Volume 5, Issue 3, March 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

# Civilizing Energy Effectiveness in Wireless Sensor Networks via Multiple Mobile Base Stations

**N. Prakashrajan[1], J.Venkateshan[2], S. Keerthi[3], P. Vinodhai[4], M. Sivaranjani[5]**
[1, 2]Assistant Professor, Department of Computer Science and Engineering
[3, 4, 5] UG Scholar, Department of Computer Science and Engineering
[1, 2,3,4,5] RVS College of Engineering &Technology, Karaikal, Puducherry, India

***Abstract - One of the main design issues for a sensor network is preservation of the energy available at each sensor node. We intend to arrange multiple, mobile base stations to protract the lifetime of the sensor network. We split the lifetime of the sensor network into equal periods of time known as rounds. Base stations are relocated at the start of a round. Our manner uses an integer linear program to resolve new locations for the base stations and a flow-based routing protocol to guarantee energy efficient routing during each round. We intend four evaluation metrics and evaluate our elucidation using these metrics. Based on the simulation results we prove that employing multiple, mobile base stations in harmony with the elucidation given by our schemes would extensively augment the lifetime of the sensor network.***

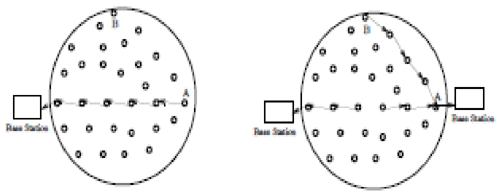
***Keywords: CHAMP, SOAR, AODV***

## I. INTRODUCTION

A sensor network is a stagnant ad hoc network consisting of hundreds of sensor nodes position on the fly for unattended operation. Each sensor node is outfitted with a sensing device, a low computational facility processor, a short-range Wireless transmitter-receiver and a limited battery-supplied energy. Sensor nodes monitor some adjoining environmental occurrence, process the data obtained and forward this data towards a base station located on the margin of the sensor network. Base station(s) collect the data from the sensor nodes and broadcast this data to some remote control station. Sensor network models considered by most researchers have a single static base station located on the periphery of the sensor network [5], [7], [9], [12]. Past research has alert on developing energy efficient protocols for Medium Access Control (MAC) [10] and routing [1], [3], [14], [15].

### *A. Improvement of utilize Multiple Base Stations*

Consider two different sensor network deployments as shown in Figure 1. In Figure 1 sensor node *A* is one bound away from its adjoining base station when two base stations are deployed. For sensor node *B* the hop-count from its nearest base station is same in both the cases. Thus, by employing two base stations instead of one we have successfully either condensed or preserve the hop count of each sensor node in the network. Since the energy addicted in routing a message from any sensor node to its nearest base station is comparative to number of hops the message has to travel, employing multiple base stations effectively reduces the energy utilization per message delivered.



(a) Circular Sensor Field (Single Base Station) (b) Circular Sensor Field (Two Base Stations)

Fig. 1. Circular Field of Interest

### *B. Why move about Base Stations?*

In [15], the authors conventional during experimental results that the sensor nodes which are one-hop away from a base station drain their energy faster than other nodes in the network. The authors trait this to the fact that nodes which are one hop away from base station need to forward messages instigate from many other nodes, in addition to delivering their own messages. In doing so, these sensor nodes weaken their energy nearer and become in operational. As a result, many sensor nodes will be incapable to converse with the base stations and the networks befall in operational. To enlarge the lifetime of sensor network we intend to utilize multiple base stations, and occasionally change their locations. We intend two strategies to choose base station locations and compare the routine of these strategies with three other strategies. We also propose a routing protocol based on flow information. Through simulations we show that our strategies better all the other strategies.

## II. SYSTEM MODEL

We formulate the subsequent assumptions about the network:

- Each sensor node has a inimitable pre-configured id.
- We believe only positive sensor networks where each node generates identical amount of data per instance unit. We presume that each data unit is of same duration.
- The transmission range of each sensor node is permanent.
- A transceiver demonstrates first order broadcasting model uniqueness [15], where energy indulgence for the transmitter or receiver circuitry is constant per bit communicated. Also, energy exhausted in transmitting a bit over a detachment *d is* qualified to $d^2$.
- There exists a conflict free MAC protocol which provides channel admittance to all the nodes.

