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Enhanced Resource Allocation in wirless Network Using Virtualization

[1] Wims Magdalene Mary, [2] D.Daniel, [3] G.Surya, [4]D.Devi
[1]First Author's address: Assistant Professor, ECE, Sri Krishna College of Engineering and Technology, Coimbatore, INDIA.
e-mail: vimsy.87@gmail.com
surya05@gmail.com

[2]Second Author's address: Assistant Professor, ECE, CSE, Dr.NGP Institute of Technology , Coimbatore, INDIA.
e-mail: daniel111joen@gmail.com

[3]Third Author's address: Assistant Professor, Sri Krishna College of Engineering and Technology, Coimbatore , Coimbatore, INDIA
e-mail:surya05@gmail.com

[4]Fourth Author's address: Assistant Professor, Sri Krishna College of Engineering and Technology, Coimbatore, INDIA.
e-mail:devi@skcet.ac.in

Abstract

This paper deals with the concept of virtualization in Wireless Sensor networks. Virtualization is an emerging concept in all technologies including storage, Networks for example virtual reality, virtual storage, virtual machines and virtual networks. In the proposed work virtualization in general wireless network is applied and implemented in wireless sensor networks. Unlike in virtual sensor networks, virtualization can be applicable to the fixed sensor nodes in target application areas. The existing methodologies has some issues like node isolation, control signaling, Resource discovery and allocation. In this paper two issues node isolation and resource allocation were identified and solved, thereby reducing the complexity in isolating the nodes for better communication between nodes and gateways and the efficiency of resource allocation is increased. The results are witnessed by simulation.

Keywords: Wireless Senor Networks, Virtualization, Nodes Isolation, Resource Allocation.

1. Introduction

At first the sensor systems were wired one yet in the wake of presenting the remote systems administration, the remote sensor organize has turned out to be extremely prevalent as a result of its versatility, strength, unwavering quality, simple execution, financially savvy and smaller in estimate. On the opposite side of systems administration the presentation of new innovations isn't yet achieved its adjustment. These days, the Sensor systems are engaged with numerous application utilizations incorporating identifying the adjustment in the temperature of the earth, following and observing the contamination and furthermore it has been utilized as a part of numerous segments like enterprises, military administrations, information correspondence in natural research territories, security also. Since the innovation has influenced the making of sensors and executing the sensor in the systems administration to side.

Virtualization is an idea presented and executed for some time in different divisions in Computer Science. Virtualization is a basic idea that makes utilization of the physical part and applies the consistent idea over it, to deliver some great outcome. It incorporates some application regions like Virtual Data Center, Virtual Machines, Virtual Reality, Virtual Storage and Virtual Networks [4]. In this paper Virtualization idea in WSN is utilized and furthermore it has some specialized issues, among them thusly two issues are taken Isolation and Resource Allocation. For Isolation, Data Size based strategy is utilized for expanding the execution and for Resource Allocation, Emergent Co-appointment Mechanism is utilized for better usage of asset.

2. Related works

In investigates virtualized arrange confinement utilizing detachment of hubs. Rogerio V. Nunes, Raphael L. Pontes, and Dorgival

Guedes propose a framework which tends to those issues without requiring new equipment. Their answer depends on bundle header reworking, done in an approach to conceal genuine movement sources and goals from the center of the system (equipment), additionally concealing activity from each virtual system from any VMs not having a place with the same tenant[1]. To do that, they utilize the virtual switches introduce in the virtualization screens (hypervisors) of each physical machine1, which as of now execute the OpenFlow design. With Open-Flow, each virtual switch trades a programming interface to their sending tables. Utilizing that

interface, a controller can advise the change to educate it of any bundles that don't coordinate already recognized streams. This prompted the production of the system hypervisor, a product controller that can seclude inhabitants' system activity as machine hypervisors detach CPU and memory bettheyen VMs. The utilization of such a controller to unify the system see is known as a Software Defined Network (SDN).

In Aram Galstyan investigate the worldview of rising coordination as a proficient circulated control instrument for WSN[2]. Rather than focusing on a particular sensor coordination issue, they show their outcomes for rather broad settings of rehashed amusements. In particular, they regard hubs as self-ruling self-intrigued operators that use a basic support learning plan and accomplish coordination by playing rehashed asset designation (stack adjusting) recreations with evolving asset (stack) limits. Their outcomes demonstrate that for a scope of parameters the framework all in all adjusts productively to these progressions. All the more essentially, the scope of parameters for which coordination emerges is free of the quantity of hubs in the framework. This property was critical for the WSN where the quantity of hubs may change in time (e.g., a few hubs will come up short on the power, while different hubs may be acquainted with an officially existing framework).

