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Research Article

Approach for Collision Minimization and Enhancement of Power Allocation in WSNs

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Wireless sensor networks (WSNs) have attracted much more attention in recent years. Hence, nowadays, WSN is considered one of the most popular technologies in the networking field. The reason behind its increasing rate is only for its adaptability as it works through batteries which are energy efficient, and for these characteristics, it has covered a wide market worldwide. Transmission collision is one of the key reasons for the decrease in performance in WSNs which results in excessive delay and packet loss. The collision range should be minimized in order to mitigate the risk of these packet collisions. The WSNs that contribute to minimize the collision area and the statistics show that the collision area which exceeds equivalents transmission power has been significantly reduced by this technique. This proposed paper optimally reduced the power consumption and data loss through proper routing of packets and the method of congestion detection. WSNs typically require high data reliability to preserve identification and responsiveness capacity while also improving data reliability, transmission, and redundancy. Retransmission is determined by the probability of packet arrival as well as the average energy consumption.

1. Introduction

In a recent situation, the most important part of WSNs is data transmission, as it is used for transferring the message from the source to the destination. Data transmission is an energy-intensive activity that necessitates an efficient routing mechanism to avoid data loss [1]. WSN was originated from the technology named distributed sensing technology. WSNs were one of the valuable technologies that the researchers came up with, and it was a huge success [2, 3]. This helps many types of physical situations, processing data, etc. WSN also helps in monitoring environmental conditions from distant locations with perfection [4, 5]. The most important part of data transmission is the flow of data in WSNs, because each data packet consists of events (energy consumption, storage capacity with some security features, etc.) that are more important for some applications [6]. WSNs, a subset of larger IoT networks, are wirelessly interconnected networks of small low-power sensor devices that sense environmental parameters at regular intervals and send them to some central storage or database [7, 8]. WSN protocols that maximise sensor node performance, minimise communication latency, and reduce power consumption are currently being researched. In this section, we will look at various works and research on traditional and core networking concepts, as well as wireless sensor networks [9].

As a result, data transmission should be secure; however, the fundamental difficulty is that data nodes have limited energy due to their low memory capacities, making maintaining security extremely challenging [3]. To make a safe data transfer, certain components of security must be maintained during transmission. Retransmission is done for a variety of reasons, the most important of which is to ensure that data is not lost during wireless connection [10, 11]. The retransmitting method is primarily used by WSN to ensure that reliability is a top priority. As a result, the higher the dependability of prioritising data packets, the higher the maximum number of retransmissions, and if the delay is more than multiple retransmissions will occur [12–14]. In a WSN, sensor nodes are comprised of a maximum number of sensing data packets that combined perceive, collect the information, and process it from the sensing objects, and then, it transfers required data to the receiver or the user through the medium of wireless communication [15–17]. The wireless sensor network's working period is limited due to the limited power of the battery, and as a result, there is a congestion of data transmission [18]. Hence, during transmission, if the data meant for reliable and complete, then in that case, many nodes are required. The most necessary part of WSN is to update the codes that are running on the sensors and these codes require a reliable circulation of huge data to each sensor along with energy efficiency [19, 20].

As there is a sleep schedule operated in sensors for energy efficiency, some of the sensors will be in sleep mode for which they miss out on some packets during the data circulation [21]. At some time, the sensor may not receive the packets successfully due to the unreliable state of wireless links, hence, for which retransmission of messages of those sensors is necessary, and for this, more amount of power is consumed. Due to that, the advanced research trend area of the IoT is applied to build the automaton process with the help of an energy-optimized range of sensors that provides better performance at the time of processing [22, 23].

1.1. Motivation. At present, wireless sensors are being deployed on roads, in cities, and in many other sectors of application for an optimal way of sensing and monitoring the data packets, which is explained below:

(1) Whenever the data packets are forwarded from the sending end to receiving end then there are more chances of loss of packets due to collision

(2) However, this collision is primarily caused by increased energy consumption, which causes significant interruption during transmission in WSNs

(3) So, this paper proposed optimal energy harvesting method, data reliability with retransmission of corrupted, or delayed data packet in the transmission which acts through optimal power consumption

The remaining part of the paper is structured as, in Section 2, we discuss the literature review. Section 3 highlights on the proposed model and methodology. In Section 4, we describe the simulation setup and result analysis. Finally, Section 5 suggests for future research and conclusion.

2. Literature Survey

Mamun-Or-Rashid [24] and other authors proposed for "reliable event detection and congestion avoidance in WSNs." wireless sensor networks (WSNs) are implemented by dense and endless signaling at the time of data communication. So, this paper introduced a collision avoidance protocol like source count-based HMAC and WRRF.

Wan [25] and other authors proposed for "congestion detection and avoidance networks." The authors provide a simulation and exploration for strategy, execution, and measurement of CODA by using three techniques such as receiver side congestion detection, hop-by-hop open-loop backpressure, and multisource closed-loop control.

Sankarasubramaniam [26] and other authors proposed for "ESRT in WSNs." WSNs are event-based systems which rely on several microsensor nodes' collective efforts. Reliable event detection at the sink is based on information collected. Source nodes were provided and not on a single article. This paper describes the reliable ESRT protocol. It is a new transport scheme that is designed with minimal energy costs to achieve efficient event detection in WSNs. It contains a collision control component designed to achieve reliability and energy conservation.

