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ENHANCING MOBILE ADHOC NETWORK PERFORMANCE WITH DYNAMIC TDMA SCHEDULING BASED ON SERVICE PRIORITY

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Abstract-Wireless sensor networks with a fixed power supply are common and affordable. But there are obstacles, such as mote failures, RF interference from nearby noise, and limited energy. In order to achieve scalability, energy efficiency, and reliable message delivery in such networks, routing protocols must solve these difficulties. But there are competing pressures to meet these criteria. Using service priority-based dynamic TDMA scheduling, this study aims to improve the performance of mobile ADHOC networks. To achieve dependable and scalable performance with minimum sacrifice of energy economy, this study proposes an efficient and reliable routing protocol (EAR). In order to dynamically find and maintain the optimum routes, EAR's routing design takes into account four parameters: predicted trip length, energy levels, distance covered, and connection transmission success history. Allocation strategies must be flexible enough to respond to changing service needs and provide top priority to resource access for perceived service information in order to ensure real-time performance for all types of service data. We begin with the presentation of an algorithm for service priority-based dynamic TDMA scheduling (SP-DS). This method takes into account the end-to-end delay performance and transmission throughput as its primary metrics for allocating slots. The new approach is a combination of the SP-DS algorithm. Compared to current slot allocation algorithms, the suggested technique outperforms them in simulations measuring slot utilization, allocation efficiency, end-to-end latency, and transmission throughput..

1.INTRODUCTION

Mobile ad hoc networks (MANETs) are multi-hop wireless networks that dynamically organize and configure themselves without a centralized controller. In these networks, mobile nodes connect wirelessly and communicate with each other on their own accord. There has been widespread and fruitful use of MANETs in the military and civilian sectors throughout the last decade. Swift deployment in unconventional situations like disaster recovery was facilitated by their capacity to self-organize and self-adapt, which did not need an underlying infrastructure. Because they are all freely mobile and their future locations are often unknown, all MANET nodes have the same functions and capacities. The communication range of these nodes is reduced, but they can still pass messages and maintain routes. Consequently, a number of intermediary nodes work together to forward these packets in a multi-hop fashion from their source to their destination. Here, user node location data is continually sent into the MANET control system using global positioning systems (GPS). Nevertheless, challenges and concerns that aren't present in conventional wireless networks arise from the adaptability of infrastructure needs. Schedulers, topology controllers, and routing modules and subsystems deal with these problems in particular. Reliable and precise methods of mobility prediction are essential for efficient modules of topology control, scheduling, and routing. This paper aims to accomplish two things: first, to create a neural learning machine-based soft mobility predictor; and second, to show that the "predictive" formulation of future node locations is better at capturing and modeling the inherent interaction between the node mobility patterns. The remainder of the article is structured as follows: Section 1 provides a summary of popular mobility models used in MANETs. There, we highlight the significance of mobility prediction while also surveying current methods for making such predictions. Section 3 provides an overview of the models used for mobility prediction using machine learning, namely the multilayer perceptron (MLP) and extreme learning machine (ELM). Not only is the design process outlined, but the suggested mobility predictor is also described in depth. Give an outline of the experimental design and setup that was utilized in the simulation studies, including the synthetic and actual mobility traces. A brief overview of the performance metrics used to evaluate the accuracy of the predictions is provided below as a final part. There includes an in-depth examination of how different design factors affect the accuracy of the predictions, as well as a discussion and analysis of those findings. On top of that, the ability of the Our novel predictor is shown using a combination of synthetic and real-world movement traces. Section 6 closes the article by drawing conclusions and outlining potential future expansions. Without a permanent infrastructure, mobile users may interact using mobile ad-hoc networks (MANETs). Extending the range of access points, facilitating communication in disaster zones, and realizing inter-vehicle communications are all possible uses for such networks. There are several technological obstacles to overcome while developing MANETs, and many of these obstacles have already been identified. Establishing the viability of a solution and, maybe, showing how it outperforms competing methods is a major challenge in this field of study. Network simulation is a well-known and popular approach for this aim. The limitations of using simulation as a primary tool for assessing MANET algorithms and protocols have recently come to light. The most important reasons for this are: You can't run a simulation without making certain assumptions on the actual world. These can end up being inaccurate or too simplistic in their attempt to include all factors impacting algorithm and protocol performance. It is intrinsically difficult for simulators to correctly represent several critical MANET properties, such as radio propagation or energy usage..

2.LITERATURE SURVEY

Babatunde Ojetunde *et al* [2019] have detailed a novel mobile payment system that enables transactions allowing users to buy in disaster regions over infrastructure-less mobile adhoc networks. In particular, we provide a lightweight system based on Bloom filters and Merkle trees to minimize communication overheads and an endorsement-based mechanism to ensure payment for customer-to-merchant transactions. By using techniques like blind signatures and location-based mutual monitoring, our mobile payment system ensures secure transactions. Additionally, our newly-introduced event chain architecture safeguards against double-spending attacks. One benefit of our endorsement-based mobile payment system is the 1.2 s average transaction completion time, which allows for speedier transaction execution. Having additional endorsers with valid event chains and enough monitoring nodes accessible to watch transactions causes the VR to rise in proportion to the number of mobile nodes. When the simulation is in its transitory stage, there aren't enough monitoring nodes, which causes the event chain validity to slightly decrease from 0.5 h to 3 h. In addition, every transaction requires a digital signature from the consumer, and it is impossible to falsify this signature.

Avirup Das *et al* [2019] have proposed a method for balancing energy consumption and transmission via effective frequency planning with CR, which incentivizes packet relaying and leads to substantial energy savings with just a small increase in average scanning overhead. Therefore, nodes with restricted energy sources, even those with low network coverage, will find this strategy quite valuable. Ad hoc Internet of Things (IoT) networks and multi-hop direct-to-device (D2D) networks can benefit from this new energy incentive-based approach to preferential band selection, which encourages nodes to act as relays for multi-hop communication, helps them save power, and improves coverage, efficiency, and quality of service (QoS). When compared to traditional cellular communication via base station, where the amount of energy used is almost constant regardless of the number of nodes, the clear winner is the increased use of relay, which reduces energy consumption by around 50-60% as the number of nodes grows. The findings demonstrate that the suggested system requires just a little increase in scanning overhead when compared to the traditional CR model, and they closely align with the numerical results. Keep in mind that in reality, channels, not just one frequency, are used for communication.

