PhD Oral Defense

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Thesis Title

Enhancing the Applicability of Low Power Wide Area Networks in IoT-oriented Smart City Deployment

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Abstract

The development of smart cities (SCs) has been a global trend. The emerging low power wide area network (LPWAN) technologies have gained much attention because they can provide a phenomenal range of up to tens of kilometers with a battery life of approximately ten years or more but scarifies data rate performance. Therefore, LPWANs are not suitable for all Internet of things (IoT) applications and may not be able to replace conventional technologies. Deciding whether LPWANs apply to specific IoT-oriented applications in SC deployment is challenging. Moreover, several competitive LPWAN technologies exist in the market, rendering the selection of most appropriate LPWAN technology another challenging issue. The adoption of non-appropriate technologies may lead to heavy extra expenditure and even failure of the whole project.

This thesis focuses on enhancing the applicability of LPWANs in the deployment of IoT-oriented SC applications and addresses these challenges. An LPWAN index (LPWAN-Dex) is defined to provide a fair basis for the comparison of performances between emerging LPWAN technologies according to specific application requirements. LPWAN-Dex helps to decide the applicability of LPWANs and select the most appropriate LPWAN technology that contributes to the achievement of best practices. The applicability of LPWANs are explored in indoor localization, smart transportation, smart healthcare. The most appropriate technology is selected, and new algorithms are designed for each application respectively.