

# A QoS-Oriented Distributed Routing Protocol for Hybrid Wireless Networks

Sadaf Mujawar<sup>1</sup>, Kalyani Handal<sup>2</sup>, Prof. Dr. P. H. Patil<sup>3</sup>,

Prof. N. A. Dawande<sup>4</sup>, Prof. Moresh Mukhedkar<sup>5</sup>

<sup>1,2</sup> Student, E&TC dept., DYPCOE, Ambi, SPPU, Pune, Maharashtra, India

<sup>3,4,5</sup> Professor, E&TC dept., DYPCOE, Ambi, SPPU, Pune, Maharashtra, India

## Abstract

*In this paper the comparative performance analysis of Wireless Sensor Networks (WSNs) in delay and reliability critical environments is highly desired due to their unique advantages such as low cost, ease of deployment and redundancy. QoS routing is a basic learning issue in remote sensor systems, particularly for mission-basic observing and reconnaissance frameworks which needs opportune and solid information gives. The best method to make sure the QoS in cross breed structure remains an open matter. In this paper, we propose Zone Routing Protocol (ZRP) to update the QoS bolster point of confinement of mix systems.*

**Keywords**— MANET, Adhoc, Routing Protocol PSO, GSA.

## I. INTRODUCTION

### Mobile Ad hoc Network (MANET)

Remote cell frameworks have been being used since 1980s. We have seen their advancements to start with, second and third era's remote frameworks. Remote frameworks work with the guide of a concentrated supporting structure, for example, an entrance point. These entrance guides help the remote clients toward keep associated with the remote framework, when they meander from one place to the next. The nearness of a settled supporting structure constrains the flexibility of remote frameworks. At the end of the day, the innovation can't work successfully in places where there is no settled foundation. Future age remote frameworks will require simple and speedy organization of remote systems.

This snappy system organization isn't conceivable with the current structure of current remote frameworks. Late headways, for example, Bluetooth presented another kind of remote frameworks known as portable impromptu systems. Portable adhoc systems or "short live" systems work without settled framework. They offer brisk and simple system arrangement in circumstances where it isn't conceivable something else. Adhoc is a Latin word, which signifies "for this or for this as it were." Mobile adhoc organize is an independent arrangement of portable hubs associated by remote connections, every hub works as an end framework and a switch for every other hub in the system.

An Ad-hoc arrange is an accumulation of remote portable hubs which powerfully shaping a brief versatile hubs which progressively framing a transitory system without the guide of any settled foundation or brought together organization. The expansion of versatile registering and specialized gadgets (e.g., phones, workstations, handheld computerized gadgets, individual advanced colleagues, or wearable PCs) is driving a progressive change in our data society. We are moving from the Personal Computer age to the Ubiquitous Computing age in which a client uses a few electronic stages at a solitary example through which he can get to all the required data at whatever point and wherever required. Versatile clients can utilize their phone to check email, peruse web; explorers with compact PCs can surf the web from airplane terminals, railroad stations, Starbucks and other open areas; vacationers can utilize Global Positioning System terminals introduced inside rental autos to find driving maps and vacation spots, scientists can trade records and other data by associating convenient PCs through remote LANs while going to gatherings home, clients can synchronize information and exchange documents between convenient gadgets and work areas.

Not exclusively are cell phones getting littler, less expensive, more helpful, and all the more intense, they likewise run more applications and system administrations, ordinarily energizing the touchy development of portable processing gear advertise. The detonating number of Internet and PC clients driving this development further. Projections demonstrate that in the following two years the quantity of versatile associations and the quantity of shipments of portable and Internet terminals will develop however by another 20– half. With this pattern, we can expect the aggregate number of portable Internet clients soon to surpass that of the settled line Internet clients.

Among every one of the applications and administrations keep running by cell phones, arrange associations and relating information administrations are without question the most requested administration by the versatile clients. As indicated by an investigation, the quantity of endorsers of remote information administrations will develop quickly from 2.6 billion worldwide in 2009 to in excess of 3.3 billion of every 2010, and the quantity of remote messages sent every month will rise

ceaselessly. Right now, a large portion of the associations among these remote gadgets are accomplished by means of settled foundation based specialist organization, or private systems.