Zhanserik Nurlan *et al* [2022] are working on mesh wireless sensor networks: goals and obstacles. The job of combining technologies like sensor and mesh channels is both simple and difficult because to the heterogeneities in transmission technologies, routing protocols, neighbor detection, performance measurements, and power needs. Moreover, a great deal of the aforementioned work is still outstanding due to the complexity of the issues involved. Along with these assignments come inquiries about anything from the evolution of broadcast protocols to the description of global routing metrics. The aforementioned metric disparities between these sensor networks and mesh networks will, however, hopefully, disappear with time. Consequently, WSN and WMN will eventually merge, necessitating the creation of practical adaptive network protocols well-suited to networks including a great variety of nodes. In addition, studies conducted by Mordor Intelligence point to the impending widespread use of WMSN technology in approaching this field. However, the most effective way to safeguard personal information is to keep data at the edge where it is gathered and provide users full control over its use, including the ability to decide whether or not service providers may access their data.

Syed Muhammad Asad Zaid *et al* [2020] have offered solutions for managing mobility in the next generation of ultra-dense cellular networks. The necessity for more efficient and smooth mobility management in future networks is underscored by the exponential surge in mobile traffic emanating from mobile devices.

People are looking to Ultra-Dense Cellular Networks, which use both conventional and mmWave bands and include cells of different sizes, as a solution to the impending capacity crisis. Nevertheless, the multitude of changeover occurrences, the consequent signaling overhead, and data interruptions for various devices would pose new mobility issues in an ultra-dense heterogeneous network including a motley of high frequency and mmWave band cells. Also, in order to achieve the lofty goals of new mobile networks, we need to fix problems like user tracking and narrow-beam mmWave cell detection. Processing several RF chains might be a challenge for the user equipment side of a make-before-break HO system. Keep in mind that the benefit of make-before-break HO will be further diminished due to the use of narrow mmWave beams in 5G, which is expected to reduce the dependability of the source connection for mobile consumers. But throughput drops because the user is squandering the radio resources of the weaker cells. In response, the authors suggest an AS window that may dynamically adjust its add/remove parameters in response to changes in the linear curve that establishes a relationship between the AS size and the add/remove offset.

Nishit Shah *et al* [2022] are use evolutionary algorithms to suggest a new routing strategy for mobile ad hoc networks. Wireless networks that use a forwarding direction to transmit data from one node to another via a series of intermediary nodes are known as mobile ad hoc networks (MANETs). Because MANET nodes propagate in all directions at unpredictable velocities, increasing the likelihood of collision and damaging throughput, routing overhead, and end-to-end latency, packet collision is one of the most important drawbacks of MANETs. A decrease in data delivery rate is another consequence of frequent node mobility, which causes topological changes and connection instability. In MANETs, where real-time applications are prevalent, traffic congestion at intermediate nodes might impact packet delivery due to restricted pathways to the target node or heavy traffic. One of the many benefits of AOMDV is its capacity to quickly and efficiently recover from failures, generate nodes without loops, keep connection intact, and establish routes on demand. Due to the great mobility of nodes, MANETs use a lot of energy, which is a drawback since there is no external power supply. The problem with ad hoc networks is that the portable nodes use batteries, which aren't very powerful and take a long time to charge or replace.

Burhan Ul Islam Khan *et al* [2021] have offered a collaborative game-logic model of the actions of both good and bad nodes. Because of the difficulty in attributing radio link interruptions, designing routing protocols for very high-speed scenarios with nodes that provide the targeted quality of service is no easy task. The architecture of the routing mechanism is further complicated by an attacker's purpose to do so. When it comes to route interruptions, a content-centric MANET has the same problems. Combining MANET with the IoT allows for opportunistic connection. Concurrently, however, it poses a new problem for collaborative networks that use both the Internet of Things and MANETs, necessitating an appropriate and efficient authentication system for the installations. Another benefit of the Internet of Things (IoT) is the consolidation of MANETs and wireless sensor networks, which creates a unified platform for true global connection. In these heterogeneous settings, the adversary is relentless in their pursuit of optimum link-state routing protocols by introducing data routing problems. The major focus of these kinds of research endeavors is not security. Beyond this, in the most critical cases, surveillance systems use MANET-style unmanned mobile vehicles or gadgets to capture video and photos in real-time. Potentially disruptive to the time slot scheduling procedures, the intruders may try to cause disruptions. Since the traditional payment system relies on communication infrastructure, implementing an e-payment system in a disaster zone presents connection issues. Multiple tiers of endorsement are necessary for this system, and unauthorized parties may attempt to impose communication overheads at any point.

Kang-Hee Ch *et al* [2020] in which a random distribution of LNs and WNs is used to characterize the throughput scaling rules of covert communication over wireless ad hoc networks. Important roles were performed by preservation areas around each WN in enhancing the network's covert communication performance while permitting a negligible number of LNs to be down. There can be no unlimited transmitting capabilities because of the hidden communication restriction. In this case, we enact a preservation zone around every WN. Outside of preservation zones, this area boosts the transmit power of LNs while also blocking transmission from them. To get the job done, we tweaked versions of multi-hop (MH), hierarchical cooperation (HC), and hybrid HCMH schemes. Given that preservation areas might potentially disrupt communication along direct data pathways, the data paths are appropriately redirected in the proposed MH and hybrid methods to avoid these obstacles. To make them suitable for the covert communication environment, it takes use of and tweaks three preexisting network communication systems. Bursty transmit power is also not a good choice for covert communication if there is no way for data to go between an LSN and its associated LDN. Scaling throughput is not accomplished in this way.

Hyeon-Seong Im *et al* [2021] have put forward a wireless ad hoc network that does not impose a covertness constraint by instituting a preservation region surrounding each warden, where transmitting is prohibited, and by meticulously studying how the covertness constraint impacts transmit power and the resulting transmission rates. To be more specific, it was shown that, for wardens whose channel counts are very small in comparison to n, the aggregate throughput scaling is arbitrary close to linear in n. Since the transmission power would be severely constrained as the number of wardens monitoring the channel outputs increases, this makes perfect sense. There is a discrepancy, nevertheless, between the lower and upper limits in Theorems 2 and 5, when s is greater than 1. The discrepancy between the optimistic and pessimistic estimates of the distance between a sender and the closest warden is the source of this non-tightness. It seems difficult because the sender-warden distance, which affects the maximum allowable transmit power due to the covertness limitation, and the sender-receiver distance, which affects the transmission rate, change over time in their own right.

