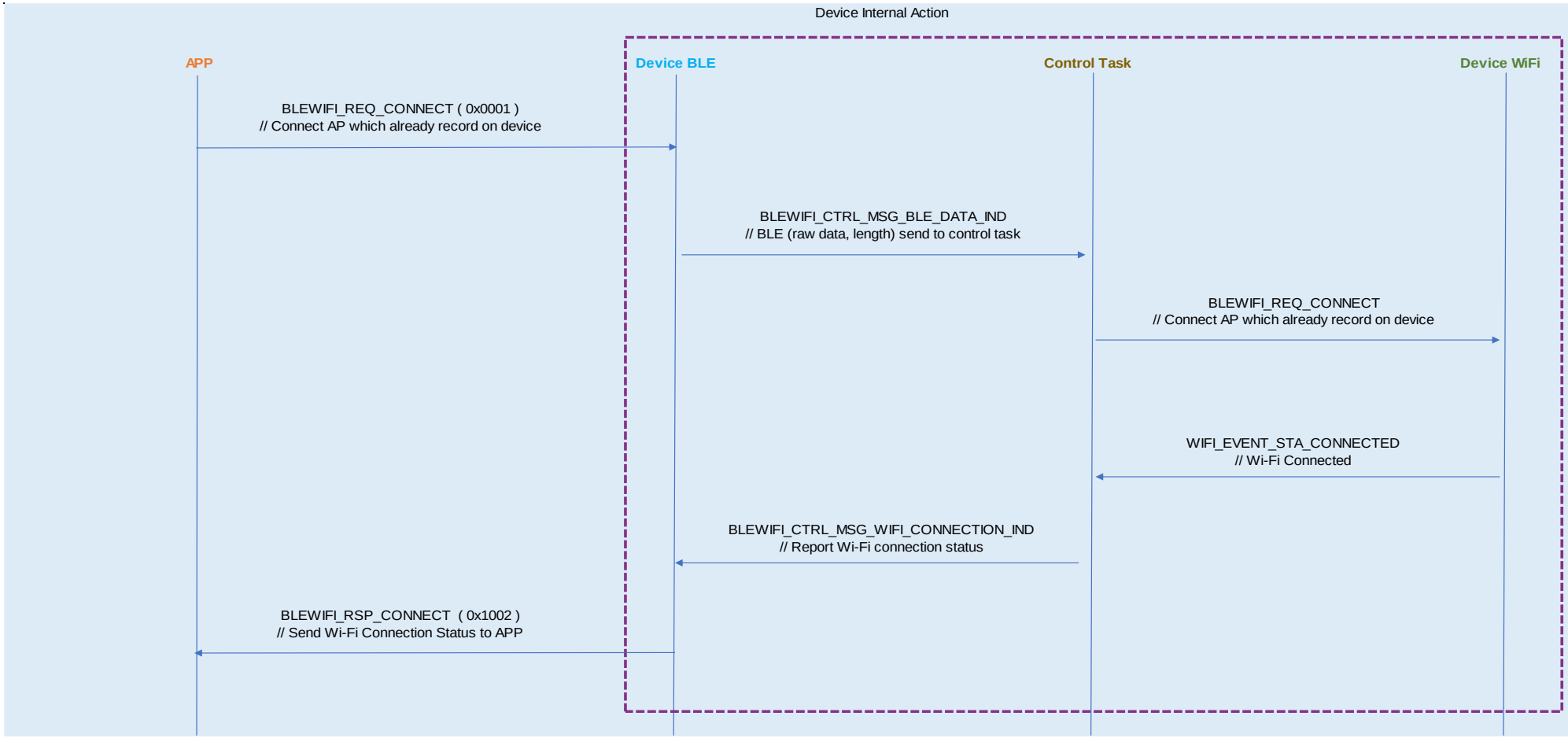
4.4. Wi-Fi Status



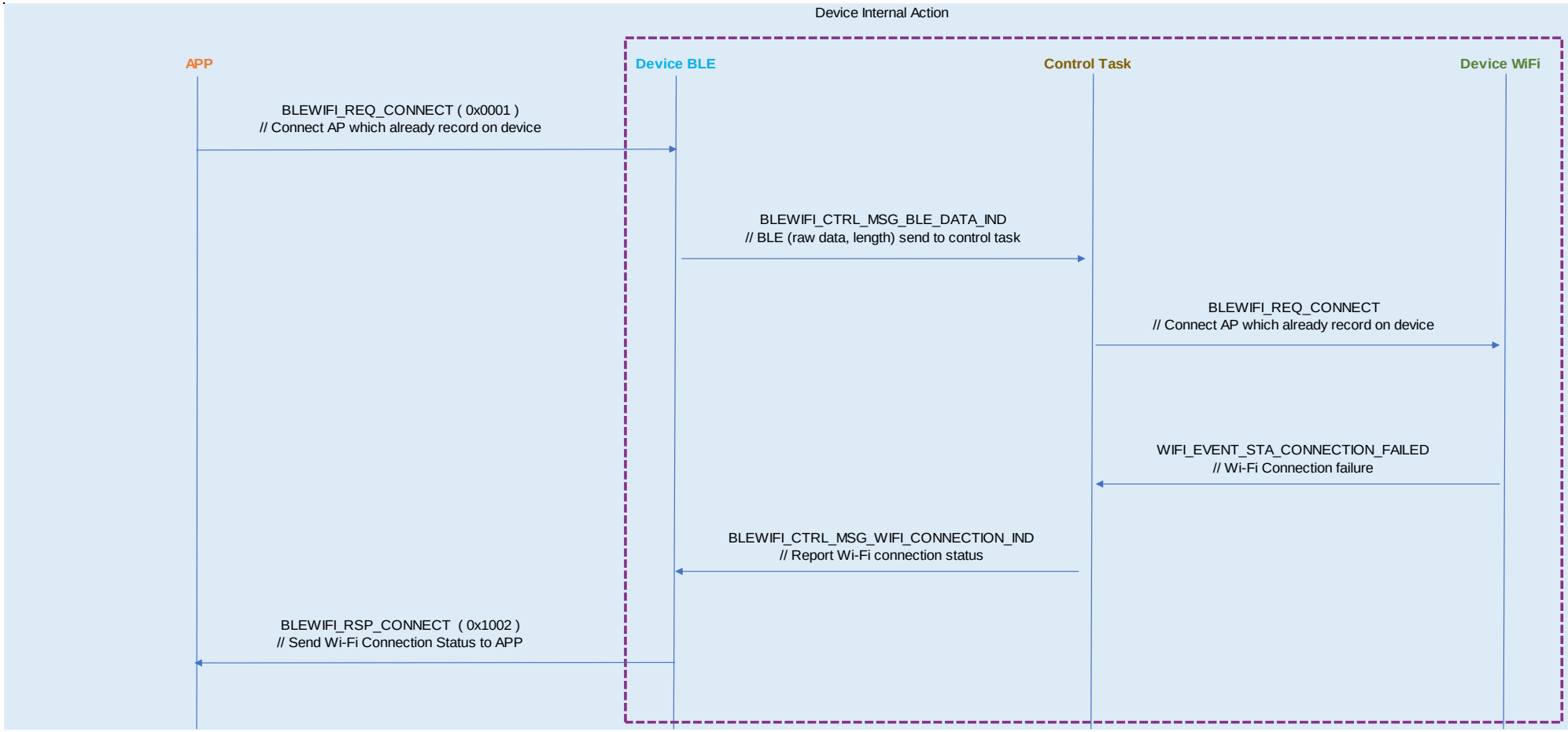