Intanagonwiwat [27] and other authors proposed "a scalable and robust communication networks." The developments in processor, memory, and radio technology would make it possible to detect, communicate, and compute small or inexpensive nodes. The purpose of this paper is to explore the directed model of this coordination. Wang [28] and other authors proposed "a study of transport protocols." First, the authors of the study of WSNs on transport protocols highlight many specific features of WSN and identify the simple design requirements and transport protocol tasks, with effectiveness of power, service quality, reliability, and collision management.

Woo and Culler [29] proposed a transmission control scheme that is applied for media access in WSNs. In a novel sensor network regime, the authors examine the issue of control over media access. Sensor network media access control should not only be energy efficient, they should also allow the equal allotment of all nodes within a multihop network to the infrastructure. The author proposes to support these two objectives an adaptive rate control system and considers that it is very successful in achieving our objective for justice, while being power efficient for both low- and high-speed network transport cycles.

Alzahrani and Bouabdallah [30] proposed a method QMMAC protocol for multichannel data transmission concept in the WSNs. This paper provided a method to enhance the level of throughput while consuming power. By using this protocol avoided the cause of the collision and overhearing with the help of a multichannel communication feature, the consequence of this paper performed optimal energy efficiency and end to end delay. Thus, this paper was examined by taking very limited parameters, but it requires increasing the range of parameters to get good performance in multiple parameters.

3. Proposed Model and Methodology

WSNs consist of a huge amount of battery-driven nodes which should be taken into account in terms of power efficiency, failure tolerance, and scalability during WSN architecture design. However, during a state of emergency, urgent info should be delivered as soon as possible, keeping reliability low latency as the main aspects. Many works had been done on data gathering schemes which are applied during a normal situation like ample. We approach the integration by any scheme for data collection that is well configured for application-oriented communication of mechanisms for quick delivery. In evolving circumstances, a certain number of measures are taken to provide urgent information to BS and any information which does not occur in an emergency remains in a natural position.

3.1. Optimal Reliability and Low Latency. The reliability and delay of urgent delivery are the most critical concerns. As it stands, the material should be designated as urgent and subject to preferred restrictions [31]. Keep in mind that the energy efficiency during transmission can be sacrificed for some time. Nodes with a small memory capacity and mechanisms to facilitate rapid and efficient urgent data transmission low energy consumption also lead to simplicity, with fewer errors of programming [32].

3.2. Technical Approach

3.2.1. Retransmission in Wireless Sensor Networks (WSNs). Retransmission is based on packet arrival probability, including average energy consumption. As WSNs require high data reliability for better performance in maintaining detection and response capability and to enhance this data reliability, retransmission is used. For each single-hop transmission, a recognition packet is sent after receiving a single data packet, and retransmission is caused by loss of the acknowledgement packet [33, 34].

One-hop loss probability P_{hl} for the loss of information acknowledgement (ACK) packet is expressed as

$$P_{hl} = 1 - \pi_0^2. \tag{1}$$

The relation between P_{hl} and retransmission time x is represented by

$$P_{hl}^r = 1 - (P_{hl})^x. \tag{2}$$

And here,

$$x = \log_{Phl}(1 - P_{hl}^r). \tag{3}$$

Then, average energy consumed by a failed one-hop transmission during the event of loss is

$$E_h{}' = \varepsilon \times \pi_1 \times 1 + \varepsilon(\pi_0\pi_1) \times 2 = \varepsilon\pi_1(1 + 2\pi_0). \tag{4}$$

Here, $\varepsilon\pi_1$ = energy consumption during data packet loss. $2\varepsilon\pi_0\pi_1$ = energy consumption during ACK packet is dropped. So, average of energy consumed for one data packet through one hop is

$$E_h{}^r = (P_{hl})^t tE_h{}' + \Sigma_{i=1}^t (P_{hl})^{i-1}\pi_0{}^2\left[(i-1)E_h{}' + 2\varepsilon\right], \tag{5}$$

where $(P_{hl})^t$ = process probability for all t transmission failed through single hop.

$tE_h{}'$ = corresponding power consumption.

$P_{hl}^{(i-1)}\pi_0^2$ = event probability for i_{th} transmission.

$(i-1)E_h' + 2_\varepsilon$ = corresponding energy consumption. So, overall power consumption for "n" hops is

$$E_e^r = \Sigma_{i=1}^n N(P_{hl}^r)^{i-1} E_h^r, \tag{6}$$

where $N(P_{hl}^r)^{i-1}$ = no. of arrival packets after i_{th} hop. Hence, for one successful arrival packet, the average energy consumption will be

$$E_{\text{avg}}^r = \frac{E_e^r}{M(P_h^r)^n} = \Sigma_{i=1}^n (P_h^r)^{i-n-1} E_h^r. \tag{7}$$

Figure 1 shows retransmission in wireless sensor networks.

3.2.2. Optimal Power Allocation in WSNs. The power allocation is the major topic in WSN, where a lot of remote sensors send data to the fusion centre via several channels in a high-traffic environment [35].

