AODV BASED APPROACH FOR WIRELESS BODY AREA NETWORK CLASSIFICATION

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Abstract : WSNs are spatially division network of autonomous sensor nodes that are utilized in the monitoring of physical structure and environment situations. Because these kinds of sensor nodes have a limited energy to work with memory storage and data processing capabilities are very much easier. They also have less data transmission and range. Current methods have seen enormous investments using wireless sensor network that demands in the sensor network that capable of operate more effective and simultaneously with enhanced methodologies.. The few factors are that are required to be measured to security, data consistency and validation of the sensor network. An efforts have been taken to enhance the system structure of the sensors that these networks. It has been worldwide accepted that data forwarding and processing method gives of opportunity to enhance the productivity of the WBAN.

In this research work, implemented routing protocol and optimization methods that are comply with the limitations and further effective uses the resources are large demand. The consistency high throughput and reliability energy consumption routing protocol for WBAN has been implemented in this research work called NEW optimized routing protocol (AODV+GA). The routing protocol works on dissimilar network in the human body. To frontward a data form sensor node to node a vital fitness function is utilized. This fitness function is evaluating utilized using the distance between the sensor nodes, residual energy that is energy consumption and the data rate of the sending data.

The simulation results in maximizing the network life-time and enhances the life-time period of sensor nodes. It implemented routing technique performance for network life-time and packet delivery rate, throughput and reliability comparing with the existing proposed routing (AODV +GA) algorithm. The consequence defines that the proposed routing protocol supports less energy and more reliability than existing routing and optimization algorithm. The new proposed routing protocols consume less energy. Through the evaluation results it defines that the proposed work performs up-to the mark and maximize the quality of services to wireless body area network to its maximum extent proves to give better result.

I. INTRODUCTION

1.1 Networking

A Network consist of computers which are connected through wires, radio waves, satellites, etc. to share files, resources like CDs, printers, and files. Basically Networking is a process of building computer networks by using different hardware, software, protocols, wireless and wired technology. Many different theories are implemented in different fields such as computer, electronics or electrical engineering. WBAN is a latest subject of conversation of wireless sensor networks, and emerging as subfield of WSN, in which radio sensors are placed on the body. The utilization of WBAN technology minimizes the expanses of patients [1]. WBAN It's used for security purpose in military and also helps the connection among human and machine

1.2 WBAN

WBAN (Wireless Body Area Network) is new creation of WSN consists of small biomedical elements, especially to ensure, simultaneous monitoring of patient's parameters [23]. WBAN comprised of low power components operates in, on or around the body to serve distinguished implementations like medical. Despite that WBAN and WSN share various issues in healthcare and biomedical observation implementations. WBAN could be non-medical or medical.

WBAN is a sensor network with designed to connect several appliances and medical sensors, placed inside / outside the body. WBAN introductions for medical implementations offers flexible and economical choices for medical patients and professionals. This framework offers two important advantages as compared to patient's electronic monitoring systems recently used. Firstly, the patient's flexibility by using portable monitoring devices and Secondly, the monitoring services became location independent. WBAN can locate a suitable connecting network for transmission of data for storage to unlikely database server due to its independent nature [14]. WBAN is an active area of RnD, because it offers huge improvement in monitoring healthcare

1.3 Application of WBAN

WBAN supports huge number of innovative implementations. It includes many areas like: emergency response, elderly living, interactive gaming and smart healthcare.Several applications of WBANs are [21]:

- Sports and Fitness Monitoring
- Video devices
- Wireless Audio
- Security
- Military
- Gaming and Entertainment.

1.4 WBAN Security

WBAN frameworks require certain safety efforts to ensure security, protection, information uprightness and secrecy of patient's wellbeing records in every situation. A supporting WBAN framework must execute particular security operations that assurance these highlights [16]. Privacy and security of statistics of patient's are critical features of WBAN framework. Security suggests that information is secured from unauthorized users protected from being transferred and processed. Whereas privacy implies an authority to handle the data gathering and utilizing the personal data of an individual.

