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IMPROVING EFFICIENCY OF THE RELIABLE FLOODING BY EXERTING LINK CORRELATION IN WSN

J. Dhananandhini-II ME(CSE)[1], T. Sureka-AP/CSE[2]

[1]Muthayammal Engineering College, Rasipuram, E-Mail: dhananandhini@gmail.com

[2]Muthayammal Engineering College, Rasipuram, E-Mail: surekathangaraj@gmail.com

99, Eswaran Kovil Street, Pethanaickenpalayam(Po), Attur(Tk), Salem(Dt),

Mob: +91-9159615551, E-Mail: dhananandhini@gmail.com

ABSTRACT

To improve efficiency of the reliable flooding in wireless sensor networks Collective Flooding (CF) mechanism to be used , which exploits link correlation to achieve flooding reliability and it requires only 1-hop information at each node, to make this design highly distributed , scalable with low complexity, this to be tested in Mesh Network. CF is tested based on two contributions i) instead of using implicit or explicit ACK, each node dynamically estimate and accumulates its neighbour's status through collective ACK's. ii)forwarders are dynamically selected these two features leads to efficient and reliable dissemination. To extensively evaluate the CF in simulation method using two different nodes: 1) single hop network with 20 MICAz nodes, 2) a Multihop network with 37 nodes. The extensive simulation shows that CF achieves the reliability through that two contributions solution while reducing the total number of packet transmission and the dissemination delay by 30-50% and 35-50%respectively.

Keywords: Flooding, Wireless Sensor Network, Link Correlation

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1 INTRODUCTION

In Wireless Sensor Network, Flooding is a Network Layer Protocol that delivers message from one node to all other nodes inside the Network. Flooding is fundamental operation on time synchronization, data dissemination, node localization and Based on Routing Tree Formation Flooding tree is constructed it is used to tune the sender on their working schedule.

In wireless sensor network existing flooding method shows their effectiveness and transmission efficiency but further performance improvement has been hampered by the assumption of link independence. In wireless mesh network using flooding is a classical problem. Using Mesh network uses software update in large networks, For example: Distribution of information such as surveillance video and entertainment, sensor nets. Flooding is also interesting and challenging: its many degrees of freedom along with interaction with the physical layer have led to much research.

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In Existing method performance improvement has been hampered by the assumption of link independence. Flooding message is collected using previous method based on multiples neighboring node is probabilistically independent on each other. This existing method requires direct acknowledgement from each receiver. Using this type of assumption may lead to congestion, high collision and possibly acknowledgement storm problem.

To Overcome this issue new method to be introduced i.e. collective ACKs. In existing method sender estimated whether the transmission based on their feedback from the intended receiver, instead of that this collective acknowledgement mechanism allows the receiver based on the link correlation among them neighbour also receives the same ACKs. Conditional Packet Reception Probability scheme as a metric to characterize the correlation among links. The CPRP is the probability of a node's successfully receiving a packet, given the condition that its neighbor has received the same packet. Based on the environment's stability, this metric is measured and calculated nodes using a form of hello message at an adaptive time interval (i.e., small interval when the environment is dynamic and large interval when the environment is stable).

