



AWaDH BLE Gateway

Technical Brief

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Technology Summary

The AWaDH BLE Gateway System is a robust, field-ready wireless data communication platform designed to bridge Bluetooth Low Energy (BLE) sensors with the cloud, enabling real-time environmental monitoring across diverse sectors. Developed by IIT Ropar's TIF – AWaDH, the system consists of two primary components: a BLE Node that senses data (e.g., temperature, humidity, light intensity) and a BLE Gateway that transmits it securely to remote servers via Wi-Fi or GSM. With a range of up to 1 km (LOS), low power consumption, and over 100+ node connectivity, the system is ideal for smart agriculture, cold storage, logistics, healthcare, and industrial monitoring.

Background

In agriculture, warehousing, healthcare, and logistics, real-time monitoring of environmental variables is essential but often limited by connectivity challenges, power constraints, and complex system setup. Existing solutions are often high-cost, power-intensive, or lack adaptability for Indian field conditions. AWaDH's BLE Gateway System addresses this gap by offering a lightweight, scalable, and easy-to-deploy IoT communication solution optimized for rural and industrial settings.

Technology Description

- **BLE Node:** Captures environmental parameters such as temperature, humidity, and light intensity using compact, energy-efficient sensors.
- **BLE Gateway:** Acts as a central hub, collecting data from multiple nodes and forwarding it to cloud-based platforms using Wi-Fi or GSM networks.
- **Wireless Firmware Updates:** Enables over-the-air (OTA) updates for long-term deployment without manual servicing.
- **Alert System:** Sends real-time alerts for threshold breaches (e.g., temperature spikes).
- **Coverage & Power:** Up to 1 km communication range in clear conditions with minimal power use, making it suitable for remote deployments.
- **Scalability:** Supports 100+ BLE nodes simultaneously with seamless cloud/app integration.

Market Potential / Proposed Deployment

- **IoT in Agriculture Market (Global):** Projected to reach USD 30.8 Billion by 2032 | CAGR ~10.8%
- **Cold Chain Monitoring Market (India):** Estimated to grow to INR 18,000+ Cr by 2027 with increasing adoption of sensor-based systems.
- **Warehouse & Smart Logistics:** Driven by food safety, e-commerce, and pharma supply chains.
- **Target Sectors:**
 - Smart Farming & Greenhouse Automation
 - Food & Pharma Cold Chain
 - Warehouse Environmental Monitoring
 - Telehealth and Remote Patient Monitoring

Applications

- Monitoring greenhouse conditions (light, humidity, temperature).
- Cold chain tracking for perishable goods in storage or transit.
- Remote patient vital monitoring in healthcare facilities.
- Ambient monitoring in industrial, warehouse, or institutional settings.
- Multi-node environmental sensing across large areas like crop fields or logistics hubs.

Value Proposition

- **Reliable & Scalable:** Connects 100+ nodes, supports GSM/Wi-Fi, and ensures secure long-range data transmission.
- **Plug-and-Play:** Easy setup with pre-configured sensor nodes and mobile compatibility.
- **Power-Efficient:** Low energy footprint enables long-duration use in battery-powered or solar-assisted setups.
- **Durable & Adaptive:** Performs under extreme conditions, from hot warehouses to freezing cold storage units.
- **Real-Time Alerts:** Enables instant notifications on threshold violations to prevent spoilage or system failures.

Technology Status

- **Technology Readiness Level (TRL):** 9 – Ready for commercial deployment
- **Deployment:** Field-tested; referenced in media by Press Information Bureau, ET Government, and Krishi Jagran.
- **Customization:** Firmware and hardware adaptable to different sensor types and sector-specific use cases.
- **Licensing Interest:** Open for exclusive/non-exclusive licensing, technology co-development, and commercialization.