3.2.3. Routing of WSNs and Flow Conservation. We are discussing the rate of message packet communication and message packet routing via the network flow conservation equation here.

$$\begin{aligned} &\Sigma a\varepsilon S_b(x_{ab}(t) - (t)) = X_{ab}(t), \quad \forall b\varepsilon S, a\varepsilon S_b, \\ &\Sigma b\varepsilon S_a(x_{ab}(t) - (t)) = X_{ab}(t), \quad \forall a\varepsilon S_b, bS_a, \end{aligned} \tag{8}$$

where x_{ab} = amount of flow of energy from node.

X_{ab} = sum information collected at source node to the sink node $j\varepsilon$.

S = sensor nodes set.

a = incoming sensor node.

b = outgoing sensor node.

3.2.4. Energy Cost Model. Lifetime of the network is dependable on utilization amount of power from the sensor node P_i and active time slot T_i of anode. $E_{RX}(t_s)$ and $E_{TX}(t_s)$ are the energy transmitted by $E_{\text{trans}}(t_s)$ time slot. The computed energy consists (t_s) and $E(t_s)$. Assume (t_s) 0 represents our whole leftover energy, the power consumption for t is

$$\begin{aligned} P_a(t_s) = &\Sigma r_{ab}(t_s)E_{TX}(t_s) + \Sigma r_{ab}(t_s)E_{RX}(t_s)a\varepsilon N_b \\ &+ \Sigma R_{ab}(t_s)E_{PR}(t_s)\Sigma R_{ab}(t_s)E_{SN}(t_s), \end{aligned} \tag{9}$$

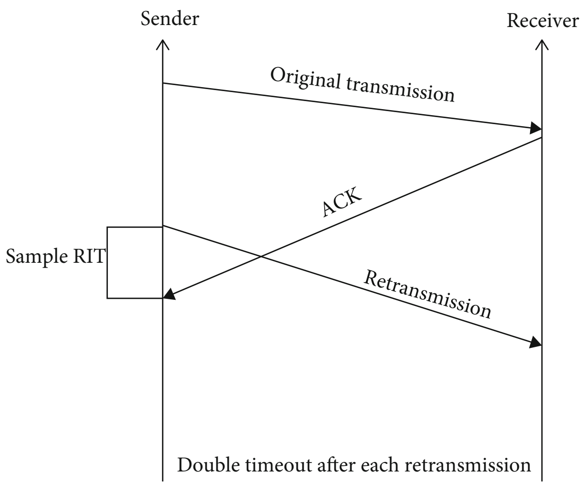


Figure 1: Retransmission in wireless sensor networks.

where $P_a(t_s)$ = power consumption in (t_s)

$$\begin{aligned} E_{TX}(t) &= \text{Transmitted energy } (t) \\ E_{RX}(t) &= \text{Receiver energy } (t) \\ E_{PR}(t) &= \text{Processing energy } (t) \\ E_{SN}(t) &= \text{Sensing energy } (t) \end{aligned} \quad (10)$$

For sending a one bit of data by sender energy from $a\varepsilon N_b$ to $b\varepsilon N_a$ over a distance (dt) is

$$E_{TX} = a_1 + a_2 * d^y, \quad (11)$$

where y = path loss exponent.

d = distance of communication; $a_1$and a_2 = constants depending upon T_c.

3.2.5. Loss in Packet and Retransmission of Data. Anatomy of packet error: the data is decrypted through a technique called CRC by

$$P_{\text{ARQ}} = 1 - (1 - P_{\text{be}})^{L_{\text{pt}}}, \quad (12)$$

where L_{pt} = packet size

$$\begin{aligned} P_{\text{lr}} &= \text{loss rate of packets} \\ P_{\text{be}} &= \text{Bit error rate.} \end{aligned} \quad (13)$$

3.2.6. Analysis of Packet Error: (ECC Scheme). In this example, the packets are transferred between the sink node and the sensor node. The rate of packet loss at the sink node is

$$P_{\text{lr}}^{\text{ECC}} = 1 - \left(1 - \Sigma_{i=a+1}^{n} \binom{m}{i} P_b^i (1 - P_b)^{m-i}\right)^{L_{\text{pt}}/k}. \quad (14)$$

Let P_{lr} be the probability of an event. The number of retransmissions is calculated as follows:

$$\text{EN}(R_t) = \frac{1}{(1 - P_{\text{lr}})}, \quad (15)$$

where $\text{EN}(R_t)$ = expected number of retransmissions. The packet loss rate of ARQ or ECC schemes is denoted P_{lr}. Packet loss rate for the h-hop state when every node is communicated independently.

$$E(R_t, h) = \frac{h}{(1 - P_{lr})}, \quad (16)$$

where h = number of hops.

3.2.7. Error Correction Scheme through RRA. A residue system of number is truly a prime base as modules set over Galois field of b-bits (GF (2_b)).

It is a set of β modules from m_1, m_2, and m_β. Let "A" be an integer data which is represented by Γ_1, Γ_2, and Γ_β.

$$\Gamma_j = B mod m_j, j = 1, 2, \cdots n, \quad (17)$$

$$\Theta = \Pi_{j=1}^{\beta} m_j. \quad (18)$$

The highest operational range of the RNS is Θ specified by Equation (18).

