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Optimization of MANET Life using DSP-AOMDV Protocol

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ABSTRACT

In this modern era of Artificial Intelligence (AI) and Internet of Things (IoT) which are acknowledged as the most significant areas of upcoming technology and is gaining attention from a wide range of different fields like Military application, Automation of Industries, Smart irrigation and Agriculture, e-learning platform of Education, The pandemic Tele health services, etc. IoT is a combination of different network like Wireless sensor network and Mobile Adhoc Network. In these networks the limited Battery power is very serious issue. Maintaining connectivity for the longer time is also a big challenge considering the self-organizing nature of the network topology and the dynamic change in the behavior and position of nodes result in failures of communication link and node availability. This paper present the kinetic energy harvesting Dynamic source of Power to supply the energy to the node battery, so that the failure of communication network will be avoided and hence it maximizes the life of Mobile Adhoc network for the reliable communication in critical situation like Military operation and Emergency rescue operation. The overall focus of this research is to handle the challenges in MANET for prolong life of MANET. This research work deals with an analysis and experimental tests on a push to rotate generator known as a Dynamic Source of Power has a built-in linear moving- coil generator with stationary magnet. A Lithium-ion battery is charged to supply the power to the nodes of MANET. The DSP-AOMDV protocol is design. Analytical equations for the induced EMF, current, voltage; electromagnetic force and power have been derived. A prototype has been made and performs experimental tests on it. The results of laboratory tests have been compared with analytical calculations. The output electric power in comparison with other energy harvesting devices is high with low cost and more reliability.

Keywords - IoT, connectivity, Energy, Layered routing, MANET, Power Control, Topology.

I. INTRODUCTION

Today we are more surround ourselves by countless communication technology to run day today life and come across several electronic sensors, data and decisions for achieving various goals and targets in the field of Military application, Automation of Industries, Smart irrigation and Agriculture, e-learning platform of Education, Our daily activities and everyday lives are running smooth so long as the transition from one field of electronic to other field of electronics remains frictionless. From advanced cars to smart home, from remote to monitoring to wearable electronic, from implantable chips to smart communication devices small scale communication network permeate our lives in almost every aspects sometimes without our being fully aware of them. The advancement in communication network technology and electronics systems design affects over numerous new features including easy inerrability, mobility and seamless connectivity for efficient use of resources. They also bring better way of lifestyle, strong economic impact, improved health decisions and industrial automation. The scientist and engineers are focusing on how to handle these practical challenges including, but not limited to, how to improve the performance and maximize the lifetime of these telecommunication network and related systems, how to run them for longer time period per charge cycle, how to communicate better for the long distance with the noisy channels and how to maintain and uphold the privacy of the data. In this paper the primary focus is to explore the challenges to designing efficient power delivery systems for small scale Telecommunication like Adhoc network and its application in Military operations as well as critical disaster management or rescue operation with secure use of electronics systems. More specifically, for systems those are usually operated in standalone condition and away from the commercial energy sources and hence rely either on battery powered operation or solely on harvested or generated energy.

In Mobile Ad-hoc Network (MANETs) there is no fixed infrastructure of access points, as shown in Fig-1, the nodes are mobile and move independently in a random way, the physical topology of the network and its connectivity changes dynamically, and at a given moment each node can act as a router. Different research efforts are underway to address various issues of ad hoc networks. In this paper we provide an adequate account of these efforts. The problem of network sustainability, load balancing and energy efficiency in MANETs is a topic of research since In Mobile Ad-hoc Network (MANETs) there is no fixed infrastructure of access points, as shown in Fig-1, the nodes are mobile and move independently in a random way, the physical topology of the network and its connectivity changes dynamically, and at a given moment each node can act as a router. Different research efforts are underway to address various issues of ad hoc networks.

The basic communication is carried out in MANET is by Route request messages as shown in Fig 2. While Route reply with route record is depicts in Fig 3. There are already some surveys available that have summarized the previous researches on ad hoc networks. Self-organization is an inherent property of such networks, thus allowing a seamless interconnection within a specific range or zone. Such networks are being deployed for many diverse applications, such as Vehicular communications, Military applications, emergency, Disaster operations, Search and Rescue operations, etc.

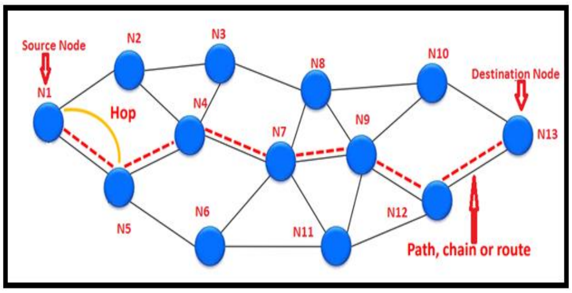


Fig.1: Arrangement of Mobile Adhoc Network

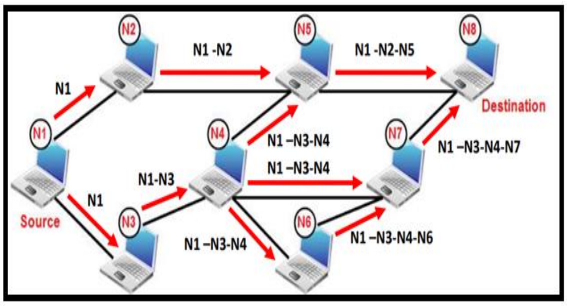


Fig.2: The basic communication is carried out by Route request messages in MANET

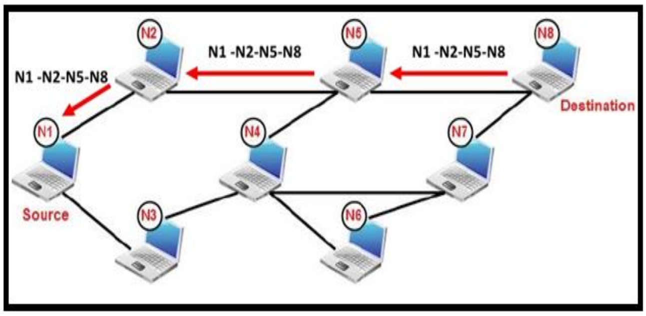


Fig.3: The process of Route reply with route record in MANET

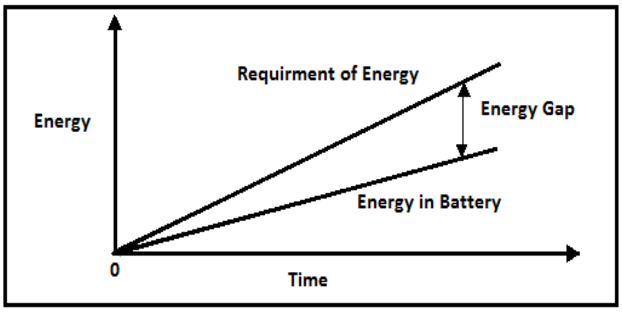


Fig.4 Graph of Energy gap between Energy requirement and Energy in Node battery.

