ISSN (Online) 2456 -1304

International Journal of Science, Engineering and Management (IJSEM)
Vol 3, Issue 4, April 2018

# Improved Zone Based Routing Protocol For MANET

[1] Aparna Balkawade [2] Pranita Roman, [3] Akshay Khatpe, [4] Supriya Theurkar
[1] [2] [3] [4] RDTC SCSCOE Dhangawadi Pune

***Abstract*- Mobile Ad-hoc Network (MANET) is a infrastructure less, self organizing and self-configurable wireless network of mobile nodes. The MANET has a dynamic nature that makes the network topology change frequently. Zone routing protocol is typical hybrid routing protocol in MANET. It combines proactive with reactive strategies, it applies a proactive strategy inside the zone and reactive strategy outside the zone. As each node in the scenario maintain a route table, there are lots of overlapping areas in the whole scenario. These overlapping area produce redundant or duplicate route request. To overcome this drawback we developed Improved Zone Based Routing Protocol for MANET. In this protocol we minimize the Zone overlapping, and also minimise the duplicate route request. In high mobility MANET, the fast change of topology increases the complexity of routing. We define new parameter the mobility of the node, using this parameter we choose best node as zone head and also best path for transmission.**

***Index Terms*— REEQ,RREQ.ACK,Mobility factor.**

## I. INTRODUCTION

Now a days the use of personal communication devices like Personal digital assistance (PDA), mobile phones and mobile computers are growing rapidly, due to progress in technology and competitively low cost these devices get easily access to the network through wireless interface. Mobile ad-hoc network (MANET) are combination of mobile nodes without existence of any centralized control means they do not have base station or pre-existing infrastructure. Manet is also called as de-centralized network. MANET includes mobile nodes. Nodes can join and leave the network at any time. Ad-hoc network support anytime anywhere computing. Such type of network generally use multi-hope path and wireless radio. They communicate with each other with the help of radio waves. Node in manet act as a router and host and are responsible for sending and receiving data with the help of intermediates nodes. Nodes co-operate with each other to perform networking operations. Manet is getting importance because of its characteristic such as self creating, self organizing and self administrativecapabilities . As the nodes are mobile any change in the network topology to communicate to other nodes so that the topology information can be updated or eliminated.

**There are three types of routing protocol for MANET**

1. Proactive routing protocol.
2. Reactive routing protocol.
3. Hybrid routing protocol.

### 1. Proactive routing protocol

Pro-active protocols follow an approach Similar to the one used in wired routing protocols. By continuosly evaluating the known and attempting to discover new routes, they try to maintain the most up -to-date map of the network. This allows them to efficiently forward packets, as the route is known at the time when the packet arrives at the node. Pro-active or table- driven protocols, in order to maintain the constantly changing network graph due to new, moving or failing nodes, require con- tinuous updates, which may consume large amounts of bandwidth – clearly a disadvant -age in the wireless world, where bandwidth is often sparse. Even worse so, much of the accumulated routing information is never used, since routes may exist only for very limited periods of time.

### 2. Reactive routing protocol

Reactive protocols determine the proper route only when required, that is, when a packet needs to be forwarded. In this instance, the node floods the network with a route-request and builds the route on demand from the responses it receives. This technique does not require constant broadcasts and discovery, but on the other hand causes delays since the routes are not already available. Additionally, the flooding of the network may lead to additional control traffic, again putting strain on the limited bandwidth.

### Hybrid Routing Protocol

In Hybrid both a purely pro-active or purely reactive approach to implement a routing protocol for a MANET have their disadvantages. The Zone Routing Protocol, or ZRP, as described in this document combines the advantages of both into a hybrid scheme, taking advantage of pro-active discovery within a node's local neighbourhood, and using a reactive protocol for communication between these neighbourhoods.

## II. LITERATURE SURVEY

NEMA:Node Energy Monitoring Algorithm for zone head selection in mobile ad-hoc network using residual battery power of node- 2016 ,Ms. Sushma, D.Ghode,Dr.K.K. Bhoyar,IEEEWiSPNET. paper [1] improved zone routing protocol by adding energy constraints into it. In that paper, two algorithms are designed such as Zone head selection Algorithm(ZHSA) and Node energy Monitoring Algorithm ( NEMA).ZHSA is used for creating zones, selecting maximum residual energy node as ZH for reach zone and NEMA is used for monitoring nodes residual energy level and assign different responsibilities like zone head, relay node, communication node, emergency node and sleep node to nodes within zone. This protocol is not used for to check data transmission with minimal battery power.