In Frank T. Ferrese exhibited in the examination expands upon the cost and utility-based asset portion systems specified above [3]. Be that as it may, it varies from past work in WSN asset administration in two unmistakable ways. To begin with, keeping in mind the end goal to represent a more noteworthy accentuation on inserted information preparing, this investigation expands the past utility capacity concentrate on ideal correspondence and information stream so as to incorporate computational speed and productivity. Second, the asset portion calculation created in this investigation is executed straightforwardly on a system of remote sensor models, permitting the execution of the proposed calculation to be assessed specifically on the detecting framework it was intended for rather than in a mimicked domain. The paper connected for models and it has yield a decent outcome, yet it isn't pertinent and reasonable for our undertaking content. What's more, hubs go about as a purchaser and merchant, so for huge number of hubs it might bring about complex and tedious process.

3. Research Methodology

The Resource Allocation in wireless networks is carried out using three steps

(i) Virtualization.

(ii) Node Isolation.

(iii) Resource Allocation.

A. Virtualization.

For virtualization we utilized nonspecific cell rate calculation which depends on broken container system. The defective basin system might be thought about unbuffered or supported. 'K' size of token pool comprises by unbuffered cracked basin instrument. Settled rate tokens are created. Specifically time if the token pool is full then a token will be lost. At the point when the cell enters the system it takes a token from the token pool. After this procedure the quantity of tokens lessened by one from the token pool. The cell might be resistant cell or abusing cell. In the event that token pool is vacant then cell will be arrive. Next we talked about supported cracked can. It is like the unbuffered defective pail however here we take 'M' size of information cradle. At the point when the token pool is unfilled a cell can hold up on the off chance that it lands at once. Abusing cells are might be dropped or labeled in view of the parameters (K, token age rate and M, in the event that it is a cushioned defective container) cracked can is characterized. The primary trouble in the flawed basin is settling its parameters. At the point when the source clings to its agreement defective can is straightforward, and when the source surpasses its agreement it discovers all the disregarding cells. A landing procedure of cells to the UNI, in cracked container it is conceivable to settle the parameters utilizing queueing based models. In finding damaging cells, the defective pail can be exceptionally incapable. Double flawed container component recommended for more able policing. The main flawed basin polices is infringement of the pinnacle cell rate, and the following one polices infringement of the sources burstiness. GCRA get all abusing cells, yet it needs an extra movement parameter.

Notwithstanding GCRA, utilizing a movement shaper a source can shape its activity with a specific end goal to the surge of cell it transmits to the system of wanted qualities. Pinnacle cell rate diminishment, burst measure decrease, and lessening of cell bunching are engaged with activity forming by reasonable separating out the cells in time.

The nonspecific cell rate calculation (GCRA) . GCRA is a deterministic calculation it isn't like the defective basin system and it catches all the disregarding cells. Be that as it may, the extra parameter known as the cell defer variety resistance (CDVT) is for GCRA requires. This extra parameter isn't to be entangled with the top to top cell postpone variety parameter portrayed.

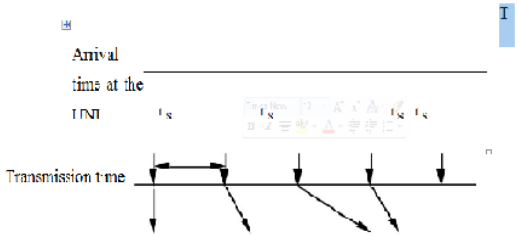

Fig. 1. Delay Variation.

Let us assume that a source is transmitting at peak cell rate and it produces a cell every T units of time, where T = 1/PCR. As shown in figure 1, due to multiplexing with cells from other sources and with signalling and network management cells, it is possible that the inter-arrival time of successive cells belonging to the same source at the UNI may vary around T. That is, for some cells it may be greater than T, and for others it may be less than T. In the former case, there is no penalty in arriving late! However, in the latter case, the cells will appear to the UNI that they were transmitted at a higher rate, even though they were transmitted conformally to the peak cell rate. In this case, these cells should not be penalized by the network. The cell delay variation tolerance is a parameter that permits the network to tolerate a number of cells arriving at a rate which is faster than the agreed upon peak cell rate. This parameter does not depend upon a particular source. Rather, it depends on the number of sources that use the same UNI and the access to the UNI, and it is specified by a network administrator. GCRA can be used to monitor the peak cell rate and the sustained cell rate. There are two implementations of GCRA, namely, the virtual scheduling algorithm and the continuous-state leaky bucket algorithm. These two algorithms are equivalent to each other.

