Performance Analysis of Grid Configuration Wireless Sensor Network using Different Packet Frequency for Oil and Gas Downstream Pipeline

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Abstract: - Over the most recent few years, there has been a shift away from utilizing costly links to communicate information from different sensors, including those estimating wind, vibration, temperature, and stickiness, to observing locales. This progress has been worked with by the reception of Wireless sensor networks (WSNs), which proposition expanded adaptability and more extensive inclusion capacities. In different businesses, these organizations have acquired ubiquity because of their flexibility. In particular, with regards to observing oil and gas offices, framework-based WSNs demonstrate profoundly appropriate for covering broad regions, especially inside the downstream period of the oil and gas handling chain. The essential point of this examination is to research how different bundle frequencies, the quantity of nodes, and directing conventions influence a lattice-based WSN. The review presents two sorts of steering conventions: responsive (AODV) and proactive (OLSR), utilizing a lattice hub plan and trying different things with different bundle frequencies. The reenactment results uncover that as the bundle recurrence builds, there is a perceptible decrease in execution, no matter what the organization's size. This presentation decline is clear in measurements like the conveyance proportion, network reasonableness, and the presence of aloof nodes inside the organization, particularly while sending 80 nodes or more. Moreover, it's significant that the AODV steering convention outflanks the OLSR partner concerning throughput, conveyance proportion, and the presence of passive nodes.

Key-Words: - Proactive (OLSR), Reactive (AODV), Wireless Sensor Network (WSN), Packet Interval, Packet Frequency, Oil and Gas monitoring, Routing Protocol.

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1 Introduction

Recently, there has been a rising interest in recording ongoing information from actual occasions like temperature, strain, and stickiness. Previously, this information were gathered and communicated utilizing costly and badly designed links to a focal assortment point. In any case, Wireless sensor networks (WSNs) have arisen as more productive, financially savvy, and easy-to-understand answers for different businesses. WSNs have exhibited their capacity to accumulate, dissect, and impart information really in various applications, particularly inside the oil and gas sector, [1].

Wireless sensor networks (WSNs) have found broad application in checking medical problems, guaranteeing pipeline uprightness, and further developing creation in the oil and gas industry across all areas - downstream, halfway, and upstream. In the upstream area, which includes the distinguishing proof and extraction of regular assets, whether from underground or underwater, [2], as displayed in Figure 1, WSNs assume a vital part. The halfway area centers around putting away and moving the removed materials, using modes like trucks, barges, rail routes, or pipelines. Ultimately, in the downstream area, the moved materials go through handling, refining, advertising, and commercialization exercises. WSNs add to streamlining tasks and improving proficiency all through the whole oil and gas creation and appropriation process.

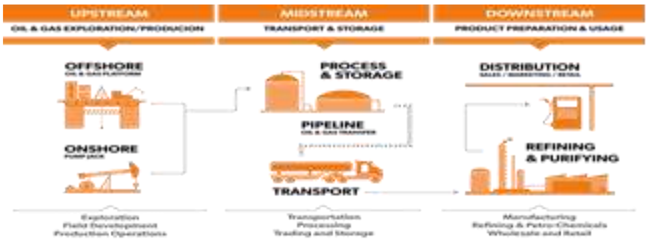

Fig. 1: Sectors within the oil and gas industry

As depicted in Figure 2, within the midstream sector, there is linear distribution, and within the downstream sector, there is dispersed distribution, making two distinct forms of pipeline distribution. This research paper specifically examines the utilization of wireless sensor networks (WSNs) within the downstream sector, where the grid node placement is well-suited to the coverage area and pipeline layout. Maintaining uninterrupted production and safeguarding assets are of paramount importance across all three sectors (upstream, midstream, and downstream), particularly considering that numerous assets are situated in remote areas. In essence, this paper delves into the application of WSNs for pipeline monitoring in the downstream sector, aligning with the grid node configuration and distribution of pipelines. The imperative need for continuous remote surveillance spans these three sectors, serving as a vital element in protecting assets and ensuring the seamless operation of the oil and gas industry, given the remote locations of many assets.