4.5. Wi-Fi Status (TimeOut)



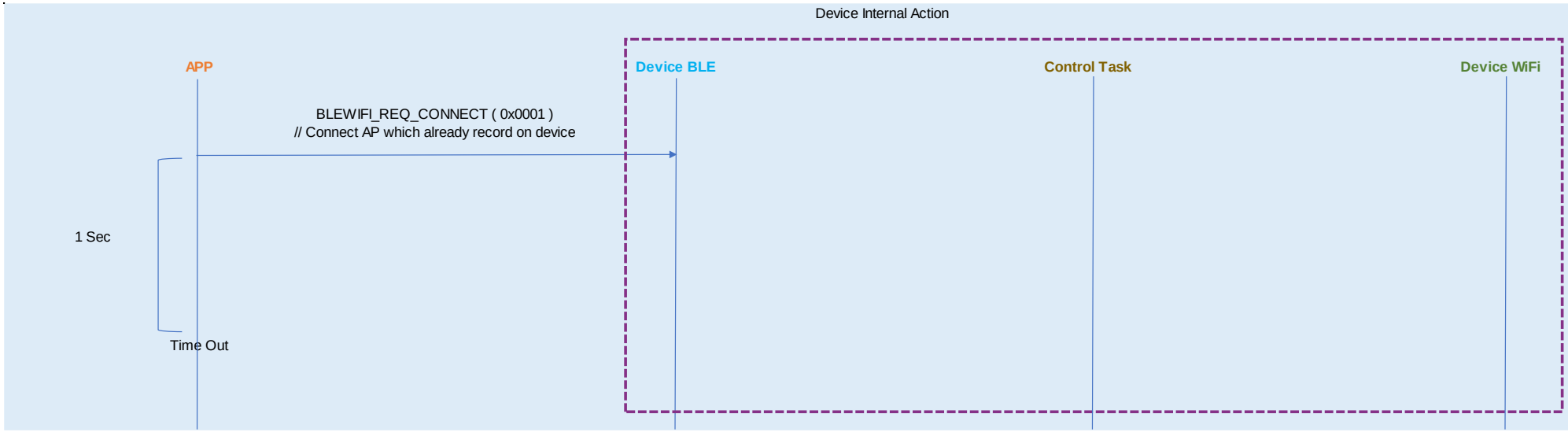
4.6. Wi-Fi Connect



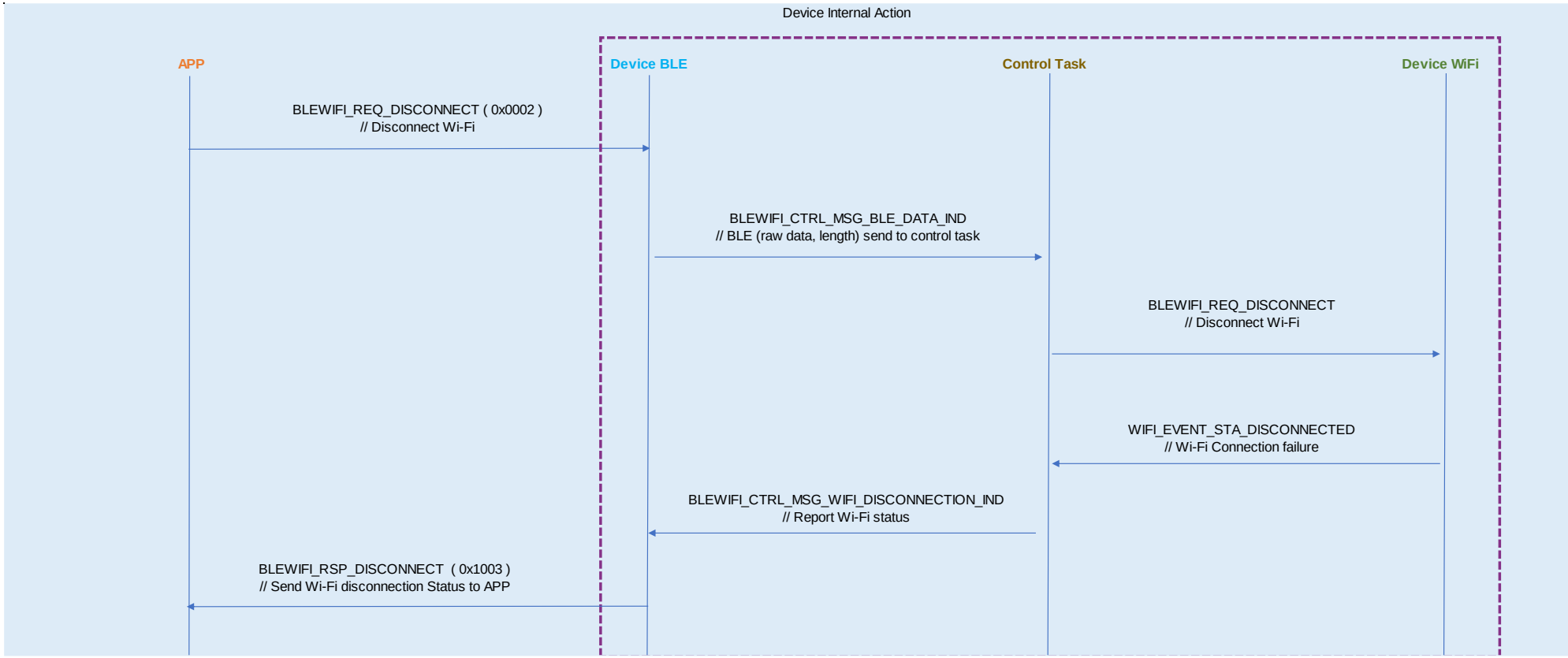