B.NODE ISOLATION (Data Size Based Technique)

Usually, sensor nodes carry a various sized nodes, size of the node may be range from kilo bytes to Megabytes. So in a WSN, say there are 50 nodes are installed. All the nodes are installed at various place, there is considerable distance between the nodes. Each node has a certain sensed data like moisture, temperature, humidity. They started to send those collected data to the gateway, but there will be a chance for occurrence congestion. Though it can be neglected by congestion control protocols and other communication protocols, those are applicable for certain amount of nodes. But in our case, we took 100 nodes. Even the protocols reduce the network traffic and also performance of nodes [8]. Nodes cannot wait for long period, since the sensed data could be changed, updated frequently. And also the nodes may lose the power unnecessarily which may result in reduced life time and performance of nodes.

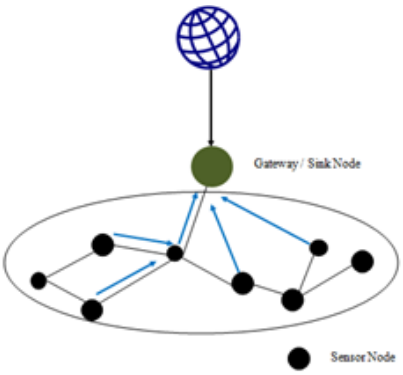

Fig. 2. Figure Before isolation

So by applying virtualization and isolating the nodes is one of the solutions for this problem, we used Data Size Based Technique.

(A)Data Size Based Technique

As already mentioned, each sensor node has certain amount of data. Data can be varying from large one to small. Threshold value is set on the inter communication protocol, so gateway can know which nodes are below and above the threshold value. If nodes fall below the threshold value is isolated into a Virtual network and if nodes falls above the threshold value is isolated into another Virtual network [9].

Usually, data packets have the details about destination, source and length of the data. So obviously, gateway came to know about the details about each sensor node. Then rest of the thing is separating the node in virtual network by virtualization.

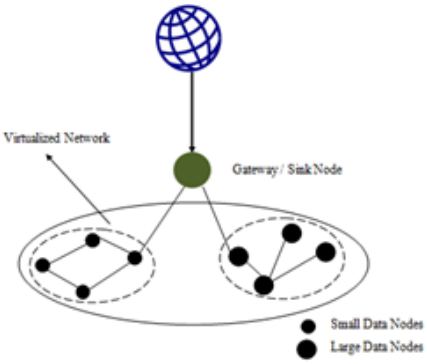

Fig. 3. After isolation

RESOURCE ALLOCATION (Emergent Coordination Mechanism)

In a WSN, resource is not only the data transmitted, it includes bandwidth, data, battery power, utilization of communication channel. So Resource must be used

efficiently. For our project, we took how to preserve the Battery resource during the communication. A battery is only resource to the nodes and it must be utilized optimally. Unnecessary usage of resource may lead to loss of node [4]. A WSN node usually uses protocols like MACA, CSMA-CD. We used those protocols as a medium to implement our concept called emergent coordination mechanism in that.

Emergent Coordination Mechanism

Emergent Coordination Mechanism is similar to the normal CSMA-CD, MACA protocol. Before establishing the connection, sensor nodes send Request-To-Send (RTS) signal to neighbourhood nodes, so that those nodes will not involve in the communication channel. In general, during that waiting time all the nodes were in operating status (i.e Nodes will be waiting to establish connection) but in our concept the nodes that ready to data will RTS signal to all nodes along with time period. So that, until the nodes completes its communication rest of the nodes will go to idle state. So there is a efficient utilization of battery power [2].

Here, after the isolation the network is virtually separated, so it will be applicable for both side of the virtual network.

Node that tries to communicate with the gateway, before that it sends RTS to nearby nodes and it is given in Figure 3.5 and after receiving the Message the rest of the nodes will be in a idle state, and its representation is given in figure 3.6.

The given Mechanism is applicable to both networks and it maximizes the performance in a considerable way [10].