The result is a dynamically change of the topology of the network and the impossibility to predict accurately or exactly the network structure at any time. A node ensuring the communication path between source and destination can become unavailable in the next time interval; the reasons are mobility or movement out of the servicing or coverage area, a drop or exhausted of power or traffic overload. Thus for such a dynamically changing environment a dynamic routing algorithm must be deployed or to make the node with portable charger to avoid link breakage and achieve the overall better performance of the ad-hoc network structure. The strength of a node regarding its available energy becomes an important issue for the period of the selection of an intermediate node to maintain stable transfer of data between nodes. Keeping lifetime of a routing path in a network is a challenging task due to the power of the nodes which depends on the node size, the propagation model, the properties ofthe model, and the capacity of the battery Data traffic and storage increases exponentially in today's MANETs and result is that the energy requirements increase, while in response to this growth the energy available in the battery becomes insufficient, thus rising up the energy gap problem as shown in Fig. 4.

Our main objective is to examine, develop, and analyse the power efficient system for the emergency Military or rescue operation in remote areas where the power requirement is crucial.

The aim of this research work is to make an overview of energy aware routing protocols to improve the lifetime of resource constrained ad-hoc communication networks like Mobile ad-hoc networks (MANET) by introducing of Dynamic source of Power from Human movement. This leads to the successful design and development of new protocol known as DSP-AOMDV. In this protocol the node energy is continuously monitored between the Lower Threshold and Upper threshold, if the node voltage goes below the lower threshold than the node battery is getting charge from the harvested energy battery. This charging process will continue up to the point when the voltage of the node battery reaches to the Upper threshold level of the node battery. This process will continue as long as the requirement communication to last movement of the military or rescue operation.

II. RELATED WORK

The features of ad hoc network are multi-hopped routing in which every node has to be get participate in the routing operation. This presents a number of challenges i.e. creation of false routes, routing loops and security attacks. Major essential services in MANET are Routing, Connectivity, and End-to-End communication. These services are likely to be continuously provided even in the occurrence of undesired events such as malicious attacks, natural disasters, or network failures [5]. Connectivity is treated as an essential requirement for survivability. The connectivity of MANETs is achieved via node degree, radio propagation, and node mobility. On the other hand, routing provides services at physical, network and data link layer to protect nodes from attackers [6].

Types of Mobile ad-hoc networks (MANET's)

1) Vehicular Ad hoc Networks (VANETs): - These are used for communication among Vehicles and between vehicles and roadside equipment's.

2) Internet based mobile ad hoc networks (iMANET):- These are ad hoc networks that link mobile nodes and fixed Internet-gateway nodes.

3) Intelligent vehicular ad hoc networks (In VANETs):- These are a kind of artificial Intelligence that helps vehicles to behave in intelligent manners during vehicle-to-Vehicle collisions, accidents, drunken driving etc.

4) Aeronautical ad hoc networking (AANET) constitutes a compelling concept for providing Broadband communications above clouds by extending the coverage of air-to-ground (A2G) networks to oceanic and remote airspace via autonomous and self-configured wireless networking among commercial passenger airplanes. In such type of networks normal Adhoc routing algorithms don't apply directly Classification of the Routing Protocols based on the routing information update mechanism for Ad hoc wireless networks can be divided into three categories. [7]. Fig.-5. Shows the classification of MANET routing protocols.

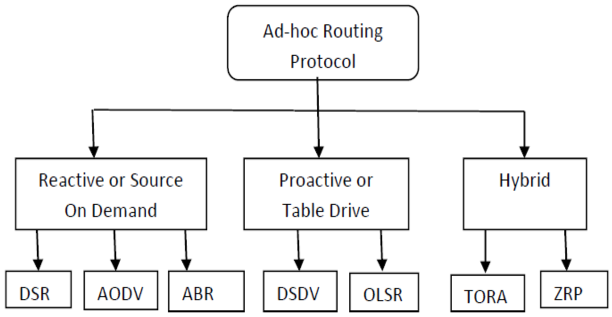


Fig.5 Classification of MANET routing protocols

Reactive (On-demand) - In reactive routing when the source node in need and wants data packets to send, a route discovery process is carried by the source node to find the route to the destination node. Once a route is getting found, the route maintenance procedure is initiated to maintain this route until it is no longer required or the destination is not reachable. The advantage of these protocols is that overhead messaging is reduced. One of the drawbacks of these protocols is the delay in discovering a new route. Such protocols for example are the Ad-hoc On Demand Distance Vector (**AODV**), Dynamic Source Routing (**DSR**), associativity Based Routing (**ABR**)

Proactive (Table driven)-In Proactive routing, the nodes maintain routing tables about nodes in the network. These routing protocols update the routing table information periodically or in response to a change in the network topology. The merit of these protocols is that a source node does not need route-discovery procedures to find a route to a destination node. On the other hand, the demerit of these protocols is that maintaining a regular and up-to-date routing table demands considerable messaging overhead, which consumes power and bandwidth and leads to a decrease in throughput, mostly in a large number of high mobility nodes. Table Driven Protocols are Wireless routing protocol (**WRP**), Fish eye State Routing Protocol (FSR), Destination Sequenced Distance Vector Routing (**DSDV**), Optimized Link State Routing Protocol (OLSR), Cluster Gateway Switch Routing Protocol (**CGSR**).

Hybrid- Hybrid routing combines the features from both proactive and reactive routing protocols, typically attempting to exploit the reduced control traffic overhead from proactive systems while reducing the route discovery delays of reactive systems by maintaining some form of the routing table. A classification of ad hoc routing protocols is described in [8].

The proposed approach in [9] the authors propose a load balancing routing algorithm, called **LBRA**, to distribute the traffic load on gateways in MANET with Internet connectivity.

The proposed approach in [10] an optimal energy scheme optimal routing algorithm called the Optimal Energy and Load Balance Routing (**OELR**) for mobile ad hoc net-works (MANETs) is proposed considering transmission power, interference, link lifetime, and load balance.

The proposed approach in [11] Challenges to QoS routing mechanisms are discussed. One of these is the dynamic topology which may lead to considerable transmission overload due to the frequent exchanges of topology information, bandwidth congestion in wireless links, and possible depletion of the limited battery life of the nodes involved. Another challenge is the unreliable wireless channel with interference by other transmissions, multi-path fading effects, all of which affect the packet delivery ratio or link longevity guarantees or both.

The proposed approach in [12] describes energy aware on demand routing protocol based on AODV that takes care of an internal load of the individual nodes and its remaining power on other nodes in its neighborhood. Thus durability and lifetime of the network are increased by avoiding a node having lesser battery power at the time of path discovery.

The proposed approach in [13] aims at increasing the network lifetime of a MANET, by distributing the routing load among all the nodes within the network. This is achieved by calculating the residual energy of all the nodes in the entire path between the source and the destination, for various available paths, and then comparing and selecting the path which is most optimal path regarding energy efficiency. This approach follows a load balancing approach that avoids power/traffic congested paths and chooses paths that are lightly loaded. This helps in reducing the variance in energy consumption at various nodes due to load distribution and thus eventually it is going to increasing the overall network lifetime of the present network. When a common node lies on several paths from different nodes, then the battery power of this node getting quickly runs into depletion. As a result this particular node may die or power off and the battery exhaustion very soon, eventually it results into shortening the network lifetime. When choosing a path, the existing routing protocol implementation chooses the path with the minimum number of hops.

The proposed approach in [14] the authors propose an Efficient Routing protocol (ERP) scheme for communication in the MANET. In ERP, the possible routes are discovered and then a path that has less traffic for communication is selected. ERP decreases congestion and increases the packet delivery ratio which ultimately enhances the network performance. This is due to a reduction in redundant control routing overhead and increases the packet delivery ratio and will eventually minimize the delay in the network.