Fig. 2: Linear pipeline (left) and spread-out pipeline (right) distribution

In testing oil and gas conditions, nodes furnished with sensors, for example, spillage sensors and tension assume a significant part in gathering fundamental modern information. This information empowers another degree of understanding into plant tasks and works with the execution of cutting-edge arrangements. By utilizing these sensors, personal time, functional expenses, and creation expenses can be diminished, while activities can be upgraded by limiting the continuous support time as well as costs, and stage security can be improved by identifying and forestalling issues. An illustration of such a basic application is pipeline transmission, which includes unforgiving conditions, exceptionally combustible materials, and high fluid tension. Any startling occasion during these tasks can have serious ramifications for the encompassing individuals, the climate, and costly hardware. In such situations, Wireless sensor networks (WSNs) end up being important by limiting human contribution and improving wellbeing in oil and gas activities.

Wireless sensor networks anticipate a vital parcel in supporting customary prospering insides oil and gas downstream relationship for some key reasons. They, without much of any vacillating, diminish standard dangers by orchestrating the wide wiring commonly major in standard plans, as decreasing the probability of oil releases, compound spills, or hardships starting from hurt wires. Other than that, their capacity to induce prepared reliable data and quickly trigger cautions on the off chance that there got to be an occasion of abnormalities works with quick reactions to overcome conventional occasions or decrease their affect. Too, the energy-effective properties of WSNs offer assistance with reducing the carbon impression, in this way pushing standard sensibility. In addition, WSNs incorporate obliging the ordinary effect amid establishment since of their diminished dependence on veritable arrangement. At final, their flexibility guarantees unfaltering consistency with driving standard measures. In rundown, WSNs convey a cautious strategy that shines lights on characteristic triumph inside the oil and gas downstream district though at the same time streamlining steady effectiveness.

Wireless Sensor Networks give huge advantages to the oil and gas region. These advantages consolidate further developed security through predictable checking, engaging early acknowledgment of issues, for instance, openings and equipment breakdowns to prevent setbacks, and lessening individual time. WSNs in like manner work with consistent data variety for perceptive help and utilitarian progression, provoking expense-save reserves. Plus, they add to the environment really looking at by following air and water quality, ensuring consistency with rules, and restricting regular impact. WSNs enable far-away action and control of equipment in hazardous circumstances, further creating staff security. In addition, the accumulated data can be separated for encounters, helping dynamic in process progression and peril the board. As a rule, offer a total solution for additional foster security, decline costs, and update natural stewardship in the oil and gas industry, [3].

Figure 3 provides an overview of the Open Systems Interconnection (OSI) model, which comprises seven distinct layers. This research, however, primarily focuses on evaluating the performance of the OSI model, with a specific emphasis on the network layer. The network layer is a critical component where the fundamental operations of routers take place. In this layer, data is enclosed within IP datagrams, which include both source and destination IP addresses. This epitome cycle works with the productive sending of information across the organization[4]. Moreover, it is inside the organization layer that steering calculations or conventions assume a significant part in deciding how information is guided inside the organization to empower productive data trade. The fundamental objective of this paper is to direct a complete examination of the exhibition of a current steering convention planned explicitly for Wireless sensor networks (WSNs). This investigation includes an assessment of the convention's execution across fluctuating bundle frequencies and an organization game plan that duplicates the conveyed format of pipelines tracked down inside the downstream area of the oil and gas industry.

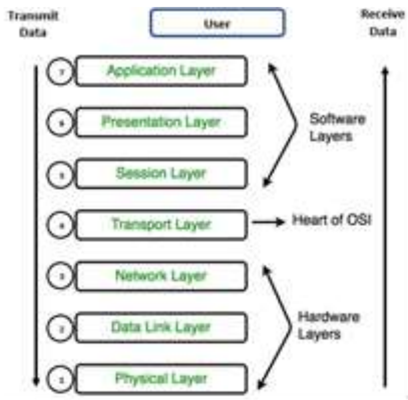

Fig. 3: The OSI model with 7 layers

1.1 Routing Protocol

The growing demand for wireless sensor networks (WSNs) and the rapid advancement of technology present numerous challenges that researchers have the opportunity to address. In high-density networks, performance degradation is a significant concern, manifesting as packet loss, reduced throughput, and increased routing overhead. Congestion within the network often contributes to these problems, highlighting the need to address routing issues. To tackle this, various routing protocols have been employed at the routing layer or network layer of WSNs, aiming to optimize network performance and alleviate these challenges, [5], as depicted in Figure 4.