There are, besides, circumstances where client required systems administration associations are not accessible in a given geographic zone, and giving the required availability and system benefits in these circumstances turns into a genuine test. All the more as of late, new elective approaches to convey the administrations have been rising. These are centered around having the cell phones interface with each other in the transmission extend through programmed setup, setting up an impromptu portable system that is both adaptable and intense. Along these lines, not exclusively would mobile be able to hubs speak with each other, yet can likewise get Internet benefits through Internet passage hub, viably stretching out Internet administrations to the non-framework territory.

As the remote system keeps on advancing, these impromptu abilities are relied upon to end up more imperative, the innovation arrangements used to help more basic and noteworthy future innovative work endeavors can be normal in industry and foundation. Inside the impromptu systems administration field, remote sensor systems play a unique part. A sensor organize is made out of an expansive number of little sensor hubs, which are normally thickly (and arbitrarily) conveyed inside the territory in which a marvel is being observed. Remote specially appointed systems administration procedures likewise constitute the reason for sensor systems. In any case, the extraordinary limitations forced by the one of a kind attributes of detecting gadgets, and by the application prerequisites, make a significant number of the arrangements intended for multi-jump remote systems (for the most part) not reasonable for sensor systems.

#### **A. Existing System**

Cross breed remote systems (i.e., multi-jump cell systems) have been ended up being a superior system structure for the cutting edge remote systems and can handle the stringent end-to-end QoS prerequisites of various applications. Half breed arranges synergistically consolidate framework systems and MANETs to use each other. Specifically, structure frameworks upgrade the flexibility of MANETs, while MANETs subsequently develop self-masterminding frameworks, growing the extent of the establishment frameworks. In a vehicle shrewd access mastermind (a case of cross breed frameworks), people in vehicles need to exchange or download chronicles from remote Internet servers through access centers (APs) (i.e., base stations) spreading out in a city. Since it is far-fetched that the base stations cover the whole city to keep up adequately solid flag wherever to help an application requiring high connection rates, the vehicles

themselves can frame a MANET to broaden the scope of the base stations, giving constant system associations.

#### **Disadvantages**

- Difficult to ensure QoS in MANETs because of their one of a kind highlights including client versatility, channel change blunders, and constrained transfer speed.
- In spite of the fact that these traditions can construct the QoS of the MANETs to a particular degree, they encounter the evil impacts of invalid reservation and race condition issues.

#### **B. Proposed System**

In this undertaking, to upgrade the QoS bolster capacity of cross breed systems, in this paper, we propose a QoS-Oriented Distributed steering convention (QOD). Normally, a cross breed arrange has far reaching base stations. The information transmission in cross breed systems has two highlights. Initial, an AP can be a source or a goal to any portable hub. Second, the quantity of transmission jumps between a portable hub and an AP is little. The main component enables a stream to have any thrown transmission along various transmission ways to its goal through base stations, and the second element empowers a source hub to associate with an AP through a halfway hub. The ideas of Particle Swarm Optimization (PSO) are utilized for group arrangement. Building the ideal steering way to transmit the detected information is another testing undertaking in WSN. In the proposed framework, Gravitational Search Algorithm (GSA) is likewise utilized for developing an ideal directing way to transmit the detected information to the base station.