The proposed approach in [15] the novel solution to transfer server load from one server to another server, from low energy node to high energy node. The complete proposed solution can be applied for multipath routing, congestion control and load balancing for MANET. Energy consumption can't be avoided but can be overcome by balancing the mobile node. Studies of the various routing algorithms find that a single route not only creates overwhelming traffic into the selected route but also decreases the energy resource capabilities for selected intermediate nodes.

The proposed approach in [16] the AOMDV_RR Range Routing protocol is proposed, which is a power and topology aware and ad hoc On-Demand Multipath Distance Vector routing protocol based on the maximum transmission range. The objective is to improve the performance of a MANET without increasing or decreasing multi-path routing protocol's default transmission range of the nodes, which leads to control the routing process and only allow hops with maximum possible distances in a route based on the received signal strength at each node

The proposed approach in [17] analysed the positive and negative impact of an increase in transmission power of individual nodes on the performance of routing protocols. Here the transmission range of the node has more influence on the network connectivity. The nodes with sufficiently higher transmission range can maintain connectivity even at higher mobility. In a multi hop communication scenario, there may be frequent link failures because of rapid change in topology due to node mobility. If the power is increased and respectively the transmission range in order to increase the one hop distance of the nodes, then to some extent it will certainly avoid link failures due to mobility. Mobile Ad hoc networks (MANETs) are power constrained since nodes are operated with a limited battery. A node not only sends it individual packets but also packets of other nodes. However, the energy consumption during routing remains a key challenge.

The proposed approach in [18] to maintain network connectivity, network survivability is an essential aspect of reliable communication by providing outstanding services. Network survivability in MANETs is most likely affected by either dynamic topology of the networks, node and link Fault or Security attacks. The survivable resource-constrained wireless network architecture is depicted in Fig. 6.

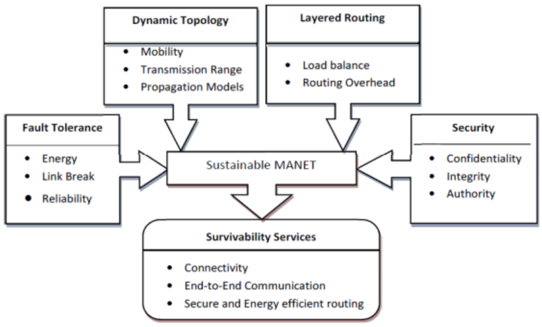


Fig.-6. the architecture of sustainable MANET

III. METHODOLOGY USED FOR THIS RESEARCH WORK.

Innovative Design of Push to generate Dynamic Source of Power.(DSP-AOMDV)

The main function of innovative Push to generate Dynamic Power Source is to collect electric energy continuously from walking process during Military operation or Rescue operation by the Military or rescue team members and at the same time to ensure the comfort of human walking. In order to achieve these functions the special type of arrangements has been made. The functional shoe mainly consists of the power generator and acquisition device which consists of a spur type gear assembly with linear generator, a storage circuit and a charging interface with power storage device like Capacitor bank or Lithium ion Battery. Block diagram of overall system is shown in fig 5, and the fabricated assembly with DC generator is shown in fig 6.At the side of heel of the shoe L shape plate is fitted with help of the sole plate as shown in the Fig 7. With the use of push to rotate mechanism and supporting Bearing with other end of shaft a Permanent Magnet Direct Current generator is attached which generate sufficient voltage to charge the battery.

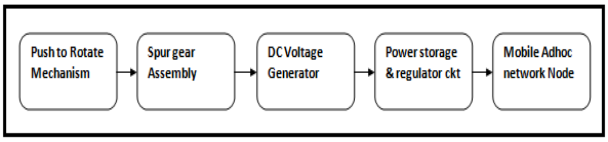
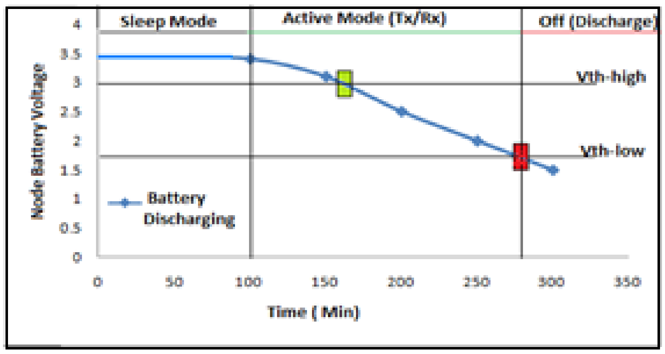
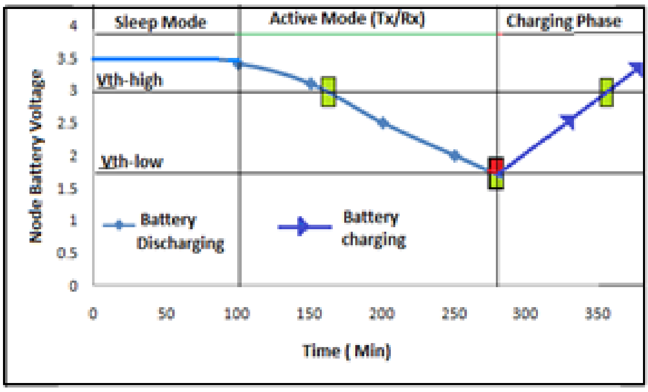


Fig.5: General block diagram of Dynamic Power Source.



Normal operation diagram of MANET node without Dynamic Source of Power



Normal operation diagram of MANET node with Dynamic Source of Power

The above graph explains how the DSP-AOMDV protocol works. Basically by supervising the Node battery voltage below the lower threshold (Vth-low) and above upper threshold (Vth-high) the charging of Node battery starts and stops which is in result of seamless data communication. So in military or rescue operation the communication between the members are very crucial and sensitive and hence this research lead to find out the solution with human body energy harvesting mechanism without depends upon external power supply .

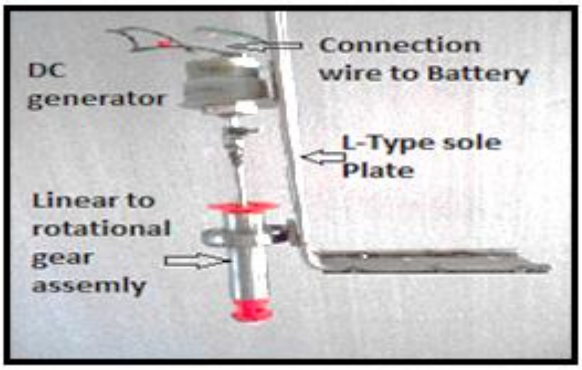
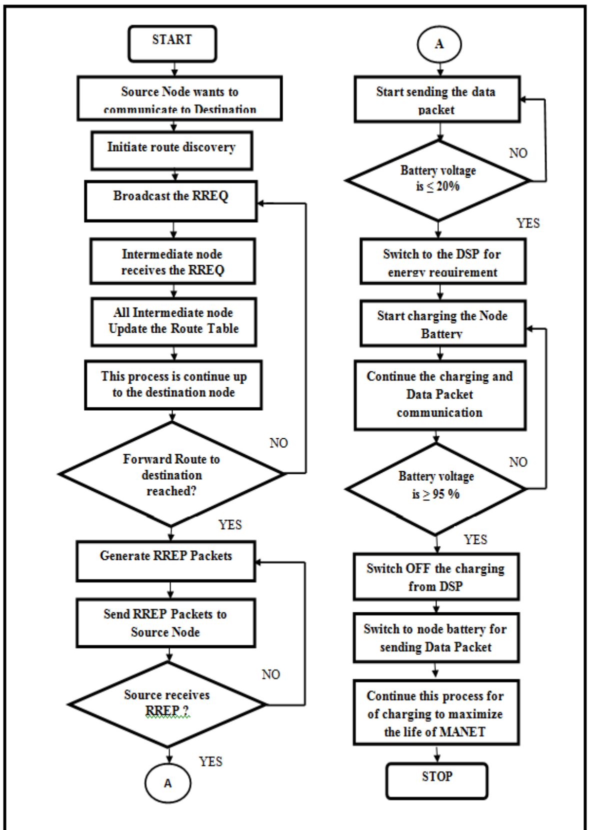


