

AWaDH BLE Gateway

Technical Brief

Ref No: TechBrief/2025/06

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.