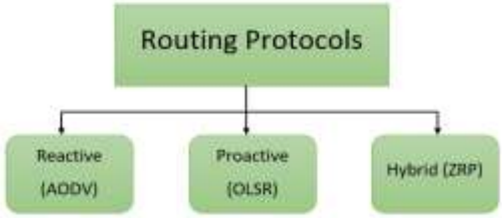

Fig 4: The network layer with three routing protocols

Proactive routing protocols employ a table-driven approach, where routing paths are pre-established and continually maintained. This proactive strategy minimizes delays in packet forwarding but comes at the cost of increased network resource consumption because of the frequent updates and the maintenance of routing tables. One instance of a proactive routing protocol is the Optimized Link State Routing Protocol (OLSR), [6]. OLSR is used in wireless ad hoc and mesh networks. It optimizes the routing process by periodically exchanging link state information, creating a topology map, and calculating efficient routes. OLSR helps devices find the shortest paths for data transmission in dynamic network environments.

In expansion, responsive directing traditions utilize an on-request coordinating strategy, laying out courses fair when they are required, [7]. Whereas this methodology might bring approximately occasional concedes in data sending, it surprisingly reduces the by and large coordinating over. An outstanding diagram of an open directing tradition is the Offhand On-Request Separate Vector (AODV) tradition. AODV lays out courses on request, lessening over by conceivably reviving ways when required. AODV is profitable for energetic organizations because it alters to changing circumstances and finds courses for data transmission when said.

Half and half directing traditions have the target of mixing the preferences innate in both proactive and open techniques, arranging to achieve a friendly adjust between decreasing delays and reducing coordinating over. An exceptional outline of a cross-breed directing tradition is the Zone Directing Convention (ZRP), which fills in as a discernible show interior this classification. By coordinating parts from both proactive and open traditions, these blended courses of action show adaptability and capable directing choices flexible to arranged organize circumstances.

Researchers have proposed various routing protocols in the past, which will be further discussed in the upcoming section

1.2 Related Research

As itemized in reference, [8], scientist led a new report with an essential spotlight on examining the steering above in responsive steering conventions inside Remote Multihop Organizations (WMhNs). This study utilized explicit directing above observing procedures and applied them to three unmistakable steering conventions: Dynamic Source Directing (DSR), Specially appointed On-Request Distance Vector (AODV), and Dynamic MANET On-request (DYMO). The coordination of these observing techniques brought about critical upgrades in the general organization execution.

The researcher, [9], uses the RH2SWL extension method which mitigates issues in data and controls message collaborations by consolidating transmission power control for RTS/CTS messages and executing deliberate transmission ranges for data messages. The essential goal is to oversee influence difficulties emerging from 1-skip neighbor-uncovered center remote nodes. The technique includes involving power-controlled transmissions for RTS/CTS messages and deliberate transmission ranges for data messages. This approach means working with obstruction-free information transmissions within the sight of 1-jump neighbor-uncovered remote nodes, eventually upgrading by and large execution and accomplishing better start-to-finish throughput for data messages in the uncovered middle of the road nodes. These actions altogether tackle difficulties related to impedance in remote multi-hop networks, adding to further developed information transmission throughput.

In [10], researcher uses, Defer Open-minded Systems administration (DTN) directing, there are two fundamental methodologies: Replication and Campaign. The Replication System, similar to the flooding technique, includes making various duplicates of a message to improve its possibility of arriving at the planned objective. Conventions, for example, Pandemic and Shower and Stand by line up with this methodology. Then again, the Campaign Technique, otherwise called the sending procedure, centers around decisively choosing hand-off nodes to further develop message conveyance probabilities, especially in situations with restricted assets. Conventions like Prophet and MaxProp are related to the undertaking system. These procedures address difficulties in DTNs, for example, irregular availability, lopsided stream, high mistake rates, and variable conveyance times.

According to researchers [11], the Double Interleaving Steering Calculation, alluded to as AODVEO, assumes a significant part in upgrading the presentation of the oil and gas pipeline network by relieving clogs and improving generally speaking effectiveness. AODVEO separates the course into Even and Odd traffic, successfully lessening steering above considerably and in this manner upgrading network traffic. During the transmission of RREQ by an odd/even hub to its adjoining frameworks, just viable frameworks are considered for acknowledgment and constant transmission. This cycle goes on until the RREQ arrives at its objective hub, so, all in all, it is dropped. Thus, the objective hub starts the transmission of RREP in the opposite course, prompting the information bundle's transmission along the laid-out course upon assortment at the source structure. The proposed AODVEO steering convention has shown high dependability and effectiveness, essentially working on the general execution of a remote sensor network with direct geography.