Critical data of WBAN framework is very sensitive and leads to various circumstances, in case of unauthorized access. If an intruders get unauthorized access by capturing nodes and changes the data and hence, incorrect data will be given to physician

may results in patient's demise. Subsequently, huge attention is needed to secure the critical and sensitive statistics from uncertified entrance and modification. Several requirements of WBAN security are [13]:

- Data Confidentiality: to avoid revelation of medical data, message coding is implemented.
- Data Authentication: validity ensures that messages received are same as sent message.
- Data Integrity: ensures that transferred message is completely unchanged and undamaged.
- Data Accessibility: protection of data from unauthorized users is strong control mechanism, but accessible to physician whenever required.
- Security Management: It's necessary for distribution and coding / decoding passwords of messages to avoid the chances of modification.

1.5 Challenges to WBAN Security

WBAN must have capability to enhance the quality of well-being of patient as per their comfort. Security of data must be protected for several reasons:

- **Supervision and Overhearing the Signs and Symptoms*:*** Overhearing is a common threat to patient's personal limits. Anyone can intrude via communication channels. Overhearing and supervision might threaten the personal limits of patients [15].
- **Information Threats while Transferring Data*:*** Wireless connections extensions make them prone to errors. Sensors discover the statistics of patient and transfer them to physician and data might be invaded.
- **Tracking the Issues in WBAN:** Wireless BAN requires multi-jump media to transfer the data from sensor to server to avoid the intrusion of unwanted users on network.
- **Distribution and Transformation Attacks*:*** Deceiving a secure node during data transfer to another place. A reliable node selected by intruder won't be secure anymore. The victim node cause alarm for emergency team for rescue operation.
- **Spatial Threats*:*** Because of the way that the versatility is one of the particulars of the WBAN's, finding the patient's exact area is vital in crisis cases. Areas following frameworks depend on radio frequencies [18].
- **DOS Attacks*:*** A denial of service attack is an event of user deprived of services from resources expected in general situations. DOS attacks may harm the applied program [27].

1.6 AODV Protocol

AODV stands for Ad Hoc on Demand Distance Vector Routing Protocol. As the name suggest, it is basically a on Demand Routing Protocol i.e., AODV protocol creates routes among the nodes when requested. It doesn't build traffic for connection among links. The routes are established as per requirement [32]. Trees are formed to communicate multi-cast groups.These are loop free and self-starting besides huge mobile nodes. In AODV, networks are quiet until and unless connections are established. It does not create any kind of extra traffic for communication and routes are maintained as long as these are required by the source. The rest of the AODV hubs forward the message and record the hub that asked for an association. A node that gets a message to make a connection and holds a course to a coveted hub sends a retrogressive message through transitory courses to the asking for hub. The hub that started the demand utilizes the course containing minimal number of bounces through different hubs. The sections that are not utilized as a part of directing tables are reused after some time. In this whole process if connection falls flat, the error mistake is send back to the transmitting hub and the procedure is performed again [33].

1.7 GA (Genetic Algorithm)

It was started by Holland in 1975. It's a fragment of figuring models in view of common choice rule. It's an effective strategy enlivened by human development. GA works better with improvement and alluded as capacity streamlining agent. Chromosome is initialised for calculation [12]. Wellness of each chromosome is computed by wellness work. Out of which best chromosomes are decided for hybrid and transformation for happier springs. GA is valuable when:

- Huge and complex search spaces.
- Calculation free analysis.
- A complex and loosely coupled problem that works with own rules.
- The existing search technique fails [10].
- Scanty of Domain Knowledge to encode tapered search.

II. OBJECTIVES

This research work will be focused to achieve the following objectives:-

1. To develop routing protocols (AODV) to enhance the security of the network and optimized (GA) of the Wireless Body Area Network.
2. To evaluate the performance parameters of Packet Delivery Rate, Throughput, End to End Delay and Packet Loss.
3. To evaluate our new approach by comparing it with the existing methods.