Fig. 6: construction of Dynamic Power Source module



Working Flow chart for Dynamic source of Power Mobile Adhoc Network

Working Flow chart for Dynamic source of Power Mobile Adhoc Network

The following major steps were involved in the process:

Step-1: When force is applied with help of shoes while walking the push to rotate mechanism rotates the shaft as shown in fig 6.

Step-2: Due to this the stud of Dynamic source of power assembly moves vertically up with angular rotation of push to rotate assembly and hence the linear motion is getting converted in rotation motion.

Step-3: this rotational motion is further given to the spur gear assembly for the increment of rpm in the ratio0f 1:50.

Step-4: For one full compression the shaft moves Two times. This finally leads the sufficient rpm for the generation of electricity.

Step-5: The intermediate gear with a greater number of teeth will rotate as a result of motion of pinion.

Step-6: The generator attached to the intermediate will obtain the rotating motion, hence results is the DC waveform from Generator. And lifting the Shoes stud get release to its original position as shown in fig 7.

Step-7: The voltage signal thus obtained is study and Analyse with help of Digital storage Oscilloscope and Digital Multimeter.

IV. RESULT AND DISCUSSION

The overall MANET communication with Dynamic source of power (DSP) with harvesting technique used for the seamless data communication the prototype has been design and implemented for the getting the desired result.

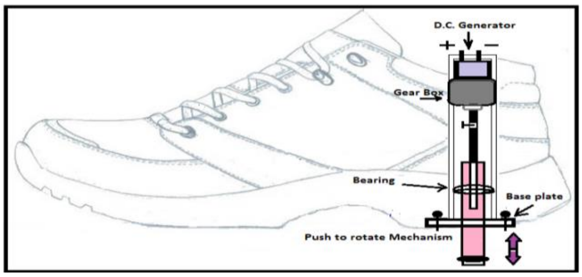


Fig.7: Assembly of Dynamic Power Source module with Shoe sole in lifting mode.

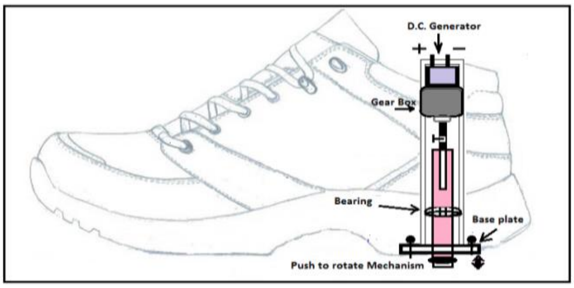


Fig.8: Assembly of Dynamic Power Source module with Shoe sole in pushing mode

Table1: Collection data from different human Walking speed.

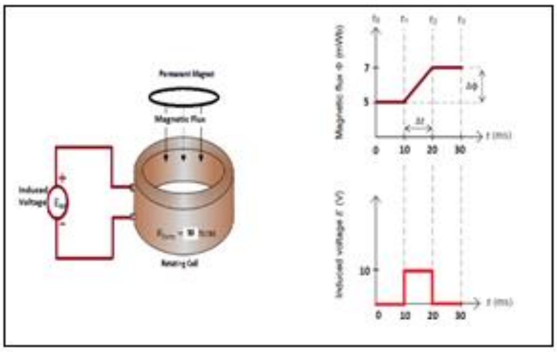


Fig. 9: Voltage induced in a loop exposed to a magnetic flux varying in intensity

When the closed circuit is **n** turns of coil, the instantaneous electromotive force can be expressed as:

$$\mathbf{E_{ind}} = \mathbf{n}\,\frac{\Delta\emptyset}{\Delta t} \qquad (1)$$

Where, $\mathbf{E_{ind}}$ is the induced electromotive force generated, and its unit is V, **n is** the number of turns of the coil; $\Delta\emptyset$ is the amount of change in the magnetic flux, and its unit is Wb.

Δt is the time interval during which the magnetic flux variation occurs, expressed in seconds (s).Figure 8 gives an example of the voltage induced E_{ind} across a wire loop that is exposed to a magnetic flux ϕ varying in intensity. Between instants $t_0$and t_1, the intensity of the magnetic flux ϕ remains constant (5 mWb), and thus, the induced voltage E_{ind} is zero. Between instants t_1 and t_2, the intensity of the magnetic flux ϕ increases at a constant rate from 5 mWb to 7 mWb, and thus, a constant voltage E_{ind} is induced in the wire loop. Between instants t_2 and t_3, the intensity of the magnetic ϕ flux remains constant (7 mWb), and thus, the induced E_{ind} voltage is zero. Using the values given in Figure 8, the voltage E_{ind} induced across the coil between instants t_1 and t_2 can be calculated by using Equation (1):

$$E_{ind} = n\,\frac{\Delta\emptyset}{\Delta t} = 50 \text{ turn} \times \frac{0.007 \text{ Wb} - 0.005 \text{ wb}}{0.01 \text{ Sec}}$$

$$= \frac{0.002}{0.01} = 10 \text{ Volts}$$

$$E_{max} = 0.5 \times 100 \times 25^2 = 31250\mu J$$

The energy or voltage charged by the 1-step in the capacitor is:

$$E_{Cap} = 0.5 \times C \times E_{ind}{}^{2}$$

$$E_{Cap} = 0.5 \times 100 \times 10^{2} = 5000\mu J$$

Motion	Force(N) Applied	Steps per second	Voltage induced
walking	687	1	9.3
Running	600	2	10.3
Fast Running	565	3	11.1

Data calculated for DSP system.

OUTPUT POWER CALCULATION,

Let us consider,

The mass of a body = 70 Kg (Approximately)

Height of spring (Stud movement) = 4cm

∴Work done = Force x Distance

Here, Force = Weight of the Body

Force = 70 Kg x 9.81 = 686.7 N.

Distance travelled by the body = Height of the outer stud of a generator is = 4 cm = 0.04 m.

Input Mechanical power.

P_{in} = Work done/Sec

= (686.7 x 0.04)/60 = 0.4578 Watts

(For one step push force).

The overall performance is summarizing in following

The following figures indicate the measurement of generated signal with the help of Digital storage oscilloscope in different motion of human walking.

1) The Fig 10: depicted the Voltage induced in a normal walking speed.

2) The Fig11: depicted the Voltage induced in a slow running.

3) The Fig12: depicted the Voltage induced in a fast running.

