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Improve the Energy Efficiency using Packet Size in Smart Grid Environment

Reena Sharma[1], Prof. Jitendra Mishra[2]
[1]M. Tech Scholar, Department of EC, PIES, Bhopal (India)
[2]Head & Professor, Department of EC, PIES, Bhopal (India)
[1]sharmareena444@gmail.com, [2]jitendra.mishra260@gmail.com

ABSTRACT
Network lifetime is, arguably, the most important performance metric in wireless sensor networks. Since wireless sensor networks nodes are battery operated, in general, optimal utilization of the limited battery energy is vital for prolonging the network lifetime. Energy budget of WSNs is dominated by the energy dissipation on communication. So that the optimization of all aspects of WSN communication and networking is the overarching goal. In this paper we present the improve model for the smart grid and also improve the performance of smart grid for various applications such as packet delivery ratio and throughput.

Keywords: Smart Grid, Wireless Sensor Network, Packet delivery ratio, Throughput.

INTRODUCTION

Smart grids (SGs) are envisioned as future power grids to enhance the functionality of traditional power grids. The communication technologies in power grids suffer from connectivity problems due to dynamic topology changes, fading, and interference. A variety of communication technologies have been suggested to overcome these problems, and the cognitive radio network (CRN) is recognized as one promising solution. CRNs employ dynamic spectrum access (DSA) to search for available channels in both licensed and unlicensed bands [4].

A wireless sensor network (WSN) is a group of sensor nodes which are deployed in a field to monitor physical conditions autonomously. WSNs can measure various physical conditions like sound, temperature, pressure, humidity, load, speed etc. After sensing the data sensor nodes pass this information to a base station or sink following a particular routing pattern. The number of sensor nodes in a WSN can vary from a few to hundreds or thousands in numbers depending on the application.

A sensor node consists of many components, a microprocessor or a microcontroller to control the operation of node, a radio transceiver to transmit and receive information, an ADC converter to convert analog information to digital and vice versa and a power source [2].

In MWSNs, the number of leaving nodes that moves away from the current cluster head before the next new cluster head selection process affects the accurate data aggregation and causes transmission delay for the collected information [7]. Due to the difference of mobility between the cluster head and its members, a time-critical data may not be accurately transmitted to sink. In addition, the transmission delay and unnecessary energy consumption may occur to each sensor node as the result of searching for a new cluster head and being allocated a slot for data transmission.

In wireless sensor networks, various applications control information, periodic power quality monitoring, meter reading and video surveillance, etc.) have different QoS requirements in terms of

packet size, frequency, delay, jitters and bandwidth, which should be considered in the routing protocol design [3].

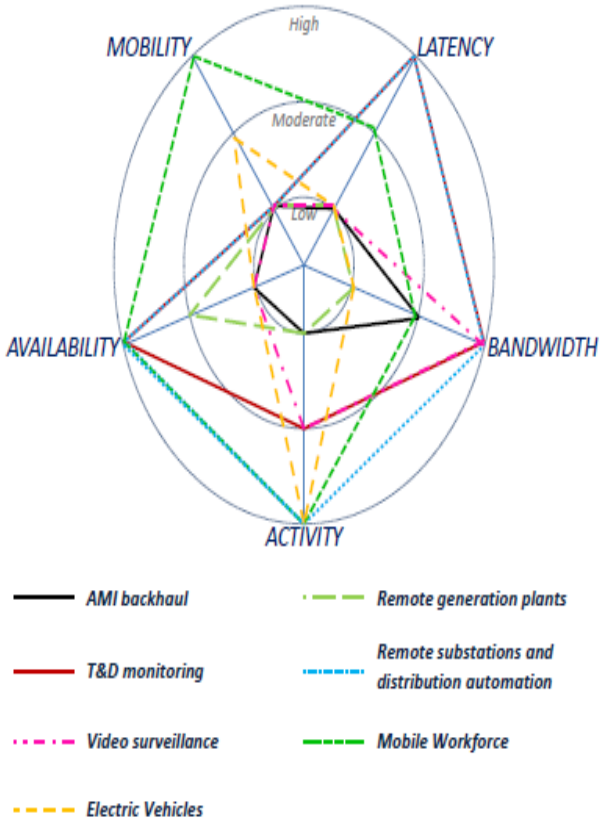

Figure 1: Mapping of QoS requirements for major SG applications.

The rest of this paper is organized as follows in the first section we describe an introduction of about the Smart grid and their applications. In section II we discuss about the energy waste in wireless sensor network. In section III we discuss about the experimental result analysis and the comparative study between existing method and proposed methods and their simulation study, finally in section IV we conclude the about our paper which is based on the experimental result study.

II ENERGY DISSIPATION AND ENERGY WASTE IN WSN

In WSN, sensors dissipate energy mainly for transmitting and receiving data as compared to data sensing and processing, while a significant amount of energy is wasted with regard to data communications as described in [14] which is mentioned below.

- Data Collision: Data packets collide when a node receives more than one at the same time resulting in all the packets that caused this collision being discarded which will in turn necessitate retransmission of the discarded packets causing significant energy waste.

- Interference: Energy is wasted as each node within the transmission and interference range receives a packet but cannot decode it.