Mukhtiar Bano *et al* [2021] via the effective and methodical migration of wireless mesh networks (WMNs) to software-defined networks (SDNs) and established a reliable routing architecture for soft mesh hybrid networks. This paper's primary goal is to propose enhancements to the SDN node architecture that will enable the introduction of several network functions—including traffic engineering, load balancing, network management, and routing—into hybrid SDN and IP networks. Using the Mini net-WiFi Simulator, one can create a hybrid network topology with 50, 100, 150, 200, and 250 nodes, a mix of software-defined networking (SDN) and legacy (legacy) nodes, and adjust the ratio of SDN to legacy nodes to test the proposed architecture's performance. We compare it to existing hybrid SDN and IP routing architectures like Hakiri and wm SDN, as well as to traditional routing protocols like Optimized Link State Routing (OLSR) and Better Approach to Mobile Adhoc Networking (BATMAN) in terms of average UDP throughput, end-to-end delay, packet drop ratio, and routing overhead. Additionally, it plans to showcase the benefits and drawbacks of SDN-based WMN solutions before using them to address the primary issues in the IoT area. While perfect compatibility between SDN and current IP devices helps minimize economic, operational, and technical challenges caused by the growth of the traditional IP-based network architecture, this is not the case here.

Btissam El Khamlichi *et al* [2019] have evolved the challenge of neighbor discovery, or the identification of nodes in a wireless ad hoc network that are neighbors of one another with the use of directional antennas alone. Use a learning automaton to represent the neighbor finding process; this automaton should be able to operate in a dynamic, non-stationary learning environment. Through analysis of its historical data, the node gains insight into its surroundings and modifies its approach to maximize its discovery rate. Analyzed is the asymptotic behavior of the suggested learning scheme, which converges to an equiprobable distribution. When applied to networks with a high population density, the suggested method speeds up the process of discovering neighbors throughout the whole network. To get the best possible discovery rate, the learning parameters are tweaked. Node density is a known predictor of the amount of time required by all three techniques to accomplish network-wide neighbor finding. Nevertheless, the convergence time is significantly reduced when a learning-based approach is used. Because accidents happen more often in crowded networks, this enhancement stands out more. The learning system is able to make optimal use of the collision data, resulting in a quicker finding. Conversely, a substantial increase in time is produced by the explore-only method used by the random and scan-based algorithms. Some of the main problems with these methods are the increased hidden terminal issue, less spatial reuse, and range asymmetry.

Mostafa Nozari *et al* [2021] was evolved with the purpose of disseminating both promotional and informative messages. Store carry and forward (SCF), rate-less coding, and a novel handshake mechanism are used in the suggested approach to address discontinuous connections, message reception uncertainty, and collisions, respectively. As a novel approach to assessing data distribution systems, this study proposes monitoring the network's reaction to changes in the Road Side Unit (RSU) message over time. Based on our findings, the network performance would be practically nullified in the event of a very fast change to the RSU message. Overhearing has been proposed as a solution to this issue, especially considering the commercial nature of messaging. We are unaware of any previous implementation of message overhearing in VANET. Nevertheless, in overhearing mode, some cars are able to receive messages without a handshake. This is because overhearing allows vehicles to receive messages from RSUs in the past with less delay, leaving more time for new messages. Hence, the mean DD will remain relatively unchanged when the number of messages in the overhearing mode is increased from two to three, as compared to the situation when RSU disseminates two messages. The average DD of RSU for states where RSU distributes 5 and 10 messages is shown in the final two subsections. In these conditions, the average DD in the non-overhearing mode drops dramatically, suggesting that the network's efficiency is being progressively depleted as the RSU message becomes more dynamic. Even while transmitting 10 messages in overhearing mode, the network efficiency remains at an acceptable level, even if the DD has been drastically lowered compared to non-overhearing mode.

Gabriel Filios *et al* [2019] proposed a comprehensive review of EMR and its effective management in wireless communication networks. One developing technology that we are particularly interested in is wireless power transfer (WPT). From a global viewpoint, we want to provide solutions that effectively manage EMR while preserving high levels of user QoS and WPT charge efficiency. To begin, we need to formally define EMR as it pertains to wireless communications and then provide certain performance indicators and assessment criteria for EMR in wireless networks. After that, we shift our attention to EMR regulation in the context of efficient wireless power transmission using several WPT models. Assuming limited energy stores and batteries, we incorporate the low-radiation-efficient charging issue to the famous scalar model. Our goal is to develop effective algorithms and heuristics by first determining the computational complexity of the task. Next, a WPT vectorial model is used to better control radiation by taking use of the fascinating received power calculative and super-additive phenomena. We provide methods that strike a good balance between radiation and charging efficiency. Afterwards, provide a more advanced model and the technique of wireless power transmission between peers, which eliminates the need for powerful central charging stations and significantly reduces radiation levels. Changing the charger in a dynamic, online manner is another option to regulate EMR for mobile nodes. This way, vast fixed-changing ranges are avoided.

Pratima Upadhyay *et al* [2022] have proposed HEGSO-based traffic-aware secure routing for citywide VANETs. Vehicle ad hoc networks are a subset of mobile ad hoc networks (MANETs). Nodes are the moving vehicles that can configure themselves. Intelligent transportation systems cannot function without it. There are both stationary components, known as roadside units, and mobile components, known as on-board units, that make up the vehicle network. It is mandatory that all vehicles using the network have the OBU. In vehicle networks, there are two main types of news: safety news and non-safety news. Even vehicular networks have MANET as a parent, and MANET is biased against their personalities. Among VANETs' many distinguishing features are their highly mobile nodes, their ability to undergo topological changes, their large size, the great distances between them, the frequent density changes, and the time constraints. Conventional methods of network security and routing do not work well with VANETs due to their unique characteristics. Furthermore, the attacker or any other node may alter or disregard the safety messages, which might result in data loss related to authenticity, privacy, integrity, and secrecy. Consequently, a secure communication protocol is a must-have for VANET security measures, as it will shield the network's architecture and data from prying eyes.

