

An RCB approach based Marginal WSN for Reliable Transmission

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Abstract:

Wireless Sensor Networks are the primary source of reliable data transfer in various application domains. But the distribution of dense and marginal network can lead to many conflicts during the dense data distribution. This issue can also be a primary cause to data loss during the transmission and the delay in the application environments. The researchers in this area are most successful in reducing the delay time but failing to minimize the information loss during transmission. The present study in this case proposed a solution as an approach than can solve the problem in the application environments. Multi-Path Reliability Data Transmission (MPRDT) approach is proposed that can be more effective in the marginal networks. The mechanism adopts a mechanism of redundancy that can realize the efficiency in the transmission and implements the parallel technology and contributes to the transmission of data packets. Duplicate data packets are generated before transmitting the original data that the sensor node (SN) requires to transfer and forwards the same to an aggregate node via multi-path. An intermediate node is used during the transfer to improve the reliability. An experimental approach is implemented and the obtained results are clearly analyzed. The results shown that the proposed MPRDT technique improves the reliability of data transmission and simultaneously reduce the packet loss. It is also observed that the technique has improved the lifetime of the network and maintained regular data transmission.

Keywords: *Wireless Sensor Networks, Multi-path Reliability, marginal network.*

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I. INTRODUCTION

Along with the continual advancement of heavy distribution of wireless sensor network (WSN) at marginal level are increasingly more substantial, as well as the demands for dependable data transfer are gaining higher as well as much higher attention [1]. There are lots of unpredicted considerations like the on-site atmosphere, depletion, careless area (black zone), and so on. These variables will certainly result in sensor node breakdowns and induce errors as well as packet delivery transmission errors [2]. The redundancy of data transmission technology is the primary method to ensure the dependability of information in WSN, primarily featuring multi-path and retransmission strategies, which are all traded for dependability through boosting redundant data packets [3]. The amount of retransmission is confined

and generally found out through web link high quality as well as dependability needs [4]. Point-to-point retransmitting necessities to experience the entire data transmission process. This technique may accomplish trustworthy mass data packets in between the base terminal (BS) as well as sensor node, along with the rise of path hops, the performance and efficiency are reduced. Information retransmissions device can easily certainly not simply make certain the effective transfer of data packet delivery; however, it additionally strengthens the interaction stability through developing and keeping numerous point-to-point individual paths. It is going to improve node efficiency intake as well as decrease network lifetime [5]. Compared to the single-path transmission, multi-path process performs packets transmission through setting up various sending pathways in between resource node as well as base station, which

significantly strengthens the excellence price of packet transmission [6]. This procedure can easily certainly not just successfully reduce the unpleasant impacts of solitary transmission failures on network, yet it additionally assists to stabilize the network bunch and enhance error resistance as well as dependability [7]. Depending on to the collection restrictions of intermediary nodes as well as links, multi-path could be broken down in to knotted multi-path as well as split up multi-path [8]. Compared to the knotted multi-path data transmission, there are no common nodes or even links in between all pathways apart of multi-path. The cost of constructing the path as well as routine maintenance is sizable, yet the data transfer, hold-up and information traffic are going to be considerably enhanced. The RCB-MRT formula recommended in this paper embraces the redundancy method. WSN is hierarchically gathered; at that point the sensor node delivers the accumulated information to the cluster head node. The CH nodes group duplicates the data packets and ahead all of them to the sink node through knotted multi-path dynamic roads. The new procedure can easily lower the information reduction cost in the transmission procedure, strengthen the stability of data packets transmission, decrease the transmission hold-up and balance the network energy intake.

II. RELATED WORK

This area includes an introduction of limited WSN, featuring the existing information transmission stability relevant investigation, data packets redundancy operation also simultaneous knotted multi-path similar concerns. In resource constrained marginal WSN, guaranteeing trustworthy as well as reliable information transmission is the major need for a reliable surveillance unit. In limited WSN, pair of often utilized approaches to guarantee trusted data packets transmission is re-transmission operation as well as redundancy system. Re-transmission system needs pertinent sending out nodes to transmit again sub-data packets later the reduction takes place. Redundancy system calls for appropriate delivering nodes to include extra data packets besides initial information packets from the beginning of the transmission. Acquiring nodes can easily rebuild sub-data packets info utilizing this additional information for reduction.

