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A Comprehensive Study of Routing Protocols for Energy Aware Wireless Sensor Networks

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ABSTRACT

A wireless sensor network (WSN) is considered a huge set of sensor nodes with constrained power supply and limited computational ability. Owing to the limited transmission range and high density of nodes, packet sending in sensor network was generally made by multi hop data communication. Thus, routing in wireless sensor network systems serves as crucial domain of study in the last few years. The main purpose of this study is presenting the ideology of the multipath routing method and its basic difficulties, along with that the fundamental intensions for using the method in wireless sensor network. Moreover, it provides a complete taxonomy on the prevailing multipath routing procedures, that were specially devised for wireless sensor network. It emphasizes the main purpose behind the advancement of every protocol group and describe the process of diverse protocols elaborately, with its merits and demerits. Also, this study summarizes and distinguishes the advanced multipath routing methods from the network application.

Keywords: Routing protocol, Cluster head, Sensor node, Wireless sensor network, Base station

I. INTRODUCTION

Wireless sensor network (WSN) contains enormous number of small and modestly low-evaluated computational nodes that communicate the important gathered data to the base station (BS) for relevant handling [1- 3]. From last 10 years, wireless sensor networks (WSNs) stand out from scholastic examination as well as from scholarly exploration. The central point behind the majority of the exploration endeavors in the field of WSNs is on the grounds that it assists with settling the greater part of the genuine issues like security, human wellbeing, medical care, and guard area [4-10]. In WSNs, various examination headings are accessible which incorporates human plan, routing methodology, techniques for power the executives, security issues, and detecting capacity of sensor nodes [11]. Lifetime of the sensor nodes is the greatest amount of issue for WSNs, in light of the fact that sensor nodes have exceptionally restricted power assets [12]. Routing protocol assumes a significant part in the lifetime of the sensor nodes. Routing in WSN isn't like other wireless networks in light of different interesting properties of sensor node like energy requirements, handling achievements, and transmission of gathered data from multiple nodes to a single BS, unlikelihood of worldwide location and arbitrary organization of sensor nodes, and so forth. To oblige these sorts of properties, various kinds of routing protocols were created. A definitive objective of these routing protocols is to accomplish energy productivity and augment the general network lifetime [13-20].

Sensor node life is subject to the existence season of battery which give capacity to sensor node, on which the life expectancy of the entire network is reliant. An energy source (power substance) supplies energy to the memory unit, detecting unit, and handset. The memory unit is utilized for the capacity of use related information and furthermore contains gadget ID data, detecting unit contains sensors to catch information from their current circumstance, and the handset is answerable for the transmission and gathering of information [21]. By tests, it is seen that wasteful routing calculation causes fast scattering of battery. Subsequently, it is significant prerequisite to plan and utilize energy effective routing calculations in WSNs which will increment generally speaking life season of WSNs [22].

Considering the decreased capacities of sensors, the correspondence with the sink could be at first imagined without a routing protocol [23-25]. Be that as it may, its effortlessness achieves critical downsides. A collapse, right off the bat, is identified on the grounds that nodes repetitively get multiple duplicates of similar information message [26]. One advancement depends on the meddling calculation [27]. Meddling stays away from collapse as the sensor sends the message to a chose neighbor as opposed to illuminating every one of its neighbors as in the old style flooding calculation. Nonetheless, cross-over and asset visual deficiency are as yet present. Besides, these burdens are featured when the quantity of nodes in the network increments. The interaction experiences a few troubles while choosing the course, which relies on, sort of network, channel qualities and the presentation measurements [28-30].

The information detected by the sensor nodes in a wireless sensor network (WSN) is ordinarily sent to the BS that interfaces the sensor network with different networks (might be web) where the

information is gathered, investigated and some activity is taken as needs be [31-35]. In multi-hop correspondence the sensor nodes produce and convey their material as well as act as a way for other sensor nodes towards the BS [36]. The most common way of finding appropriate way from source node to objective node is called routing and this is the essential obligation of the network layer.

This study is presenting the ideology of the multipath routing method and its basic difficulties, along with that the fundamental intensions for using the method in wireless sensor network. Moreover, it provides a complete taxonomy on the prevailing multipath routing procedures that were specially devised for wireless sensor network. It emphasizes the main purpose behind the advancement of every protocol group and describe the process of diverse protocols elaborately, with its merits and demerits. Also, this study summarizes and distinguishes the advanced multipath routing methods from the network application.

II. RELATED WORKS

The LEACH is normal energy successful cluster based progressive routing protocol [37] for WSN was introduced to lessen energy utilization. It uses restricted administration for empowering power and adaptability for dynamic networks, and diminishes the amount of information which ought to be moved to the BS, coordinates data blend to the routing protocol. The PEGASIS is a chain based various leveled protocol [38], laid out type of LEACH protocol, instead of consolidating sensor nodes to cluster. It utilizes chain development at first at each round. Over the arrangement, each node is considered to recognize its neighbors. This strategy is used for choosing an underlying node that would introduce the chain shaping system. The TEEN protocol is executed to be open to the startling changes in the detected elements [39-41]. The system of sensor network in TEEN is relying on progressive mix though close by nodes structure clusters, and this methodology go on next level till the BS is achieved. The sensor node generally faculties the moderate anyway the transmission of information is made lesser. The TEEN uses LEACH way to deal with make a cluster. The whole network involves 2 levels: the underlying level CH is produced using BS and the powerful CH is made near the BS [42, 43].

The HEED method incidentally picks CH based on 2 factors, remaining energy of each and every node and the closeness to its neighbors, named as node degree. In HEED [44-50], the introduced procedure in some cases picks a CH based on the reconciliation of 2 factors. The clustering system at each node requires various rounds and each round is plentiful to achieve data from different neighbors with cluster. In different sensor network applications, with enormous measure of nodes, it is unimaginable for assigning all-inclusive identifiers for each node [51, 52]. This absence of all-inclusive identifier with inconsistent position of sensor nodes makes it trying to pick a gathering of sensor nodes for examining [53-56]. Subsequently, the data is normally communicated to a position region with significant redundancies. It prompts information driven routing protocol [57].

The SPIN is an underlying information driven protocol carried out for WSN [58]. It uses 3 sorts of correspondences: DATA, ADV, and REQ. The ADV message is sent through node which contains not many data; this message involves information with respect to the sort of data included by promoting nodes. Mindful node gets the ADV message travel a REQ message requesting data [59-65]. The node has the data sent to the mindful nodes. The nodes, later achieve data, send an ADV message and work persistently till the data accomplish the BS. The area based/geographic protocols use locational information to liken a successful course search towards the end [66]. It is profoundly proper protocol for sensor networks, while information total is a gainful technique to decrease how much correspondence towards the BS by eliminating redundancies between bundles from different sources [67]. It is profoundly alluring for enormous multi hop WSN where the nodes aren't steady and their network geography is frequently changing.

III. CONCLUSION

This study is presenting the ideology of the multipath routing method and its basic difficulties, along with that the fundamental intensions for using the method in wireless sensor network. Moreover, it provides a complete taxonomy on the prevailing multipath routing procedures that were specially devised for wireless sensor network. It emphasizes the main purpose behind the advancement of every protocol group and describe the process of diverse protocols elaborately, with its merits and demerits. Also, this study summarizes and distinguishes the advanced multipath routing methods from the network application.

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