Davi Falcao *et al* [2021] to enhance the DTN architecture's security, have shown the use of discriminant analysis as a classification method for choosing secure connections. An advancement of mobile ad hoc networks (MANET), disruption-tolerant networks (DTN) function in situations when end-to-end infrastructure is unavailable, connections are sporadic, and nodes are unevenly dispersed and low density. Hence, DTNs are suggested for applications with high latency, which might last over hours or even days. There are aspects of the maritime context that make DTN networks a good fit, but data security is still an important consideration. Under this protocol design, every node is responsible for relaying exactly one message. The main benefit of this protocol is that it does not need the allocation of massive storage resources. As compared to other routing protocols, this one will have the longest message delay periods. Importantly, this action lowers the likelihood of communications reaching their intended receivers. One drawback of probabilistic protocols is their sensitivity to unexpected changes, such the reallocation of nodes in scenarios, since they depend significantly on a priori data, which is often employed for routing choices. Decision mistakes and missed routing opportunities are the results of these modifications.

Prasant Kumar Pattnaik *et al* [2021] When obstacles are present in the terrain region, the provided MOAR protocol outperforms EEOARA and AODV, leading to improved MANET communication efficiency. A number of studies, including MOAR, AODV-RT, and EEOARA, have compared and contrasted their results. Results show that MOAR outperforms alternatives in dynamic mobility and traffic scenarios with regard to packet received ratio, average latency, average energy consumption, throughput, and routing overhead. To improve MANET performance, the multipath route method makes advantage of the divergence of active network circumstances. By modifying the cartographically optimal link state-based routing strategy, this method automatically identifies barriers. The system more efficiently and with better coverage pinpoints the obstacle area. Without analytical data on the obstacle design, it effectively avoids broken links produced by terrain obstacles and gives a suitable percentage of accuracy. On the other hand, this plan can't come first in the chain of events that involves obstacle detection and mobility prediction.

Bikash Choudhury *et al* [2019] have put out a plan for replicating services that, when compared to current methods, improves service availability, response time, and system-wide performance. An optimum job assignment strategy based on multi-agent technology allows for batch-wise decision-making, and a proactive sensing mechanism based on dual-thresholds determines which services will need to be duplicated soon. When combined, these strategies enhance system-wide resource usage and decrease the service drop rate. Implementing an approach that leverages both physical and functional contexts significantly decreases the service response time and the effort required to make assignment choices. At the same time, this study builds an integrated model to compare and contrast several generic service replication techniques. While the aforementioned methods do manage scalability, they rely only on geographical closeness for clustering, which means that benefits derived from functional similarity or temporal correlation go unused. But strict QoS requirements may not be necessary for all queries.

Gagan Deep Singh *et al* [2022] have created a very effective routing protocol by combining the GA approach with the Reynolds algorithm. In order to finish the job and cooperate with other nodes, the suggested approach has used the nature of relationships. A new goal function was designed for the suggested method using the special properties of GA. We evaluated the suggested HGFA against industry-standard algorithms like Fire

Fly and PSO and put it through its paces. Unfortunately, no routing method based on metaheuristics was determined to work well in both sparse and intense urban traffic situations. It can't handle sparse network settings. No routing method based on metaheuristics was determined to work well in both sparse and congested urban traffic situations. While Ant Colony Optimization (ACO) excels in sparse network situations including highways, Particle Swarm Optimization (PSO) excels in city-based scenarios involving dense networks.

Nandkishor Joshi *et al* [2023] in CRAHNs, have introduced a framework for optimizing the 802.11 (DCF) MAC protocol using fuzzy logic. By concurrently training a database of input parameters, contention window, and packet length for the 802.11 (DCF) protocol models of Mamdani and Sugeno fuzzy inference systems (FIS), it maximized throughput and latency. Over the last several years, cognitive radio networks (CRNs) have seen extensive usage across a variety of industries to optimize the use of radio spectrum. Protecting this limited resource from the increasing demand for next-generation communications is of the utmost importance. The main user's activity detection in CRNs relies on opportunistic spectrum sensing to make the most effective use of the scarce and beautiful radio spectrum. Therefore, CRNs are essential for secondary users to alleviate spectrum shortages caused by main user bands. One kind of CRNs that uses infrastructures with a reduced number of cognitive radio (CR) nodes is the cognitive radio ad hoc network, or CRAHN. Compared to standard wireless network MAC protocols, CRAHN's CR-MAC protocol operates in a somewhat different way. Although throughput decreases as the number of CR users grows, it increases when the contention window size extends. The FIS optimization demonstrates that a fuzzy inference system is an excellent tool for increasing throughput.

C. Rodrigues *et al* [2019] are presenting the BT-MANET algorithm, a new method for mobile ad hoc video streaming that is similar to BitTorrent. Its novel ideas primarily concern (i) a sliding window to prioritize data requests, which strikes a balance between data variety and playing continuity, and (ii) a flexible data-transmission mechanism between immediate neighbors. Our idea is validated and confirmed to have good performance for on-demand streaming after we run many simulations and evaluate four distinct competitive measures. For example, BT-MANET is shown to be relatively competitive with another wired implementation and to support double the data rate of a notional theoretical approach. In this regard, this paper's main contribution is to shed light on practical protocol designs aimed for mobile ad hoc networks' on-demand multimedia streaming.

