6. Radios & Protocols

SMHUB integrates multiple radios to support a **broad range of smart home and IoT protocols**, making it a true **multi-radio coordinator and Matter bridge**.

6.1 Zigbee

- **Chipset:** TI CC26xx series.
- **Port:** /dev/ttyS1
- **Baudrate**: 115200
- **RTS/CTS**: false
- **Protocol:** Zigbee 3.0 and legacy devices.
- **Software:** Zigbee2MQTT (Z2M).
- **Integration:**
  - Pairs and manages Zigbee devices directly.
  - Publishes states/events via the preinstalled **Mosquitto MQTT broker**.
  - Compatible with Home Assistant, OpenHAB, Node-RED, and other MQTT platforms.
- **Coordinator Mode:** Can operate as a standalone Zigbee coordinator, without additional servers.

6.2 Thread

- **Chipset:** Silicon Labs EFR32MG series.
- **Port:** /dev/ttyS2
- **Baudrate**: 115200
- **RTS/CTS**: false
- **Protocol:** Thread 1.1/1.2.
- **Integration:**
  - Acts as an **OpenThread Border Router (OTBR)**.
  - Works with **Matterbridge**, exposing Thread/Zigbee devices into Matter.
- **Use Cases:**
  - Bridging Zigbee sensors to Matter.
  - Running mixed Zigbee + Thread networks.

6.3 Z-Wave

- **Radio Module:** EFR32ZG23 expansion module.
- **Port:** /dev/ttyS3
- **Baudrate**: 115200
- **RTS/CTS**: false
- **Protocol:** Z-Wave 700/800 series, including **Z-Wave Long Range (LR)**.
- **Software:** Managed via Z-Wave JS (installable).
- **Integration:**
  - Local Z-Wave or Z-Wave LR networks.
  - Automation via Node-RED and MQTT.
- **Hardware:** Dedicated LED and reset/flash pins for diagnostics and firmware updates.

6.4 4G/LTE (in development)

- **Module:** SIM7672G LTE modem.
- **Port:** /dev/ttyS4
- **Baudrate**: 115200
- **RTS/CTS**: false
- **Capabilities:**
  - LTE Cat 1 connectivity.
  - Interfaces: USB, debug UART.
  - Antenna connectors for LTE and GNSS.
  - SIM slot with SIM detection.
- **Status:** Hardware fully integrated, **software support is in active development**.
- **Planned Functions:**
  - LTE fallback connectivity.
  - Remote site deployments without Ethernet/Wi-Fi.

6.5 Wi-Fi

- **Bands:** Dual-band **2.4 GHz** and **5 GHz**.
- **Modes:** Access Point (AP) and Client.
- **Use Cases:**
  - 2.4 GHz: long range, high compatibility.
  - 5 GHz: higher bandwidth, reduced interference.
- **Integration:** Used for device connectivity and as a network backbone when Ethernet is not available.

6.6 Bluetooth

- **Version:** Bluetooth 5.0.
- **Support:** Bluetooth Low Energy (BLE).

6.7 Multi-Radio Operation

- Zigbee + Thread + Wi-Fi + Bluetooth operate simultaneously out of the box.
- Z-Wave and 4G/LTE are available via expansion modules.
- Hardware and firmware are designed to minimize interference and ensure stable concurrent radio operations.

6.8 Matter Bridge

SMHUB can function as a **Matter bridge**, allowing non-Matter devices to join modern ecosystems:

- Bridges Zigbee and Thread devices into Matter.
- Compatible with Google Home, Apple Home, Amazon Alexa, SmartThings.
- Entirely **local bridging** — no third-party cloud services required.

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