



**GadgEon**  
Engineering Smartness



## Communications during Emergency Events at Schools

Customer needed a reliable communication system during emergency events at schools

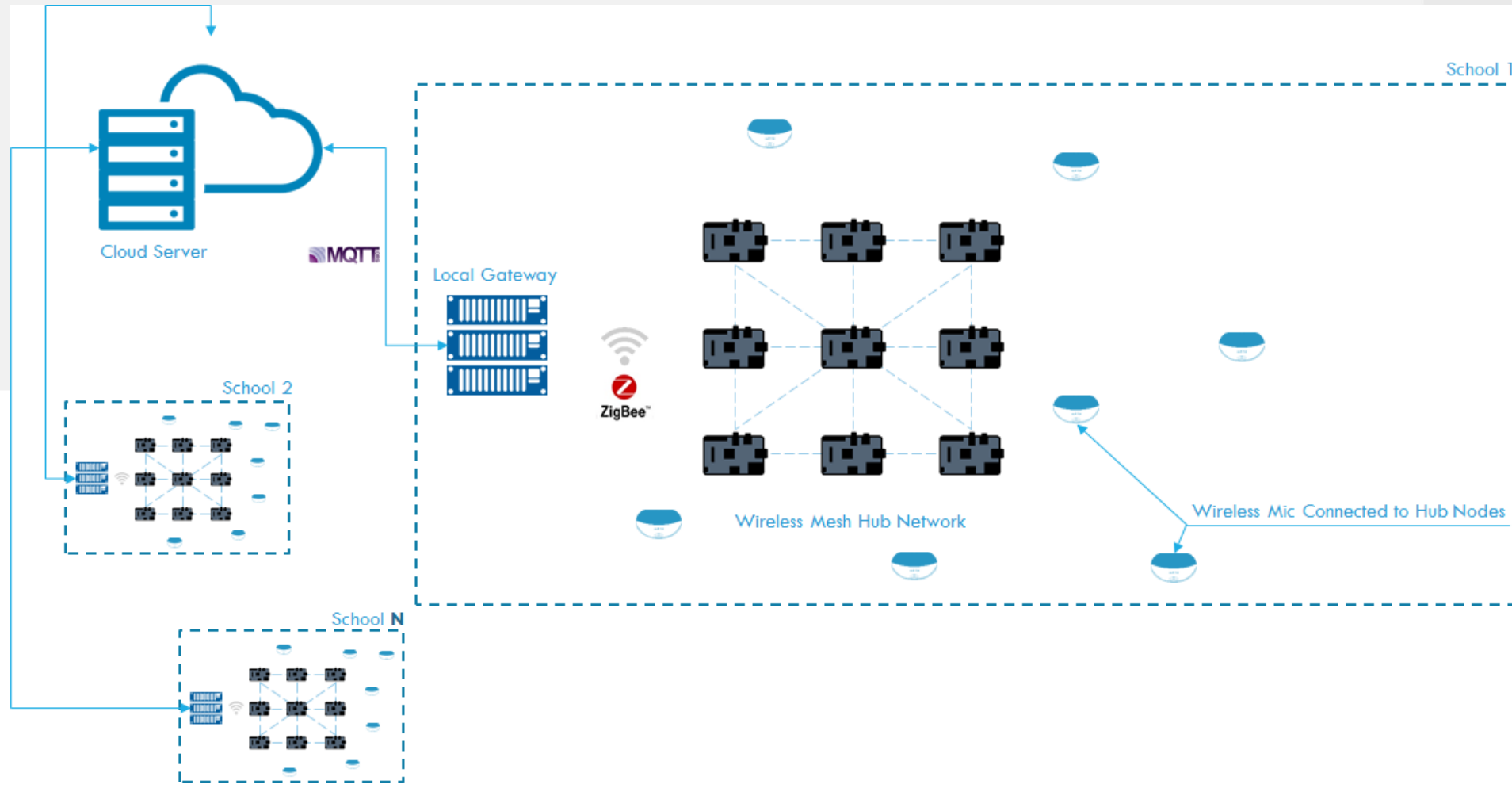
### Legacy Communication Challenges

- One-way communication
- Unable to customize alerts for specific events
- Lack of leadership engagement

