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Research Article

Intertwine Connection-Based Routing Path Selection for Data Transmission in Mobile Cellular Networks and Wireless Sensor Networks

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In a network setting, a sensor node's round-trip delay time over hostile nodes compromises the node's ability to transmit data from the sender node to the destination node. Minimum distance path discovery causes the path failure, since aggressive nodes are available. Node connectivity is poor which should cause the packet loss; it does not control more energy consumption, since packet broadcasting is repeated for many times using that path. So, the proposed intertwine connection-based routing path selection (ICBRPS) technique allows only energy efficient routing path, path connectivity is important, and routing path is damaged because of the presence of aggressive nodes. It hacks the information from sensor and operates unpredictable manner. The objective of this presented ICBRPS scheme is to improve the routing path in efficient manner. If any damages occur during the transmission of data, then the alternate best node connectivity path is created by energetic route discovery method. The performance metrics of parameters are delay, network overhead, energy consumption, packet loss, packet delivery ratio, and connectivity ratio. It enhances the connectivity rate and reduces the energy consumption.

1. Introduction

Sensor nodes are newly turned up as one of the "in-demand" wireless scheme because it is constructed with various sensor depending uses. Sensors are fixed in all position in network environment; The house sensors are designed to control lighting, protection, and freshening, and for the main methods, it is also known as well-dressed house as well as elegant areas. Initially planned to make easy armed process, network loads are examined; also the ground for observing soil circumstances with the house sensors is also developed to manage illumination, protection, and freshening [1]. The wireless sensor network is wireless networks from the minority count of sensor nodes which are fixed in network environment. All nodes are having a transceiver to execute general uses. In order to locate the mutually structured packets at the middle cloud position and to evaluate, execute, and broadcast the sense and footage of the physical state of the network's architecture, a collection of dedicated sensors is required [2].

The network area dimension prepared by wireless sensor network incorporated temperature, sound, effluence range, moisture, and weight [3]. The use of wireless sensor networks has increased over the past ten years as a result of their practical utility. The resulting minimum energy wireless sensor networks may be able to serve as extra inaccessible sensing edges and may reduce node connection overhead [4]. The majority of older wireless sensor nodes are powered by batteries, which often recharge and alter their battery level, which causes an energy usage issue in wireless sensor networks [5].

Then, the power limits on the employment of wireless sensor network while sensors need to broadcast data packet in a more time slot. Recently, immature method develops into a recognized model which is causal in minimizing energy usage [6]. Consequently, it is a vital to build wireless sensor nodes as an energy resourceful employment because sensor network has a grouping of power in dependable packet transmission. Power well-organized sensor network should support to improve lifespan of network and guarantee network characteristics. In excess of the previous scheme should survey on energy-efficient for wireless sensor network using many schemes and techniques to increase energy effectiveness in sensor network [7].

Survey for energy usage in wireless sensor network becomes a major difficulty at the similar instance judge dependable data speed. Present method works with various layers. Commonly interruption, cross-layer plan for network method is individual of the capable techniques those merit in wireless sensor network uses [8]. Switch over data packets between OSI layers can be helpful to defeat the problems of incomplete capital and together optimize the entire characteristics of the network process. Those methods should resourcefully allow through the exercise of the cross-layer method [9]. The primary technique of cross-layer method is conserving the important duty of the unique layers, except the association and organization between various layers can be processed. The straightforwardness between the OSI layers can be preserved; with a method, the quantity of control signal can be determined [10].

WSN is located to check the sense area and organize data packets from environment. Frequently, dual methods are employing to complete the data packet organization process: among straight message transmission, with multihop broadcasting. In the first phase, sensor nodes transmit the data packet straight to target node among one-hop wireless message; output indicates more communication distances and obliterates the energy effectiveness of sensor nodes in wireless network [11]. Otherwise, multihop broadcasting, information is knowledgeable to the target node against numerous intermediate node; with the packet broadcasting, distance is reduced. Despite nodes near the target node often having a large number of broadcasting data packets, their energy levels can be very high, limiting the network characteristics. The primary goal of the sensor node is to continuously gather data. After broadcasting data packets into a digital signal, the signal is eventually transmitted to the target node or sink node. Earlier than monitor, the position of those nodes should create a network and recognize their intermediate relay nodes. Analyze the energy usage for data packet broadcasting to target node and sense the area of target node in network environment [12].