4.7. Wi-Fi Connect (Failure)



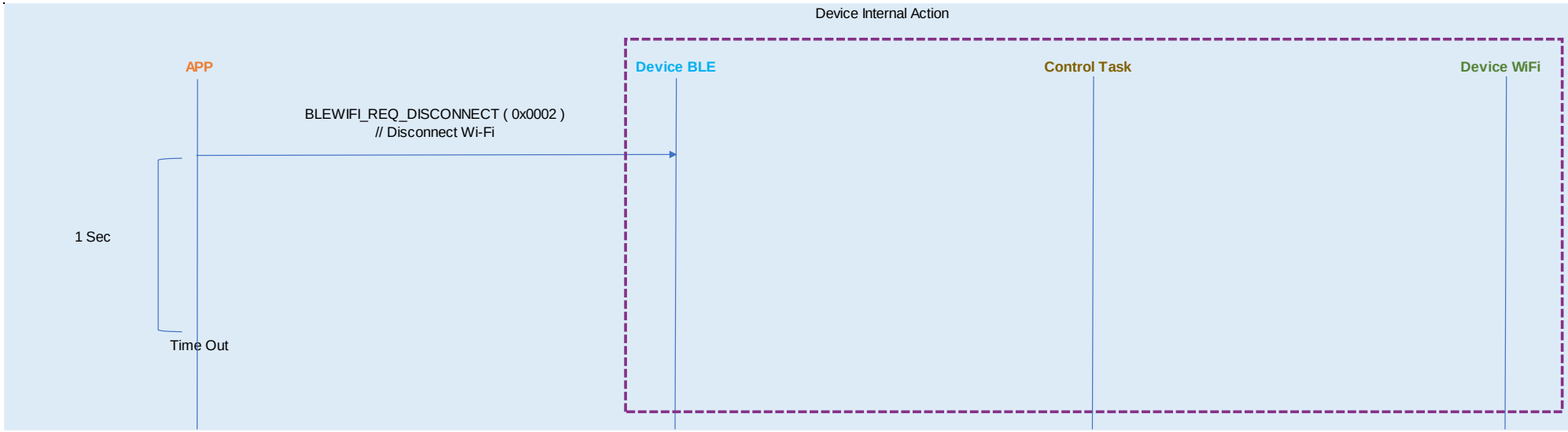
4.8. Wi-Fi Connect (TimeOut)



