A LITERATURE SURVEY ON ZIGBEE

Milu Hanna Mathew[1], Dr.T.Parithimar Kalaignan[2]
[1]IV-B.E.-CSE, [2]Principal
Annai Mathammal Sheela Engineering College, Erumapatty, Namakkal, Tamilnadu

ABSTRACT

This abstract tells about a Wireless Technological Device which is popular for extremely Low Power, and Low Bit Rate Wireless PAN Technology called ZigBee.ZigBee is designed for wireless Automation and other lower data tasks, such as smart home automation and remote monitoring. ZigBee is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widelydeployed in wireless control and monitoring applications, the low power usage allowslonger life with smaller batteries, and the mesh networking provides high reliability andlarger range. Due to the low-cost and low-power usage this wireless technology is widelyused in Home Automation, Smart Energy, Telecommunication Applications, PersonalHome, and Hospital Care. ZigBee enables new opportunities for wireless sensors and controlnetworks. ZigBee is standard based,low cost, can be used globally, reliable and self-healing, supports large number of nodes, easy to deploy ,very long battery life and secure.

1. INTRODUCTION

ZigBee is a new standard developed by the ZigBee Alliance for Personal-Area Networks (PANs). Consisting of more than 270 companies (including Freescale, Ember, Mitsubishi, Philips, Honeywell, and Texas Instruments), the ZigBee Alliance is a consortium that promotes the ZigBee standard for a low-rate/low-power wireless sensor and control network. The ZigBee protocol stack is built on top of IEEE 802.15.4, which defines the Media Access Control (MAC) and physical layers for Low-Rate Wireless Personal-Area Network (LR-WPAN).

The image below is taken from the paper 'Implementation of multi-channel technology in ZigBee wireless sensor networks by Chia-Hsin Cheng in 2015.

Multi-channel technology with adaptive channel access algorithm
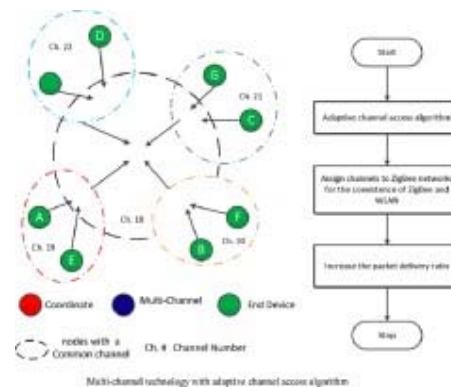
The ZigBee standard offers a stack profile that defines the network, security, and application layers. Developers are responsible for creating their own application profiles or integrating with the public profiles that were developed by the ZigBee Alliance. The ZigBee specification is an open standard that allows manufacturers to develop their own specific applications that require low cost and low power.

2. LITERATURE SURVEY

Amar Abane[1] et.al. explains that Named Data Networking (NDN) is a new architecture which allows communications using data's natural names rather than hosts' logical addresses. In recent years, several research projects have demonstrated the ability of NDN to support emerging IoT applications like home automation, smart cities and smart farming applications. This work aims to integrate NDN with ZigBee to give NDN a better support for

IoT applications that are known to require wireless sensing/actuating abilities, mobility support and low power consumption. For this purpose, we present our NDN-over-ZigBee design and we show through experiments conducted with three different scenarios the suitability and the ease of use of NDN in IoT context. The choice of ZigBee is motivated by the fact that it is a network specification for low-power Wireless Personal Area Networks (WPANs) and supports a large number of nodes.

JiasongMuLiangHan[2] et.al. said that The ZigBee network is widely studied and deployed recently because of its low cost and simplicity features. However, the power consumption issue needs a further improvement since the application requirements are not fully satisfied. The emerging 5G communication technology is characterized by the smarter devices and the native support for the M2M communication. On that basis, the 5G terminals are capable of joining the existing ZigBee networks and have the potential to improve the data transmission. In this paper, we investigate the performance of the ZigBee networks in the 5G environment for different scenarios. Then a Nearest Access Routing (NAR) algorithm based on the physical depth is proposed for different communication types. To reduce the loads in ZigBee networks, the data flow in the neighborhood of 5G terminals is gathered and transmitted via the IP networks. The simulation results showed that NAR effectively share the communication in ZigBee networks. It leads to better performances with higher packet delivery ratio, less hop counts from ZigBee devices, lower latency, fewer packets sent by ZigBee nodes and zero routing overheads.

JiasongMu[3] proposes that a modified AODV Junior routing protocol is adopted as part of the combined routing strategy in the ZigBee networks. However, its routing overhead caused by the routing discovery and the routing table maintenance needs to be further reduced. Considering the deploying environment, the emerging 5G technology tends to be ubiquitous in the near future. Due to its native support to the smart devices and the M2M communication, the 5G terminals may be used as gateways for the ZigBee networks to improve the existing routing method. The ZigBee coordinator and the 5G

terminals, which both have the accessibility to the internet, are defined as Associated Gateways (AG). Aiming to the higher efficiency and the shorter path, an improved ZigBee AODV (Z-AODV) routing protocol using associated gateways for the heterogeneous networks in the 5G environment is proposed in this paper. Besides the regular ZigBee function, by sharing the neighbour and routing information via IP network, the AGs are also responsible for collaboratively finding the optimum path and transmitting the packets to reduce the consumption for ZigBee devices. Moreover, an additional routing information collecting method is developed to further improve the routing performance. The proposed algorithm is evaluated based on simulation results. It is shown that our routing method outperforms the existing ones by higher picketer deliver ratio, shorter path length, lower latency, fewer packets sent per ZigBee node and lower routing overhead.