In this process of energy generation from the Dynamic source of power the overall effect of following parameters can be improved to great extent and hence the life of Adhoc network is prolonged and helps to maximize the network life for Military and rescue operations.

Performance Analysis with Simulation result

The following Table indicates the simulation

Sr. No.	Parameter	Value	Unit
1	Total No. of Nodes	50	Numbers.
2	Total number of Turns	5	Numbers.
3	Node Speed (Velocity)	0,2.5,5,7.5,10	Meter/Sec.
4	Packet Queue Size	50	Numbers
5	Packet Size	64,128,256,512,1024	Bytes
6	Mobility Model	Random Waypoint	No Unit.
7	Simulation area for network	1500 × 1500	Sq. Meter
8	Transmission Range	250	Meter
9	Traffic Type	CBR	Bits/Sec.
10	Initial Energy	100	Joule
11	Tx. Power Consumption	0.02	Joule
12	Rx. Power Consumption	0.01	Joule
13	Sleep Power	0.001	Joule
14	Simulation Time	10,20,30,40,50	Seconds
15	Routing Protocols	DSP-AOMDV, AOMDV	No Unit.

The network parameters used for the simulation are highlight in the above Table protocol validation with Network Simulation 3 (NS 3). The different parameters for network evaluated.

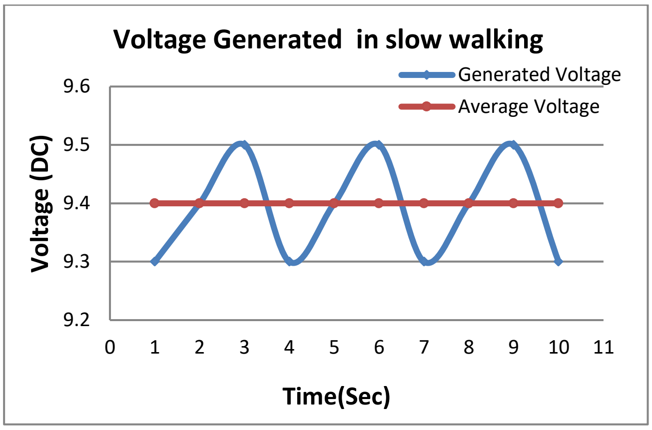


Fig 10: Voltage induced in a slow walking

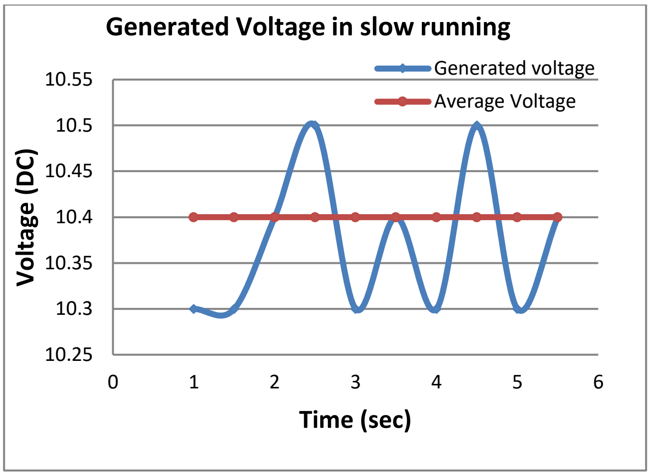


Fig 11: Voltage induced in a slow running.