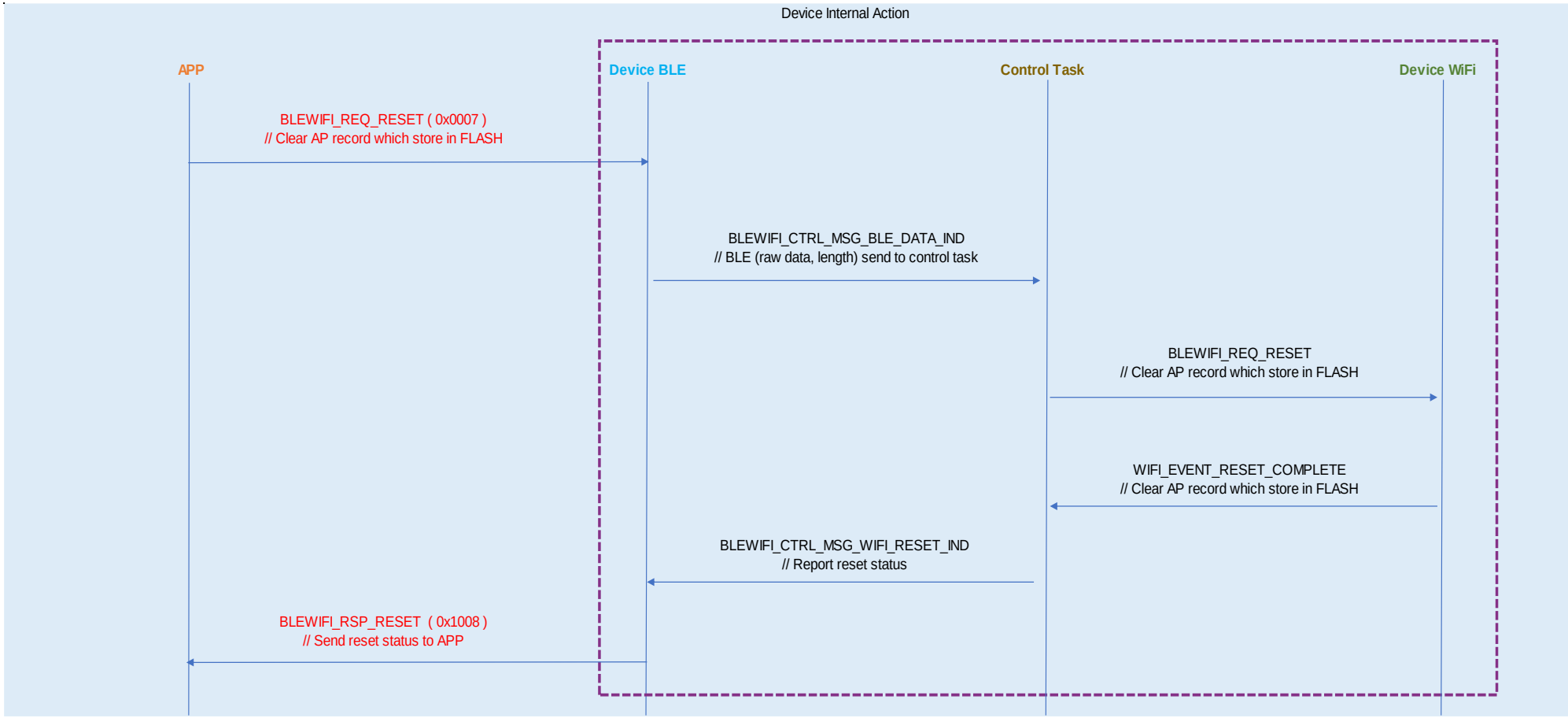
4.9. Wi-Fi Disconnect



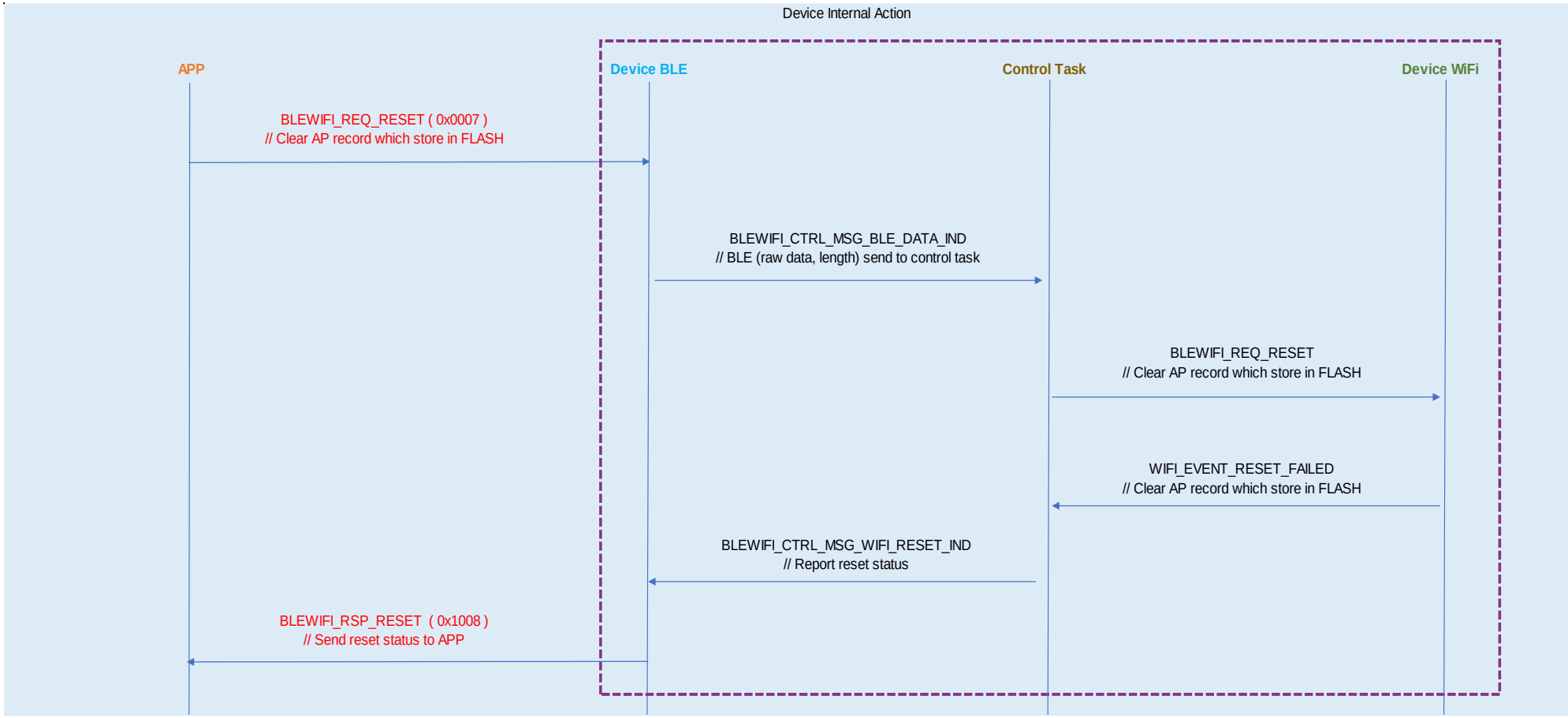