ZONE-BASED ROUTING PROTOCOL FOR HIGH-MOBILITY MANET2003,HongyanDu,HossamHassanein,ChihsiangYeh ,IEEEWiSPNET.In this paper [2], an SNR-VBS election technique is used to improve the performance of ZRP and make MANET virtually cellular. In that algorithm they measured the impact of the three scenarios such as i)Network Density, ii)Mobile nodes mobility, iii)traffic load on the parameters like throughput, end-end delay and energy consumption .In that algorithm they does not reduced end-end delay relative to ZRP, at higher load.

QOS parameters Improvement for the hybrid zone based routing protocol in MANET,Imane M.A. fahmy ,LailaHassef ,Imane A. Sarait ,S.H. Ahmed,IEEEWiSPNET.Use of geographical information based on ZRP to limit the area for discovering a new route.

A zone-based routing protocol with parallel collision guidance broadcasting for MANET,ShadiSalehBasurra ,Marina De Vos ,Julian Padget,Tem Lewis ,Simon Armur,IEEEWiSPNET.In this paper[3],a Zonebased Routing Protocol with Parallel Collision Guidance Broadcasting (ZCG). ZCG can speed up the routing process in MANET through on-demand parallel collision guidance broadcasting. ZCG reduces redundant rebroadcasts via: (i) positive collisions occurring through the parallel broadcast from the source and destination nodes;(ii) zone to live (ZTL) technique, which is the number of zones a broadcast need to propagate through before it gets discarded by edge nodes, act as a"defence" wall to protect their zones from receiving needless broadcasts

Reliable and energy efficient hybrid multicast routing in MANET,GyanappaA. Walikar ,Rajashekhar C. Biradar,IEEEWiSPNET.. In this paper, [4]it maximizes lifetime of the network and improves the packet delivery ratio. Routes a packet to multicasts group member with reduced packet loss because of its reliable and robust route construction mechanism. In this paper,[5]a new approach is proposed by use of geographical information based on ZRP to limit the area for discovering e new route.

Location aided zone routing protocol in MANET, Pham ThiMinh ThuNgugen TrongTien, Dong-SeongKim,IEEEWiSPNET.

In this paper, [6] novel zone-based routing protocol for high-mobility MANET. They use source routing, which reduces the routing overhead .A more stable path can be discovered which leads to lower proability of link breakage, and reach higher throughput for the network.

A New approach for energy efficient routing In MANET using multi objective Geneticalgorithm, NehaAgarwal, NeerajManglani, IEEEWiSPNET..

In this paper[7],algorithm gives us a set of paths to transfer packet from source to destination. Genetic algorithm can be used to find optimal path that uses power of nodes efficiently to transfer packets in MANET.

Design and validation of new routing protocol in MANET for optimal performance, Rakhipurohit, BrightKeswani, IEEEWiSPNET. In this,proactive protocol provide better throughput in more traffic condition where network have more node count and more simulation time. Suitable protocol should be capable to provide optimal performance in terms of throughput of network.

**MATHEMATICAL MODEL**

System Description:

- System can be stated as set S that consists of S=N, Sr, D, F, RREQ, RREP, Sc, Fc
- - N= Number of Mobile Nodes.
- - N = G, P, Nn
- G : set of Gateway Nodes.
- G = g1, g2
- P : set of Peripheral Nodes.
- P = p1,p2..
- Nn : set of Normal nodes.
- Nn = n1,n2
- F = Functions that can be executed
- - F = F1, F2, F3
- F1 : Mobility factor Calculation function
- F2 : Zone Head selection function
- F3 : Zone Creation
- Sr = Source Node.
- D = Destination Node
- RREQ = Route Request Packet
- RREP = Route Reply Packet
- Sc = Success Case.
- Success Case : Data reached to Destination Successfully.
- Fc = failure Case.
- Failure Case : Destination not found.

ISSN (Online) 2456 -1304

International Journal of Science, Engineering and Management (IJSEM)
Vol 3, Issue 4, April 2018

Goals and Objectives

- Minimizing zone overlapping.
- Minimize data flooding.
- Select best path for data transmission.
- Minimize the time to find Route.

