Modified Iterative Centralized Administration Load Balanced Protocol (MICALBP): The proposed Model

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Abstract -*This paper proposed a position based routing approach which incorporates Dynamic Selection of the Gateway nodes to reduce the number of control packets flooded in the network required for efficient routing of data packets. The proposed algorithm was based on concept of bird flocking. In the algorithm each node is equipped with GPS, which provides the location of the destination node and the node itself. The algorithm was divided into two phases: Inter cluster routing and intra cluster routing. Simulation of the proposed algorithm was carried out using random waypoint model and different numbers of nodes up to 50 nodes for simulation time of 10 minutes. The results shows improved life time and packet delivery ratio.*

Key Words: load balancing, routing protocols, packet drop & received, energy efficiency.

1. Introduction

MANET is a kind of wireless ad hoc network and is self configuring network consisting of a set of wireless nodes. Routing in mobile ad hoc network is multi hop. These networks are infrastructure less and have no centralized control. The participating nodes acts as routers and are free to move randomly thus the network topology changes rapidly and unpredictably. In MANET, a wireless node can acts as a source node, an intermediate node or a destination node during the transmission. When a wireless node acts as an intermediate node, it serves as a router which can receive and forward data packets to its neighbor closer to the destination node. Mobile ad hoc network is a collection of independent mobile nodes that can communicate to each other via radio waves. The mobile nodes can communicate to those nodes that are in range of each other, whereas other nodes need the helps of intermediate nodes to route there packets. These networks are infrastructure less and fully distributed in nature so can be set up at any place without the aid of any infrastructure. Mobile ad hoc networks are characterized by autonomous terminals, dynamic topologies, infrastructure less, distributed operation, multi hop, limited resources and lack of centralized control. [1,2,3]

1.1 Features of MANET

- Autonomous Terminal: In MANET, each mobile terminal is an independent node, which may acts as both a host and a router. In other, since there is no fix infrastructure network, besides the basic processing ability as a host, the mobile nodes can also perform switching functions as a router.

- Distributed Operation: The MANET is infrastructure less so, for the central control of the network operations, the control and management of the network is distributed among the terminals. The nodes involved in a MANET should collaborate amongst themselves and each node acts as a relay as needed, to implement functions e.g. security and routing.

- Multi hop Routing: Basic types of ad hoc routing algorithms can be single-hop and multi hop, based on different link layer attributes and routing protocols. Single-hop MANET is simpler than multi hop in terms of structure and implementation, with the cost of lesser functionality and applicability. When delivering data packets from a source to its destination out of the direct wireless transmission range, the packets should be forwarded via one or more intermediate nodes.

- Dynamic Network Topology: Since the nodes are mobile, the network topology may change rapidly and unpredictably and the connectivity among the terminals may vary with time. MANET should adapt to the traffic and propagation conditions as well as the mobility patterns of the mobile network nodes.

- Light Weight Terminal: In most cases, the MANET nodes are mobile devices with less CPU processing capability, small memory size, and low power storage. Such devices need optimized algorithms and mechanisms that implement the computing and communicating functions.[4,5,6]

1.2 Characteristics of MANET

- Bandwidth Constraint: Wireless links have significantly lower capacity than infrastructures

networks. Throughput of wireless communication is much less because of the effect of the multiple access, fading, noise, interference conditions. As a result of this, congestion becomes a bottleneck in bandwidth utilization.

- Energy Constrained operation: Almost all the nodes in an ad hoc network rely on batteries or other exhaustive means for their energy. The battery depletes due to extra work performed by the node in order to survive the network. Energy conservation is an important design optimization criterion. The network life time depends upon the energy of the nodes. Therefore, MANET performs energy constrained operations.

- Dynamic Topologies: Nodes are free to move arbitrarily. The network topology may change randomly and have no restriction on their distance from other nodes. As a result of this random movement, the whole topology is changing in an unpredictable manner, which in turn gives rise to both directional as well as unidirectional links between the nodes.