3.EXISTING SYSTEM

3.1 BLOCK DIAGRAM OF EXISTING SYSTEM

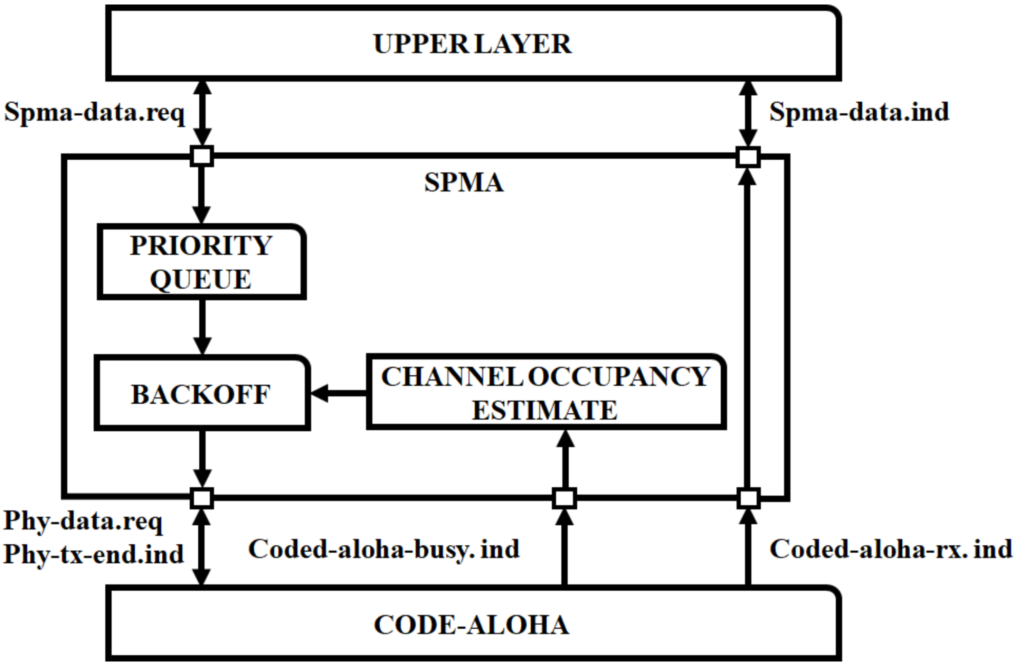

Figure 3.1: Existing System Block diagram

Within this preexisting framework, we built the SPMA protocol's performance analysis for use in mobile ad hoc networks operating at high speeds. A preemptive M/G/1 queue-based time slot transmission probability modeling approach is introduced with the purpose of analyzing the performance of the statistical priority-based multiple access (SPMA) protocol. A technique for computing the time slot transmission probability equation given the system characteristics is described, and the equation is inferred using mathematical modeling. The next step is to calculate the message's successful reception probability and develop a general link between the duty cycle and the likelihood of successful reception in order to define the strategy for establishing the threshold for the most important message. The SPMA protocol threshold setting issue is resolved by adopting the technique of minimizing re-served resources across priorities in order to determine the low priority threshold with the least threshold difference. This settles the tension between the nodes' priority scheduling process and their goal of maximizing channel usage.

3.2 MATHEMATICAL MODELING OF SPMA PROTOCOL

Multiple access protocol SPMA stands for random contention. The physical layer is characterized by a low bit error rate and a short latency. The access latency of Aloha is the lowest of all the multiple access protocols. On the other hand, with heavy channel loads, the ALOHA protocol's packet delivery performance suffers. Because of its numerous improvements over original ALOHA—including message encoding and decoding, random time and frequency hopping, and more—the SPMA physical layer is known as coded ALOHA. It improves service low-delay performance in multiple-access environments, guarantees message delivery rates at the expense of channel capacity and utilization, and lays the groundwork for SPMA link layer operation. Turbo coding is used. The message is encoded by the transmitter using n pulses. In order for the receiver to decipher the message, k pulses must be received, where k is less than or equal to n. Multiple working frequencies are available to the node. There are two distinct kinds of pulse reception disputes that do not involve intervention from external parties. Two examples of this phenomenon are half-duplex and multiple access interference. In the former, a node cannot receive pulses sent by other nodes, while in the latter, the receiver may receive several pulses simultaneously, but only some of them will be able to be received. The time and frequency domains are used when a message is encoded and split into many pulses before transmission. It is impossible to interpret the data contained in two pulses that are broadcast at the same frequency and at the same time because the pulses would clash and interfere with one another. By using a random transmission method, the SPMA protocol significantly lowers the likelihood of pulse collision. The protocol's channel coding node can decode the whole message using little over half of the pulses received by the node upon reception. In addition to supporting several service priorities, it offers very reduced access latency for services with a high priority. Channel identification and multi-priority transmission decision-making mechanisms are the core components of the SPMA link layer. SPMA checks the duty cycle and cuts power when it goes beyond a certain point. What this means is that priority packets will not be sent at this time. The duty cycle must be below the threshold before packets may be dispatched.

3.3 DERIVATION OF KEY PROTOCOL PARAMETERS

SLOT TRANSMISSION PROBABILITY

Saturation of the system's input causes its throughput to remain largely constant. It is now safe to assume that the slot transmission probability (STP), the chance P of packets being sent from any node in the system in any slot, is a constant number. Below, we examine the computation of the slot transmission probability of the SPMA system in preemption mode, using the M/G/1 queue. To begin, we compute the STP expression with respect to the backoff probability. We examine the priority packets' backoff processes using the classical Markov model. Assuming this to be true, packets of priority i ($0 \leq i < I$) will arrive at a rate denoted as λ_i, following the Poisson process. At that point in time t, the likelihood of n packets arriving is:

$$q_i(n;t) = \frac{e^{-\lambda_i t}.(\lambda_i t)^n}{n!} \quad (3.1)$$

For the packet with priority i, the probability that no packet with a higher priority arrives is:

$$yi(t) = \prod_{j=0}^{i-1} qj(0;t) = \prod_{j=0}^{i-1} e^{-\lambda jt} = e^{-\sum_{j=0}^{i-1} \lambda_j t} \quad (3.2)$$

When i = 0, yi (t) = 1

Consider the following parameters

γ_i : back off probability of the packet with priority i. For the sake of simplicity in the derivation, let's pretend that the packet's likelihood of backoffing again after each backoff is finished is a constant value while the system is in steady state. The unknown vector that has to be addressed is the likelihood of backoff of each priority, which is connected to the transmission probability.

k: Maximum backoff times.

Messages are rejected when the queue is full or exceeds the aging restriction, however the real system may not have a set backoff number limit. Assuming a maximum backoff limit and sending the message instead of discarding it when it is reached simplifies the modeling process.

δ: The time length of each backoff slot.

One essential way to examine the saturated steady-state performance of the system is to discretize the system state and slot the system. It is crucial to carefully choose the length of the backoff slot. The access latency will be worsened since the backoff time frame is too lengthy. Too little time makes it easier to trigger a deluge of message bursts since there's no pressing need to react to a change in the channel load rate. Backoff time slots are same in length to packet equivalent transmission times.

b_k: The mean quantity of return slots for the k-th return. The duration of the window is Wk time slots when the k th backoff occurs. The number of backoff time slots is typically calculated as (Wk + 1)/2, and they are evenly and randomly chosen from the interval [1, Wk].