**Scope of idea**

In todays world there are many routing protocols for MANET. The most suitable routing protocol is Zone Routing protocol which is hybrid type. But Zone aslo have some drawbacks our protocol minimize those drawbacks and improve routing. In this system we are implementing Improved Zone Based Routing Protocol. This protocol minimize the zone overlapping and data flooding using three hop count.

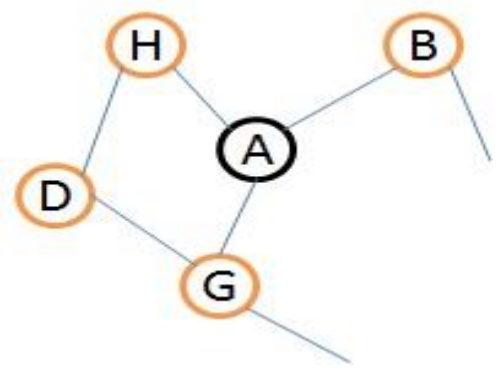
## III. PROPOSED SYSTEM

In this protocol we are minimizing the zone overlapping and trying to improve efficiency and data transfer speed. In this protocol we are calculating the mobility factor of each node, mobility factor means average number of times a node is move from one zone to another. It simply follows the zone protocol approach , that is inside the zone proactive routing strategy and outside the zone reactive routing strategy. Hence every node send its information to all its neighbour and create a zone which is fix length or radius. Every zone has a zone leader, the selection of zone leader is based on mobility factor, smallest the mobility factor becomes zone leader. The node which are part of one zone can not create its own zone and not participate in another zone, only peripheral nodes can participate in more than one zone, the node having hope count equal to zone radios called peripheral nodes. In this protocol the zone leader send data to only gateway nodes not to peripheral node, Gate nodes are the nodes which are belongs to two or more zones. when request packet reach to destination by more than one route, destination node calculates mobility of all routes and the route with less mobility will choose to send reply packet.

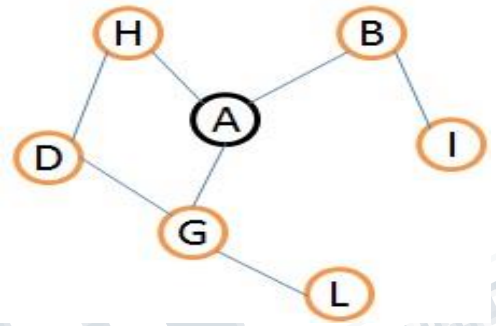
Mobility factor: Mobility factor means average number of times the node moves from one zone to another zone.

- (Mobility factor)=mf=mot/ut
  Here mot=move out time,
  Ut=Update time
- Hope Count: One Hope Count:One
- Hope count means any node x which has set of neighbour nodes which has at least one link to node x.Node H, G and B are one hope neighbours of A Or hope count of B, H and G is 1 from node A.