- Limited security : MANET are generally more prone to physical security threats than wireless networks because the ad-hoc network is a distributed system and all the security threats relevant to such a system are pretty much presents, as a result, there is an increased possibility of spoofing, eavesdropping and denial of service type attacks.[7,8,9]

1.3 Advantage of MANET

- These networks can be setup easily at any place and time.
- Location independent in nature.[10]

1.4 Disadvantage of MANET

- Limited resources and physical security.
- Lack of centralization.
- Volatile network topology of nodes.
- Intrinsic mutual trust vulnerable to attacks.
- Need of separate security protocols than wired network.[11,12]

2. Problem Domain

Because of mobility of nodes there is no fixed topology. So it is always topic of research to design a protocol to find optimal path, energy efficiency is also a big aspect in such kind of research work. Mobile ad hoc network especially follows multi hopping mechanism for routing to make a path from source to destination. If we have a sound and solid routing path that would be efficient, reliable and adaptable to the different scenarios of network too by following the next hop mechanism and also should be the farthest node within the cluster then we could achieve better performance by the network.

The various objectives to formulate the problem can be outlined as follows:

a) To study the various *routing protocols* in MANETS.
b) To enhance the energy efficiency of MANET using *multipath, secure load balancing* protocol.
c) To examine the *performance and the feasibility of more energy* efficient protocol by considering a set of parameters.

3. Modified Iterative Centralized Administration Load Balanced Protocol (MICALBP): The Proposed Model

The proposed work is to evaluate the performance of two ad hoc routing protocols AODV and DSR in ad hoc wireless network.

- This evaluation is carried out through extensive literature review and simulation.
- The proposed simulation of the ad hoc protocols get the general understanding of the ad hoc network and could be used for further studies.
- Implement AODV and DSR protocols for wireless ad hoc network.

The algorithm is proposed to evaluate the performance of AODV and DSR by considering node energy. Firstly the network is formed by mobile nodes by taking their respective position in the grid area. Network is assigned threshold energy; nodes having less energy than the threshold energy of the network are not allowed to take part in communication. For this purpose a flag is set for energy of each node. After this the node sends an information packet to check the presence of node in the network and get the acknowledgement. Then the communication between sender and destination node get started. The performance of both protocols will be evaluated using NS2 which is a discrete event simulator that works at packet level and provides substantial support for TCP, UDP, DSR and other routing protocols. The graphs are plotted using trace graph software.
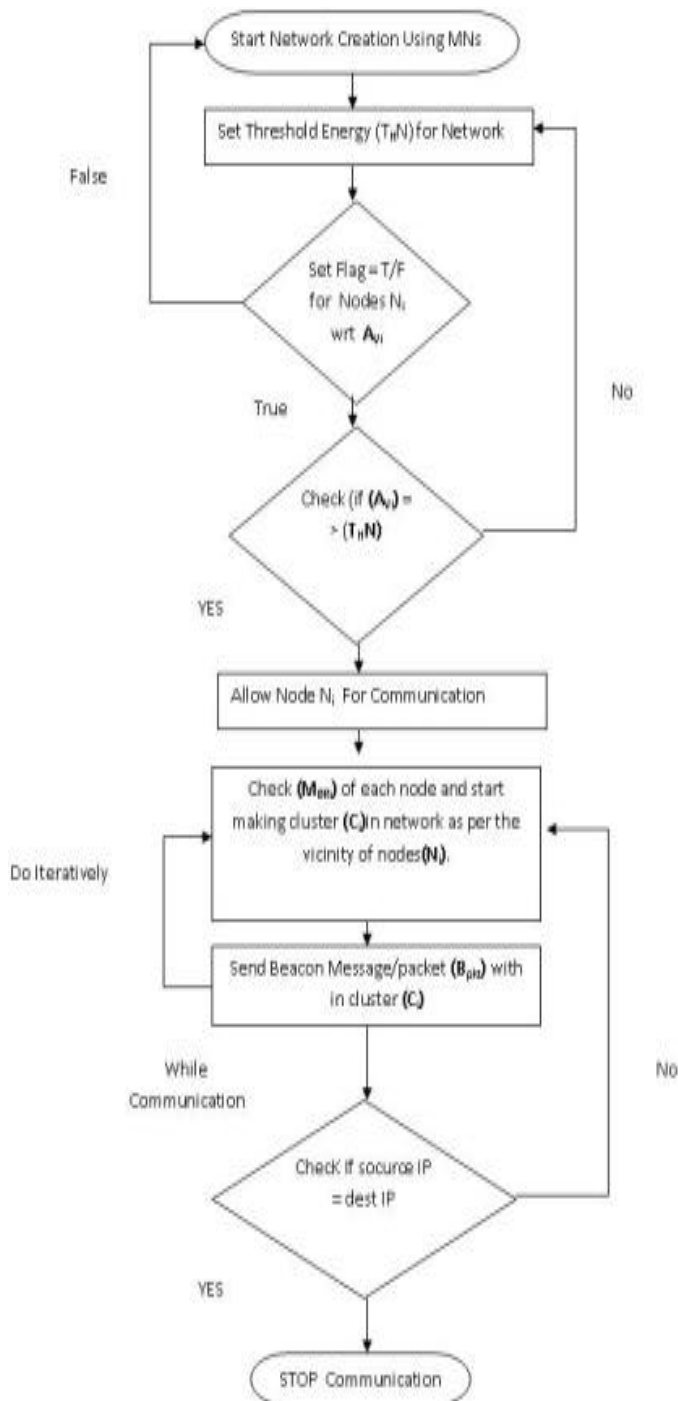
Fig -1: Flowchart for proposed system