Chia-HsinCheng[4]et.al. proposes a multi-channel ZigBee Wireless Sensor Network (WSN) for robust data transmission. This study sought to increase the Packet Delivery Ratio (PDR) through the application of multi-channel technology. Based on a cluster-tree construction protocol, we implemented a multi-channel time division multiple-access scheme using hardware devices. Furthermore, ZigBee and Wireless LAN (WLAN) both operate on the 2.4 GHz band, referred to as the industrial, scientific, and medical unlicensed band. As a result, ZigBee faces severe interference problems in the presence of WLAN. In this study, we developed an interference avoidance method to improve conditions for the coexistence of ZigBee and WLAN and then conducted experiments using a practical network implementation to evaluate the resulting performance. Our experiment results demonstrate considerable improvements in the PDR of ZigBee transmission in an environment with interference from WLAN.

JacekStępień[5] et.al. conversed that an implementation of mobile nodes tracking system based on ZigBee and Wi-Fi wireless networks is presented. On the base of known algorithmic as well as circuit solutions a simple yet universal system, applied in prototype application dedicated for person's localization in museum premises has been developed. Since system

utilizes entirely wireless communication, it can be applied in any closed objects. The system has been preliminarily verified in real in-situ environment.

Rob Toulson [6] et.al. statesintroduces concepts and applications relating to wireless data communication. It starts with a review of the principles, including the electromagnetic spectrum, radio transceivers, protocols and antennae. The background to short distance, personal area network protocols is introduced, through reference to IEEE Working Groups. Bluetooth is introduced, and trialled using the RN-41 Bluetooth module. The RN-41 is used to develop key Bluetooth concepts. Simple PC-to-mbed and mbed-to-mbed Bluetooth links are demonstrated. The Zigbee protocol, its typical networks and applications are introduced. XBee radio modules are used to illustrate simple Zigbee links, in transparent mode. Use of the XBee in its more flexible API mode is then introduced, which opens the door to more advanced Zigbee applications.

JiaJia[7] et.al.said that the physical layer of ZigBee communication systems was defined by IEEE 802.15.4 and has good external white noise resistance due to its spread spectrum characteristic and error correction of the baseband coding process. However, previous research has shown the performance of ZigBee to degrade in the presence of impulsive noise. In this regard, an improvement of the ZigBee receiver is warranted in order to improve the decoding process. A novel Error-Balanced Wavelet filtering approach utilizing the multiresolution property is proposed to suppress the impact of impulsive noise prior to symbol detection and thus improve the Bit Error Rate (BER) performance of the ZigBee demodulation process. This assessment is based on computer simulations and verifies that the overall transmission performance is improved by our proposed approach. The results obtained are also compared with existing impulsive noise suppression approaches and it is shown that our wavelet-based method outperforms other methods in improving the system BER.

L.K.Wadhwa[8] et.al. proposes that Energy efficiency and network lifetime are main concerns in WSN. In order to improve these factors ZigBee plays an important role. Low cost, low data rate features of ZigBee results in low power consumption and makes it useful in wireless sensor networks, increasing life of small batteries of nodes in the network. Since tree routing in ZigBee does not require any routing tables to send the packet to the destination, it can be used in ZigBee end devices that have limited resources. Routing protocols such as AODV (Ad-hoc On Demand distance Vector routing), ZTR (ZigBee Tree Routing), and STR (Shortcut Tree Routing) are compared on the basis of different performance metrics (End to end delay, routing overload, throughput, packet delivery ratio). The performance evaluation shows that STR achieves better performance as compared to other two routing protocols. But there are some limitations of the STR method. Performance of packet delivery ratio of STR is less as compared to AODV. Performance of end to end delay of STR is poor as compared to AODV. Hence ESTR is proposed. The main aim of proposed ESTR [Extended STR] is to present new ZigBee network routing protocol with goal of improving the performance of ESTR in terms of PDR and delay against STR and AODV.

ShashwatPathak. [9] et.al.explains an energy efficient wireless telemonitoring scenario of cardiac patients through ZigBee, based on variable duty cycle being rendered to sensors. In an intra-hospital telemedicine scenario, Electro Cardio Gram (ECG) signals of patients are acquired through ECG sensor nodes having transmission capability and these ECG signals are received by Personal Digital Assistant (PDA) kept at nursing station through ZigBee network. ECG signals are further transmitted to Doctor's PDA. If the duty cycle is varied as per the load or number of active sensors, total energy consumed in idle mode can be avoided and total energy consumed by sensors is reduced hence increasing total network lifetime. This paper, comparatively analyzes the energy efficiency of ZigBee sensors with different percentage of duty cycle on the basis of energy consumption parameter under variable load conditions. The matrices used in performance evaluation are energy consumption in transmit mode, energy consumption in received mode and energy consumption in idle mode.

CONCLUSION

This paper discusses study of the capability of ZigBee Technology. Zigbee suited for commercial & domestic applications. It is a good solution to enhance the routing in communications. In this article Zigbee protocol improves the performance of wireless communication.

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