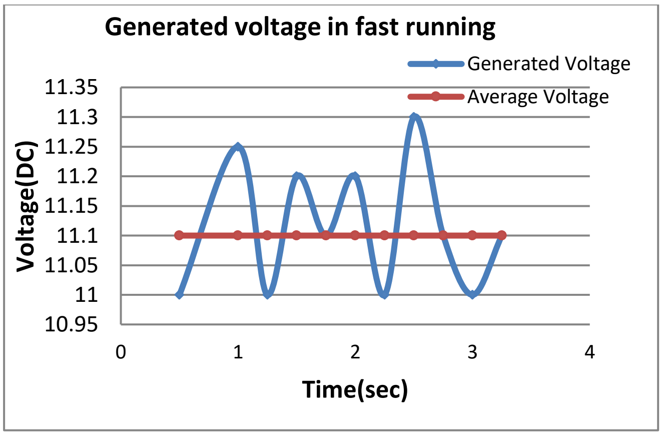


Fig 12: Voltage induced in a very fast running

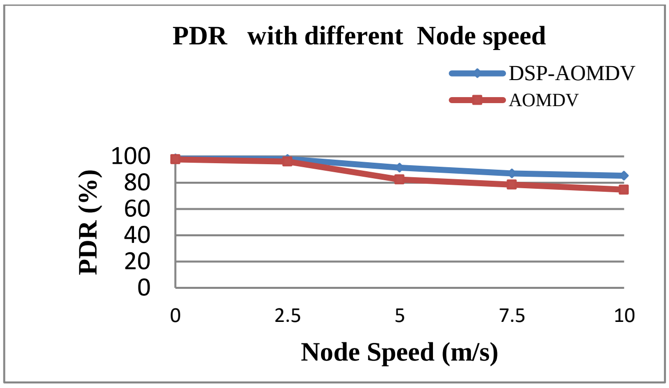


Fig 13: Graph for PDR with Node Speed

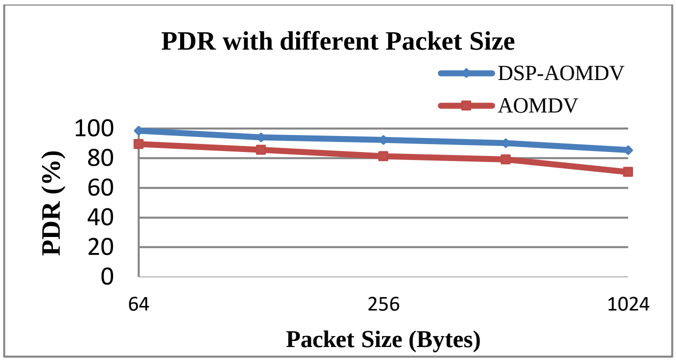


Fig 14: Graph for PDR with Packet size

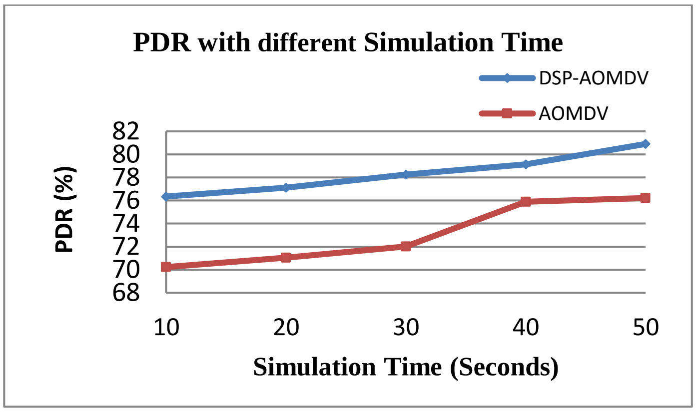


Fig 15: Graph for PDR with Simulation Time

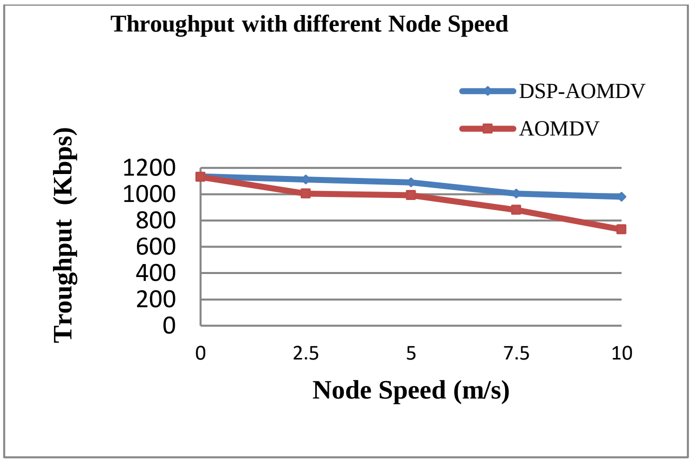


Fig 16: Graph for Throughput with Node Speed

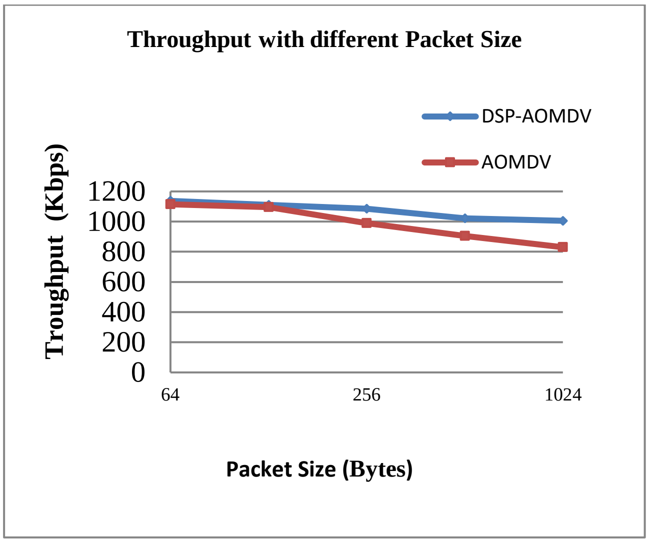


Fig 17: Graph for Throughput with Packet Size

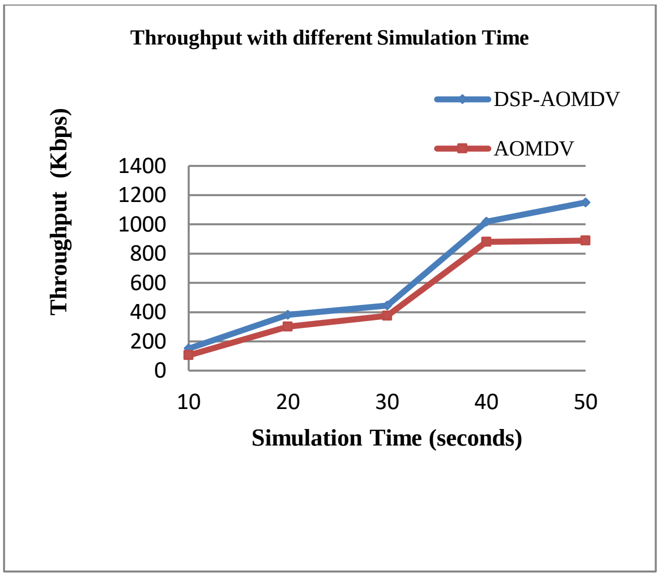


Fig 18: Graph for Throughput with Simulation Time

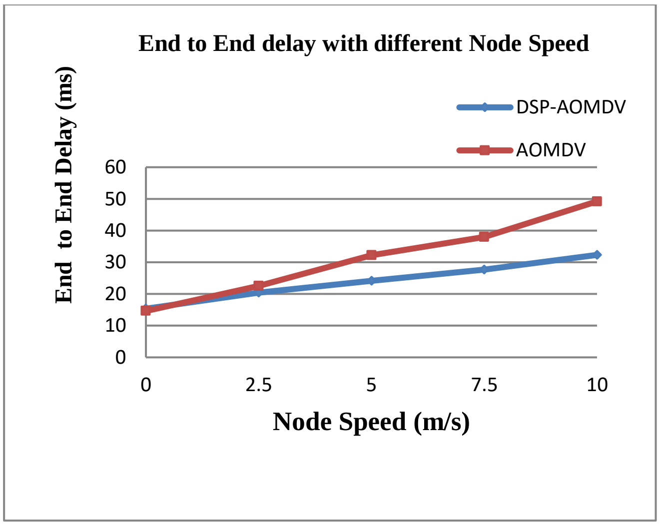


Fig 19: Graph for End to End Delay with Node Speed

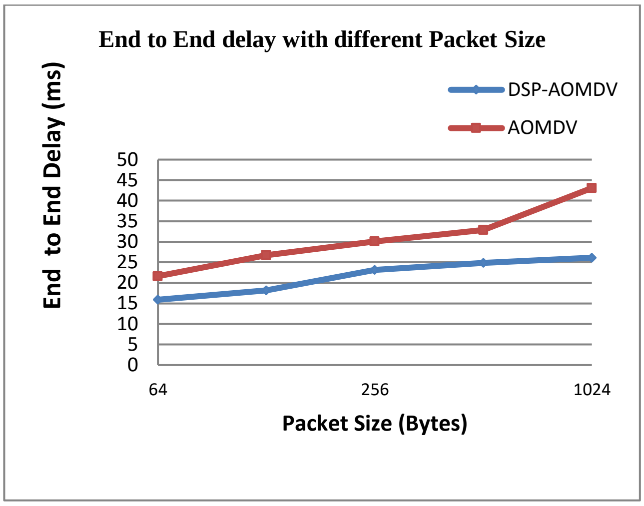


Fig 20: Graph for End to End Delay with Packet Size

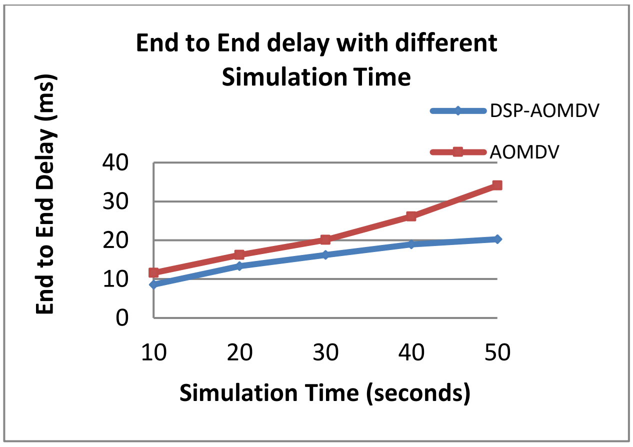


Fig 21: Graph for End to End Delay with Simulation Time

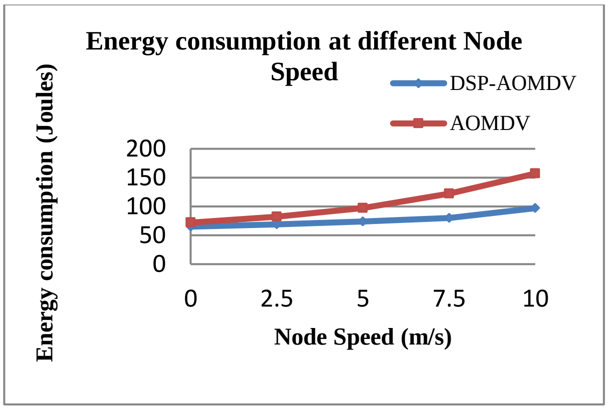


Fig 22: for Energy Consumption with Node Speed

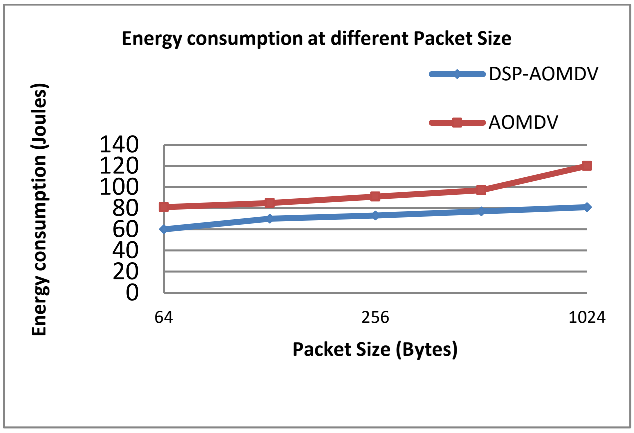


Fig 23: Graph for Energy Consumption with Packet Size

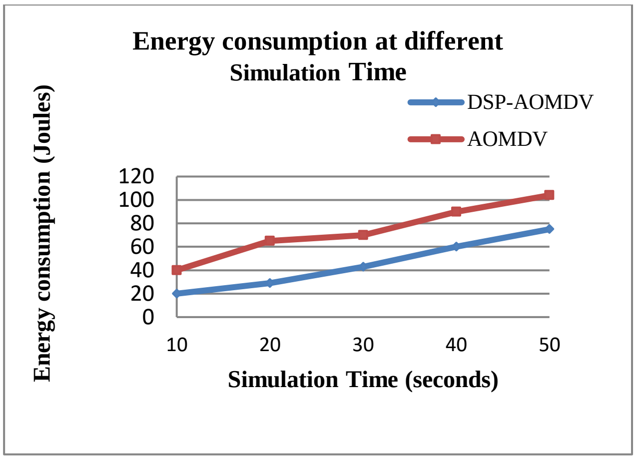


Fig 24: Graph for Energy Consumption with Simulation Time

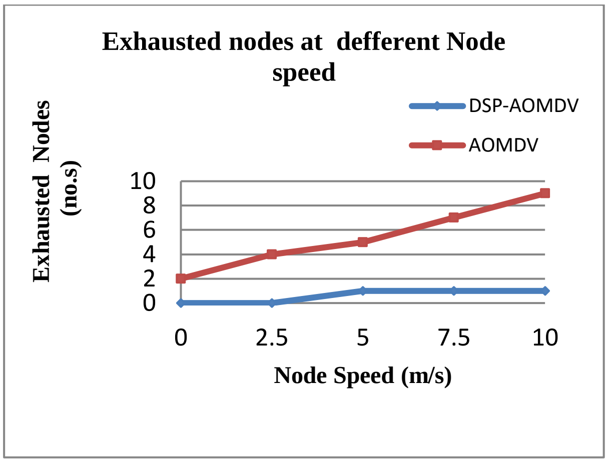


Fig 25: Graph for Exhausted Nodes with Node Speed

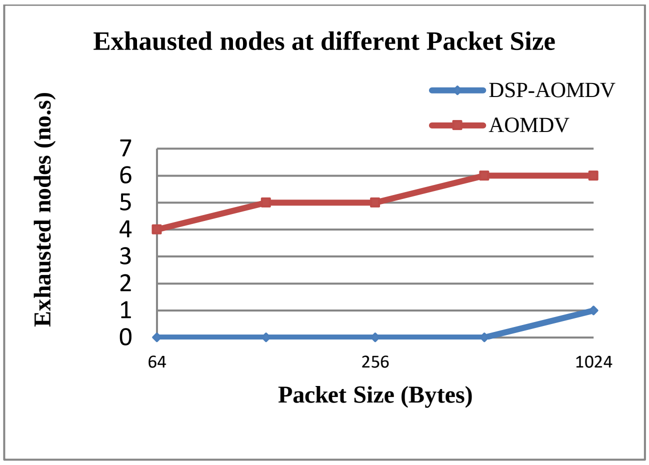


Fig 26: Graph for Exhausted Nodes with Packet Size

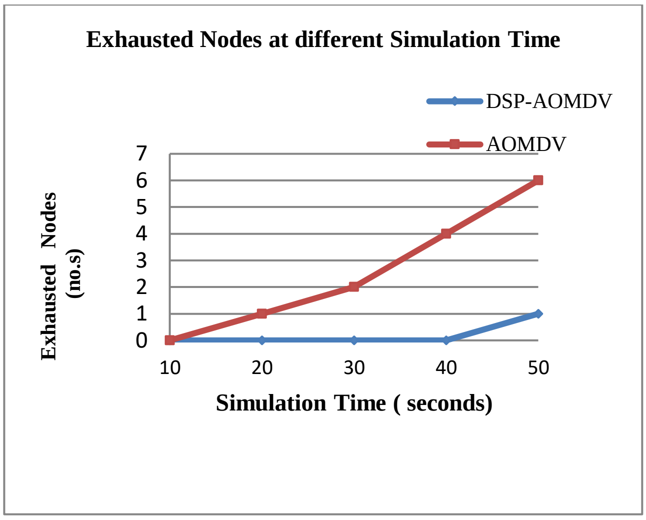


Fig 27: Graph for Exhausted Nodes with Simulation Time

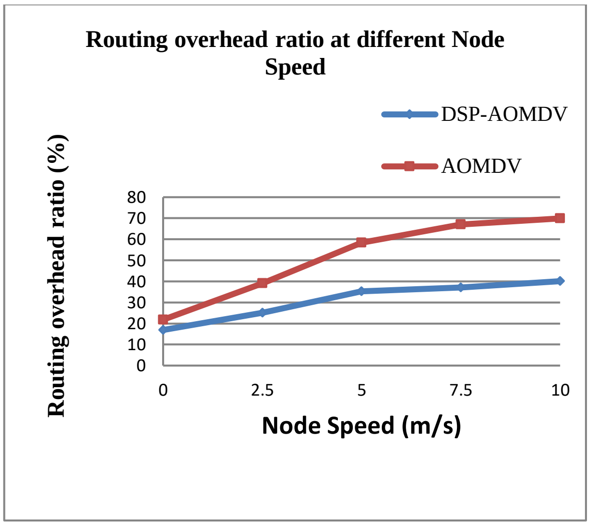


Fig 28: Graph for routing overhead ratio with Node Speed

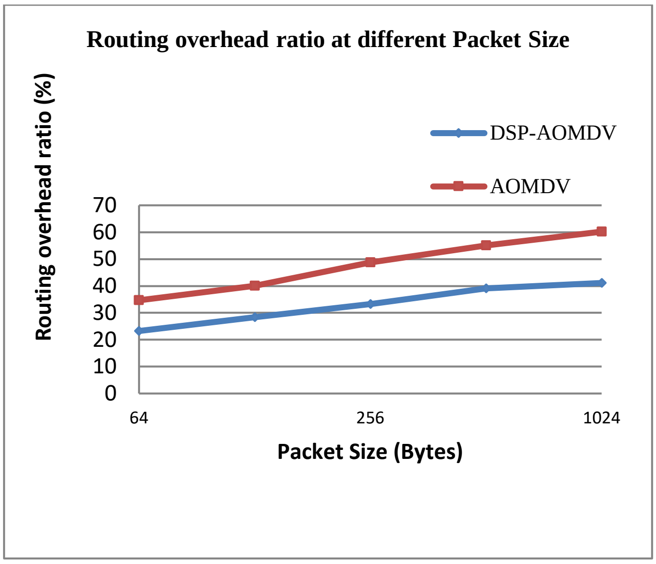


Fig 29 Graph for routing overhead ratio with Packet Size

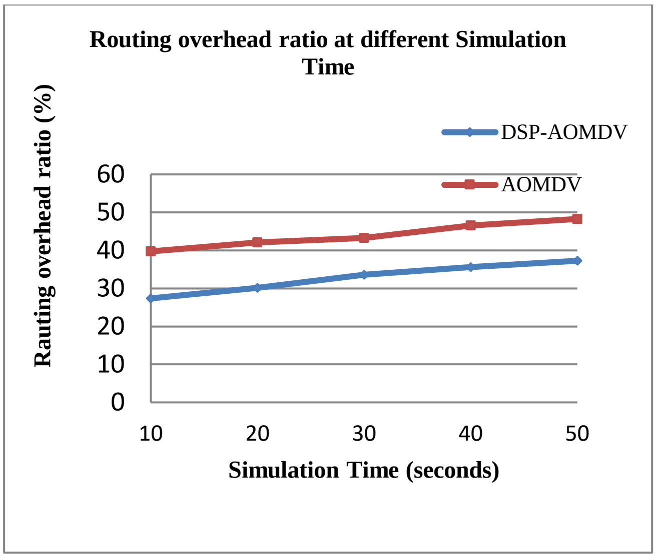


Fig 30: Graph for routing overhead ratio with Simulation Time

Analysis & conclusion on overall simulation result on DSP-AOMDV & AOMDV Protocol

a. Packet delivery ratio (PDR)

The variation of packet delivery ratio for DSP-AOMDV ,AOMDV, When the node speed increases from 0 to 2.5 m/s then 2.5 to 5 m/s then 5 to 7.5 m/s and from 7.5 to 10 m/s the packet delivery ratio decreases due to interference of noise at higher speed. DSP-AOMDV decreases from 98.51 % to 85.29 % while AOMDV decreases from 96.79% to 67.35%. The DSP-AOMDV has higher packet delivery ratio than AOMDV. The DSP-AOMDV routing protocol selects and follows the most stable route toward the destination with more efficient toward energy consumption and less node or link failure rate due to the energy harvesting and selecting the shortest route. This results to the minimum packet loss.