## III. FLOW BASED ROUTING PROTOCOL

Sensor nodes can use the flow in sequence obtained by solving the integer linear program to route messages in an energy competent comportment. Consider sensor node A with its incoming and outgoing number of messages as shown in the

Figure 2. Once a sensor node has this information it would achieve its routing as illustrate below.

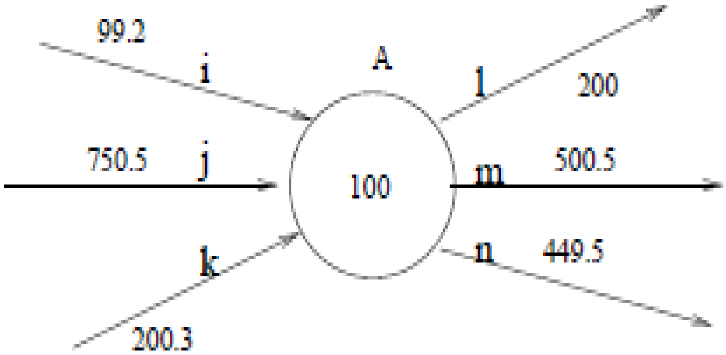



Fig.2. Flow Based Routing

- For every outgoing link a contradict is maintained. The value of the contradict is set to the ground of the flow going out on that scrupulous link.
- Whenever a node needs to broadcast its packets, it would select one of the outgoing links in a round robin approach.
- If the counter value of the preferred link is superior to the number of packets that have to be transmitted, then all the packets are transmitted on that link and counter value is decremented by the number of packets.

## IV. NECESSITATE FOR THE STUDY

At the instigation of each round we need to tenacity the scene of the base stations at feasibilities. We refer to this difficulty as the Base Station Position (BSL) problem. The node *an* in 250 packets to transmit. If link *l* was selected then 200 packets would be convey on this link and its new counter value would beset to 0. The enduring 50 packets would be transmitted on *m* and its counter values would be rationalized to 450. Flow Based Routing Protocol is used. Only one base station used. Static sensor nodes only used. Design issues for a sensor network are fortification of the energy reachable at each Sensor node. The transmission range of each sensor node is not prearranged.

## V. APPRAISAL OF LITERATURE TESTIMONIAL

Geographic ad hoc networks use position information for routing. They habitually operate stateless greedy forwarding and require the use of healing algorithms when the greedy approach fails. We intend a novel idea based on virtual repositioning of nodes that allows increasing the efficiency of greedy routing and significantly increasing the success of the Recovery algorithm based on local information alone. We explain the problem of predicting dead ends which the greedy algorithm may reach and circumvent voids in the network, and introduce NEAR, Node altitude Ad-hoc Routing, a solution that integrate both essential positioning and routing algorithms that progress performance in ad-hoc networks surround negated.

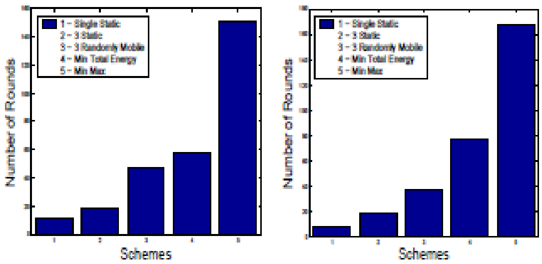
Routine association of Scalable Position Services for Geographic Ad Hoc Routing we present a quantitative model of protocol overheads for predicting the performance tradeoffs of the protocols for stagnant networks. We then analyze the performance impact of mobility on these position services. Finally, we estimate the performance of routing protocols outfitted with the three position services with two topology-based routing protocols, AODV and DSR, for a wide range of network sizes. Our study articulate that when practical MANET sizes are conscientious, toughness to mobility and the standardized characteristic matter more than the asymptotic costs of position service protocols. In particular, while GLS scales improved asymptotically, GHLS is far simpler, transmits fewer control packets, and delivers more data packets than GLS when used with geographic routing in MANETs of sizes considered practical today and in the near expectations. Similarly, although XYLS scales worse asymptotically than GLS, it transmits smaller amount control packets and delivers more data packets than GLS in immense mobile networks.