## II. FLOW DIAGRAM

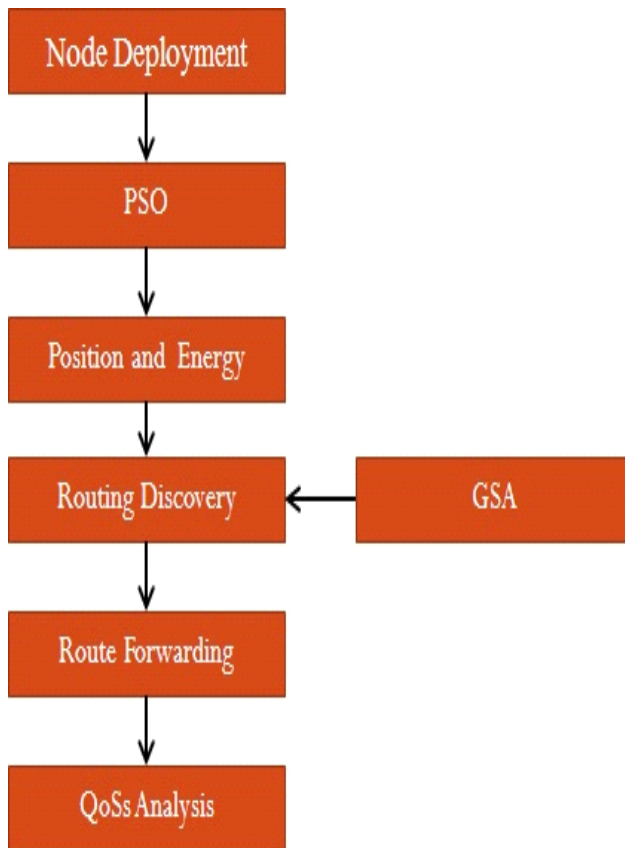


Fig.1. Flow Diagram

## III. SYSTEM ARCHITECTURE

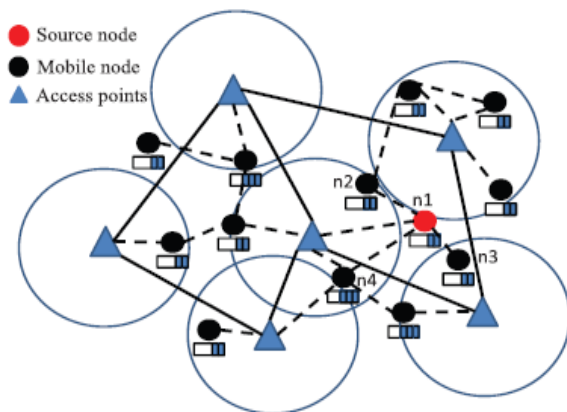


Fig.2. System Architecture

### A. Modules

- Node Deployment.
- PSO Algorithm
  - Position calculation

- Speed calculation
- Velocity calculation
- Energy calculation
- ZRP Protocol
- GSA algorithm
  - Routing
  - Select best hop
- Performance Analysis.

## IV. MODULE DESCRIPTION

### A. Network Formation

- Nodes are created for sending and receiving the data packets.
- ZRP (Zone Routing Protocol) routing protocol is used for routing the information which was sent by source.
- TCP is utilized for setting up the association between the source and goal.
- File transfer protocol (FTP) and randomly choose different source-destination connections.
- Networks are formed with the given range of the sensors.
- Nodes are group by design depends upon their radio waves agent are created for group registration.
- The mock-up is done in ns2.

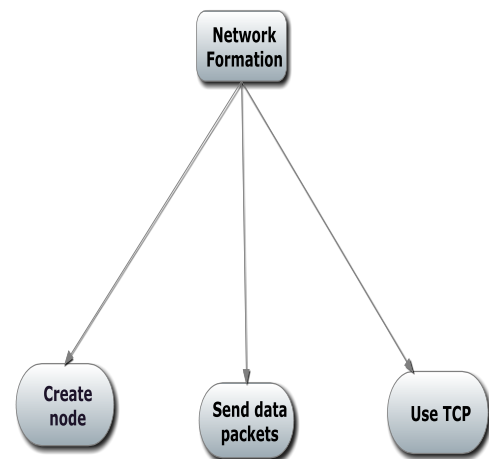


Fig.4. the Network Formation in Wireless Sensor Network.

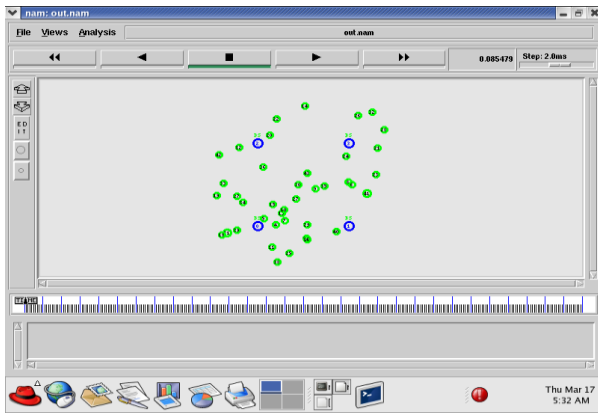


Fig.5. Formation of Nodes

### B. Particle Swarm Optimization

PSO encompasses swarm of particles. In general, each and every particle occupies position in the search space. The position's quality is generally being demonstrated by the fitness of each particle which revolves in the search space with a specific velocity. Each particle's velocity is substantially influenced by its best position established in the search space so far and an appropriate solution will be demonstrated by the neighbourhood positions. Finally, the swarm will meet the optimal positions. Particles are created by considering two parameters namely,

- a. Position (x, y) and
- b. Velocity (v1, v2)

The wellness esteem is computed for picking a bunch particle depends on the accompanying three factors to be specific,

- a. Energy of the particle or node EN
- b. Energy of particles or sensors with in a radio range from a particular particle (p)
- c. Distance of those particles within the radio range from a particular particle(p)

