International Journal of Research in Advent Technology (E-ISSN: 2321-9637) Special Issue
1st International Conference on Advent Trends in Engineering, Science and Technology
"ICATEST 2015", 08 March 2015

A Design Approach for Load balancing in Wireless Sensor Smart Grid Network by prioritizing least used paths.

[1] SURAJ P SHENDE, [2] Prof. AMIT G FULSUNGE
[1] *P.G Student, Dept of ElectronicsEngineering,TGPCET,Nagpur,India,srjshende@gmail.com,9765487627*
[2] *ASST PROFF., Dept of Electronics Engineering, TGPCET ,Nagpur ,India*

Abstract:- The smart grid is an intelligent power transferring system that makes use of the communication platform for exchanging the information and optimizing the operation of interconnected power units to increase the performance, accuracy, and sustainability of electrical services.In this paper, we used the different attribute of smart grid traffic including multimedia and set forth a priority-based traffic scheduling approach. The smart grid system depend on different traffic attribute of smart grid for example controlling commands, multimedia meter readings. Here, we develop a traffic scheduling method taking into consideration of channel switch and spectrum sensing defects, and solve a system utility intensification error for smart grid communication system. Our explanation are verified through both analyzes and simulations. This research will make passable a new era for upcoming smart grid communication.We proposed new traffic scheduling approach and an intensified framework for supporting various smart grid traffic types, including multimedia on smart grid communication platform.

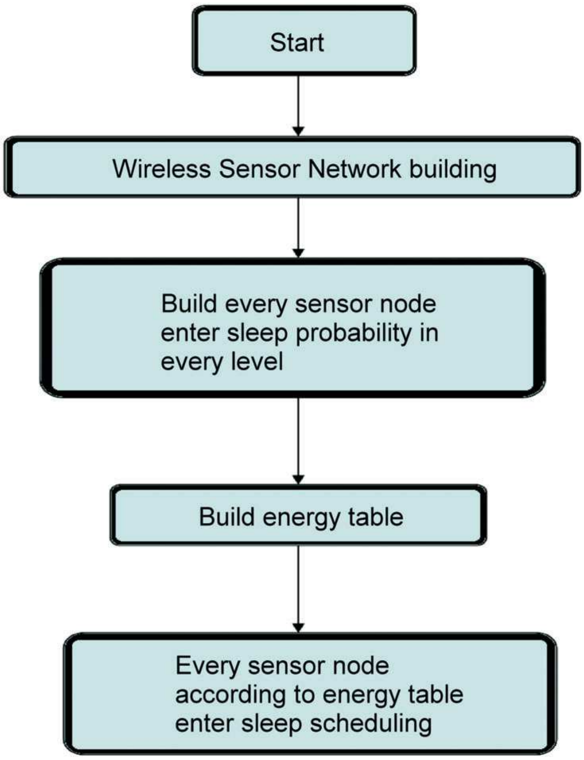
Keywords–Smart grid networks , WSN (Wireless sensor networks), CRN (cognitive radio network), Power Control, Sleep Control, Scheduling.

1. INTRODUCTION

Wireless sensor networks (WSN) have been analyzed as a connected and comprehending monitoring system platform for smart grid setup. For example, low-cost wireless sensor nodes can be dispensed on large fields where the power plants are placed and can boost utility resource monitoring capabilities. The control center can collect the signals from remote wireless sensors in order to reveal the working of the power setup and control the stability of power grid. WSNs will play an vital performance in remote system monitoring, automatic meter reading, remote customer site monitoring, equipment error diagnosing and etc. Latter, wireless multimedia sensor networks (WMSNs) using sensors such as video, acoustic sensors can increase the accuracy, safety and safety of smart grid system by providing high surveillance data for grid failure detection and recovery, power source monitoring, asset management, etc. For example, use of smart camera sensors for scanning solar power plants can adumbrate the quantity of generated power and thus easy managing the power distribution. A important point for the flying colors of smart grid system is how to complete the various communication requirements such as high reliability and low remission necessity, mostly under hard environmental conditions. Smart grid needs high quality of services (QoS) and resource efficiency as well as the system costs and bandwidth. The communication challenge requires more research and customized resolutions for smart grid applications. For example, large information quantity of system monitoring and power unit control commands would be delivered through the smart grid communication infrastructure and it uses high radio bandwidth, and increases the interference and competition on the limited and crowded radio frequency. In this paper, we proposed new traffic scheduling method and an intensified framework to support various smart grid traffic types.