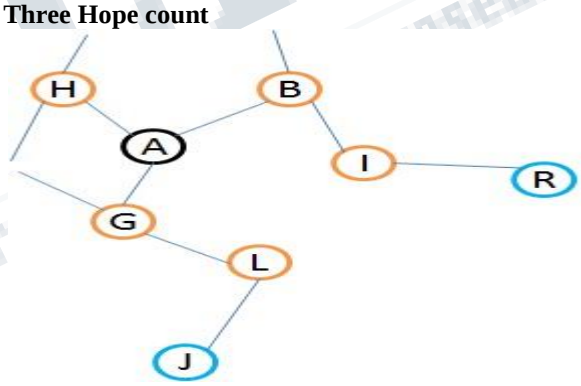
**1) One hope count**



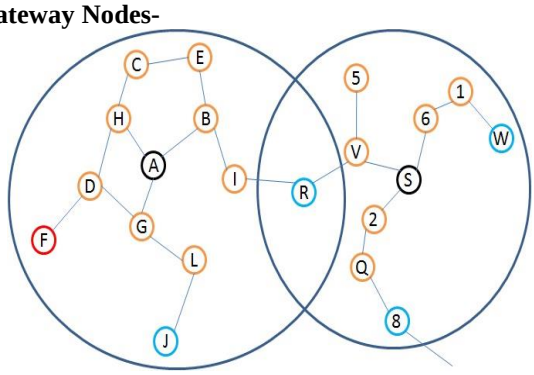

**2) Two Hope count**




**3) Three Hope count**



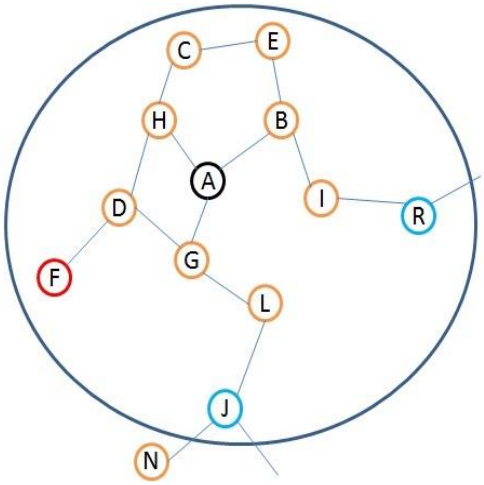

**4) Gateway Nodes-**




**5) Peripheral Nodes-**

ISSN (Online) 2456 -1304

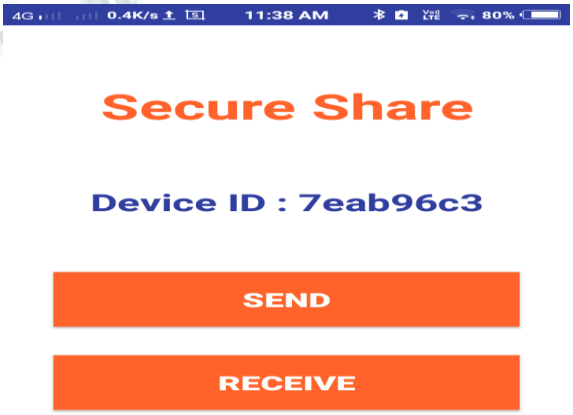
International Journal of Science, Engineering and Management (IJSEM)
Vol 3, Issue 4, April 2018




Algorithm
1) S = Source Node , D = Destination Node, N Number of Mobile Node in the Network.
2) Step 1: Zone Creation
– Begin:
– Calculation of mobility factor :
• Every node calculates its mobility factor
– (Mobility factor) mf = mot / ut
Here mot = move out time, ut = update time.
– For i = 1 to N; do
• Node i transmits "HELLO" message at regular interval to discover its one hop neighbours;
• Mobility factor and Neighbours information received from the neighbouring nodes are recorded when node i received "HELLO RESPONCE" message from its neighbours;

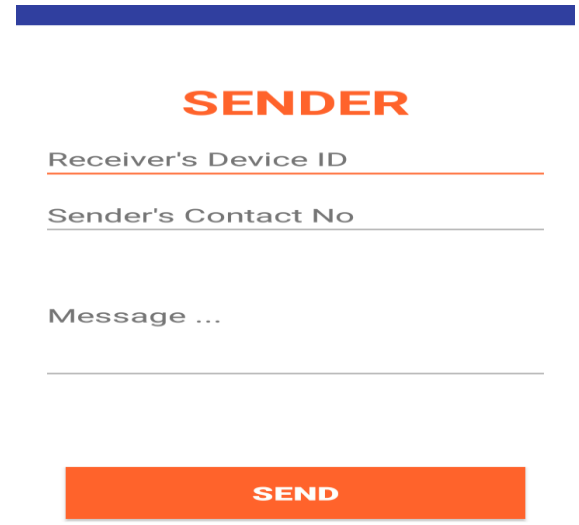
– ZoneCreation()
• Start
For i = 1 to N // all mobile nodes
Begin
Get mf = {mf1, mf2, ....mfn} //mfi Mobility factor of ith node mfsmall = mf[1]
For ( i=1; i<N; i++)
{
If (mf[i] < mfsmall)
mfsmall = mf[i]
Else
Continue
}
Zone head ZHead= mfsmall ;
Node i with less mobility factor becomes Zone Head ZHead and send message to its Zone Participant nodes and maintain its routing table.
3) Step 2: Finding Route to Destination D
– Source node S broadcast RREQ packet towards destination node D
If Source node S is ZHead THEN
Check routing table to find destination node in its Zone
If Destination D is Found in Zone
Send RREQ packet to D
Otherwise
Send RREQ packet to Gateway nodes
Otherwise
Send data to ZHead
– ZHead checks its routing table to find destination node
If Destination D is found
Send RREQ packet to D
Otherwise
Send data to Gateway Node
– Gateway node send packet to its another ZHead
– Repeat step 2 until reached to destination node D
4) Step 3: Selection of BEST path
– If node D received more than one packets of RREQ from different route it will calculate mobility of route
Mobility of Route = Addition of mobility factor of intermediate nodes / no. of intermediate nodes
– Less mobility route is select to send RREP packet back to Source node S
5) Step 4: Transmission of data
– Then Source S send data packet to Destination D
– And Destination send ack back to Source S
6) Step 5: End