Researchers in [12], introduce an innovative routing protocol called the Novel Hybrid Distance Vector (NHDV) protocol. This approach combines the strengths of the AODV and DSDV routing protocols, resulting in several advantages. By merging these protocols, NHDV achieves a reduction in route discovery time, helps alleviate network congestion, and enhances scalability in hybrid mesh networks. NHDV incorporates a clustering method, where the cluster head is designated as the gateway through the use of Hello packets. This clustering technique optimizes communication within clusters, thereby improving network performance. Furthermore, the implementation of the DSDV protocol further enhances the quality of paths within the NHDV protocol. Overall, the NHDV routing protocol offers the combined benefits of both AODV and DSDV, leading to improved network performance, reduced route discovery times, congestion mitigation, and enhanced scalability in hybrid mesh networks.

The specialists [13], direct a near examination of different half-breed firefly calculations for range designation (treated as a discrete enhancement issue) and power portion (considered as a nonstop streamlining issue) in a TV Blank area (TVWS) organization. Assessed calculations incorporate crossover firefly draws near, hereditary calculation (GA), molecule swarm improvement (PSO), and a blend of GA and PSO. Utilizing recreation results acquired through Matlab, the review surveys the exhibition of these calculations concerning range and power assignment. The objective is to distinguish the most effective crossover firefly calculation for every enhancement issue inside TVWS organizations, tending to their one-of-a-kind difficulties

In [14], Network virtualization (NV), gives a powerful stage to custom-fitted start to finish execution of different administrations continuously. With regards to brilliant lattice correspondence, NV presents the idea of virtual organizations (VNs) that work autonomously while keeping some distance. These VNs are exactly planned onto actual frameworks, for example, remote lattice organizations (WMN) and power line correspondence (PLC), all the while, guaranteeing productive help for constant administrations. The essential assignment of assets to VNs works with their free activity without causing impedance, improving the general execution of shrewd network correspondence. Network virtualization demonstrates urgency in streamlining the exhibition of different administrations inside the shrewd framework, lining up with unmistakable Nature of Administration (QoS) prerequisites and adding to an improved and productive correspondence foundation.

In reference [15], the scientists present a novel directing convention known as the Multicast Impromptu On-request Distance Vector - Reinforcement Branches (MAODV-BB). This convention is intended to address the impediments of the current MAODV convention. MAODV-BB consolidates the benefits of both tree and cross-section network geographies to streamline network execution. Inside the MAODV-BB convention, the tree network structure is used to preserve network assets and productively send information across the organization. Nonetheless, the tree construction might experience difficulties in guaranteeing decency in the dispersion of assets among nodes. To handle this issue, the convention likewise consolidates a lattice structure, which succeeds in overseeing network traffic during times of high utilization. By coordinating these two organization geographies, MAODV-BB plans to improve the Quality of Service (QoS) in high-load network situations. MAODV-BB uses the proficient information-sending capacities of the tree structure while tackling the heap dealing with the abilities of the lattice structure. Fundamentally, it offers a better QoS by exploiting the qualities of both tree and lattice geographies, empowering proficient information sending and viable burden the executives, especially in high-traffic circumstances.

The analyst [16], researches what variable angle decrease means for insightful results relying upon the simulated intelligence method utilized. The review uncovers that help vector machines (SVM) are fundamentally impacted by angle decrease, though counterfeit brain organizations (ANN), strategic relapse (LR), and Innocent Bayes (NB) show negligible time-related impacts. Regardless of these minor transient effects, perspective decrease prompts a decline in the precision of these strategies, delivering it unsatisfactory for stir examination. The assessment of a keen way to deal with prescient agitate examination additionally looks at the effect of perspective decrease, at last tracking down no improvement in strategy execution. Thus, the review proposes that angle decrease may not generally be prudent for stir examination applications.

In [17], the scholars made modifications to the ZigBee Routing Protocol (ZBR) and introduced a new routing protocol called Neighbour Perception ZBR (NP-ZBR). ZBR exhibited positive attributes in terms of average node count, transmission rate, and delay. However, ZBR's nodes consumed excessive network resources, leading to increased congestion, load, and energy consumption. To address these challenges, the researchers proposed the NP-ZBR protocol. NP-ZBR demonstrated improved performance in transmission delay and average node count while maintaining comparable average end-to-end delay, transmission rate, and throughput to those of ZBR. The modifications introduced in NP-ZBR aimed to mitigate network resource utilization and address congestion issues, resulting in enhanced hop count and transmission delay performance. These improvements contribute to the overall efficiency and effectiveness of the NP-ZBR routing protocol.