- Idle Listening: This phenomenon occurs when a node keeps listening to an idle channel in search of a data packet destined for it, thus wasting a good amount of energy.

- Control Packet Overhead: Control packets usually synchronize the whole data transmission phase but don't carry any user data. Therefore, it is always a design goal that minimal number of control packets be generated to reduce the energy consumption by these non-data packets.

- Data Overhearing: Although a node is not transmitting, it will eventually listen to transmissions destined for other nodes causing continuous energy waste.

III EXPERIMENTAL RESULT ANALYSIS

Simulation is an experimental process in that process proposed a simulated model for wireless sensor network and put some standard parameter for valuation of result. In our research work perform energy minimization in wireless sensor network. The proposed model written in MATLAB script language and scenario of network generated by script command provided by MATLAB simulator. MATLAB well knows research software of wireless network. The evaluation of performance of our proposed methodology in two parameter throughput of network and packet dropping of network.

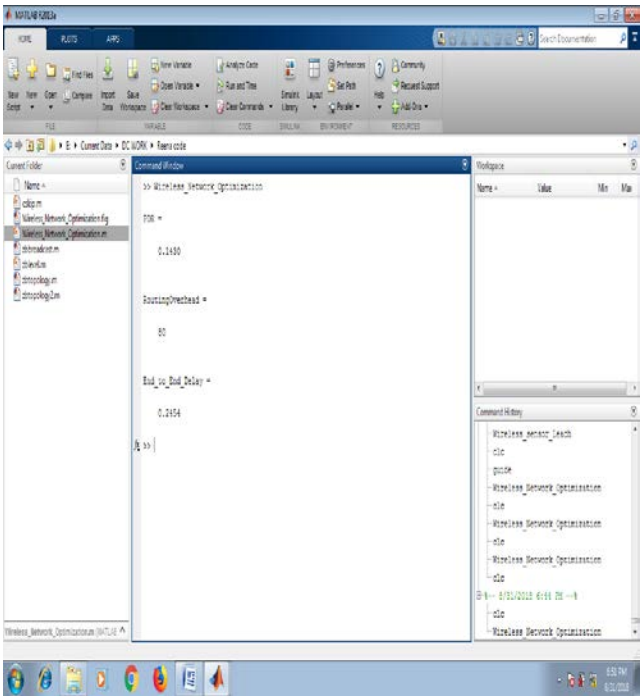

Figure 2: Shows that result window for the existing methods using the number of node is 10.

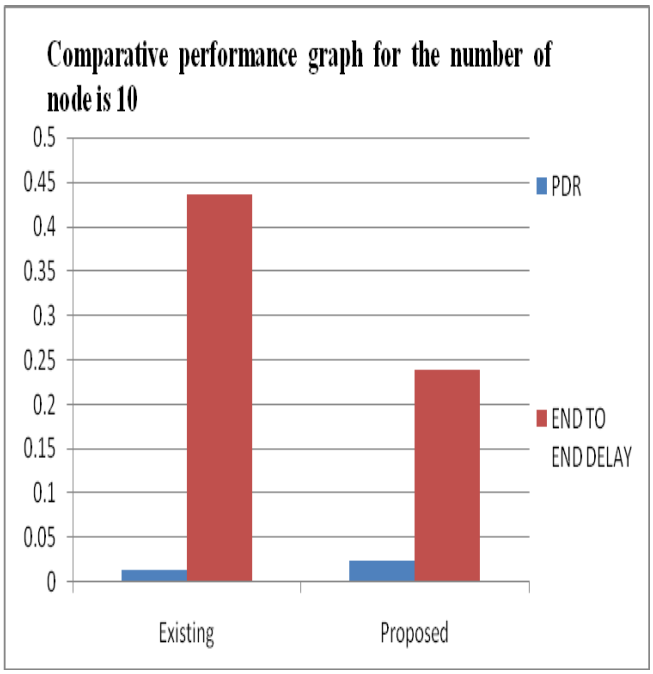

Figure 3: The above figure shows that the comparative performance evaluation graph for the xisting and proposed methods using the number of nods is 10.

IV CONCLUSIONS

Smart grids have a multi-tiered architecture consisting of home area network (HAN), neighborhood area network (NAN), and wide area network (WAN). The smart grid performance strongly depends on reliable, successful, and timely end-to-end message delivery among these architectural tiers. In this paper we proposed a model to improve the energy efficiency in a wireless sensor network using the packet optimization, here we improve the performance parameter value.

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Reena Sharma received her Bachelor`s degree in Electronics & Comunication, TIT, Bhopal, M.P., in 2013. Currently she is pursuing Master of Technology Degree in Electronics & comunication (Digital communication) from PIES, (RGPV), Bhopal, Madhya Pradesh India. Her research area include Wireless sesnor networks.

Mr. Jitendra Kumar Mishra he is Associate Professor and Head of the Department of Electronics and Communication in PIES, Bhopal (RGPV). His received Master of Technology and Bachelor's of engineering respectively in Digital communication from BUIT, Bhopal and from RGPV, Bhopal. He has more than 10 years of teaching experience and publish 20+ papers in International journals, conferences etc. His areas of Interests are Antenna & Wave Propagation, Digital Signal Processing, Wireless Communication, Image Processing etc.