2. SLEEP ALGORITHM

In a network frame of reference, the off time and rate adaptation decisions one router makes fundamentally impacts and is impacted by the decisions of its adjacent routers. Moreover, as we see later in the paper, the strategies by which each is best oppressed are much different (Intuitively this is because sleep-mode savings are best oppressed by maximizing idle times, which implies processing work as fast as possible, while performance-scaling is best oppressed by processing work as slowly as possible, which reduces required idle times). Hence, to prevent complex interactions, we consider that the complete network or at least well-defined components of it, runs in either rate adaptation or sleep mode. We develop the specifics of our sleeping method, and our rate adaptation method. Note that our clarification are deliberately constructed to implement broadly to the networking infrastructure – from end-host NICs, to switches, and IP routers, etc. – so that they may be exercised wherever they prove to be the most valuable. They are not bound to IP-layer protocols. The overall power savings we can expect will depend on the extent to which our power-management algorithms can successful exploit opportunities to sleep or rate adapt as well as the power profile of network equipment (i.e., , relative magnitudes of p a , p I and p s). To clearly separate the effect of each, we evaluate sleep clarification in terms of the fraction of time for which network elements can sleep and rate-adaptation clarification in terms of the reduction in the average rate at which the network operates. In this way we assess each solution with the respective baseline. We then evaluate how these metrics translate into overall network power savings for different equipment power profiles and hence compare the relative caliber of sleeping and rate-adaptation. For both sleep and rate-adaptation, we calibrate the savings achieved by our practical clarification by comparing to the maximum preservance achievable by optimal, but not necessarily practical, clarification. In network environments where packet arriving rates can be highly non-uniform, allowing network elements to transition between operating rates or sleep/on modes with corresponding transition times can introduce additional packet delay, or even loss, that would have not might occurred. Our goal is to explore resolution that usefully navigates the tradeoff between potential power savings and performance. In terms of performance, we calculate the average and 98th percentile of the end-to-end packet delay and loss. In the absence of network equipment with hardware support for power management, we base our results on packet-level simulation with real-world network topologies and traffic workloads. The important factors on which power savings then depend, are the technology constants of the sleep and performance states and the characteristics of the network. In particular, the usage of links determines the relative magnitudes of T active and T ideals well as the opportunities for profitably exploiting sleep and performance states. We give simple models for technology constants. To obtain the effect of the network on power savings, we drive our simulation with two realistic network topologies and traffic workloads that are summarized below. We use ns2 as our packet-level simulator.



3.SIMULATION MODEL

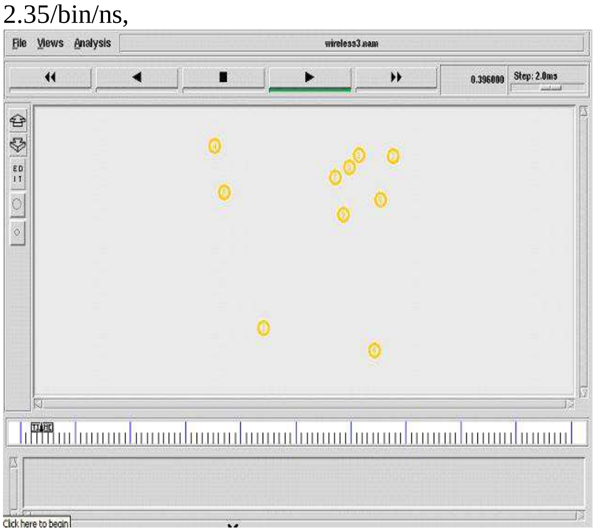
Design Methodology:

NS2(NETWORK SIMULATOR) is an open-source event-driven simulator designed for research in computer communication networks. Having been under constant investigation and enhancement for years, NS2 now a days contains modules for number of network components such as routing, transport layer protocol, and application. Since its introduction in 1989, NS2 has continuously gained full of interest from industry, academia, and government. To calculate network performance, researchers can simply use an easy scripting language to configure a network, and observe outcomes generated by NS2. hence, NS2 has become the most widely used open source network simulator, and one of the most widely used network simulators.