b. Throughput

The simulation results after performing simulations clearly shows the variation of throughput for DSP-AOMDV and AOMDV. These different protocols have different throughput in terms Kbps when increasing the node speed in meter per seconds. When speed of the mobile nodes increases from 0 to 2.5 m/s, 2.5 m/s to 5 m/s from 5 m/s to 7.5 m/s & from 7.5 m/s to 10 m/s. The throughput of DSP-AOMDV decreases from 1135.57 Kbps to 980.52 Kbps and AOMDV decreases from 1130.64 Kbps to 721.31 Kbps. The DSP-AOMDV routing protocol has higher throughput than protocols. In this scenario the nodes are stationary not moving speed is zero or at different humans walking or running speed. The mobile node movement in different direction or Random movement makes the nodes moves to different locations for each time running.

c. End-to-end delay

Graph shows the variation of end-to-end delay for different node speed DSP-AOMDV, and AOMDV. If a node speed increases from 0 ms to 10 ms in the interval of 2.5 ms the end-to-end delay increases with increasing node speed. The DSP –AOMDV increases from 15.35 ms to 32.33 ms AOMDV increases from 14.63 ms to 49.21 ms. The DSP-AOMDV has less end-to-end delay compare to AOMDV.

d. Energy consumption

Above graph shows the energy consumption for DSP-AOMDV, and AOMDV. When the node speed increases as 0 m/s, 2.5 m/s, 5 m/s, 7.5 m/s and 10 m/s, the amount of energy consumption of network increases due to many interference parameters. The

DSP-AOMDV increases from 65 joules to 97 joules and AOMDV increases from 72 joules to 157 joules. The DSP-AOMDV routing protocol has less energy consumption than AOMDV. The DSP-AOMDV protocol due to highly reliable and less susceptible to network partition or packet loss due to continues availability of high energy levels. When source node sending the data packets they decide to distributes the packets through the highly energy routes here all the nodes in the networks has continuous supply of energy due to energy harvesting. Hence this process consumes less energy than sending the traffic through multiple routes.

e. Network lifetime

From above graph shows the variation of exhausted nodes for DSP-AOMDV, and AOMDV. When the node speed increases as When the node speed increases as 0 m/s, 2.5 m/s, 5m/s, 7.5m/s and 10 m/s, the number of exhausted nodes also get increases. The DSP-AOMDV exhausted from 0 to 1 nodes and AOMDV exhaust from 2 to 9 nodes. The reason behind less exhausted node in DSP-AOMDV is enhancement in battery energy, which is available and harvested by Dynamic Source of Power generated by human body motion.