2.1 Methodology

The following steps are performed to obtain the objectives:

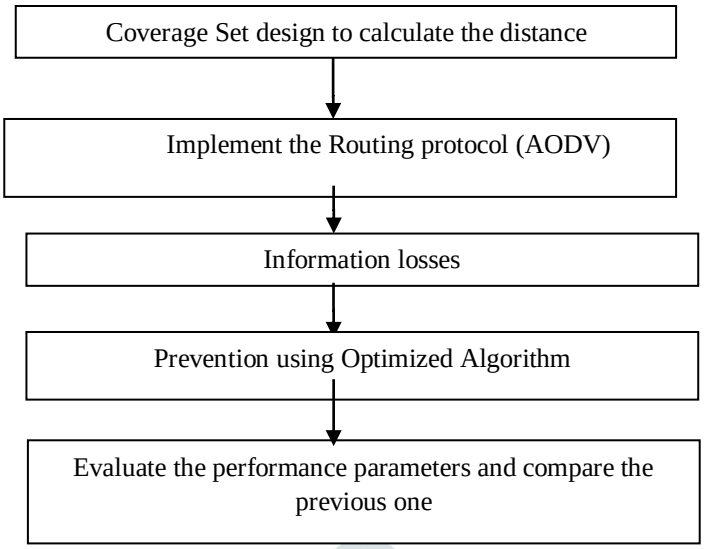
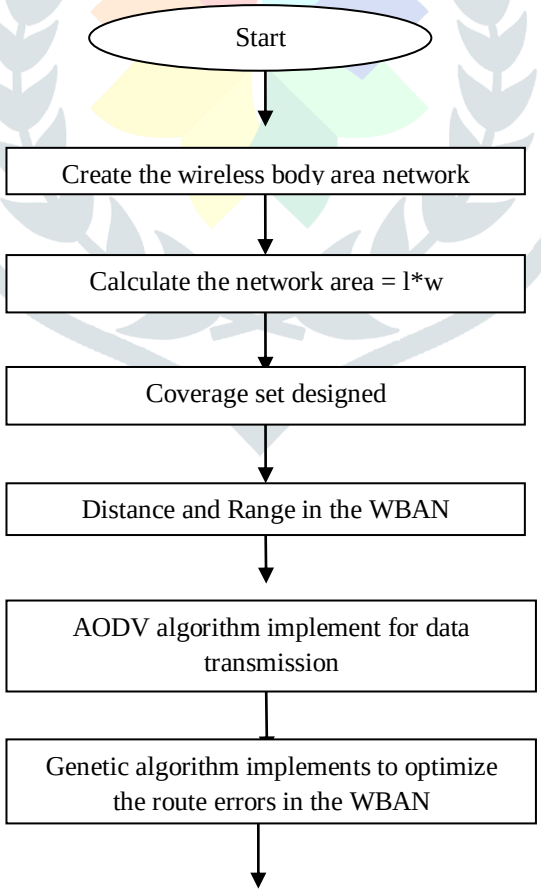


Fig 3.1: Proposed Flow Work

2.2 Work Flow

Step 1: Initialize the wireless body area network. Calculate the network area with two parameters required that is network length and network width. In this network assign the base station to manage the packets in the network.

Step 2: Search the source node and destination node in the network. We assign the information i.e, packets value is 1000. In packet start to move the source node and destination nodes is the end point. In this communication we next calculate the coverage area.