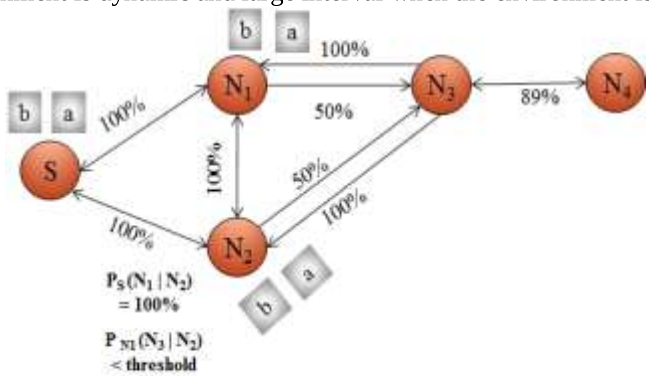

Fig 1.1 An example sensor network and flooding two packets using collective ACK

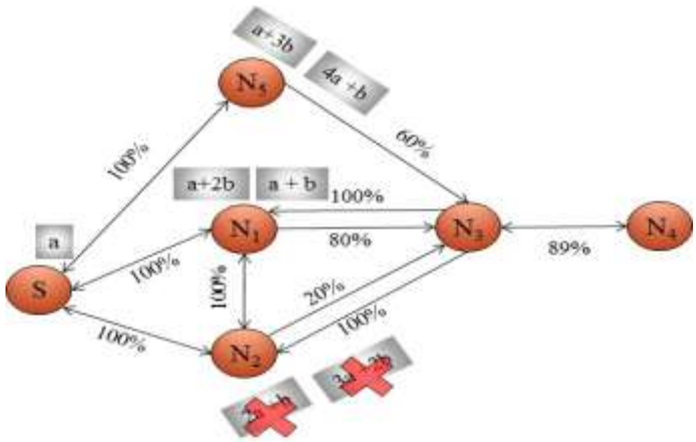

Fig 1.2 Forwarder selection in an example wireless sensor network.

2 Motivations

To improve the efficiency of the reliable flooding by utilizing link correlation in wireless sensor network using Collective Flooding mechanism. In this Collective ACK is a new concept that improve the reliable flooding operations. It transforms the direct ACK into correlated and accumulative ACKs.

The main goal of this method is to reduce redundant transmissions inside the network while providing reliable message dissemination. Collective Flooding, a node is called a covered node if it has already received the broadcasting packet. If the node is already Covered means that nodes are responsible for rebroadcasting the packet to uncovered nodes in the network. In our design, rebroadcasting is used as an implicit ACK to the sender to save protocol overhead. We note that CF can be also applied when explicit ACKs are used.

Specially two key mechanisms in the CF protocol:

- **Collective ACKs**: In Collective Flooding mechanism the node's rebroadcasting not only indicates that this node has received the packet, but also serves as some other neighbouring nodes for collective ACK.

- **Dynamic Forwarder Selection**: The forwarder is selected dynamically through competition among nodes that have already received the broadcasting packet.

2.1 Experiment Setup

In our method 1) 20 nodes for Single hop method and 2) 37 MICAz nodes for Multihop method that to be used in Round Robin Fashion. Fixed single sender other nodes are consider as receivers. Efficient Flooding scheme shows

Fig 2.1 Efficient way of Flooding Scheme

Conditional Packet Reception Probability (PRP) Scheme is used to measure the probability value of the flooding information. The CPRP is the probability from sender node that a high-PRR node N_h receives a packet M, given the condition that the packet M is received by a low-PRR node N1 based on high PRR and low PRR N_h and N_l are the neighboring receivers of the Node S.

2.2 Simulation Setup

Using NetBeans IDE simulation tool the JAVA program to be run on that. This figure shows the network formation in this red color node shows the sender it act as a sensor node. And other green color shows the receiver node that receives the information.

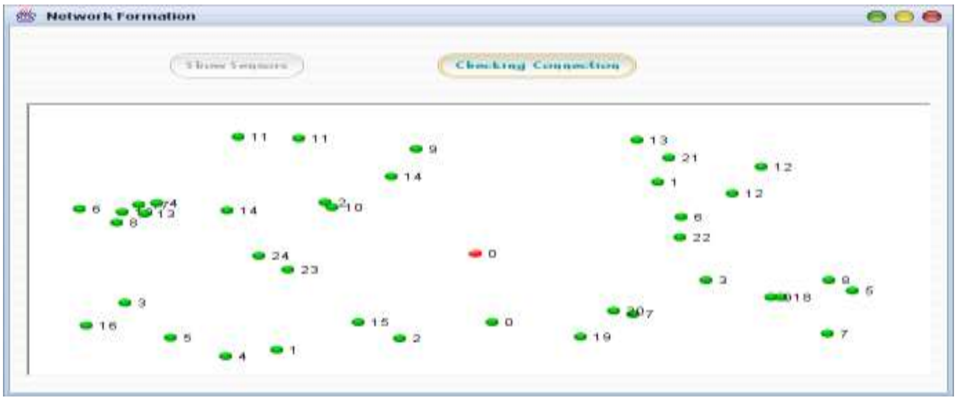

Fig 2.2 Network Formation

The idea of our design is the collective ACKs. In Existing method a sender estimated whether a transmission was successful based only on the feedback from the particular receiver. To reveal that mechanism of collective ACKs allows the sender to knows the success of a transmission to a receiver based on the ACKs from other neighbouring receivers by utilizing the link correlation among them. At an adaptive time interval Hello information to be send to the receivers this operation to be performed to check the connection link between the sender and receiver.