A structure for Reliable Routing in Mobile Ad Hoc Networks Position services are used in mobile ad hoc and combination networks whichever to locate the geographic position of a given node in the network or for locating a data item. One of the main usages of position services is in position based routing algorithms. In painstaking, geographic routing protocols can route messages more competently to their objective based on the intention node's geographical position, which is provided by a position service. A content position service provides to the requesting node either the requested data itself or the identifier of the node that necessities this data. now and then the position of the node that stores the data is also provided. Such data position services are useful for put into practice content-sharing applications, accepting caching, and publish promise systems.

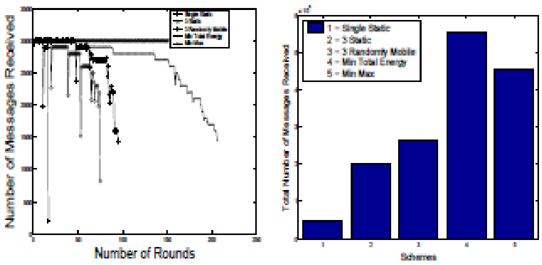
A mobile ad hoc network is an sovereign system of infrastructure-less, multichip, wireless mobile nodes. Immediate routing protocols perform well in this ambiance due to their competence to cope quickly against topological changes. This paper intends a new routing protocol forename CHAMP (Caching and Multiple Path) routing protocol. CHAMP uses cooperative packet caching and directly multipath routing to reduce packet loss due to abundant route failures. We show through extensive imitation results that these two techniques significant augmentation in terms of packet delivery, end-to-end delay and routing intelligibility. We also show that obtainable protocol optimizations employed to reduce packet loss due to abundant route failures, explicitly local refurbish in AODV and packet repossess in DSR, are not effective at high mobility rates and high network swapping.

SOAR: Simple Opportunistic Adaptive Routing Protocol for Wireless Mesh networks are becoming a new attractive announcement archetype owing to their low cost and ease of deployment. Routing protocols are influential to the performance and trustworthiness of wireless mesh networks. Habitual routing protocols send traffic along approved paths and face difficulties in coping with defective and capricious wireless middling. In this paper, we intend a Simple Opportunistic Adaptive Routing protocol (SOAR) to unambiguously support multiple instantaneous flows in wireless mesh networks. SOAR incorporates the following four major apparatus to accomplish high throughput and fairness: (i) adaptive forwarding path selection to leverage path grouping though minimizing reproduction transmissions, (ii) priority timer-based forwarding to let only the best forwarding node advance the packet, (iii) local loss resurgence to resourcefully distinguish and retransmit lost packets, and (iv) adaptive rate control to establish an contradictory sending rate according to the current network environment.




(a) 30 Nodes (b) 200 Nodes

Fig. 3. Number of Rounds for First Node to Die




(a) Number of Messages Received at Base Stations in Each Round (b) Total Number of Messages Received at Base Stations

## VI. PROSPECT ENHANCEMENT

This work considers n nodes to simplify the process and the network is anticipated to certification the routine of a set of computable pre-specified service element such as impediment, possibility of packet loss. As a future work, with the advances in support of group communications, the use of multimedia objects, such as video, audio, or images from diverse sites will proliferate in mobile ad hoc application domains.

## VII. CONCLUSION

In this paper, we address the problem of reliable data delivery in highly dynamic networks. In the face of numerous link breaks due to node mobility, substantial data packets would either get lost, or experience long latency before restoration of connectivity. Several forwarding candidates are also explicitly precise in case of link break.