The rest of the part in paper is designed as follows. Section 2 provides related works. In Section 3, the proposed information of the proposed intertwine connection-based routing path selection (ICBRPS) technique is applied to achieve only the energy efficient routing path to ignore aggressive nodes using energetic route discovery scheme. Section 4 provides simulation performance result analysis which obtained below different parameters. At last, Section 5 concludes the paper with future work.

2. Related Works

Hammoudeh et al. [13] present scheme to estimate the necessary amount of sensor nodes to arrange sequence to obtain a particular range of exposure according to the select parameters in an agreed restraint area, when maintain link within the network environment. Subsequently, a novel cross layer communication scheme is known as LDG (level division graph), constructed particularly to attend to the message wants and connection dependability for topologically linear sensor uses. The characteristics of the present scheme are extensively calculated in experiment using realistic situation and metrics. Output indicates to its greatest adversary in the survey; it enhances packet delivery ratio, and throughput also minimizes packet latency. Maintain similar behavior in terms of normalize routing weight and energy usage.

Luo et al. [14] present the scheme that is constructed and applied to network and also estimate the packet integrity rate; network structure that uses packet integrity rate negotiates among intermediate node domain as interdomain routing substance. The rout link connection two domains are reserved underground and update energetically. The intermediate node domains discuss merging rate of packet which should maintain packet transmission details while packet information updates, to construct and estimate the processing node capacity and carry out experiment to calculate its efficiency and charge. Experimental output indicates that packet integrity rate should successfully avoid intrusions.

Ahmed et al. [15] present a TERP-secure and energy aware communication scheme which provides employ of a dispersed secure representation for the intrusion identification and removal from network environment. Additionally, TERP features a combined routing mechanism that keeps track of security, the amount of energy left in intermediary nodes, and the number of hops between them while choosing the creation routing option. Its multifacet communication scheme supports to manage energy usage between secure nodes when transmitting packets using minimum distance route. Experimental output shows minimum energy usage and increased transmission rate, and lifespan of network is distinguished with previous method.

Papithasri and Babu [16] proposed traffic management cluster and dual data transmitting data scheme and distinguished the equivalent challenges and problems. DAMHR-latency aware adaptive multihop routing method is used; it is a heuristic scheme which points a near-optimal drifting explore; it reduces energy usage of sensor nodes and enhances the data organization. Route discovery issue is determined in traffic control grouping and latency assurance sensor networks with a route controlled by target node and deliberates on a well-organized packet organization method which concurrently improves the entire quantity of packet and decrease the energy usage. The best route is favorite to convene the essential on latency which also reduces energy usage for whole network. Conventional target node speed is disheartened to increase energy effectiveness of sensor network.

Sadiq et al. [17] presented the EECL technique using the X-MAC scheme with the aid of a responsibility cycle that launches a shorter preamble and shifts to an active state only for nodes to feel comfortable using the communication channel when the other nodes are set to be in an inactive state. The growth among nodes that control energy usage and BER is positioned to be the metrics that are helpful in illustrating the need for energy for all nodes during route path discovery in sensor networks and reject the intermediate nodes that are troubled by maximum BER and with excessive path length. Simulation results estimate the efficiency of present scheme energy usage and achieve higher throughput.

Wani and Nalbalwar [18] proposed an accepted probabilistic network scheme for building of organization structure and also residential technique for detection of LBMDS-traffic control maximal dominator node group and establish link connection among those nodes. Furthermore, present an expected allocation prospect technique to resolve parent node obligation issue. Designing of data organization structure by detecting managing node improves lifetime of sensor nodes.

Xiuwu et al. [19] present communicating method which depends on EBPC analyzing area separation-based grouping for energy managing. To sense area into various effective separation, manage the amount of frequent nodes and groups by packet collection rate and broadcast cluster head packets to the neighbor part with shortest route discover coefficient. In comparison to the prior technique, the presented inquiry and reproduction of the present enhance data collecting rate and network lifespan and also reduce end-to-end delay and energy utilisation.

