

4. Software & System

SMHUB is powered by a **Linux-based operating system** with an integrated **Node.js runtime** and a suite of **smart home applications**. This software foundation provides both **enterprise-grade stability** and **DIY flexibility**.

4.1 Operating System

- **Base:** Lightweight Linux distribution optimized for embedded controllers.
 - **Runtime:** Node.js preinstalled for native execution of Node.js applications.
 - **Package Management:** Extendable via Linux packages and Python scripts.
 - **Update System:**
 - Secure firmware updates.
 - Individual application updates independent of OS.
-

4.2 Preinstalled Applications

Zigbee2MQTT (Z2M)

- **Preinstalled by default.**
- Works with onboard CC26xx or EFR32XX Zigbee radios.
- Publishes device data to MQTT.
- Compatible with Home Assistant, OpenHAB, Node-RED, etc.
- Local dashboard for Zigbee pairing and monitoring.

Matterbridge

- **Preinstalled by default.**
- Bridges Zigbee/Thread devices into the Matter ecosystem.
- Compatible with Google Home, Apple Home, Amazon Alexa, SmartThings.

Node-RED

- **Preinstalled by default.**
- Visual, flow-based automation editor.

- Includes libraries for MQTT, Z2M, and Matterbridge.
- Accessible via web browser.

Mosquitto MQTT Broker

- **Preinstalled and running by default.**
 - Provides the MQTT backbone for Zigbee2MQTT, Node-RED, and Matterbridge.
 - Allows additional MQTT clients to integrate seamlessly with SMHUB.
-

4.3 System Services

- **Networking**
 - Ethernet (default).
 - Wi-Fi 2.4 GHz and 5 GHz (AP and Client modes).
 - Bluetooth 5.0 with BLE.
 - **VPN Support**
 - WireGuard preinstalled.
 - Secure remote access tunnels.
 - **USB Passthrough**
 - Full passthrough of USB dongles to the host stack.
 - USB protection logic for safe host/device switching.
-

4.4 Built-In Visual System

- **Ambilight System**
 - Runs continuously by default.
 - Uses 12 × WS2812B RGB LEDs for system visualization, notifications, or ambient effects.
 - User-configurable patterns and colors.
 - **Service LEDs**
 - Indicate power, network status, and radio activity.
-

4.5 Features in Development

- **Buzzer Control**
 - System and user notifications.
- **Audio Output (3.5 mm jack)**

- System alerts, notifications, and future media playback.
 - **IR Transmitter & Receiver**
 - IR learning and replay for remote-controlled devices.
 - **Extended LED Controls**
 - Custom animations and media sync in Ambilight.
-

4.6 Developer Options

- Full **SSH access**.
 - Node.js environment ready.
 - Support for Python scripting and Linux daemons.
 - Exposed GPIO, UART, I²C, and SPI for DIY hardware extensions.
-

Revision #1

Created 8 September 2025 16:25:38 by Support3

Updated 8 September 2025 16:29:32 by Support3