f. Routing overhead ratio

Above graph shows the variation of routing overhead ratio for DSP-AOMDV and AOMDV. When the node speed increases from 0 m/s to 2.5m/s, 2.5 m/s to 5 m/s, 5 m/s to 7.5 m/s and 7.5 m/s to 10 m/s, the routing overhead ratio get increases as we increase the node speed due to the retransmission of packets in case of route is break or cause partition of network. The DSP-AOMDV increases from 16.9% to 40.1% and AOMDV increases from 21.79% to 69.92%. The DSP-AOMDV protocol has best performance as compare to all other protocols AOMDV protocols in terms of routing overhead ratio because it construct strong and highly stable routes and the very less possibility of route failure becomes almost minimal with less routing over head and process of route discovery.

Overall performance analysis clearly indicates that the life of Mobile Adhoc network increases nearby 70 % to 80 % as compare to other routing protocol. The reason behind less exhausted node in DSP-AOMDV is enhancement in battery energy, which is available and harvested by Dynamic Source of Power generated by human body motion. After getting the satisfied results the system may be implemented physically in Military and rescue operation by modifying the prototype as per the military standards.

III. CONCLUSION AND FUTURE SCOPE

This research work studied the various techniques of life time enhancement and energy harvesting mechanisms related to MANET. The new approach has been design known as DSP-AOMDV which involves various approaches and techniques to save energy and energy harvesting in MANET. The essential services in MANETs are routing, connectivity, and end-to-end communication. By appalling the research for Military and rescue operation lead to strong communication setup. This also reduces the overall number of broadcasts on the network and ensures a reliable and energy efficient connection. The aim should be better Connectivity, reliable End-to-End Communication, Secure and energy efficient routing to improve network lifetime in homogeneous as well as heterogeneous MANETs. Future work could be related to the higher end long lasting connectivity for network to achieve the define objective with more powerful and potable energy generators. After getting the satisfied results the system may be implemented physically in Military and rescue operation by modifying the prototype as per the military standards.

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