Xin et al. [20] proposed adaptive several path communication schemes to minimize the energy usage and assure the quality of service needs with consider to packet latency. The prepare problems are nonlinear NP-hard optimization issue. Accordingly, maximum calculation difficulty of these issues presents two polynomial-time estimate schemes to effectively choose the access points in the sensor network which depends on the network structure. Merging the recent adaptive several route communication schemes, experimental result indicates lesser energy usage that should distinguish with the previous method use individual path.

3. Overview of Proposed Scheme

The proposed intertwine connection-based routing path selection (ICBRPS) technique is applied to achieve lesser energy usage for communication between sensor nodes; it does not lose more packet, and node link is a better one to make perfect communication among sensor network. The aggressive node tries to block the continuous routing from source to destination node. When a routing path is compromised, it is challenging to find an effective routing solution that uses the least amount of energy. Every time there is an unstable manner, the offending node modifies its procedure. It does not provide exact connection between neighbor nodes.

These data packets in specific time slots are not transmitted because of the routing path's heavy demand, which wastes a lot of energy. The energetic route discovery method is applied in sensor network to discover the alternate routing path with efficient connectivity [21]. Sensor nodes are categorized with its behavior; nodes having more energy are stable to operate effectively in wireless network. So those routing nodes are able to work in long time period. It enhances the network lifetime and minimizes the energy consumption.

Figure 1 shows the proposed intertwine connection-based routing path selection. Sensor node is deployed in environment to perform normal routing using those paths and to categorize the sensor node based on energy level. Intertwine connection-based routing path selection is used to identify aggressive nodes which are present in routing path, since node connectivity is very poor. Also, it analyzes the over traffic in communication route. Energetic route discovery method is designed to balance the over load, when aggressive node works as unpredictable manner. It achieves energetic communication route from source node to destination node. It enhances lifetime of network and minimizes energy consumption.

3.1. Assigning Routing Path and Categorize Sensor Node Behavior. Packet aggregation is regularly using the routing path. Source nodes are a starting node to sense information from real-time environment. All nodes contain concentrating route on the way to destination node among intermediate relay nodes [22]. Transmission initiates from source nodes and collective by destination node to reject the dropped packets to the destination node. Depending on traffic occurrence on every node transfer of source, relay node is present in routing path. R_p is routing path, $E(N)$ is energetic node, and $I(C)$ is intertwine connection.

$$R_p = E(N) * I(C). \tag{1}$$

Various areas for nodes exist that are fully linked with each other, if any out of coverage range means they are disconnected with each other. When all of a set of nodes' connections are insecure for packet broadcast, there is an

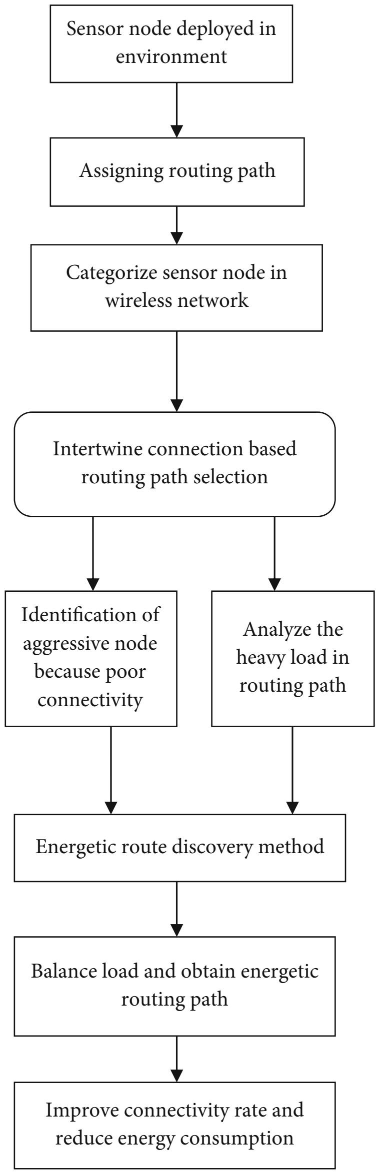

Figure 1: Block diagram of proposed intertwine connection-based routing path selection.