2.3 Single Hop Indoor Experiment

Here 20 nodes are taken, in this single sender to be used and other 19 nodes are distributed among the sender. Single hop means between sender and receiver single node to be used. Information to be send from sender to any receiver based on the single hop information. In this Collective ACKs and Dynamic Forwarder Selection to be tested. In the dynamic forwarder selection scheme whenever collective flooding Protocol is initiated protocol enters into the maintenance state, in which all of its 1-hop neighbor information is periodically maintained. Here, two nodes are considered as neighbours if the link quality between them is larger than 0%. Whenever the node receives a broadcasting data packet, the node enters the receiver state and uses this packet as a collective ACK to update its neighbours' coverage probabilities. If the node has uncovered neighbor, it sets its back-off timer based on its transmission effectiveness, then goes back to the maintenance state. When the node's back-off timer fires, which means it wins the competition, it enters the sender state, in which it sends out the packet and updates its neighbors' coverage status; after that, it goes back to the maintenance state. This procedure repeats until the node estimates that all its neighbors are covered.

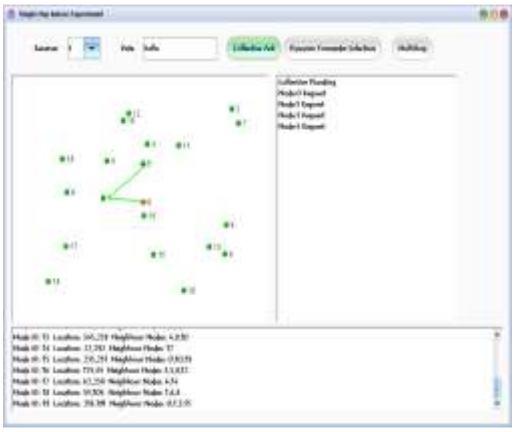

Fig 2.3.1: Collective ACKs

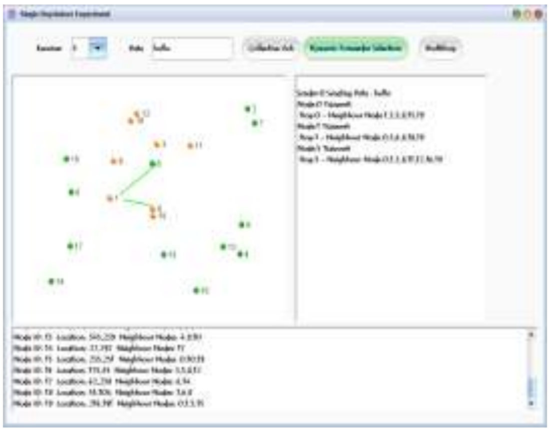

Fig 2.3.2: Dynamic Forwarder Selection

2.4 Multihop Indoor Experiment

Here 37 nodes are taken, in this single sender to be used and other 36 nodes are distributed among the sender. Multihop means communication between the sender and receiver more than one node to be used. Externally FLD and RBP protocols to be executed. The node running CF has more 1-hop neighbours, which would further help the node accurately predict whether its 1-hop neighbours have received the packet. CF has fewer transmissions than does standard flooding. Comparing indoor and outdoor experiments the outdoor experiment each node has fewer neighbours, resulting in more unbalanced transmissions among these nodes.