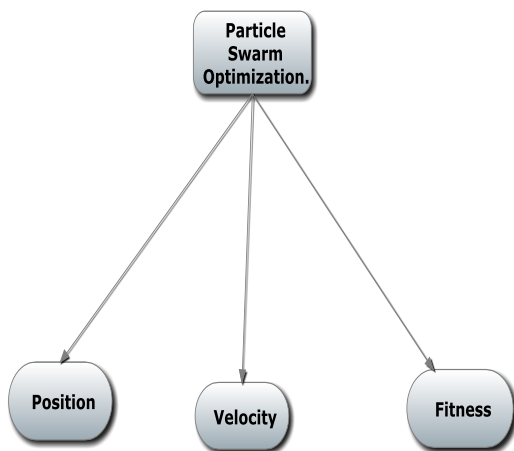


Fig.6. the Particle Swarm Optimization In Wireless Sensor Network.

### C. ZRP Protocol

- We propose in this Module ZRP Protocol was implemented.
- The Zone Routing Protocol (ZRP) consolidates the upsides of the proactive and responsive methodologies by keeping up a cutting-edge topological guide of a zone fixated on every hub. Inside the zone, courses are promptly accessible.
- For objectives outside the zone, ZRP uses a course divulgence strategy, which can benefit by the area coordinating information of the zones.
- ZRP limits the traffic amount as compared to original proactive / reactive routing.
- Routes to nodes within the zone are immediately available.
- ZRP can recognize various courses to a goal, which gives expanded dependability and execution.
- It ensures that the routes are free from loops.
- It is a level convention, which decreases clog and overhead normally identified with progressive convention

### D. Performance Analysis

A different network parameter analysis is being done for the proposed and existing protocols. Parameters like Total Energy Consumption, Throughput, Packet Delivery Ratio and delay are compared for the proposed and the existing protocols.

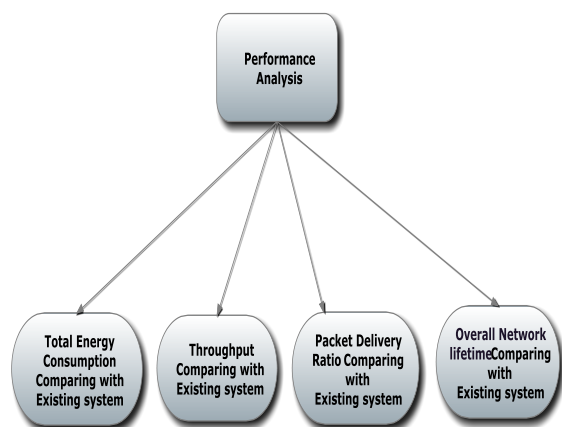


Fig.7. Performance Analysis

**E. Delay**

- It is characterized as the normal time taken by the parcel to achieve the server hub from the customer hub.

$$\text{Delay} = \frac{\text{No of Packets Sent}}{\text{Simulation time}}$$

**F. Delivery Ratio**

- Packet Delivery Ratio is characterized as the normal time taken by the parcel to achieve the server hub from the customer hub.

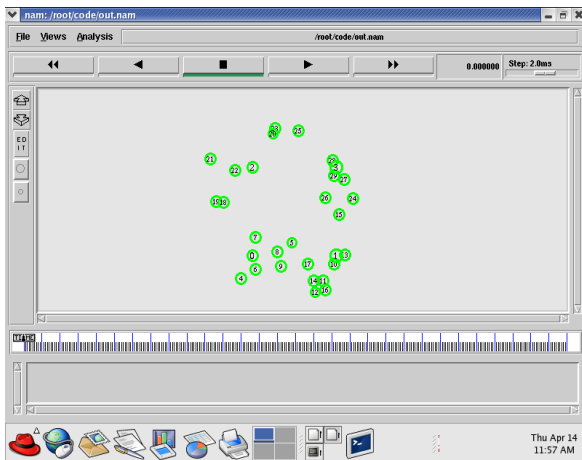
$$\text{Delivery ratio} = \frac{\text{No of Packets Received}}{\text{No of packets Sent}}$$