The theorem of Chinese remainder as:

$$\begin{aligned} B &= \Sigma_{j=1}^{t} \Gamma_j * MI_j^{-1} * MI_j, \\ MI_J &= \frac{\Theta}{m_j}, \end{aligned} \quad (19)$$

where MI_j^{-1} = integers are the multiplicative inverses of MI_j.

In Pseudocode 1, at the top of the following page is shown pseudocode for the Proposed Move Right algorithm (PMR-Algo) which is a nonmonotonic energy method to resolve offline structured tree of PTP. In the pseudocode, τ_a^x represents the value of ain the ath repetition and the sink (a, m) is set to min $\{\Gamma, n_a\}$ for transmission time to each of the links, but the rest of the links is set to 0 for the transmission time (steps 2 and 3). The initial times of packet transmission (moving right) are iteratively increased so that every step locally optimizes the overall power method. This local optimization finally leads to an optimum consequence worldwide.

The transmission of all links not included in the subtree, i.e., transmissions for an initial period from n sensor nodes (Sn) children and the subtree, is finding the end period of transmission by the best.

(•) function around the Sn. We may prove that Sn start times are never reduced through the best

(•) function which provides a binary search between the actual initial and the end time of the transmission for a locally optimal initial time for the transmission from Sn. Step 10 is critical as the entire transmission time on the sink links moves correctly. When the latency limit is reached, this movement ceases.

Start 1:Setx ⟵02 : For(a,m) εP, $set\tau_a^x$⟵min $\{\Gamma, n_a\}$3:For$(a, m)\varepsilon P$,such that b m,set τ_a^x04 : *Set* f ⟵05 :While $f = 0$6 :x $x + 1$ 7 :ForeachV_a $with a from m - 1 down to N + 1$8 : $(\{\tau_a^x\}_{(a,b)\varepsilon P}, \tau_a^x)$best ({_a^x − 1},_a^x − 1)9 :For(a,m) P10:Set_ a^xmin$\{n_a, \Gamma - (\max V_{a_a}\{L_b\} - \tau_a^x)\}$11:IF k= k-1,$f$ ⟵ 1
Stop

Pseudocode 1: For Proposed Move Right algorithm (PRM-Algo) (PMR) algorithm (PMR-Algo)

3.3. Collision in Wireless Sensor Networks. WSN's impact happens with at least two nodes of their information over the organization simultaneously. For evading crash in WSN, the information must be surrendered and, afterward, retransmitted.

3.4. Collision Minimization. A collision during data transmission is one of the prime causes for the degradation of performance, which is practically expected in wireless sensor networks [36]. This collision could lead to unnecessary delay and loss of the packet. In order to reduce the risk of a packet collision, the area where the data packet crash occurs should be minimised.

Cooperative transmissions and optimal power allocations are used for minimizing the probability of collision during data transmission [37, 38]. Network collision is avoided by incorporating optimised algorithms, which can be achieved by using parameters such as the number of sources to maximise the size of the containment windows. If a node has a low containment window, it causes a collision, and if the containment window sizes of a node are high, then an average delay of access and a crash-free transmission are created [39].

(a) Congestion detection strategies: the most popular techniques of congestion detection are packet loss, queue length, service time, and time delay

(b) Packet loss: the receiver with the number of sequence used will calculate the packet loss. The congestion detection packet CTS (Clear to Send) can be used. It can be used as a signal for congestion to repair losses. Wireless errors are causing losses instead of packet collision

(c) Queue length: each node has a buffer to allow its duration to indicate congestion easily and properly. Congestion is indicated when the duration of the buffer reaches the fixed threshold. The excess rate is the rate of traffic. The rate of traffic is the difference between the output and the number of the rates supplied and forwarded. Several nonempty tails may show the degree of congestion

(d) Packet service period: packet's service period is different from the packet rate; the interval of the packet reaches the MAC layer and its efficient transmission. Incoming traffic through the overloaded channel is equal or less than the outgoing traffic

(e) Delay: delay quantifies the time required from the sender to the endpoint receipt from packet generation. The greatest delay is due to the usage of MAC responsibilities, which costs sleep latency

(f) Congestion detection and avoidance in sensor networks (CODA): it is a WSN-specific energy-efficient congestion control method. It helps with the detection of congestion by observing the sensor node buffer size and the use of a wireless channel. It is made up of three mechanisms

When a large number of messages are used for transmission, the crossover condition occurs, and messages are queued based on their priorities. The successors are generated during processing by crossover action. It requires optimal scheduling, so we can select crossover probability 1.0. Again, this process has improved the optimization by using efficient transformation probability as follows:

3.5. Congestion Detection. Precise and efficient detection of congestion in wireless network congestion is critical [40]. CODA uses an efficient congestion detection on every low-priced recipient to derive a combination of present and past channel load and current buffer occupancy [41]. Since the transmitters are shared and traffic between other devices is congested in the neighbourhood [42], the channel state must be recognized by sensor networks. When the channel is listened to in order for local loading to be measured, the cost of energy is high. CODA uses a sampling system, therefore, which initiates local channel monitoring, to reduce costs while forming a reliable estimate at the appropriate time. Upon detection of congestion, nodes signal their upstream neighbours through a backpressure system.