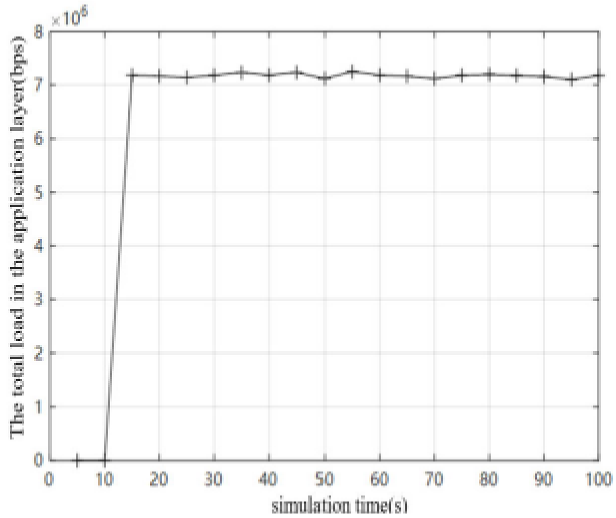

Figure 3.3.1: The total load in the application layer

The total load in the application layer can be stabilized at 7Mbps and the channel utilization is high.

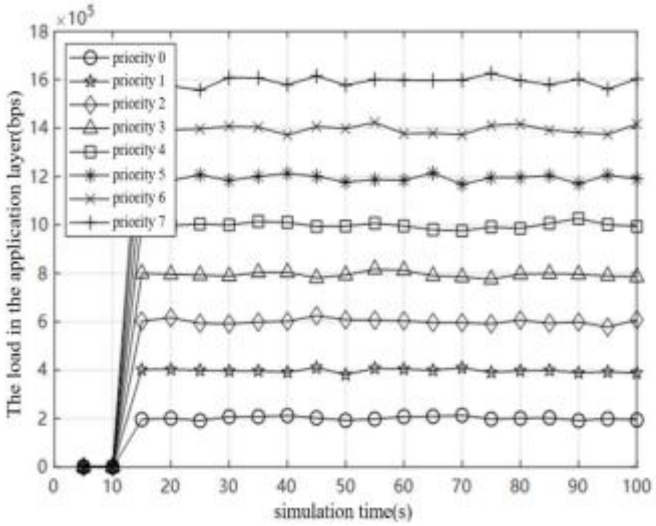

Figure 3.3.2 : The load in the application layer

The total load in the application layer can be stabilized at 7Mbps and the channel utilization is high.

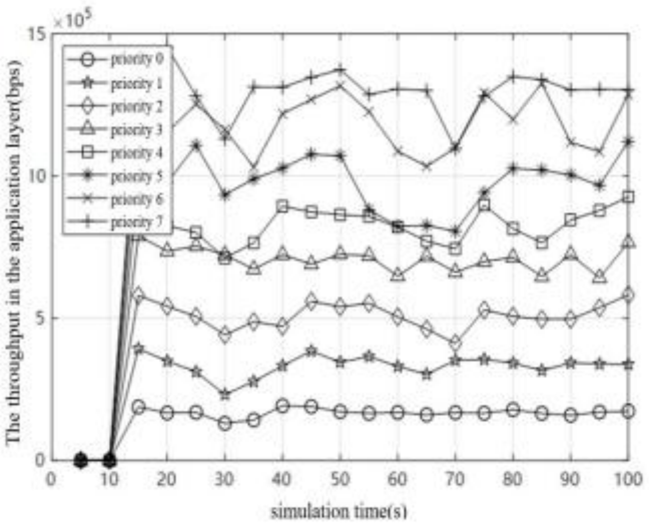

Figure 3.3.3: The throughput in the application layer

There is a reasonable degree of consistency between the priority load ratio in the simulation parameters and the application layer load for all priority services. As seen in Figure 3.3.3.

DRAWBACKS OF EXISTING SYSTEM

• On the other hand, ALOHA protocol's packet delivery performance degrades at high channel load rates. • By setting the low priority channel load rate to the smallest threshold difference, maximum channel utilization may be achieved.

4.PROPOSED SYSTEM

4.1 BLOCK DIAGRAM OF PROPOSED SYSTEM

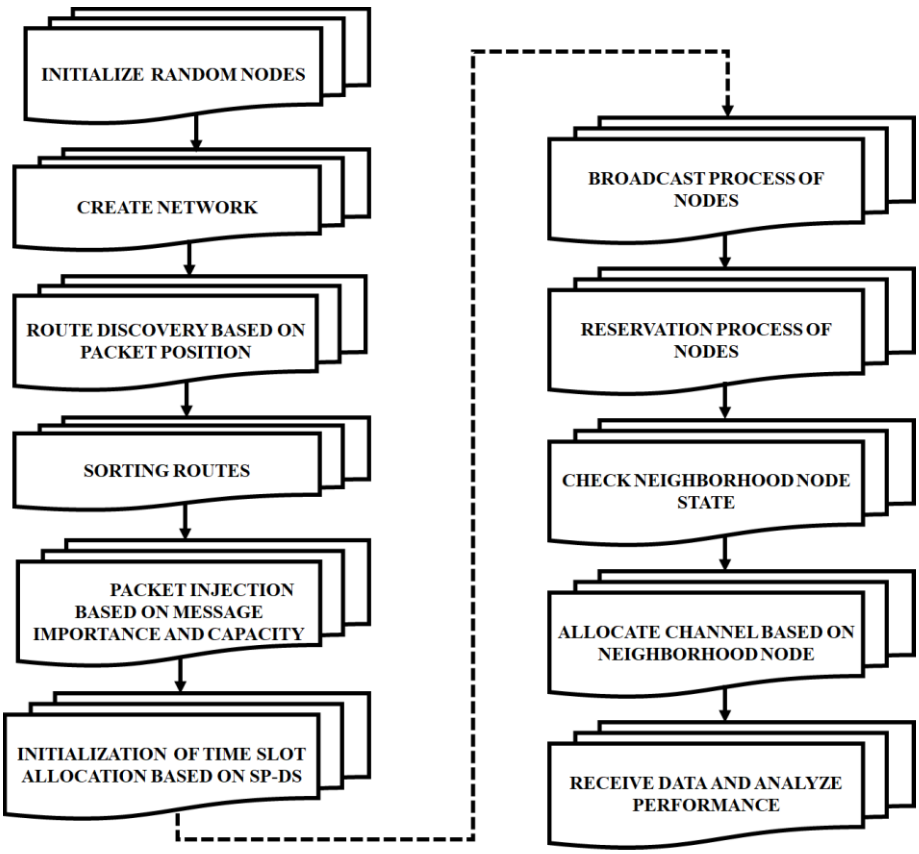

Figure 4.1: Block Diagram of Proposed System

This research presents an efficient and trustworthy routing protocol (EAR) that achieves scalable and reliable performance with minimal sacrifices on energy conservation. Four elements form the basis of the EAR routing design, which allows for the dynamic establishment and maintenance of the optimum routes: energy levels, predicted path length, link transmission success history, and a weighted combination of these. The real-time performance of various kinds of perceived service data depends on the allocation strategy's ability to adapt to the service's changing needs and give service data first priority when it comes to accessing resources. The first approach is an SP-DS technique, which uses service priority as a reference factor for slot allocation and fully accounts for transmission throughput and end-to-end delay performance. By merging the SP-DS algorithm, the new approach is created. In terms of end-to-end latency, transmission throughput, slot utilization, and slot allocation efficiency, the simulation results demonstrate that the proposed approach outperforms the existing techniques.