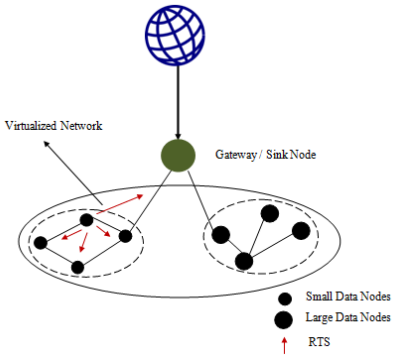

Fig. 4. Node active

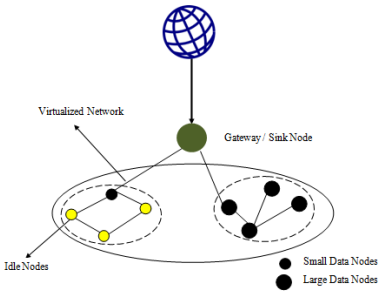

Fig. 5. Node idle

4. Simulation Results

For our simulation, we use the network simulator NS 2.30 the results are obtained from X graph that has the bandwidth usage for resource allocation and packet delivery ratio for better isolation. The results are compared with traditional routing and resource allocation technique with our technique, and results are mentioned below, but here we used general wireless network implemented with virtualization, isolation and resource allocation technique, for virtualization in wireless network, the result has obtained from MNO and DSR. MNO has the result of usual wireless network and DSR has virtualized network result.

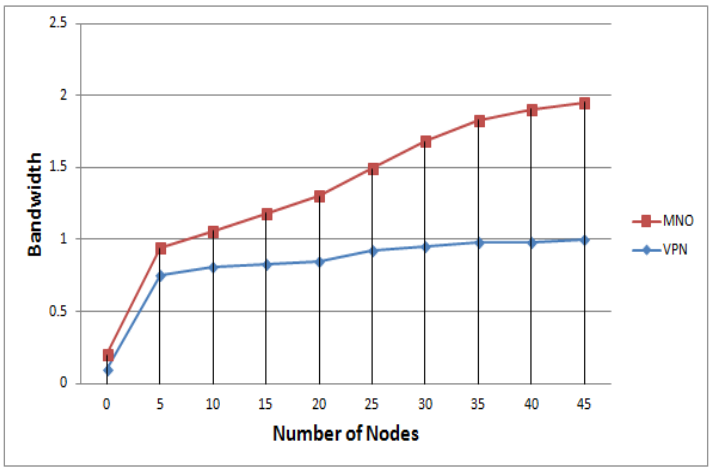

Fig. 6. Efficient Bandwidth usages

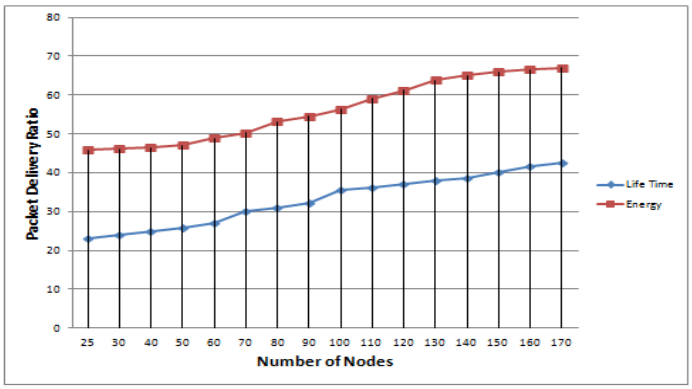

Fig. 7. Better packet delivery ratio of DSR

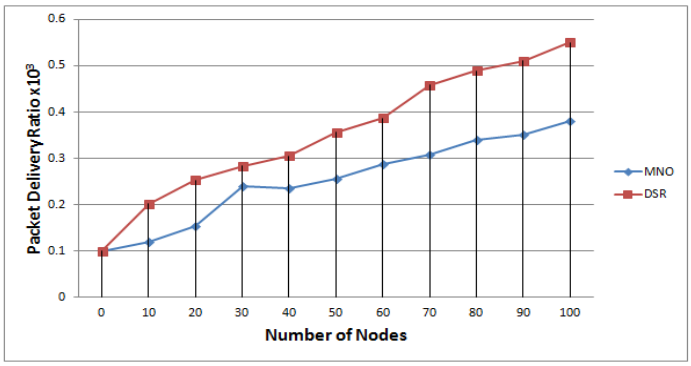

Fig. 8. Overall Performances

6. Conclusion

The proposed work has a better output than the surveyed paper and the above papers deals with wireless sensor network and as well as wireless networks. The simulation of the WSN done in our project is completely based on WSN not wireless network so there might be some issues, when the above methodologies implemented in general wireless networks, but the methodologies that we used will surely yield a good result in WSN. Virtualization plays an important role in this project which is the only thing derived from wireless networks and existing concepts are suitable for WSN in some scenarios which not includes virtualization of WSN, but this proposed concept will work for virtualization. Future work is to make the proposed concepts work under cloud based environment.

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