Ns-2 Installation Procedure:

1) Introduction: This installation guide is on Linux **Ubuntu 11.04**, and uses **ns-allinone-2.35** source file for NS2.
2)Before install NS2, we installed some essential software's.
sudo apt-get install tcl8.5-dev tk8.5-dev.
sudo apt-get install build-essential autoconf automake.
sudo apt-get install perl xgraph libxt-dev libx11-dev libxmu-dev.

3) Unpacked ns-allinone-2.35.tar.gz to our home directory.
tar -zxvf ns-allinone-2.35.tar.gz -C /home/stan
4)a) Modify the make file
/home/stan/ns-allinone-2.35/otcl-1.14/Makefile.in
b) Changed CC = @CC@ to CC = @CC@ -V 4.5
5) Installed NS2:cd /home/stan/ns-allinone-2.35sudo ./install
6) Modify .bahrc
vi /home/stan/.bashrc
added the scripts below:exportPATH=$PATH:/home/stan/ns-allinone-2.35/bin:/home/stan/ns-allinone-2.35/tcl8.5.10/unix:/home/stan/ns-allinone-2.35/tk8.5.10/unix
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/home/stan/ns-allinone-2.35/otcl-1.14:/home/stan/ns-allinone-2.35/lib
export TCL_LIBRARY=$TCL_LIBRARY:/home/stan/ns-allinone-2.35/tcl8.5.10/library.
Enable the path setting: cd /home/stan source .bashrc
Part III: Verifying which ns If it shows /home/stan/ns-allinone-2.35/bin/ns,



4.PROPOSED SYSTEM

Effectively managing the power of the sensor node and increasing the life time of the complete network is very important problem hence, we offer the optimal sleep control for wireless sensor networks in which we randomly set the sensor nodes in the whole network and determining the sleeping probability by the distance between the sensor node and sink. This method reduces the transmission frequency of the sensor nodes that are nearer to the sink and effectively reaches the network's loading balance. However, the sensor nodes process their sleeping schedules according to their own remaining power to save power.

The relay frequency of the sensors nearest to the sink is reduced by increasing the sleeping probability of the sensors farthest from the sink. The loading of the complete network is thus balanced. Each sensor processes sleep and on schedules according to its own remaining power and reaches the sensor node energy saving. The algorithm in this paper contains four stages: establish a network, set up the sleeping probability for each sensor, set up an power table, and the sleep and on modes for sensor nodes according to the power table.

5. CONCLUSION

In this paper we put forth an effective sleep mechanism in order to balance the network traffic and to save the power of sensor nodes in the network. We effectively adjust the off and ON time according to the remaining power of sensor nodes resulting into proper usage of network power. It saves much power of sensor nodes and increases the life time of the complete wireless sensor smart grid networks. With the help of simulation product, we can demonstrate that the proposed mechanism would effectively balance the gridlock of the network and saves the power of sensor nodes increasing the network Lifetime. The output of a system without priority control decreases since its outcome depends mainly on the available channel assets instead of the traffic density It is observed that the prioritized system is more beneficial than a system where all types of traffic are treated the same in terms of SG traffic transferring. The performances of a CR network system with and without priority control for smart grid communications have been examined in the paper. The research in this paper opens a new face of upcoming smart grid communications and has great potential in increasing the adaptability and flexibility, reliability and accuracy of SG system. The proposed architecture and clarification have yielded significant outcome and momentum for upcoming developments.

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