(a) Channel loading

It provides the optimal data about how busy the adjacent network is, but it is a local modification mechanism. It has a limited effect.

(b) Buffer queue length

In conventional data networks, tail management is also used to detect congestion [43]. Nevertheless, the buffer use or queue size cannot be followed as a congestion signal without a connector layer admissions (some applications do not need this and thus will not use it to save its overhead). Since conventional methods for congestive recognition are not up to the mark, other techniques such as hop backpressure and multisource control in the closed-loop are needed.

(c) Use buffer and weighted buffer difference for congestion detection

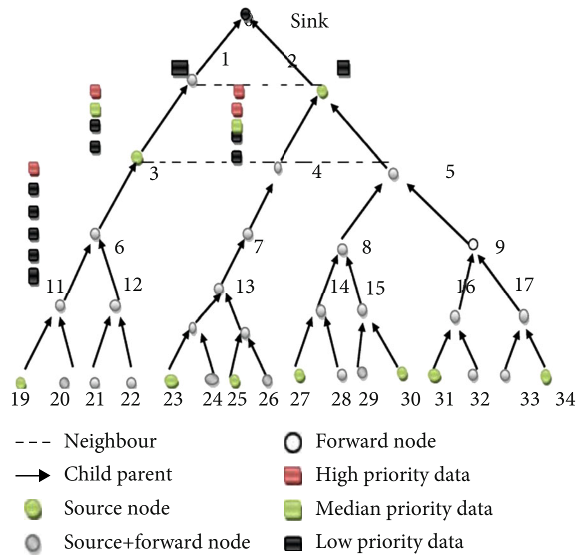


Figure 2: Network topology for source node arrangement.

Congestion detection uses queue management. The congestion cannot be detected by the buffer. Nodes directly or implicitly send backpressure messages to their neighbour using a congestion sensing buffer. The solution for the detection of congestion [44] is to adjust the buffer and weighted buffer gap. Figure 2 represents network topology for source node arrangement.

A buffer and weighted buffer variation to detect congestion are used to solve this problem. If we take the weight of high, medium, and low priority data to be P_h=3, P_m=2, P_l=1, as shown in Figure 2, the node_6 is considered as a length of a weighted buffer WBL_6 by

$$\text{WBL}_6 = 2 * P_h + 1 * P_m + 3 * P_l = 2 * 3 + 1 * 2 + 3 * 1 = 11. \tag{20}$$

If we denote weighted buffer variance as WBV $\text{WBV}(\text{node}_6, \text{node}_3) = 6$,

$$\begin{aligned} \text{WBV}(\text{node}_4, \text{node}_3) &= 5, \\ \text{WBV}(\text{node}_4, \text{node}_8) &= 7, \\ \text{WBV}(\text{node}_4, \text{node}_2) &= 9, \\ \text{WBV}(\text{node}_8, \text{node}_4) &= -7, \\ \text{WBV}(\text{node}_3, \text{node}_4) &= -5. \end{aligned} \tag{21}$$

We propose buffer and weighted buffer differences in congestion detection for two local congestion measuring levels at each node. The length of weighted queue is expressed as:

$$\text{WB} = \Sigma_{j=1}^{N} \text{DP}\left(\text{Packet}_j\right), \tag{22}$$

where the priority of data packet dynamic is defined as:

$$\text{DP}(\text{Pack}) = \frac{\alpha^* \text{hop} + \text{SP}(\text{Pack})}{1 + \beta^* \text{delay}}. \tag{23}$$

N is the total number of buffer packets. A weighted buffer with length WB (b), after Δb, it becomes

$$\text{WB}(b + \Delta b) = \text{WB}(b)\text{WR} * \Delta b. \tag{24}$$

The weighted buffer difference at time $t + \Delta t$ is

$$\text{WBD}_n ode_i(p + \Delta p) = \Sigma_{j=1}^{N} \text{DP}\left(\text{Pack}_j\right) - \text{Max}\ (\text{WB}_k(p + \Delta p)). \tag{25}$$

If $\text{WBD}_{\text{node}_i}(p + \Delta p)$,it means that the data of node_i is the most important among its neighbors.