intermediary; these link connections are referred to as damaged connections [23]. The presentation of upper layer method gets precious by this coverage area. Consequently, it does not entirely monitor the behavior of network using deterministic network scheme. Priority depending scheme makes the poor connection among every couple of nodes that denotes priority for packet broadcasting success rate. The priority of successful receiving data packet in every couple of node is estimated by using connection superiority [24]. An additional scheme for calculation is computed broadcasting achievement rate by forwarding request at initially. Next is monitoring the load availability of node connected with another node in network environment. Traffic rate indicates quantity of packets created by every node. Evaluation of traffic is obtained by estimating possible traffic on every node that depends on chance of packet broadcasting with data packet accepting rate of every node. $T(\text{rate})$ is traffic rate, and t is time usage for particular transmission.

$$\begin{aligned} E(N) &= T(\text{rate}) + t, \\ T(\text{rate}) &= \iiint T. \end{aligned} \tag{2}$$

Sequence to select energetic node in routing scheme at initial level, it wants to decide group of nodes such that it does not cross bordering limit. Those nodes are known as higher aggressive in group of nodes which depends on possible traffic of every self-governing node. Destination node is forever measured as self-governing node. Higher aggressive range, which is determined by the number of nodes, is used for traffic management. Aggressive level is supposed to higher while this level is not a separation of an additional aggressive level. Group of nodes in higher aggressive level is indicated by intruder nodes, where $P(L)$ is packet loss rate.

$$\begin{aligned} \iiint T &= \text{PacketSent} \overset{T}{\Rightarrow} \text{PacketReceive}, \\ \text{PacketSent} &\overset{T}{\Rightarrow} \text{PacketReceive} = P(L). \end{aligned} \tag{3}$$

Obtaining that link with another node is establishing the link connection with minimum aggressive level nodes. Choose the appropriate connection from the previous nodes' displays to control traffic by allocating intermediary nodes in a network context. The usual traffic based on aggressiveness is similar that is calculated by introducing a new restriction known as the usual assigning node priority in the heavy load unbiased assigning technique. Matching to each aggressive and self-governing node couple indicates the usual chance that the control is assigned to the self-governing node [25]. The node priority range is connected on each control, and aggressive node pair straight decides the traffic management of all assigning method. It should be entirely unbiased after task of sender node and intermediate nodes. Designing a managing traffic occurrence of particular node is ineffective. This task separates the traffic of data packet on every node. Therefore, it does not achieve traffic free communication in wireless sensor network.

3.2. Intertwine Connection-Based Routing Path Selection. The routing schemes perform communication in a wireless sensor network which is one of the vital issue in formative the various routes of the packet transmission and higher energy consumption. A recent adaptive multipath routing protocol to reduce the energy consumption and to assure quality of service needs with deference to end-to-end packet latency. Furthermore, recent routing technique takes a necessary process for intermediate node choosing method. Secure routing is achieved by comparing the energy consumption for each packet transfer to the connection's efficiency. Establish a link between two intermediate neighbor nodes in the routing path and estimate the cost of the link connection.

$$t = \hat{e} \min_{n} (ms). \quad (4)$$

The energy usage range accepts data packet against the wireless connection among wireless sensor nodes in every packet transmission. Packet latency for transmission denotes the end-to-end delay against the wireless connections that can be around surrounded based on intertwine connection. Increase or decrease of end-to-end delay makes wireless connection that is normally based on the routing path performance. The lesser end-to-end delay from the wireless sensor node source to destination node, it supports to obtain intertwine connection between wireless nodes. As a result, the reply route is from the destination node to the source node (and vice versa) through the intermediate node, and the communication route is from the source node to the destination node through the intermediate node. This routing environment is used to easily apply for a given routing method; for that situation, each of the wireless connection cost is calculated.