PARAMETER	VALUE
Operating System	Red Hat
NS2 Version	2.34
Channel Type	Wireless
Antenna	Omni Antenna
Radio Propagation	Two Ray Ground
MAC Type	802.11g
Number of nodes	
Simulation time	10 Seconds
Simulation Area	1000*1000
Node Speed	Random
Mobility Model	Random Waypoint
Traffic Type	CBR
Application	TCP
Routing Protocol	AODV,DSR
Packet size	1000 Byte

Fig -2: Simulation Parameters

The figure 3 shows the network parameters packet received and packet drop for AODV. Graphs shows that number of packet received is more than the number of packet dropped at a node.
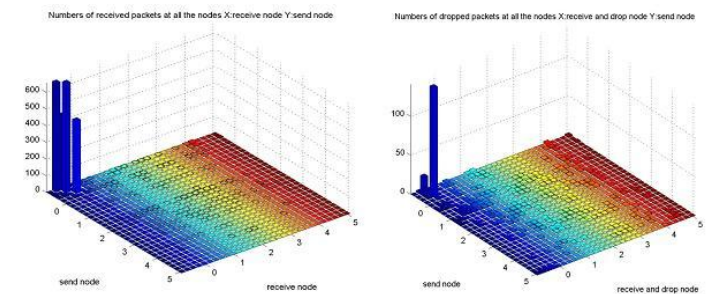

Fig -3: Number of packet received & packet Drop

In figure 4 packet generated and sent is shown for AODV. Graph shows that almost every packet generated is sent to the destination. The output graphs are same for packet generated and packet sent.
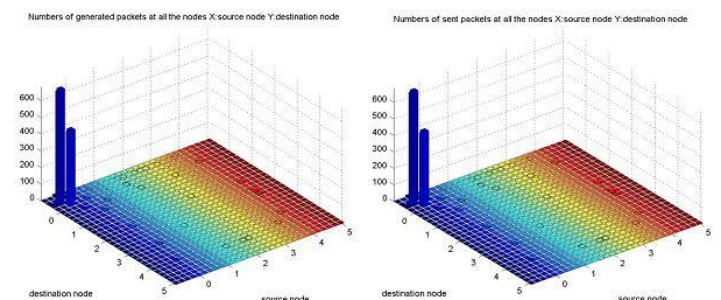

Fig -4: Number of generated & send packets

4. Results and Discussion

As already mention above we have taken two ad hoc routing protocol Ad hoc On demand Distance Vector routing protocol (AODV) and Dynamic Source Routing protocol (DSR). The performance of both protocols is evaluated using NS2 network simulator. Figure2 given below describes the parameters used into our simulation scenario. In this scenario some parameters with a specific value are considered.

5. CONCLUSIONS

This work evaluated the performance of AODV and DSR routing protocols in MANET using NS2 network simulator. This evaluation is based on node energy. AODV routing protocol shows a better packet received Vs packet lost than DSR which shows a high packet lost at the end of simulation. The performance is evaluated in terms of throughput, end to end delay, jitter, packet received and packet drop. AODV routing protocol shows better throughput and jitter than DSR routing protocol. The number of packet generated is more in case of DSR than AODV. However as the simulation time increases packet dropped for DSR also increases. Hence the packet received Vs packet lost ratio for AODV is better. This evaluation is done based on available energy of node. A node having low energy than the threshold energy of the network not allowed to take part in communication. The results for each performance metrics is shown for both protocols in graphical representation.

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