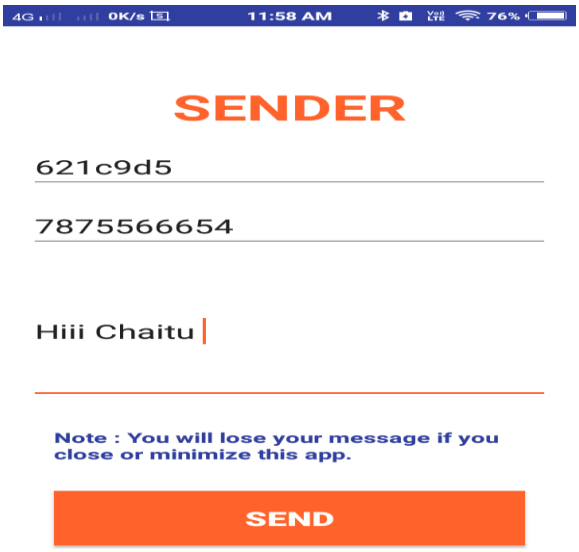
## IV. RESULTS

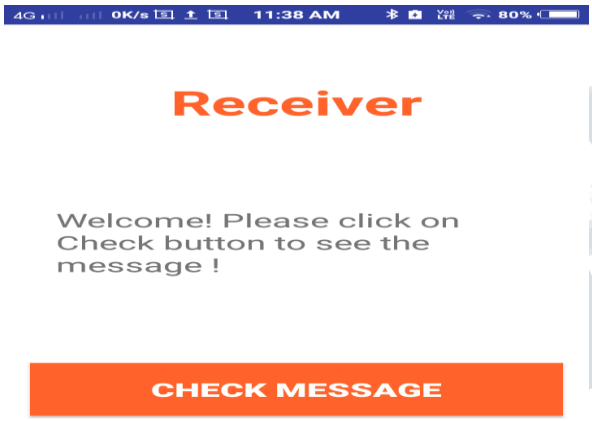


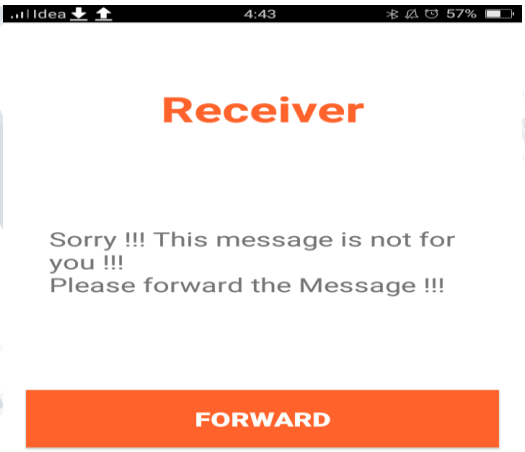
ISSN (Online) 2456 -1304

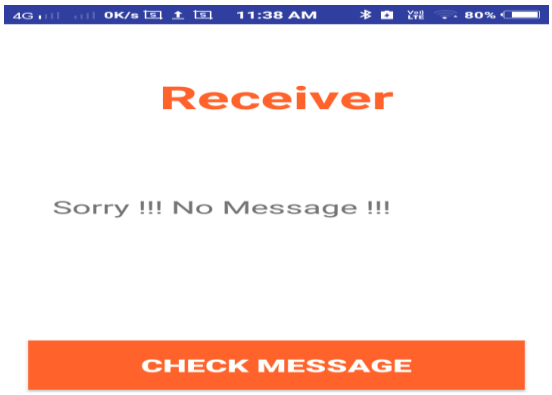
International Journal of Science, Engineering and Management (IJSEM)
Vol 3, Issue 4, April 2018




## V. CONCLUSION

With the algorithm we have proposed, we can develop a zone routing protocol which will minimize the zone overlapping in network and provide better performance.

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