$$E(N) = P(L) + \hat{e} \min_{n} (ms). \quad (5)$$

The wireless connection that is applied to the communicating scheme also establishes minimum distance path. For the various routing path, the equivalent routing details will be dissimilar because the nodes have different characteristics. Energy loss range and the qualified node speed evaluation range of nodes parameters are combined to estimate the connection lifespan forecast scheme. All nodes have restricted storage space to maintain the accepted sign force, residual energy, energy used up for victorious packet transmission, and the accepting time of the request message. Those details are used to calculate connection lifespan. Node link life span can be predicted using an affecting average knowledge by maintaining path of the pervious node remaining energy level and the equivalent time slot for the previous number of packets accepted and transmitted by each sensor node. It is used to calculate the energy loss range for communication, where $I1$ and $I2$ are intermediate nodes 1 and 2.

$$I(C) = I1 \overset{C}{\leftrightarrow} I2. \quad (6)$$

This intertwine connection is used to obtain end-to-end communication with lesser energy usage. The present method employs the conception of connection, whether the node connection is null in initial stage. Minimum amount of packets is transmitted at starting using those link connections that are maintained in routing table while connection is recognized. Though, as a substitute of action sightless duplication, it secures that collection of data packets is only scatter to the connection which goes near to the target node. Additionally, rather than continuing to join the target node and transmit its maximum number of data packets, one of these network nodes tries the source's neighbor node to broadcast its collection of additional packets to another node depending on connection state routing decision. All hops choose the efficient route to perform packet sharing with the next neighbor node such that the broadcasting time minimizes and chance of packets to arrive at target node is increased, and consequently, the communication is prove well-organized.

$$I1 \overset{C}{\leftrightarrow} I2 = \sqrt[2]{I(C)} + \sqrt[n]{I(C)}. \quad (7)$$

The potential is for identifying aggressive nodes and, consequently, a method for indicating the thickness of the sensor node. That preferred routes must permit intermediate relay nodes. However, to refute this claim, one needs to assert that aggressive nodes are acting in a specific order to lessen the likelihood that they will be recognised when conducting their actions in a specific coverage region. In addition to that, the fact that aggressive nodes lack knowledge of the locations or sensing ranges of the sensor nodes, you can see how it achieves its goal by choosing the shortest possible route between intermediary nodes in a given network coverage area.

3.3. Energetic Route Discovery Method. The similar possibility nodes are chosen as energetic route; difficulty structure needs amount of sensor nodes than the path identification. The support of difficulty structure as parameters also source nodes needs to analyze amount of aggressive node available in routing path of network environment. Except in situations when a challenge is formulated, no computation of the likely rate of aggressive nodes is included in an efficient routing system to discover the likelihood of minimal or no hostile nodes entering the routing path. An identification possibility depending parameters should get to distinguish the cost of energy consumption for particular aggressive node performance. It monitors the load of routing path; heavy load makes the packet loss for particular communication between wireless sensor network environments. It increases the packet delivery ratio and reduces overload of network.

$$\begin{aligned} I(C) &= \sqrt[2*n]{I(C)}, \\ R_p &= P(L) + \hat{e} \min_{n} (ms) * \sqrt[2*n]{I(C)}. \end{aligned} \quad (8)$$

The precedence allocates the more amount of individual hop node selected for routing path; it minimizes the end-to-end delay for every communication between source node to destination node. The possibility of allocating individual path is higher compared with many hop schemes. Though, consider the active wireless connection, the additional the communication space, the minimum the packet receiving ratio. Consequently, node possibility of allocation is incompatible. A cooperation method is used to obtain effectiveness. The quality of service needs is important for the spatiotemporal restriction for packet transfer. Parameters measuring should indicate its needs more truthfully. Consequently, the usual packet go forward speediness of the many hop is well-known the parameters of possibility allocation.

Step 1. Measure the sensor node behavior.
Step 2. To categorize the sensor node.
Step 3. For each assign intermediate node to form routing path.
Step 4. if{node == Connection}.
Step 5. Nodes establish intertwine connection.
Step 6. To perform communication.
Step 7. else if{node! = Connection}.
Step 8. Connection is failed.
Step 9. End if.
Step 10. if{Path energy == minimum}.
Step 11. Select these paths to start communication.
Step 12. else if{Path energy == maximum}.
Step 13. Reject those paths not start communication.
Step 14. End if.
Step 15. End for.