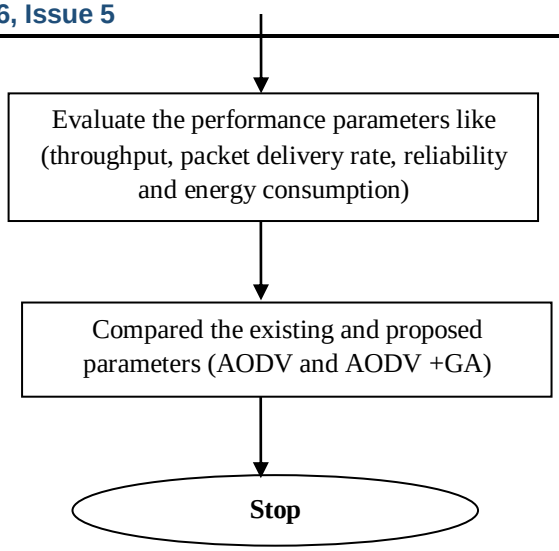


Fig. 3.2 Proposed Work flow in the Diagram Form

Step 3*:* Calculate the coverage set based on active node and sleep node in the wireless body area network. In this coverage we calculate the distance based on $= \sqrt{(x2-x1)2+(y2-y1)2}$. The purpose of the coverage set range and distance calculation to found the data transmission in the wireless body area network.
Step 4: it implement an ad-hoc on demand distance vector routing protocol. In this routing protocol works in two phases like (i) Route Discovery and (ii) Route Maintenance. In this routing protocol consume maximum energy and increase the time complexity cause of the packet load increases after that less data transmission in the wireless body area network.
Step 5: It evaluate the performance parameters with AODV like packet delivery rate, reliability, and throughput and energy consumption in the wireless body area network.
Step 6: In this research work, we implement a genetic algorithm in the wireless body area network. In this network that to communicate the packet one node to another sensor node in the network. In this algorithm uses three operators like selection, crossover and mutation. In this algorithm evaluation fitness function using evaluate the fit value in the network.
Step 7*:* It evaluate the performance parameters with Genetic Algorithm and AODV like packet delivery rate, reliability, and throughput and energy consumption in the wireless body area network and compared with the existing work.

III. RESULT AND DISCUSSION

4.1 Result discussions

In this chapter, to identify the efficiency and effectiveness of the techniques implemented, we approved out experiments on health care wireless body area network.

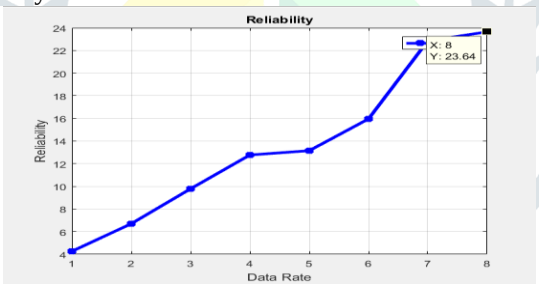


Fig. 4.1 Reliability with AODV Routing Protocol

In this figure shows that the performance parameters is Reliability with AODV routing protocol a large scale static network is presented that the slow speed of 8 data rates and results of WBAN reliability of WBAN is 16% and 23 % for 1, 2 ,3 , 4, 5, 6 , 7 and 8 data rates respectively.

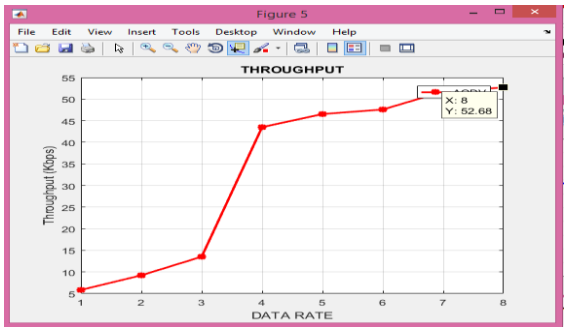


Fig. 4.2 Throughput with AODV Routing Protocol

In this figure shows that the throughput with AODV routing protocol is consider the number of received bits at the received end in unit interval time. It is requirement of wireless body area network to transmit information or data of patients at every instant, especially abnormal information to deal with any emergency immediate sensor node. Therefore, throughput of the WBAN network shall be minimizing to keep the network handler updated.