In [18], reproduction results feature a critical compromise between discovery time and throughput in mental radio organizations. Broadening discovery time benefits essential client security by limiting obstruction however diminishes throughput for optional clients. On the other hand, taking on a more limited recognition time boosts optional client throughput yet builds the gamble of impedance with the essential client. Eminently, using helpful detecting improves throughput contrasted with single-client detecting, despite the related above. The concentrate likewise takes note that raising the number of optional clients can enhance throughput, yet this presents a compromise between the number of clients and generally speaking throughput. These discoveries give a nuanced comprehension of the discovery throughput tradeoff and enlighten framework limitations influencing the presentation elements of mental radio organizations.

In [19], Versatile Adhoc Organizations (MANETs), the Adhoc On-Request Distance Vector (AODV) convention faces weakness to assaults like blackhole, wormhole, and narrow-minded hub assaults. These dangers disturb directing, causing dropped or diverted parcels. The review, utilizing NS2 reproduction, uncovers their huge effect on network execution, showing expanded dropped bundles and narrow-minded hub issues. It likewise recognizes an ideal bundle size for the greatest throughput, supporting deciding the organization's reasonable parcel size. Generally, the exploration stresses the requirement for vigorous safety efforts in MANETs to moderate these particular assaults and upgrade by and large organization flexibility.

Researchers, [20], use MPDV-Hop calculation is acquainted with upgrade normal bounce distance calculation and relieve situating mistakes in remote sensor organization (WSN) applications. The calculation centers around enhancing the estimation of normal bounce distance, an essential figure for exact confinement WSNs, intending to refine the strategy and further develop distance evaluation accuracy between nodes. Moreover, the MPDV-Hop calculation consolidates the bat calculation to streamline situating, adding to improved hub situating precision and diminished blunders in WSNs. Exploratory outcomes affirm the calculation's viability in altogether decreasing confinement mistakes without bringing about extra equipment costs. Through upgrades in ascertaining normal bounce distance and enhancing area results, the proposed calculation accomplishes lower limitation mistakes contrasted with the conventional DV-Hop technique. In rundown, these upgrades on the whole plan to work on the exactness of normal bounce distance evaluation and lessen situating blunders in WSN applications, situating the MPDV-Hop calculation as a promising answer for restriction in remote sensor organizations.

In reference [21], NDMRD (Non-Disjoint Different Course Revelation) convention utilizes a course disclosure process started through RREQ (Course Solicitation) parcels to catch numerous courses. These courses meant as ST (Source-Target) courses, are non-disjoint and are accumulated at the source hub. Accomplishing this includes the gathering of copy RREQ parcels by every hub. The amount of found courses is dependent upon both the Course Aggregation Dormancy and the quantity of RREQ copies. Moreover, the Hub State data, affixed to RREP (Course Answer) parcels, upgrades course revelation by giving fundamental measurements. This data incorporates QoS (Nature of Administration) boundaries like transfer speed, delay, and the hub network file (NCI), which are scattered in a calculated way. These QoS boundaries are then used by the QOSRGA (Nature of Administration Course Age Calculation) convention to choose the most ideal QoS courses.

Before, various examinations have zeroed in on framework geography in Wireless sensor networks (WSNs). In any case, a considerable lot of these examinations much of the time did exclude the organization of countless nodes in the organization. Thus, there is an examination hole concerning the presentation of network WSNs while thinking about elements like the number of nodes, bundle stretch (parcel recurrence), and directing conventions.

To address this hole, late examinations have arisen with a particular spotlight on researching the effect of various hub amounts, directing conventions, and bundle spans on the presentation of lattice WSNs. These examinations mean to acquire bits of knowledge into what these variables mean for the productivity, unwavering quality, and in general execution of WSNs working in a network geography.

By investigating these angles, specialists plan to give significant information and proposals to and streamline the presentation of lattice WSNs, filling the hole in past examination and propelling the comprehension of network WSNs under different situations and setups.