Algorithm 1: Algorithm for intertwine connection-based routing path selection.

Step 1. For each estimate energy level all nodes.
Step 2. Assign routing path.
Step 3. if {node == min load}.
Step 4. Packets are broadcasted using the path.
Step 5. Better connection.
Step 6. else if {node == max load}.
Step 7. Search alternate path.
Step 8. To discover efficient minimum energy path.
Step 9. End if.
Step 10. Increase connectivity ratio.
Step 11. Minimize energy consumption with.
Step 11. End for.

Algorithm 2: Energetic route discovery algorithm.

The sensor nodes are always active to perform communication. It chooses the individual hop nodes to achieve perfect connection between those nodes. It detects aggressive node which are present in path and manage the overload of packets available in communicating path. Finally, it enhances the connectivity ratio and reduces energy consumption.

The packet ID maintains the coverage ranges, intermediate node location, and processing features of the routing node.

In Figure 2, the proposed ICBRPS packet format is shown. Here, the source and destination node ID field take 4 bytes. Third one is categorize sensor node in wireless network which occupies 2 bytes. Separate sensor nodes based on behavior to allocate routing path use single path at initial level. Intertwine connection-based routing path selection is the fourth field which occupies 4 bytes. It establishes the connection among sensor nodes which are present in routing path; to detect the aggressive node in routing path, they are removed from environment. Fifth occupies 5 bytes which is the energetic route discovery method; this identifies which node is higher; they are selected to perform communication and to control the traffic occurrence in network environment. The last filed is balance load and obtains energetic routing path, finally achieving minimum energy using routing path; it occupies 3 bytes, to minimize energy consumption.

4. Performance Evaluation

4.1. Simulation Model and Parameters. The proposed ICBRPS is simulated with network simulator tool (NS 2.34). In our simulation, 100 mobile nodes move in an 880 meter × 680 meter square region for 34 milliseconds simulation time. Each mobile node goes random manner among the network in different speed. All nodes have the same transmission range of 250 meters. CBR (constant bit rate) provides a constant speed of packet transmission in network to limit the traffic rate. AODV (ad hoc on demand distance vector) routing protocol is applied to provide energy efficient routing path from source node to destination node. Table 1 shows simulation setup estimation.

4.1.1. Simulation Result. Figure 3 shows that the proposed ICBRPS scheme provided is applied to obtain the minimum energy efficient routing path which is compared with existing BMS [13] and PDDS [14]. The ICBRPS technique is used to find the aggressive node which is available in routing path. The energetic route discovery scheme is designed, to analyze the traffic occurrence for particular routing from source to destination node; if any traffic is made, they are managed by this method. It improves the connectivity ratio and reduces energy consumptions.

4.1.2. Performance Analysis. In a simulation, the following performance indicators are examined using the graph.

(1) End-to-End Delay. Figure 4 shows that end-to-end delay is estimated by amount of time used for packet transmission from source node to destination node; each node detail is maintained in routing table. In the proposed ICBRPS scheme, end-to-end delay is reduced compared to existing

Source ID	Destination ID	Categorize sensor node in wireless network	Intertwine connection based routing path selection	Energetic route discovery method	Balance load and obtain energetic routing path
4	4	2	4	5	3

Figure 2: Proposed ICBRPS packet format.

Table 1: Simulation setup.

No. of nodes	100
Area size	880×680
Mac	802.11 g
Radio range	250 m
Simulation time	34 ms
Traffic source	CBR
Packet size	512 bytes
Mobility model	Random way point
Protocol	AODV

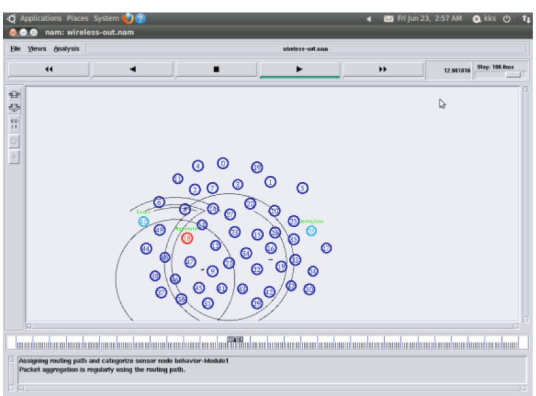

Figure 3: Proposed ICBRPS result.