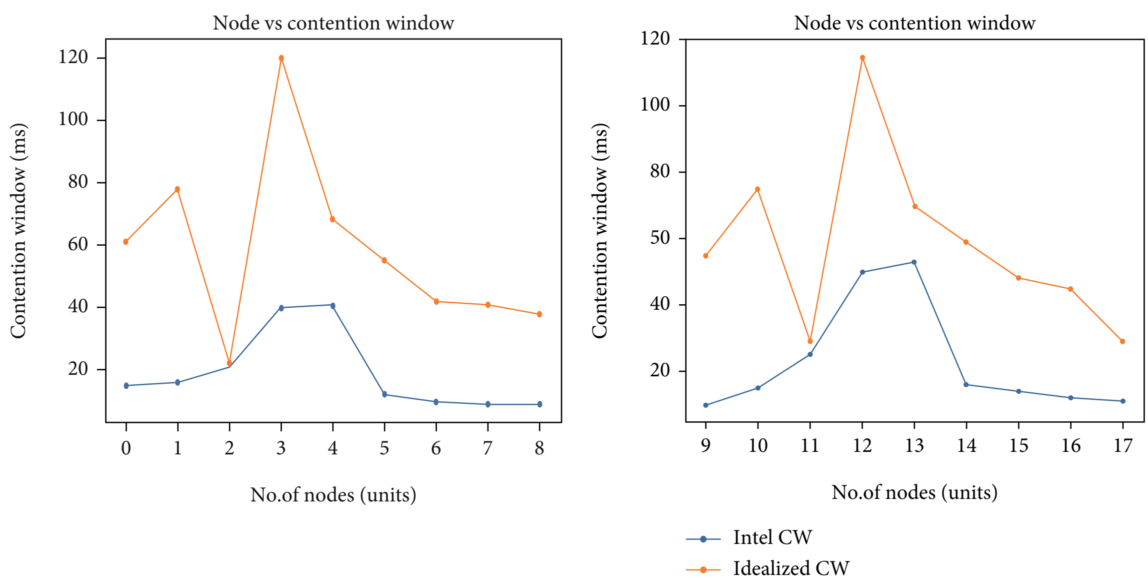
3.6. Open-Loop Hop-by-Hop Back Pressure. Sensor network CODA uses a backpressure to message anywhere congestion is detected [45, 46]. Backpressure signals pass to the source point directly. Backpressure is directly at the source in the case of impulse data in dense network conditions. The backpressure nodes of the recipient raise the rate of return of local congelation and settle on a method based upon the local network situation when an upstream node receives the backpressure node (backpressure nodes).

3.7. Regulation of Closed-Loop Multisource. It helps regulate congestion from a sink under persistent congestion over multiple sources. If the rate of source events is smaller in a channel, then the source controls itself, and the value is greater, so there is a greater likelihood of congestion [47, 48]. Only when a certain threshold is reached will the source reach the sink. This means that in order to maintain its rate, the source requires continuous, slow-term input from the sink. ACKs here act as a self-clocking system to keep the current rate of events.

4. Simulation Setup and Result Discussion

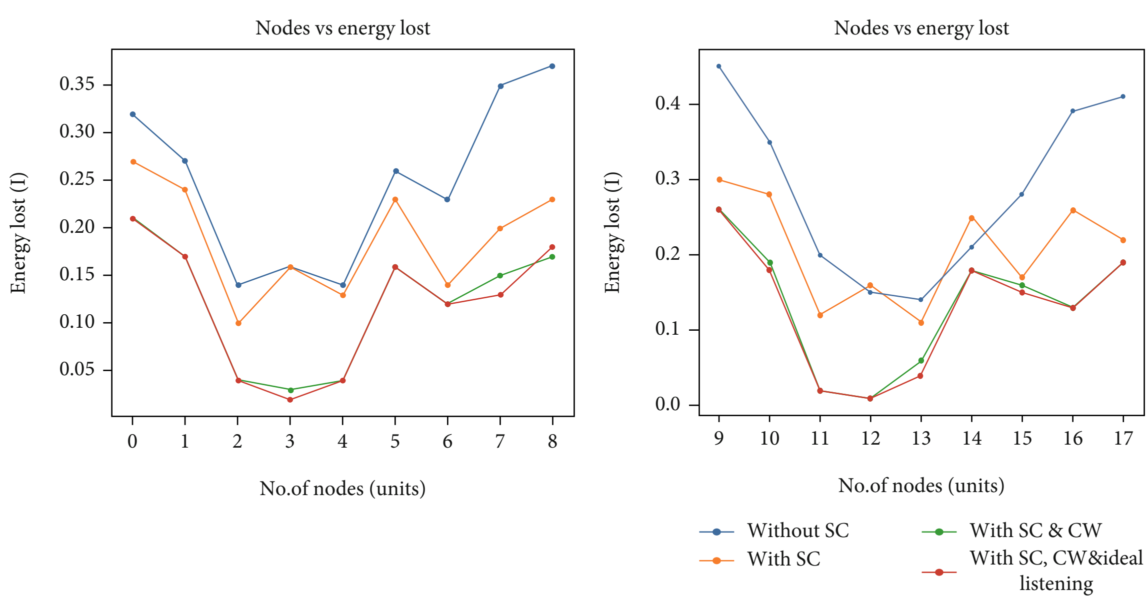
Consider each node in networking having a higher number of packets for transforming towards downstream nodes in the network. For this, there should be a small contention window; hence, its size is increased, and hence, it is found that congestion is diminished. Consequently, a small quantity of power is stored through a reduction in idle listening when a medium access delay happens. This reduces the energy loss feature. This simulation is performed in two distinct setups with several nodes like 0 to 8 and also 9 to 17 in various measuring factors which are discussed below.