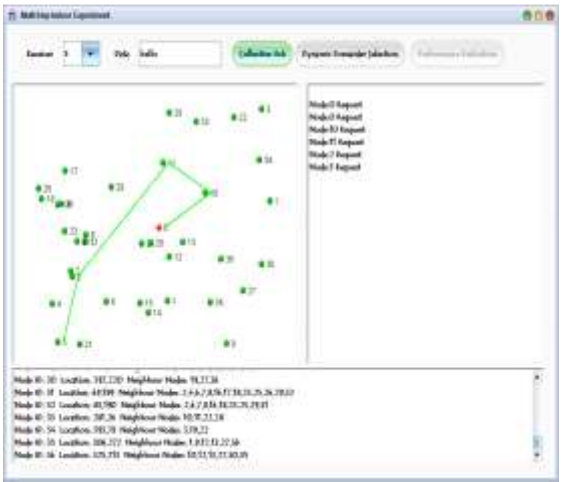

Fig 2.4.1: Collective ACKs

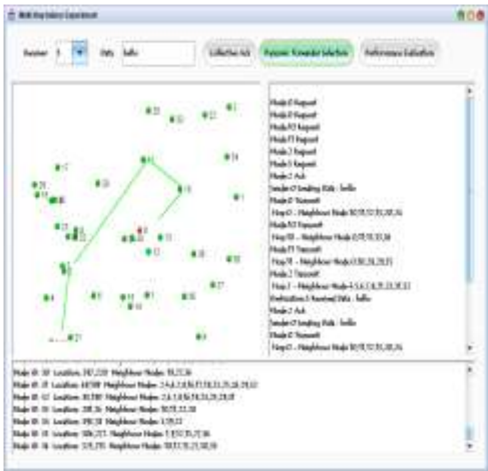

Fig 2.4.2: Dynamic Forwarder Selection

2.5 Performance Evaluation

Performance to be calculated based on comparing CF protocol with some other existing Protocol. Performance to be increased link quality to be increases, the nodes that do retransmission become centralized. When the link quality equals 100%, CF becomes the protocol that relies on the nodes with high connectivity to do the retransmission. In this method the CF protocol is to provide an efficient and reliable message dissemination service with low complexity. To demonstrate that CF is effective through two main mechanisms: *collective ACKs* and dynamic forwarder selection. Both mechanisms take advantage of link correlation among neighbouring receivers.

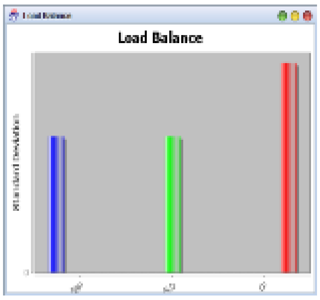

Fig 2.5.1: Load Balance

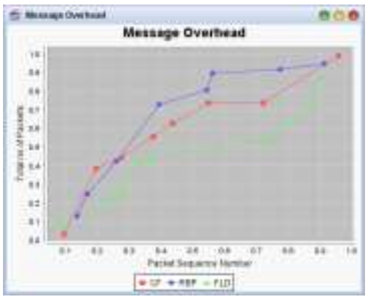

Fig 2.5.2: Message Overhead

Fig 2.5.3: Dissemination Delay

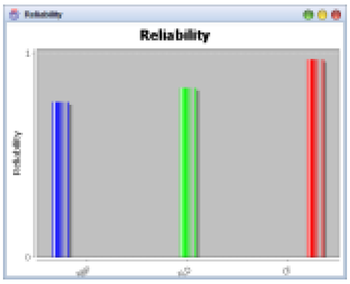

Fig 2.5.4: Reliability

CONCLUSION

Thus the Protocol is implemented and evaluated the CF protocol including a single-hop network with 20 MICAz nodes, a Multihop network with 37 MICAz nodes. Collective Ack and Dynamic forwarder selection is the first work that transforms the direct ACK per receiver into a collective one. This unique design noticeably reduces the redundancy in rebroadcasting, as shown in our evaluation. The results show that the CF protocol has low overhead, low dissemination delay, and high reliability in unreliable wireless environments. To test this CF using some other various network is the future work and evaluate the performance of that.

REFERENCES

[1] T. Zhu, Z. Zhong, T. He, and Z. Zhang, "Achieving efficient flooding by Utilizing link Correlation in wireless sensor networks," in Proc. NSDI, 2014,p. 4.

[2] Y. Sun, O. Gurewitz, S. Du, L. Tang, and D. B. Johnson, "ADB: An efficient multihop broadcast protocol based on asynchronous duty-cycling in wireless sensor networks," in Proc. SenSys, 2009, pp. 43–56.

[3] T. Zhu and M. Yu, "A secure quality of service routing protocol for wireless ad hoc networks," in Proc. IEEE GLOBECOM, 2006, pp. NISO2-4:1–NISO2-4: 6.

[4] Y. B. Ko and N. Vaidya, "Flooding-based geocasting protocols for mobile ad hoc networks," Mobile Netw. Appl., vol. 7, no. 6, pp. 471–480, 2002.

[5] Amin Hassanzadeh, Radu Stoleru, Jianer Chen Department of Computer Science and Engineering, Texas A&M University "Efficient Flooding in Wireless Sensor Networks Secured with Neighborhood Keys" 2011 IEEE 7th International Conference on Wireless and Mobile Computin978-1-4577-2014-7/11