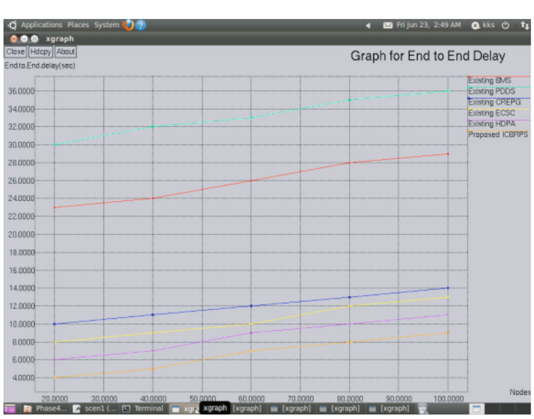

Figure 4: Graph for nodes vs. end-to-end delay.

methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{End to End Delay} = \text{End Time} - \text{Start Time}. \quad (9)$$

(2) Network Overhead. Figure 5 shows that network overhead is minimized in which sender transmits packet to receiver node; energetic route discovery algorithm is used to choose minimum energy consumption node for communication from sender to target node in network. In the proposed ICBRPS scheme, network overhead is minimized compared to existing methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{Network overhead} = \frac{\text{Number of Packet Losses}}{\text{Received}} * 100. \quad (10)$$

(3) Packet Delivery Ratio. Figure 6 shows that packet delivery ratio is measured by no. of received from no. of packet sent in particular speed. Node velocity is not a constant; simulation mobility is fixed at 100 (bps). In the proposed ICBRPS scheme, packet delivery ratio is increased compared to existing methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{Packet Delivery Ratio} = \frac{\text{Number of packet received}}{\text{Sent}} * \text{speed}. \quad (11)$$

(4) Connectivity Ratio. Figure 7 shows connectivity ratio; weak connectivity between nodes in routing path is removed by energetic route discovery scheme to analyze node capacity which established intertwine connection between nodes from network environment. In the proposed ICBRPS scheme, connectivity ratio is improved compared to existing methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{Connectivity ratio} = \frac{\text{weak connection}}{\text{overall connection}}. \quad (12)$$

(5) Energy. Figure 8 shows energy consumption; Calculate energy consumption from the beginning energy level to the finishing energy level in order to determine how much energy is expended during communication. In the proposed ICBRPS scheme, obtain minimum energy routing path to choose energetic node from sender to destination node;

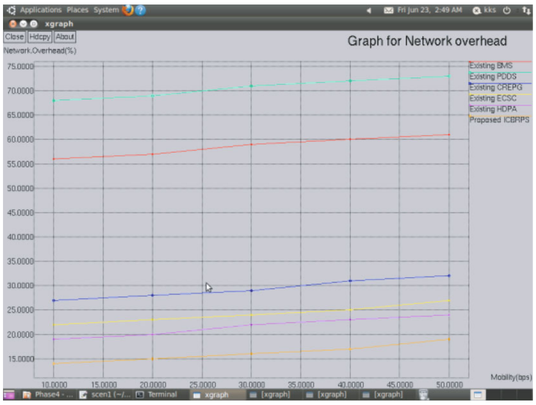

Figure 5: Graph for mobility vs. network overhead.

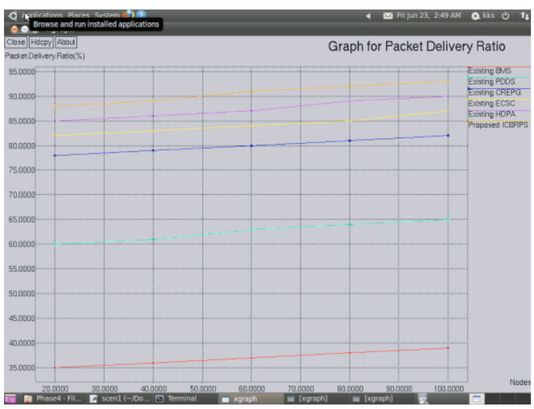

Figure 6: Graph for nodes vs. packet delivery ratio.