Endorsement [9] matched up the re-transmit system along with the redundancy operation. When it comes to reduced data packet reduction cost, the erasure technical strategy based upon redundancy is even more energy-saving as well as trustworthy than the re-transmit approach. When it comes to a higher data packet reduction cost, the efficiency of erasure technology is going to be reduced considerably. To address the point-to-point integrity concern, referral recommended a multipath reputable relevant information sending procedure, which delivers numerous duplicates of data packets along several pathways coming from the resource node to drain node to acquire the anticipated trustworthy data packets details. Recommendation planned a host-by-host information transmission procedure, which uses redundancy of resource nodes and roads to obtain QoS needs and make the most of the network lifetime of limited WSN. The study suggested a dependable split up interweaving multi-path transmitting process for limited WSN based upon network coding. The procedure utilizes hop-by-hop method to constitute multi-path, as well as merely keeps the neighborhood network details of each node, before setting up the point-to-point course. Next-door neighbors of each nearby node are arranged depending on to the hops coming from the node at the sink to enhance the network lots harmonizing trouble.

Some studies recommended a trustworthy marginal WSN information sending procedure. This method makes use of the efficient modulus embedded in a repetitive amount unit to incorporate redundancy to carry information data packet, which may efficiently strengthen the transmission cost of the information packet and minimize the point-to-point problem. Endorsement planned a new bionic transmitting method, which blends ant swarm optimization meta-heuristic protocol along with low-priced circulated area discovery modern technology tag breeding. This method generates near nodes in limited WSN and harmonies energy intake by means of flock intellect transmitting data packets within neighbor nodes. Utilizing this technique, it calls for a lot less moment as well as expense to construct as well as keep transmitting pathway details, the integrity of data packets transmission could be boosted by means of the data packets re-transmit approach based upon neighborhood verification. Fig: 1 shows the WSN models.

Referral suggested a multi-path trusted data packets sending transmitting procedure based upon proximity as well as energy restraints. The process determines the body weights of each node in the earlier stage and rates the weights of its own next-door neighbor nodes. In the data packets transmission stage, the resource node sends out the data packets to the next neighbor node along with the highest possible significance in the value desk. A multi-coordinator directing method along with various individual region identifiers to address the singular aspect failing complication (SPF) in ZigBee-based marginal WSN. Through transforming their PAN IDs, network participant nodes may switch over coming from one planner to one more just in case of breakdown. This procedure speeds up the rate of negligence recuperation and boosts the effectiveness of information transmission.

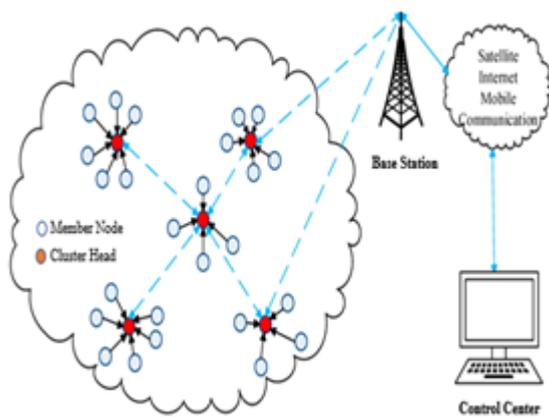


Fig: 1 (a) WSN Model 1

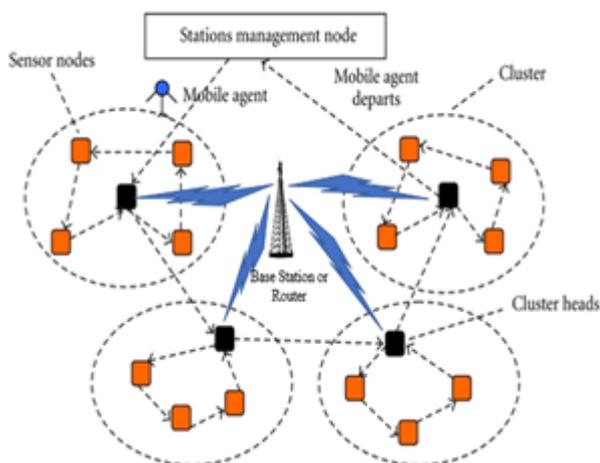


Fig: 1 (b) WSN Model 2

Coming from the above referral, our experts may observe that several historians have researched reputable transmission for WSN, as well as they have embraced various techniques to locate different Quality of Service (QoS) indications in the network including problem, offered data transfer, performance and more. Blending the above existing research study, our team can easily obtain the perks of QoS directing: QoS transmitting is a procedure that may choose courses depending on to network on call sources and solution circulation QoS needs. As a new research study procedure, it may dramatically enhance network throughput as well as network functionality degeneration, maximize source appropriation, harmony network lots, enhance network worldwide information usage, as well as take full advantage of network functionality. The potential to approve various other QoS criteria demands.

