WF88-M MQTT GPIO Remote Control Design

1. Overview

This document specifies the design and usage of the MQTT-based GPIO remote control and monitoring feature for the WF88-M module.

Note: This GPIO configuration is applicable only to the WF88-M module.

2. System Configuration (NVM)

- **Config Name**: `GPIOModeSet`
- **Config ID**: `VAR_ID_GPIO_MODES`
- **Data Format**: String
- **Default Value**: `"IN,IN,IN,IN,IN,IN,IN,IN"`
- **Config Command**: `at+ab config GPIOModeSet =OUT,IN,IN,IN,IN,IN,IN,IN`

2.1 Mapping between Configuration String and GPIO (GPIO0 - GPIO7)

Each position in the configuration string corresponds to a specific GPIO index:

String Position	Corresponding Pin	Description
1st (e.g., "OUT")	**GPIO 0**	Allows `gpiowrite`, blocks `gpioread` requests
2nd (e.g., "IN")	**GPIO 1**	Allows `gpioread` requests, blocks `gpiowrite`
3rd	**GPIO 2**	...
4th	**GPIO 3**	...
5th	**GPIO 4**	...
6th	**GPIO 5**	...
7th	**GPIO 6**	...
8th	**GPIO 7**	...

3. MQTT Protocol Specification

3.1 Dynamic Topic Generation

Assuming MAC = `00:80:E1:FC:AB:4C`

Function	Topic Name	Action
Remote Write	`T00:80:E1:FC:AB:4C/gpiowrite`	Subscribe
Remote Read	`T00:80:E1:FC:AB:4C/gpioread`	Subscribe
Result Feedback	`T00:80:E1:FC:AB:4C/gpioresult`	Publish

3.2 Payload Format

- **gpiowrite**: `PinIndex,Value` (e.g., `5,1`)
- **gpioread**: `PinIndex` (e.g., `5`)
- **gpioresult**: `PinIndex,State` (e.g., `5,0`)

4. Core Logic & Validation

1. **Write Protection**: Blocked if pin is not configured as `OUT`.
2. **Read Filtering**: Only allowed if pin is configured as `IN`.

5. Communication Examples (Message Flow)

Setup: Execute command: `at+ab config GPIOModeSet =OUT,IN,IN,IN,IN,IN,IN,IN` (Result: GPIO 0 is
Output, GPIO 1-7 are **Input**)

Case A: Setting GPIO 0 to High

1. **Remote App**: Publishes to `T00:80:E1:FC:AB:4C/gpiowrite`.
2. **Payload**: `0,1`
3. **Result**: GPIO 0 pin on the module goes High.

Case B: Unauthorized Write to GPIO 1

1. **Remote App**: Publishes to `T00:80:E1:FC:AB:4C/gpiowrite`.
2. **Payload**: `1,1`
3. **Result**: Operation rejected because GPIO 1 is `IN`.

Case C: Querying the state of GPIO 1

1. **Remote App**: Publishes to `T00:80:E1:FC:AB:4C/gpioread`.
2. **Payload**: `1`
3. **Result**:
    - Module reads GPIO 1 level (e.g., Low).
    - Module publishes `1,0` to `T00:80:E1:FC:AB:4C/gpioresult`.

6. GPIO Hardware Mapping Table (WF88-M)

Mapping between the MQTT logical index (external) and the internal MCU port:

MQTT Index (External)	Internal MCU Port (ref SDK)	Physical Pin Info
0	10	GPIO 0
1	1	GPIO 1
2	2	GPIO 2
3	3	GPIO 3
4	4	GPIO 4

5	7	GPIO 5
6	6	GPIO 6
7	9	GPIO 7