4.1. Nodes vs. Contention Window. Figures 3(a) and 3(b) depicted that contention window is a time bound parameter. It specifies the flow rate and medium time of access of the data packets. In the communication process, the contention window value is considered for each node. Now, in this figure, one contention window initial value and idealized value is plotted for each of the nodes. Contention window value is evaluated by



(a) (b)

FIGURE 3: The initial contention window and idealized contention window for (a) nodes 0 to 8 and (b) nodes 9 to 17.



(a) (b)

FIGURE 4: The energy lost comparison after applying the various causes for (a) nodes 0 to 8 and (b) nodes 9 to 17.

$$CW(x) = CW_{min}\left(\frac{S_n}{SC_x}\right), \quad (26)$$

where $CW(x)$ = contention window value for any node x,

$$\begin{aligned} CW_{min} &= \text{minimum contention window value}, \\ S_n &= \text{estimated number of nodes within the detecting radius}, \\ SC_x &= \text{source count value of any node x}. \end{aligned} \quad (27)$$

4.2. Nodes vs. Energy Lost (J). In Figures 4(a) and 4(b), energy loss at each node is plotted for various conditions like with and without source-count, with combining source-count, contention window, and ideal listening.

4.3. Nodes vs. Collision. To minimise the collision of network packets. The source value prioritises data packet communication of each sensor node, which decreases the congestion of data packets and the access time for the medium node. The value of the source count priority is to communicate packets from every node, hence, reducing data packet congestion and medium node access time. Figures 5(a) and

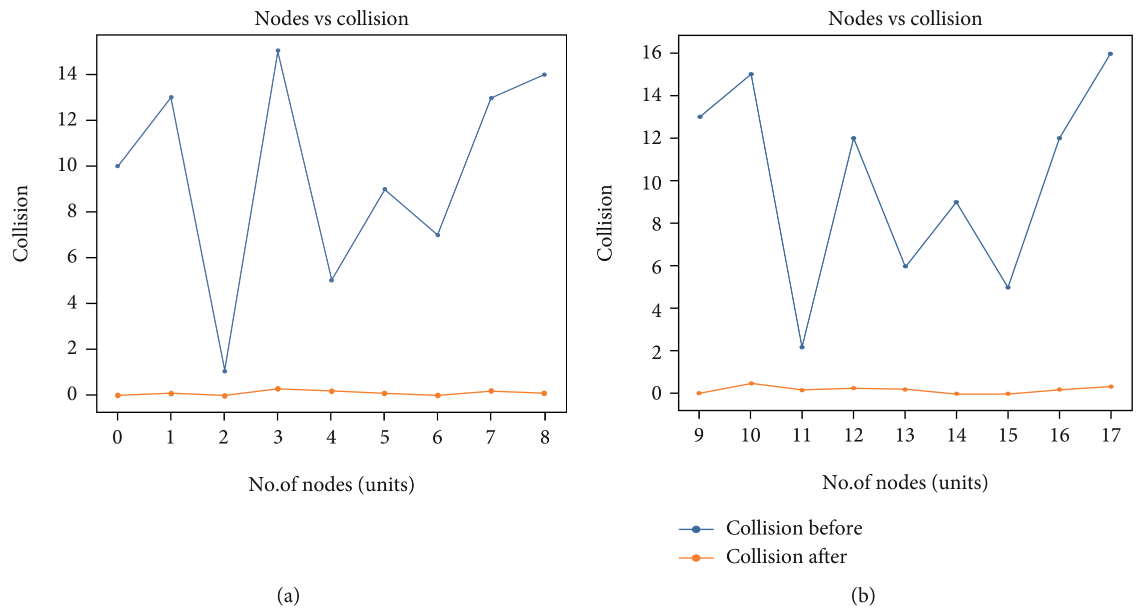


Figure 5: The collision occurring and the collision which has been minimized for (a) nodes 0 to 8 and (b) nodes 9 to 17.