4.2 INITIALIZE RANDOM NODES

Random node initialization can be performed in the prediction of MANET performance:

Network Area Definition:

Set the limits of the network region that will be simulated by the MANET. To do this, just define the region where the nodes will be spread in terms of their length, breadth, and form.

Node Placement:

Put a certain number of nodes into the specified network region at random. The intended simulation scenario dictates whether the placement is uniform or follows a specified distribution pattern.

Node Attributes:

Put each node's location, range of transmission, power, mobility, and communication protocols into its appropriate properties. The MANET nodes' actions and efficiency will be impacted by these characteristics.

Connectivity Establishment:

Connect nodes that are close enough and have a similar transmission range to establish a connection. While nodes in range may form direct connections, those further away may have to go via intermediary nodes to get their messages where they need to go.

Traffic Generation:

Define the kind, amount, and format of the data sent and received between nodes to create simulated traffic patterns. Data such as packet size, packet creation rate, and traffic patterns fall under this category.

5. RESULT AND DISCUSSIONRESULT AND DISCUSSION

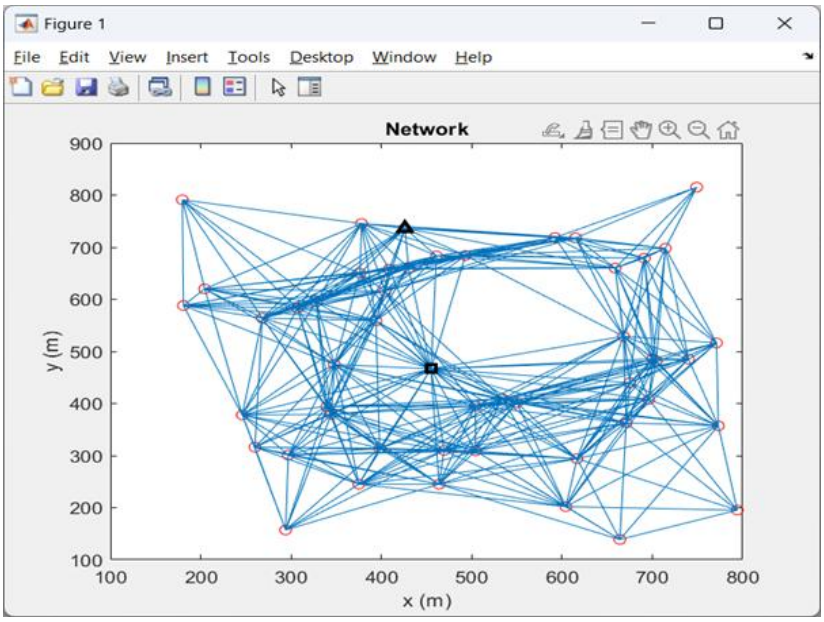

Figure 5.1: Network

In Figure 5.1, the network is shown. The number of nodes, their connections, and any special characteristics associated with each node are all parts of the network topology that must be defined initially. The network may be represented visually using an adjacency matrix or graph. An adaptable system that learns via linked nodes is a neural network. There are several uses for neural networks.

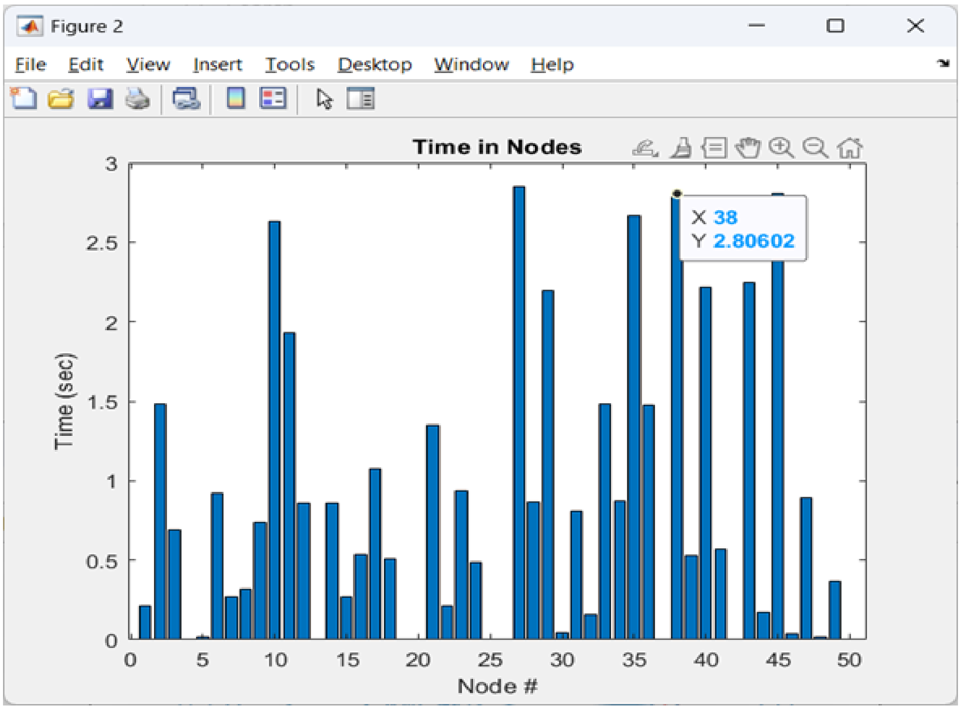

Figure 5.2: Time in Node

In Figure 5.2, we can see the node time. Put each node's energy, computing power, and communication range to their initial values. Give each node in the network a starting value for these parameters. Set the amount of time the simulation will run for and have things happen at predetermined intervals using the time and event generation features. Any important network event, such as data transfer or node activation, might fall within this category.