**G. Throughput**

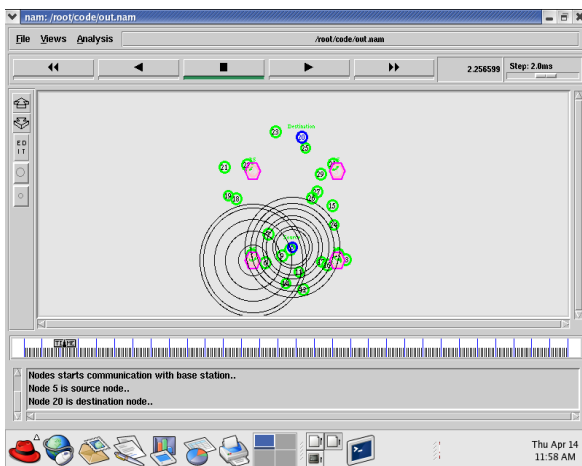
- Throughput is the quantity of helpful bits per unit of time sent by the system from a specific source deliver to a specific goal, barring convention overhead, and barring retransmitted information parcels.

$$\text{Throughput} = \frac{\text{No of Packets Received}}{\text{Simulation time}}$$

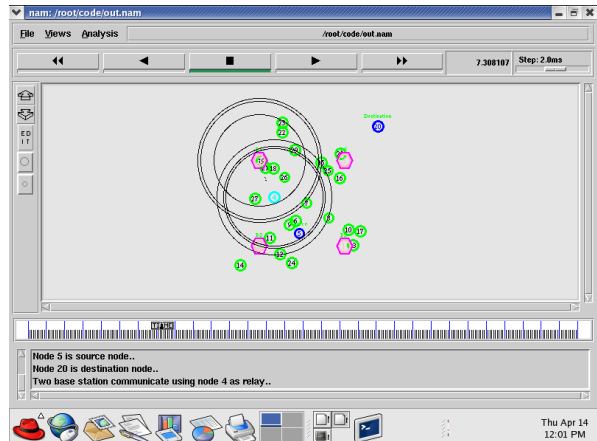
**V. RESULT**



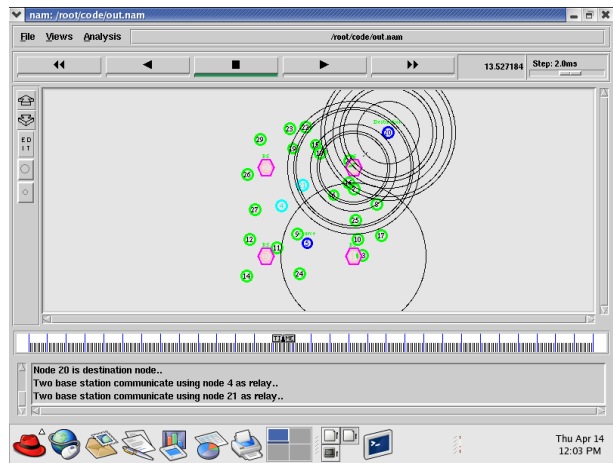
**Fig.8. Creation of Nodes**



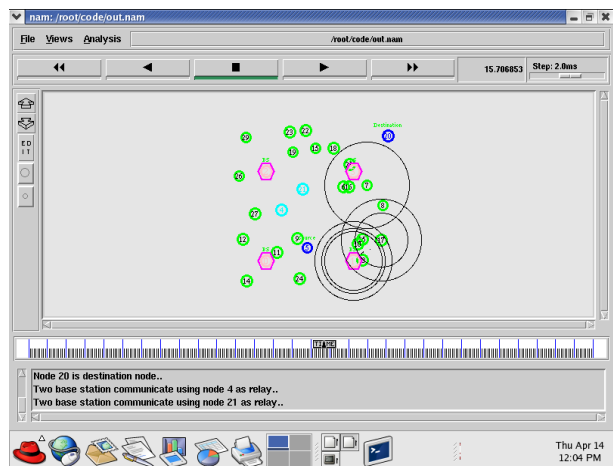
**Fig.9. Communication of Nodes**



**Fig.10. Communication Between The Two Base Stations And Nodes**



**Fig.11. Communication Between Nodes**



**Fig.12. Communication Between Destination Node and Base Stations**

**VI. CONCLUSION**

Comparative performance analysis of nature inspired routing algorithms such as DEA and ACO is done. These algorithms are commonly utilized for efficient and optimized routing in MANET. For

performance analysis, QoS matrices such as Throughput, End to End Delay, Routing Overhead and PDR are considered. By analyzing the results it is found that DEA have efficient results for optimized routing. Hence efficient and optimized routing in MANET can be achieved with the help of DEA.

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