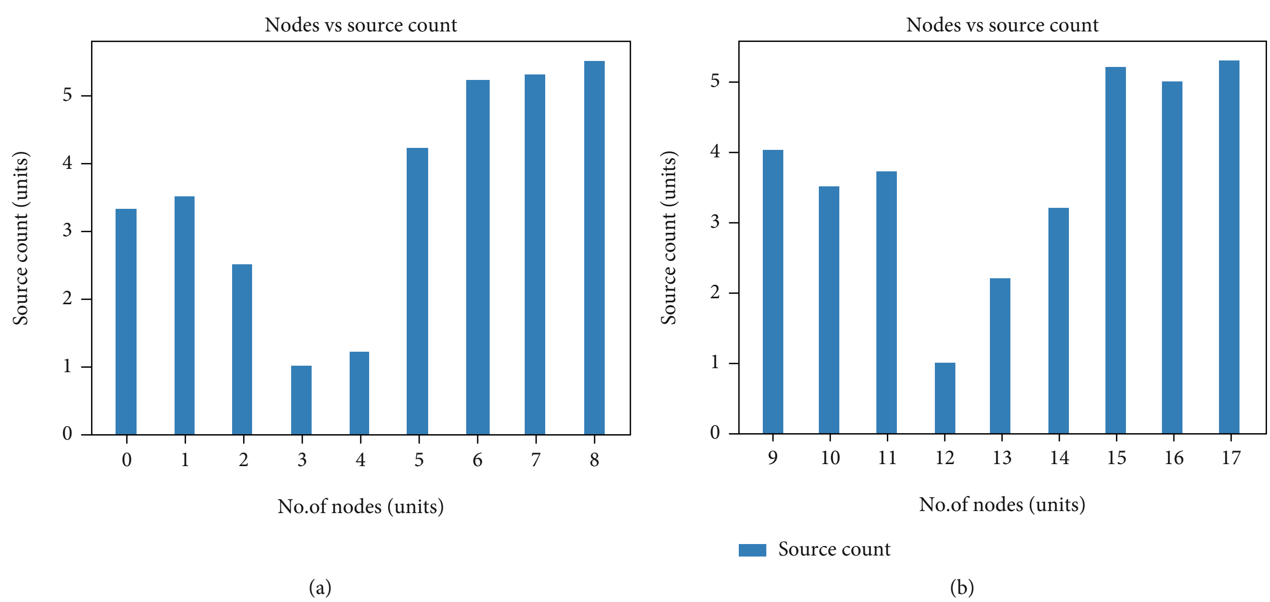


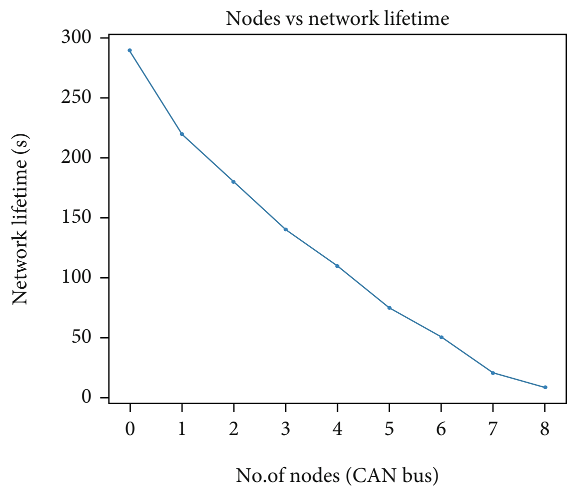
Figure 6: The source count value for each (a) nodes 0 to 8 and (b) nodes 9 to 17.

5(b) display before and after variation of collision in respective nodes.

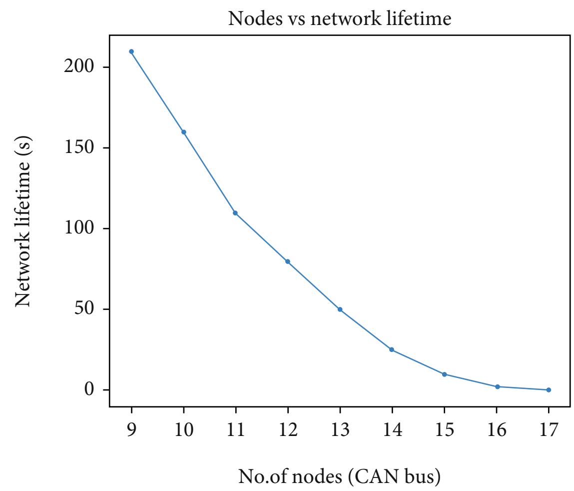
4.4. Nodes vs. Source Count (SC). The whole number of source nodes to which data can be transmitted, the value of any node x, referred to as SC, is specified. Because when a node has packets to transmit, it needs to understand its source count (SC); it is enough to transmit SC value along with the packet. Figures 6(a) and 6(b) depicted that the SC for each node is represented.

The contention window should be greater than the user for each node with a smaller amount of data packets that can be forwarded to downstream nodes in the network. The situation varies in a way which makes medium access delay insignificant and ultimately prevents collisions. It has been observed that medium access delays and the impact of collisions have been reduced which have contributed to increased network performance.

4.5. Nodes vs. Network Lifetime (NL). The standard simple network topology is explained about the improvement of performance for the proposed condition method attains globally optimal solution by allocating the traffic into each node equally, then it is required to maximize the network lifetime (NL). Figures 7(a) and 7(b) show the effect of the number of nodes on the output of NL under this condition



(a)



(b)

Figure 7: The network lifetime for each (a) nodes 0 to 8 and (b) nodes 9 to 17.

method. While the number of nodes rises, the NL drops exponentially. It will be therefore easy and effective to extend the NL by limiting the network utilization in the small case.

5. Conclusion and Future Work

In this assessment work, an audit on WSN and their developments, standards, and applications were finished. Far off sensor networks include little centre with identifying, estimation, and wireless trade limits. Many coordinating, power the chiefs, and data communication shows have been unequivocally expected for WSNs where imperativeness care is a basic arrangement issue. WSNs include little centre points with recognizing, computation, and wireless correspondence limits. Many coordinating, power the heads, and data correspondence shows have been expressly proposed for WSNs where imperativeness care is a crucial arrangement issue. Future work is focused on a more optimal power efficiency model for cloud servers, smart devices, and wireless sensors that would improve the accuracy of the simulation results.

Data Availability

The 'Nodes' data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors of this manuscript declared that they do not have any conflict of interest.

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