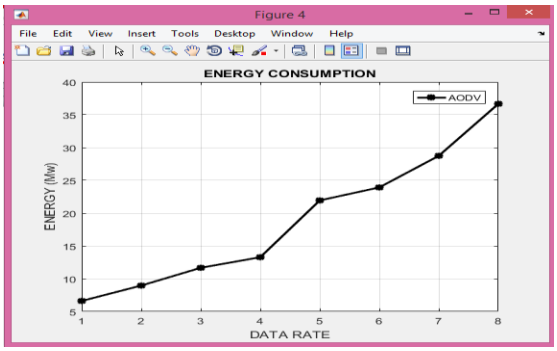


Fig 4.3 Energy (Mw) with AODV Routing Protocol

The above figure shows that the energy consumption during the wireless body area network set-up routing and information transfer cause power loss in the wireless body area network. In the body area network these consumptions shall be lower to improve the network life-time since implanting of sensor nodes and their batteries in the human body is difficult.

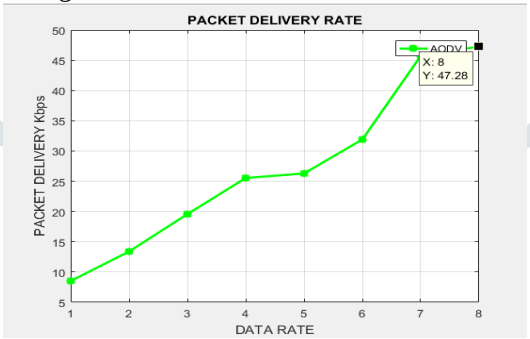


Fig. 4.4 Packet Delivery Rate with AODV Routing Protocol

In this figure defined that the packet delivery rate with AODV routing protocol decrease the packet delivery rate with routing protocol . We achieved the packet delivery with 43% data transmitted in the wireless body area network. It is the issue to determine the efficiency of the network. It is the ratio of data packets received with the respect to the packet transmitted.

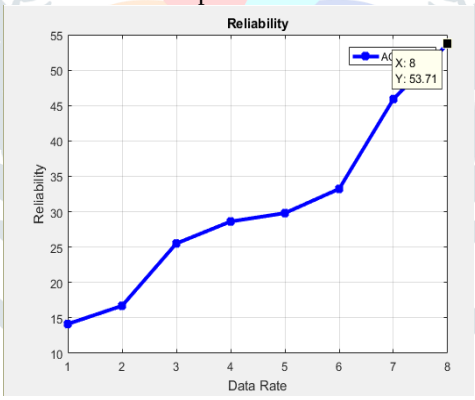


Fig 4.5 Reliability with AODV Routing Protocol and Genetic algorithm

In this figure shows that the performance parameters is Reliability with AODV routing protocol and Genetic Algorithm a large scale static network is presented that the high speed of 8 data rates and results of WBAN reliability of WBAN is 40% and 43 % for 1, 2 ,3 , 4, 5, 6 , 7 and 8 data rates respectively. In these performance parameters is concerned with the quality f data received high at the destination point with the minimum delay in wireless body area network high reliability has greater concern for complete medical aid and diagnosis.

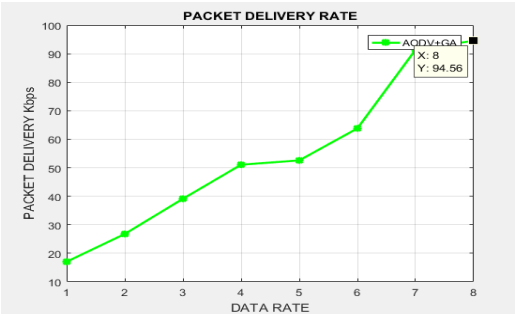


Fig 4.6 Packet Delivery Rate with AODV Routing Protocol and Genetic algorithm

In this figure defined that the packet delivery rate with AODV routing protocol and Genetic algorithm enhance the packet delivery rate in the packets with routing protocol . We achieved the packet delivery with 84% data transmitted in the wireless

body area network. It is the issue to determine the efficiency of the network. It is the ratio of data packets received with the respect to the packet transmitted.