2 Simulation

The essential focal point of this paper lies in the assessment of the spread-out circulation of Wireless sensor networks (WSNs), using a matrix hub game plan. The reproduction of the organization assumes a crucial part in uncovering any expected deficiencies inside the organization, especially under unambiguous natural circumstances. In this exploration, the organization reproduction is explicitly designed for the lattice geography, with varieties in bundle frequencies being a critical part of the review. The boundaries and steering conventions utilized in the reenactment are thoroughly recorded in Table 1. To lead the tests and break down the results, the analysts have utilized the Organization Test System 2 (NS2.35) as their picked reenactment device.

The organization execution measurements got through recreation, have been painstakingly recorded to clarify the ways of behaving and qualities of the mimicked network. Moreover, explanations and ends from relevant exploration papers have been consolidated to reinforce and offer reasoning for each introduced outcome. This approach upgrades the credibility and reliability of the discoveries, as they are immovably established in the current writing and the more extensive collection of information inside the field. Through the consideration of experiences from other examination papers, the introduced results gain added setting and advance the general cognizance of the subject being scrutinized.

Table 1. Simulation Parameter

Parameters	Value
Routing protocol	OLSR, AODV
Transport agent	TCP
Bandwidth	2Mbps
Topology	Grid with node formation of 6x4 and 16x18
Node distance	50m
Number of nodes	24, 48, 80, 120, 168, 224
Propagation model	Two ray ground
Queue length	50
Simulation time	500 s

The parcel recurrence in the reenactment is resolved utilizing the equation f=1/T (1), where T addresses the period between every bundle transmission. Table 2 gives an outline of the particular periods and their comparing parcel frequencies used in this reproduction. The table presents the various settings utilized for the time spans and the subsequent bundle frequencies, which are pivotal boundaries for assessing the organization's execution in the review.

Table 2. Packet Frequency Conversion from Packet Interval

Time Interval (s)	Packet Frequency (Hz)
0.125	8
0.5	2
2	0.5

3 Results and Discussion

Figure 5 The data exhibits a clear pattern where the delivery ratio decreases as the network size increases, regardless of the packet frequency. This trend signals a higher incidence of packet loss and a decline in throughput, as visualized in Figure 6. These observations can be attributed to increased traffic load and congestion that emerge with larger network sizes and higher density, as discussed in reference [22]. It's crucial to emphasize that the queue length factor also holds considerable importance in this situation. During the simulation, a queue length of 50 was implemented with a tail drop queue type. This configuration implies that any packets enqueued after the 50th one will be discarded, regardless of the packet frequency. Such an event is commonly referred to as "packet loss.". Taking into account the trend illustrated in Figure 5, it is evident that the AODV routing protocol exhibits better performance than OLSR in terms of delivery ratio. Additionally, the use of a packet frequency of 0.5Hz produces superior results because it allows for more time to elapse before reaching the 50th enqueued packet, consequently leading to fewer packet losses within the network.

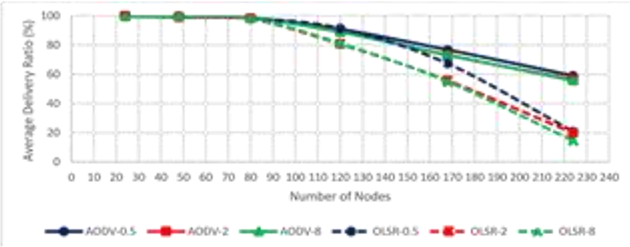

Fig. 5: An average delivery ratio over the number of nodes

The problem of packet loss has directly contributed to the observed decline in throughput, as shown in Figure 6. To address congestion resulting from heavy traffic, the TCP congestion control mechanism makes adjustments to the transmission rate or discards packets, as highlighted in reference [23]. Regrettably, this approach leads to packet loss and subsequently results in a reduction in throughput. Figure 6 illustrates that the decrease in throughput is consistent across all packet frequencies. However, it's important to note that, for the OLSR routing protocol, the decline in throughput becomes more pronounced once the network size exceeds 80 nodes. This implies that OLSR is more vulnerable to performance deterioration in densely populated network conditions.