Leveraging on such natural backup in-the air, broken route can be recovered in a timely manner. The efficacy of the involvement of forwarding candidates against node mobility, as well as the transparency due to opportunistic forwarding is analyzed. High packet delivery ratio is achieved while the delay and duplication are the lowest. By temporarily amend the direction of data flow; the robustness brought about by opportunistic routing can still be accomplished.

**REFERENCE**

[1] Manjeshwar and D.P. Agrawal. TEEN: a routing protocol for enhanced efficiency in wireless sensor networks. Intl. Proc. of $15^{th}$ Parallel and Distributed Processing Symp., pages 2009 – 2015, 2001.

[2] J. Broch, D. A. Maltz, D. B. Johnson, Y.-C. Hu, and J. Jetcheva, "A performance comparison of multi-hop wireless ad hoc network routing protocols," in MobiCom '98. ACM, 1998, pp. 85–97.

[3] F. Ye, A. Chen, S. Liu and L. Zhang. A scalable solution to minimum cost forwarding in large sensor networks. Proc. of Tenth Intl. Conference

[4] on Computer Communications and Networks, pages 304 –309, 2001.

[5] M. Mauve, A. Widmer, and H. Hartenstein, "A survey on position-based routing in mobile ad hoc networks," Network, IEEE, vol. 15, no. 6, pp. 30–39, Nov/Dec 2001.

[6] G.J. Pottie.Wireless sensor networks. Information Theory Workshop, pages 139 – 140, 1998. S.Biswas and R. Morris, "Exor: opportunistic multi-hop routing for wireless networks," in SIGCOMM '05, 2005, pp. 133–144.

[7] J. Agre and L. Clare. An integrated architecture for cooperative sensing networks. Computer, 33(5):106 – 108, 2000.

[8] SIGCOMM '07, 2007, pp. 169–180. E. Rozner, J. Seshadri, Y. Mehta, and L. Qiu, "Soar: Simple opportunistic adaptive routing protocol for wireless mesh networks," Mobile Computing, IEEE Transactions on, vol. 8, no. 12, pp. 1622 –1635, dec. 2009.

[9] J. Elson and D. Estrin. Time synchronization for wireless sensor networks. Proceedings 15th International Parallel and Distributed Processing Symposium, pages 1965 – 1970, 2001.

[10] K. Sohrabi, J. Gao, V. Ailawadhi and G.J. Pottie. Protocols for selforganization of a wireless sensor network. IEEE Personal Communications, 7(5):16 – 27, 2000.

[11] D. Chen and P. Varshney, "A survey of void handling techniques for geographic routing in wireless networks," Communications Surveys & Tutorials, IEEE, vol. 9, no. 1, pp. 50–67, Quarter 2007.

[12] R. Min, M. Bhardwaj, Seong-Hwan Cho, E. Shih, A. Sinha, A. Wang and A. Chandrakasan. Low-power wireless sensor networks. Fourteenth International Conference on VLSI Design, pages 205 – 210, 2001.

[13] D. Son, A. Helmy, and B. Krishnamachari, "The effect of mobility induced position errors on geographic routing in mobile ad hoc sensor networks: analysis and improvement using mobility prediction," Mobile Computing, IEEE Transactions on, vol. 3, no. 3, pp. 233–245, July-Aug. 2004.

[14] Karp and H. T. Kung, "Gpsr: greedy perimeter stateless routing for wireless networks," in MobiCom '00, 2000, pp. 243–254.

[15] S. Lindsey and C. Raghavendra. PEGASIS: Power-Efficient Gathering in Sensor Information Systems. Intl. Conf. on Communications, 2001.

[16] W.R. Heinzelman, A. Chandrakasan and H. Balakrishnan. Energyefficient communication protocol for wireless micro sensor networks. Proceedings of the 33rd Annual Hawaii International Conference on System Sciences, pages 3005 – 301, 2000.

[17] S. Chachulski, M. Jennings, S. Katti, and D. Katabi, "Trading structure for randomness in wireless opportunistic routing.