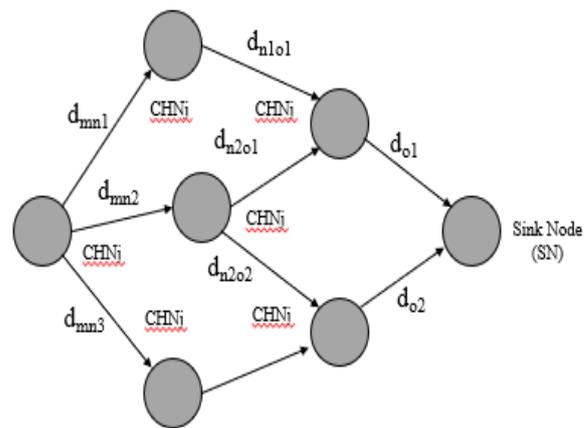


Fig: 2 (a) Data Transmission Pathway

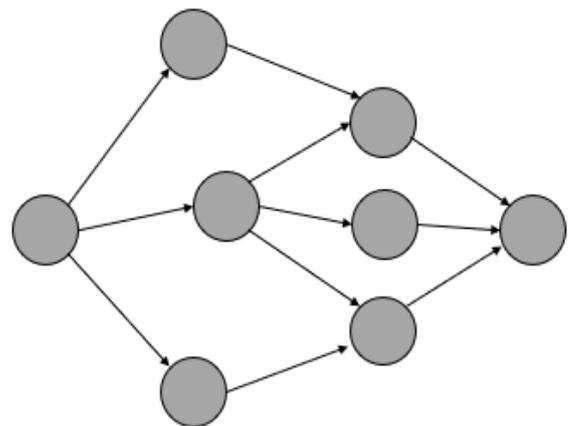


Fig: 2 (b) Transmission of three Hops

III. RCB APPROACH

Our experts thought about a large, high-conflict marginal WSN setting featuring dozens sensor nodes that are broken down right into bunches of various amounts coming from significant to reduce through ordered concentration formulas. The nodes in each set deliver the affective data packets relevant information to the chosen collection scalp node, as well as ultimately, every data packet of intra-cluster node information gathered due to the bunch scalp node is sent in a multi-hop to the sink node. Various sets will result in problems in the process of data packets transmission, leading to reduction of data packets relevant information. The failing of the node in charge of sending will additionally cause the reduction of data packets details. For convenience of research study, the acknowledged limited WSN network version possesses the complying with buildings:

- With higher thickness qualities, segregated nodes will certainly not show up under first health conditions.
- The base station is special as well as the energy is certainly not confined;
- The first energy of the sensor node may certainly not be improved.
- The sensor node possesses specific information combination abilities and possesses a special identifier.
- The sensor node possesses the installing functionality.

Fig: 2 show the data transmission paths.

IV. RESULTS AND DISCUSSIONS

During the simulation process it is observed that the procedure proposed and designed for RCB-MRT in this area consumes low energy than the other existing three procedures. During the transmission of data packets that can easily conserve high energy expenses of the bunch sensor node. Many of the issues at SPF are due to the fatigue of the energy of the collection sensor node. The RCB-MRT procedure may likewise a lot better reduce the situation of SPF concerns. It may be viewed coming that the RCB-MRT process designed in this paper is much more than the various other three methods. In time, the variety of nodes making it through at the exact time. The observations

are depicted in the figure 3.

