

## Case Study - Enterprise IOT

A Cloud Interface Unit (CIU) has been developed using an industry-leading SoC and Wi-Fi chipset, running on FreeRTOS. The CIU communicates with a legacy sensor module through a proprietary protocol, bridging the gap between legacy hardware and modern cloud infrastructure. Sensor data is securely transmitted to the AWS Cloud using the MQTT protocol. Likewise, the cloud can send configuration updates to the sensor module through the CIU over the same protocol.

The onboard Wi-Fi module enables seamless commissioning and provisioning, allowing the CIU to be easily integrated into any network. A mobile application communicates with the CIU via socket-based interfaces during the setup phase to provide Wi-Fi credentials and complete the provisioning process.

The firmware is designed for real-time operation, with clearly defined task separation, priority management, and robust inter-process communication (IPC) using message queues. These optimizations ensure reliable performance and prevent watchdog timeouts. A lightweight LittleFS is used to manage local storage efficiently.

Security is built into the core of the design. The CIU includes an onboard cryptographic chip for secure key management and a secure bootloader that validates firmware integrity during startup. It also supports Over-the-Air (OTA) updates with a rollback mechanism, ensuring system integrity in case of an invalid or failed update.

By retrofitting legacy sensor modules with the CIU, they are transformed into connected, configurable, and updatable devices, significantly enhancing maintainability, reducing operational overhead, and lowering total cost of ownership—extending the value of existing hardware with minimal disruption.