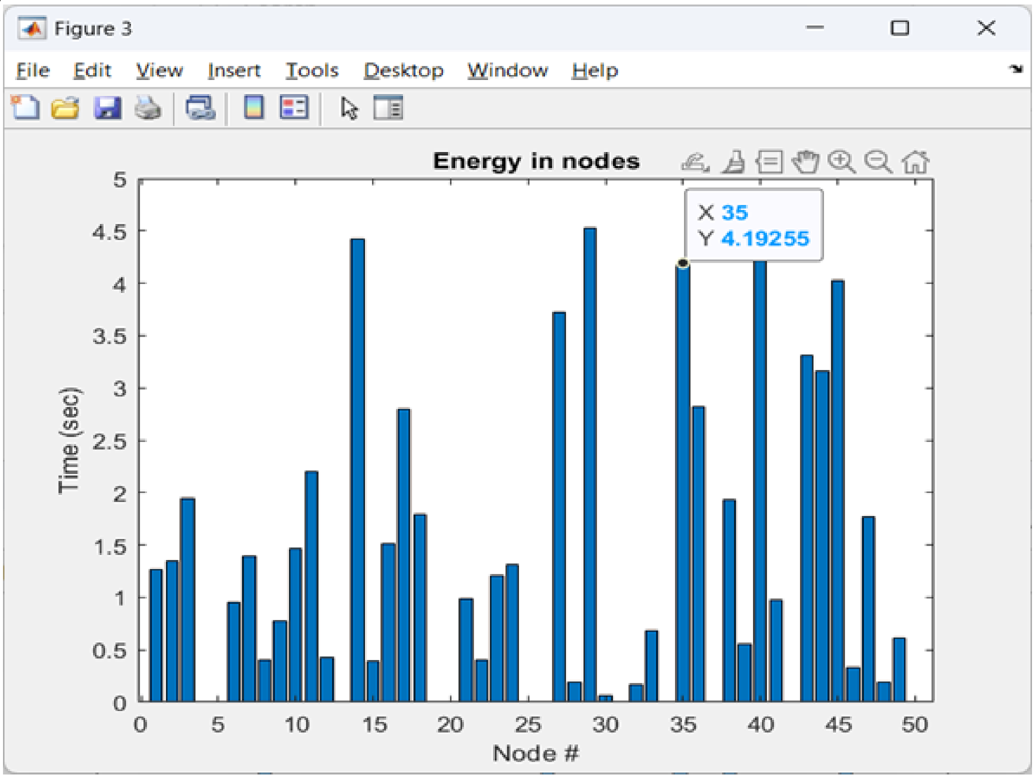

Figure 5.3: Energy in Node

In Figure 5.3, we can see the energy hub. By considering various parameters, including the power consumption of the radio transceiver, the processing unit, the sensors, and the communication protocol, it calculates the energy required by the sensors or nodes in a wireless sensor network using MATLAB.

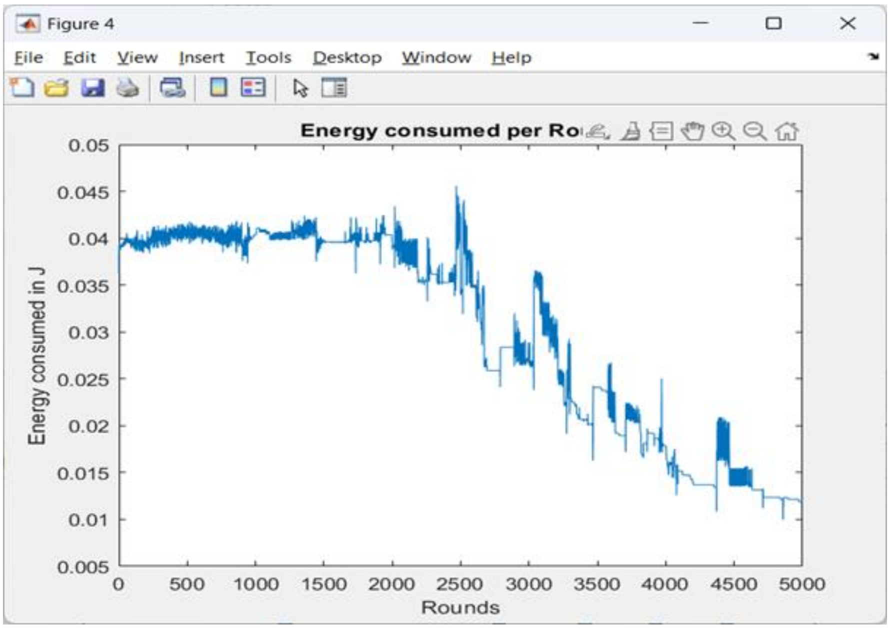

Figure 5.4: Energy Consumption

Figure 5.4 shows the model of energy consumption. The document details an energy consumption model that illustrates the power consumption of each node during various processing tasks, data transmission and reception, and idleness. This model might either have a theoretical basis or be based on actual data.

CONCLUSION AND FUTURE SCOPE

CONCLUSION

This study details the use of Matlab's service priority-based dynamic TDMA scheduling (sp-ds) algorithm to forecast mobile ad hoc network performance. An energy-efficient routing protocol (EAR) that is both reliable and effective in meeting performance objectives. The EAR routing architecture employs four features—expected path length, energy levels, a weighted mix of traveled distance and success history of link transmission—to discover and maintain the best routes on the fly. The allocation method had to be flexible enough to respond to the service's evolving demands and prioritize the access to resources for service data if it was to guarantee the real-time provision of various forms of service information. Initial work focused on introducing SP-DS, a service priority–based dynamic TDMA scheduling mechanism that fully accounts for transmission throughput and end-to-end delay performance when allocating slots. By merging the SP-DS algorithm, a new method was born. Simulation findings reveal that the proposed method outperforms the existing slot allocation methods with regard to transmission throughput, end-to-end latency, slot usage, and slot allocation efficiency. In MANETs, the performance is substantially impacted by the dynamic distributed TDMA slot allocation technique, which has significant implications for the division of service priority. Prioritizing the availability to resources for sensing data with high service priority is essential.

FUTURE SCOPE

Investigating SP-DS framework-based energy-efficient scheduling solutions for MANET mobile device battery life extension. In order to save energy without sacrificing quality of service, this investigation may include developing new energy-aware scheduling algorithms that prioritize low-power nodes, decreasing idle listening, and adjusting transmission power levels.

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