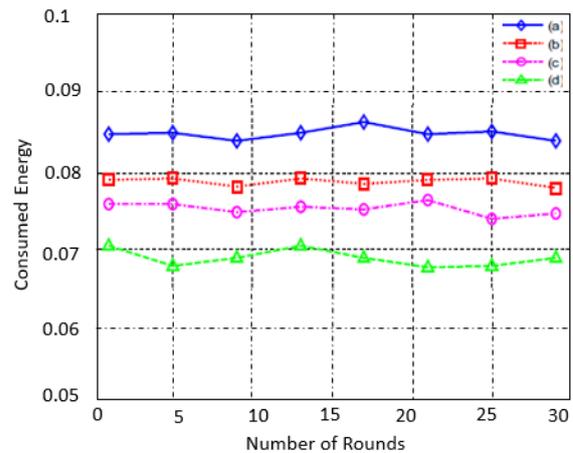


Fig: 3 (a) RCB Energy consumed

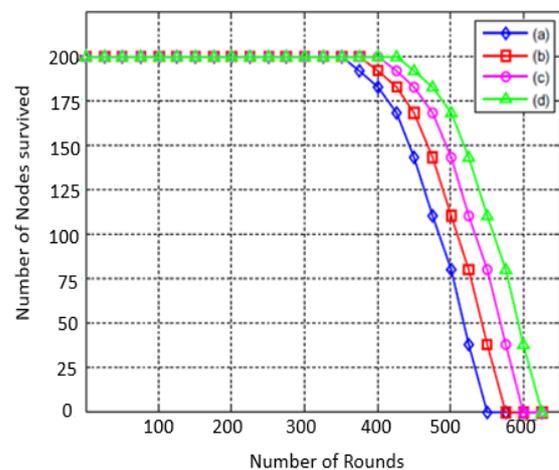


Fig: 3 (b) Survived Nodes

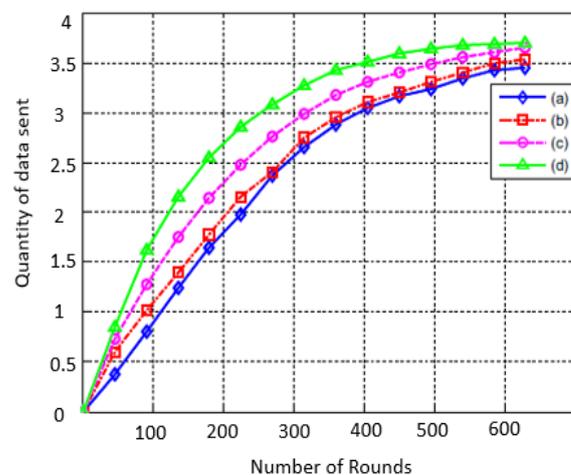


Fig: 3 (c) Data sent quantity

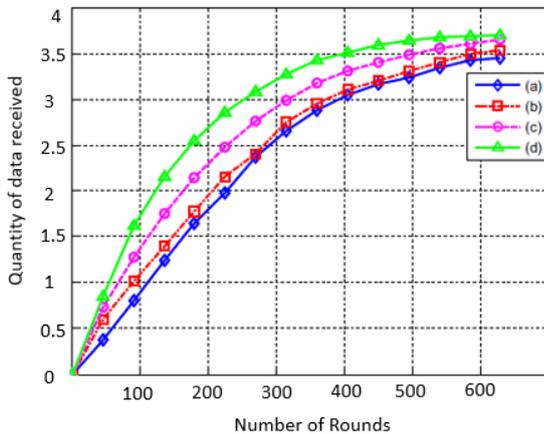


Fig: 3 (d) Data received quantity

The new strategy can easily minimize the data packets reduction cost in the transmission method, enhance the stability of information transmission, decrease the transmission problem and harmony the network power consumption.

IV. CONCLUSION

Data packets loss and decrease of network lifetime are the primary problems facing by WSN while distributing the data in the dense marginal networks. The present paper proposed a new approach of data transmission in a more reliable and efficient manner. The MPRDT technique proved to be the best method that reduced the loss of data packets and transmission delay time. The technique is followed the concept of data packet redundancy in which the large amount of original data is divided into small data packets and the same are forwarded through the network. The present implementation is further compared with the existing protocols and proved to be the best in terms of reliability and increasing the marginal sensor networks life cycle. Simultaneously, the present work has raised the need of edge computing applications.

REFERENCES

- [1] Attiah, A., Amjad, M. F., Chatterjee, M., & Zou, C. C, "An evolutionary game for efficient routing in wireless sensor networks", In Global communications conference, 2017.
- [2] Saginbekov, S., & Jhumka, A, "Many-to-many data aggregation scheduling in wireless sensor networks with two sinks". Computer Networks, 2017, pp. 184–199.
- [3] Tang, L., Sun, Y. Gurewitz, O., & Johnson, D. B, "Pwmac: An energy-efficient predictive-wakeup mac

protocol for wireless sensor networks". In 2011 Proceedings IEEE INFOCOM, IEEE, pp. 1305–1313, 2011.

- [4] Tian, Y., Ou, Y., Reza Karimi, H., Liu, Y. T., & Han, J. Q, "Distributed multi-target probabilistic coverage control algorithm for wireless sensor networks", Mathematical Problems in Engineering, 2014.
- [5] Rao, S., & Mehta, N. B, "Energy harvesting wsns for accurately estimating the maximum sensor reading: Trade-offs and optimal design", IEEE Transactions on Wireless Communications, pp. 4562–4573, 2015.
- [6] Morell, A., Correa, A., Barcelo', M., & Vicario, J. L, "Data aggregation and principal component analysis in wsns. IEEE Transactions on Wireless Communications, pp. 3908–3919, 2016.
- [7] Marques, B., & Ricardo, M, "Energy-efficient node selection in application-driven wsn. Wireless Networks", pp. 889–918, 2016
- [8] Qiu, C., Shen, H., & Chen, K, "An energy-efficient and distributed cooperation mechanism for k-coverage hole detection and healing in wsns", IEEE Transactions on Mobile Computing, 17(6), pp. 1247–1259, 2017.
- [9] Mahmood, M. A., Seah, W. K., & Welch, I. "Reliability in wireless sensor networks: A survey and challenges ahead". Computer Networks, pp.166–187, 2015.