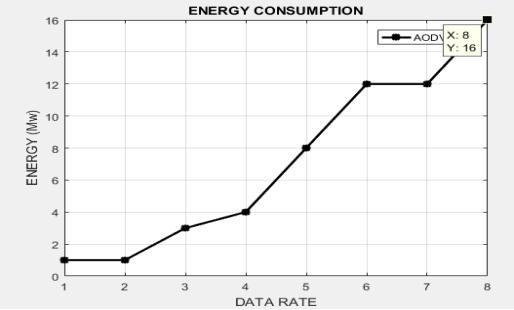


Fig 4.7 Energy Consumption in the AODV and Genetic Algorithm

The above figure shows that the energy consumption during the wireless body area network set-up routing and information transfer cause power loss in the wireless body area network. In the body area network these consumptions shall be lower to improve the network life-time since implanting of sensor nodes and their batteries in the human body is difficult. But we improve the performance based on AODV and GENETIC algorithm to less consumed energy to high data rate or packet transfer in the network.

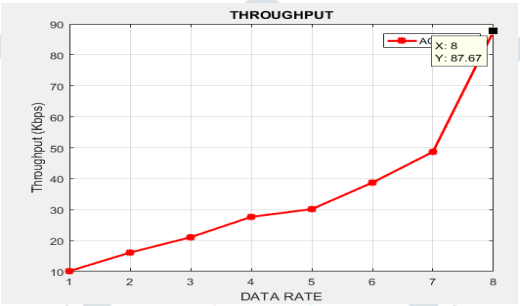


Fig 4.8 Throughput in the AODV and Genetic Algorithm

In this figure shows that the throughput with AODV routing protocol and GENETIC ALGORITHM is consider the number of received bits at the received end in unit interval time. It is requirement of wireless body area network to transmit information or data of patients at every instant, especially abnormal information to deal with any emergency immediate sensor node. Therefore, throughput of the WBAN network shall be minimizing to keep the network handler updated. In this proposed approach to enhance the throughput rate in the wireless body area network.

IV. CONCLUSION AND FUTURE SCOPE

4.1 Conclusion

Health-care and monitoring human is one of the emerging wireless sensor network areas which groups problems of reliable, time, packet delivery rate and throughput. The challenges of wireless body area network are dissimilar from those of normal wireless sensor network applications, also their difficulties increases due to availability of dissimilar wireless nodes within the network. There problems are more projecting in implementing cities due to their limited resources and minimum advanced medical activities and to resolve problem of dissimilar body area networks. In this research work, we implement an AODV and GENETIC Algorithm defines a co-operative communication among sensor nodes using hybrid methods in the WBANs. The adaptive environment of Medium access control and network protocol layer further enhancement the network performance and its energy efficiency.

Wireless body area network based on energy efficiency routing protocol is implemented to path of the data. An implemented routing protocol reduces energy consumption and modifies to enhance the life-time of network in the heterogeneous wireless body area network. The perception of fitness function is calculated to search appropriate the route to send data to destination evaluation on the basis of distance, range, average data, data rate and energy. In the case of real-time and alternative direct information connects are used to change the efficiency. ECG and Monitoring nodes , divide their information straight-forward to the destination as they are associated directly to the destination. After the selection of paths AODV (Ad hoc on-demand Distance Vector Routing Protocol) routing protocol is used for communication between the sensor nodes. The simulation used of implemented routing technique performance for network life-time and packet delivery rate, throughput and reliability comparing with the existing proposed routing (AODV +GA) algorithm. The consequence defines that the proposed routing protocol supports less energy and more reliability than existing routing and optimization algorithm.

4.2 Future Scope

In future work, it can work regarded to compression to reduces the rate of data transmission, improve the power saving capability and enhance sensor sampling rate could be emphasize in the real –time processing. It can provide a routing protocol that is implemented after connecting the good practices and new research approaches from all the other smart routing protocols and working on the energy efficiency to provide a more reliable health application environment or structure.

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