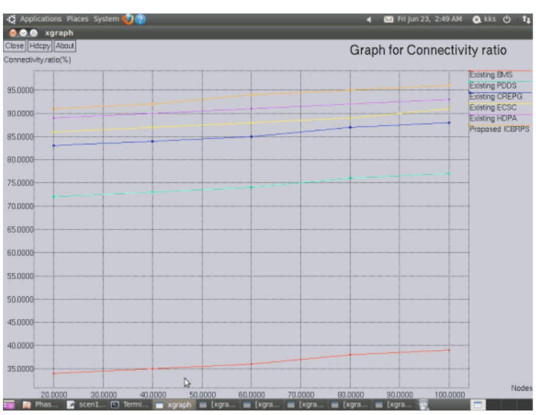

Figure 7: Graph for nodes vs. connectivity ratio.

energy consumption is minimized compared to existing methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{Energy Consumption} = \text{Initial Energy} - \text{Final Energy}. \quad (13)$$

(6) Packet Loss. Figure 9 shows that packet loss of particular communication in network is calculated by node loss packet with poor connectivity avoided by intertwine connection between nodes to obtain efficient transmission; the aggressive node characteristics are monitored and

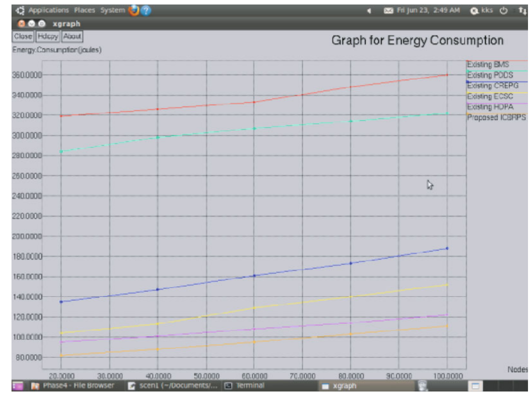

Figure 8: Graph for nodes vs. energy consumption.

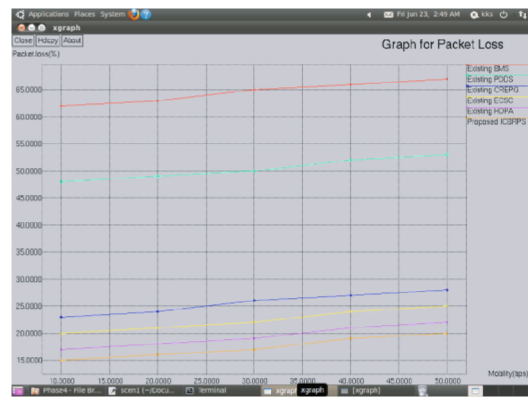

Figure 9: Graph for mobility vs. packet loss.

rejected by using energetic route discovery algorithm. In the proposed ICBRPS scheme, packet loss is reduced compared to existing methods BMS, PDDS, CREPG, ECSC, and HDPA.

$$\text{Packet loss} = \left(\text{Number of packet} \frac{\text{dropped}}{\text{Sent}}\right) * 100. \quad (14)$$

5. Conclusion

Sensor nodes generally perform which packet transmission consumes more energy. It does not follow single routing path, because single path has some aggressive nodes that are not easily detected. It loses packet and operates abnormal manner; sometimes, it processes like trust node; otherwise, it processes like untruth node. As a result, its sensor nodes have weak connectivity, which has increased energy consumption and decreased connectivity ratio. So, the proposed intertwine connection-based routing path selection (ICBRPS) method is used to obtain only energy efficient routing path, and node link is the better one; to make perfect communication among sensor network, it does not lose more packet since initially aggressive nodes are detected, and the use of effective path with the support of energetic route discovery algorithm provides minimum energy path routing and avoids traffic occurrence. It hacks the information from sensor and operates unpredictable manner. This improves connectivity ratio and reduces energy consumption. In future work, present integral path steadiness monitoring method to measure different parameters.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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