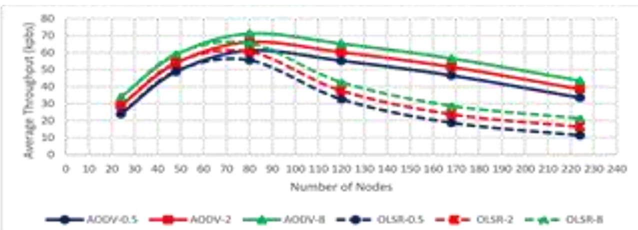

Fig. 6: Average throughput over the number of nodes

When network overhead increases, it can deplete network resources and cause significant unfairness, as noted in references [8] and [24]. Figure 7 illustrates that there aren't notable differences in the trend of fairness index between the OLSR and AODV routing protocols. However, an 8Hz packet transmission frequency leads to the poorest fairness index, whereas a 0.5Hz packet frequency yields the highest fairness index in the network. This observation implies that employing shorter packet intervals, associated with higher packet frequencies, consumes more network resources and leads to a decrease in fairness.

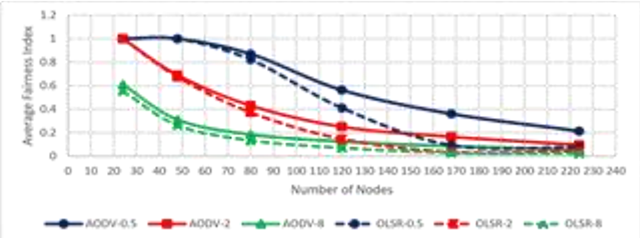

Fig. 7: Average fairness index over the number of nodes

In addition, the presence of aloof nodes is one more disadvantage that prompts wasteful asset use inside the organization. Lopsided designation of organization assets implies that specific nodes have the chance to send or get information while others stay inert. As portrayed in Figure 8, the quantity of latent nodes increments as the organization develops. Besides, the OLSR directing convention will in general show more detached nodes contrasted with the AODV steering convention. This uniqueness can be credited to the more noteworthy asset utilization related to OLSR as opposed to AODV. The presence of inactive nodes is most articulated when the organization works at an 8Hz parcel recurrence, and it is least common while utilizing a 0.5Hz bundle recurrence. This perception lines up with the comprehension that higher parcel frequencies bring about expanded asset utilization, hence prompting a bigger number of uninvolved nodes. It's critical to take note that both the presence of aloof nodes and shamefulness straightforwardly influence the conveyance proportion of the organization, highlighting how these variables impact the general presentation and proficiency of the framework.

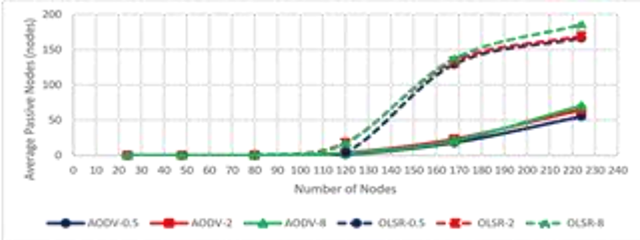

Fig. 8: Average passive nodes over the number of nodes

4 Conclusion

Wireless sensor network (WSNs) have exhibited their critical worth across a scope of utilizations, with a prominent effect in ventures like oil and gas. The oil and gas area includes three essential cycles: upstream, halfway, and downstream. This exploration paper, notwithstanding, puts its particular accentuation on the downstream area, where the conveyance of pipelines in a spread-out design fits really with the framework hub game plan.

The consequences of the review show corruption in execution measurements after arriving at an organization size of 80 nodes and then some. It is seen that a more modest parcel recurrence prompts a higher conveyance proportion and better transmission rate, bringing about fewer bundle misfortunes. On the other hand, utilizing a bigger parcel span decreases the organization's throughput. In any case, with the development of the organization, the throughput goes through a significant decay once it arrives at 80 nodes.

Higher packet frequencies contribute to increased routing overhead, wasting network resources, and causing fairness issues. Consequently, this leads to the presence of more passive nodes in the network.

Regarding routing protocols, the AODV protocol demonstrates superior performance compared to the OLSR protocol across various metrics, including delivery ratio, throughput, number of nodes, and fairness index. This distinction becomes more pronounced as the network scales up, especially when considering the grid node configuration. Based on the study, it is highly recommended to use AODV with a smaller packet frequency, for better communication between the nodes. However, it is highly recommended to use this method for networks with a small number of nodes up to 160 nodes as the performance degrades when the network gets larger.

In future research, this method might be combined with Artificial Intelligence (AI) and automeasure the node capability. Thus, the packet frequency also can be set automatically based on the node's capability according to the network size.

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