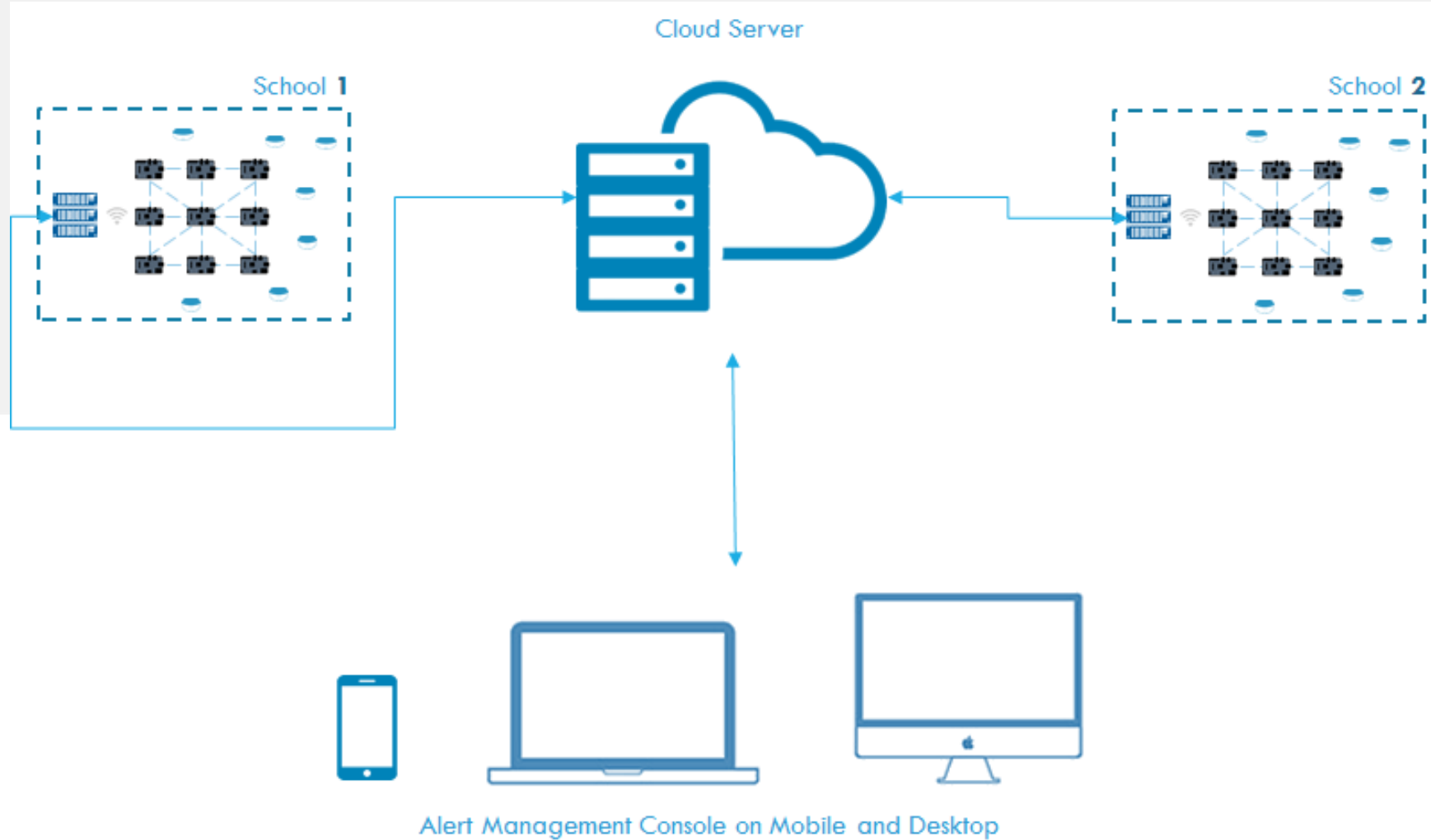
### Solution

- GadgEon designed an end-to-end IoT system that included a custom microphone, hub, gateway, mobile app and cloud development.
- Result is the first classroom audio system to incorporate two-way messaging, staff-locating, and visual alert notifications for emergencies.

# RoomPro - Data Flow Diagram



# RoomPro - Cloud Architecture



WHAT DID GADGEON DO?	PLATFORMS/ TECHNOLOGIES USED
1) Architecture for complete system including ZigBee based end node, ZigBee Hub, Gateway, Cloud and Mobile App	Requirements Gathering & Analysis, Uses cases, Architecture development, identification of functional components.
2) Hardware design, prototyping, boardbring up for ZigBee based end node and Hub	Cadence allegro, optimized for battery powered operation.
3) Embedded firmware for end node, Hub and its integration and testing on reference platform and on Target platform	Ti Z-Stack, IAR embedded workbench, Sharp memory LCD, Optimization for battery operation, Infrared Audio Subsystem, Location identification using IR and ZigBee, UI Menu and button interface, Z-Stack configuration for large network operation using Many To One routing.
4) Embedded Linux based Gateway application between ZigBee and IP	Off-the-shelf Hardware (beaglebone Black) was used with the Linux application(cpp), CC2538 interfaced via UART for ZigBee protocol, MQTT over SSL for cloud communication, LCD Display (7 inch ) & touchscreen for the visual alert notification and alert generation, Firmware upgrade initiated from the cloud server.
5) Mobile App design and development for controlling and managing School Security System - both iOS & Android – native	MVC architecture, encrypted databases, realtime notifications using MQTT & GCM, REST API based alert generation, Followed the recommended design patterns from Apple and Google.
6) Integration of all subsystems with Cloud application developed by 3rd party	





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