Using Wi-Fi HaLow Technology for IoT GNSS Monitoring Systems

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SUMMARY

This study pioneers the integration of Wi-Fi HaLow technology into IoT-based Global Navigation Satellite System (GNSS) monitoring systems, with a focus on landslip monitoring applications. Wi-Fi HaLow offers an advantageous mix of low power consumption, extended communication range, and robust data throughput, making it highly suitable for remote and challenging environments. While the limited connection range of Wi-Fi HaLow may appear restrictive, this limitation aligns well with the short baseline requirements of high-precision, low-cost GNSS monitoring.

The research compares Wi-Fi HaLow with traditional communication technologies, highlighting its advantages in scenarios where LTE is unavailable. Field experiments were conducted at two sites in New South Wales, Australia: one utilizing LTE-M communication and the other Wi-Fi HaLow. Results demonstrate the capability of Wi-Fi HaLow to support reliable data transmission over significant distances while maintaining system autonomy with solar-powered devices. Despite observed delays, the system's store-and-forward mechanism ensured no data loss during network outages. The findings underscore Wi-Fi HaLow's potential as a viable solution for high-precision GNSS applications, providing critical insights for advancing IoT-GNSS monitoring in remote or harsh environments.