4.10. Wi-Fi Disconnect (TimeOut)



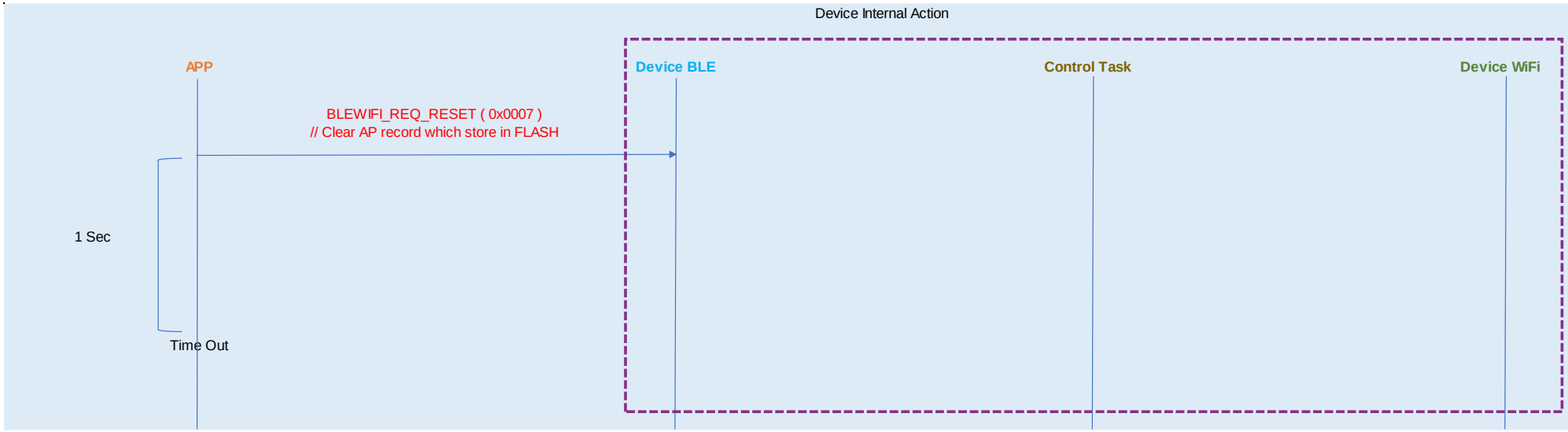
4.11. Wi-Fi Reset



4.12. Wi-Fi Reset (Failure)



4.13. Wi-Fi Reset (TimeOut)



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