SafeLoRa Troubleshooting Guide

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November 26, 2025

Introduction

This document lists all known issues encountered in the SafeLoRa project, including the ESP32-P4 Tab5 tablet, E220 LoRa module, vibration sensor, MQTT communication, and UI stability. Each issue includes symptoms, causes, and resolution steps.

1 System Overview

- **Sender Node:** ESP32 + E220 LoRa + SW-420 vibration sensor.
- **Receiver Node:** M5Stack Tab5 (ESP32-P4) + E220 LoRa + optional MQTT uplink.
- **Communication:** UART → E220 → 868 MHz link → UART → Tab5.

2 Troubleshooting Index

1. E220 module not sending or receiving frames
2. Wrong frequency or channel configuration
3. RSSI always equal to 0 dBm
4. Tab5: Wi-Fi not working (SDIO pins)
5. Tab5: MQTT not sending data
6. SW-420 vibration not detected
7. UI freezes or becomes slow
8. LoRa frames received only twice and then stop
9. JSON parsing errors
10. Power and grounding issues

3 E220 Module Issues

3.1 1. Nothing Received on the Tablet

Symptoms:

- No messages appear on Serial Monitor.
- Display shows "NO SIGNAL".

Common Causes:

- TX/RX pins reversed.
- Different UART baud rates between sender and receiver.
- E220 configured with different channel or address.

Fix:

1. Verify wiring: RX $\leftrightarrow$ TX, GND shared.
2. Ensure baud rate is **9600 bps**.
3. Set same parameters using the EBYTE configurator:
    - CH18 (868.125 MHz)
    - Fixed mode
    - AddrH = 0x00, AddrL = 0x01 (or your own values)

3.2 2. Wrong Frequency or Channel

Symptoms: Frames are lost every few seconds.
Fix:

- Ensure both modules use **CH18 = 868.125 MHz**.
- Make sure country regulations follow **ETSI EN 300 220 (REC 70-03)**.

3.3 3. RSSI Always Shows 0 dBm

Cause: Reader did not wait for the full 4-byte response.
Fix:

- Add a 50 ms timeout.
- Clear serial before sending the RSSI command.

4 Tab5 / ESP32-P4 Issues

4.1 4. Wi-Fi Does Not Work

Cause: Wrong SDIO pins for ESP32-P4.

Correct Pins:

```
WiFi.setPins(GPIO_NUM_12, GPIO_NUM_13, GPIO_NUM_11,
             GPIO_NUM_10, GPIO_NUM_9, GPIO_NUM_8,
             GPIO_NUM_15);
```

4.2 5. MQTT Messages Not Sent

Checklist:

1. Internet working on Tab5.
2. TLS certificate configured:
   - `espClient.setCACert(ca_cert);`
3. Correct credentials (EMQX local username, not WebClient).
4. Topic exists: `SafeLoRa/vibration`.

4.3 6. LoRa Frames Stop After 2 Messages

Cause:

- Blocking delays inside the UI code.
- Drawing too many frames per second.

Fix:

- Limit UI refresh to 5 FPS.
- Remove long `delay()` calls.

5 Vibration Sensor Issues

5.1 7. No Vibration Detected

Checklist:

- SW-420 output pin connected to ESP32 digital input.
- LM393 board powered at 5 V.
- Potentiometer adjusted. Clockwise increases sensitivity.

5.2 8. Too Many False Alarms

Fix:

- Reduce LM393 sensitivity.
- Add software debounce:

```
if (millis() - lastTrigger < 300) ignore;
```

6 JSON / Parsing Issues

6.1 9. JSON Not Recognised

- Payload must be ASCII (no binary noise).
- JSON example:

```
{"vibration":1, "strength":54, "ts":1234567}
```

- Ensure sender flushes Serial before writing.

7 Power and Grounding

7.1 10. Random Freezes or Reboots

Causes:

- Insufficient current supply.
- Ground loops.

Solutions:

- Use a stable 5 V supply for both LoRa and SW-420.
- Ensure GND shared between ESP32, E220 and sensor.

Conclusion

This troubleshooting guide covers all major sources of issues in the SafeLoRa system. Each section identifies symptoms, typical causes and corrective actions. This document should be used during development, validation, and future debugging sessions.