

Evaluation and Analysis of ZigBee-Based Wireless Sensor Network: Home Monitoring as Case Study

Authors : Omojokun G. Aju, Adedayo O. Sule

Abstract : ZigBee wireless sensor and control network is one of the most popularly deployed wireless technologies in recent years. This is because ZigBee is an open standard lightweight, low-cost, low-speed, low-power protocol that allows true operability between systems. It is built on existing IEEE 802.15.4 protocol and therefore combines the IEEE 802.15.4 features and newly added features to meet required functionalities thereby finding applications in wide variety of wireless networked systems. ZigBee's current focus is on embedded applications of general-purpose, inexpensive, self-organising networks which requires low to medium data rates, high number of nodes and very low power consumption such as home/industrial automation, embedded sensing, medical data collection, smart lighting, safety and security sensor networks, and monitoring systems. Although the ZigBee design specification includes security features to protect data communication confidentiality and integrity, however, when simplicity and low-cost are the goals, security is normally traded-off. A lot of researches have been carried out on ZigBee technology in which emphasis has mainly been placed on ZigBee network performance characteristics such as energy efficiency, throughput, robustness, packet delay and delivery ratio in different scenarios and applications. This paper investigate and analyse the data accuracy, network implementation difficulties and security challenges of ZigBee network applications in star-based and mesh-based topologies with emphases on its home monitoring application using the ZigBee ProBee ZE-10 development boards for the network setup. The paper also expose some factors that need to be considered when designing ZigBee network applications and suggest ways in which ZigBee network can be designed to provide more resilient to network attacks.

Keywords : home monitoring, IEEE 802.14.5, topology, wireless security, wireless sensor network (WSN), ZigBee

Conference Title : ICCST 2015 : International Conference on Computer Science and Technology

Conference Location : Stockholm, Sweden

Conference Dates : July 13-14, 2015