INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

TWO-PHASE STABLE ROUTING IN ODMRP

PROF. SUPRIYA. S. TELSANG, PROF. P. R. THAKARE, PROF. SABA. A. PATEL

Dept. of Information Technology, SITS, Narhe, Pune, Maharashtra.

Accepted Date: 15/03/2016; Published Date: 01/05/2016

Abstract: Routing protocol design is a major issue in the field of Mobile Ad-hoc Networks. Change in topology raises major challenges. Failure of node leads to breakage of link and may cause loss of network resources. A new method is proposed which works in two phases. First phase works based on signal strength based ODMRP. On failure of first approach, the work shifts to second phase where the system works on the residual energy of a node. Signal strength ODMRP works by measuring signal strength between nodes and compares this value with RSSI threshold value. If this value is greater than threshold value, it is accepted for further processing else it is discarded. If a route is not found in first phase, the system will switch to next phase that selects the route based on residual energy of the nodes. Simulation results show that TPS-ODMRP performs better than ODMRP in terms of packet delivery ratio, throughput, normalized routing load, delay and control overhead.

Keywords: Routing; Energy; Stability; signal strength; MANET

Corresponding Author: PROF. SUPRIYA. S. TELSANG

Access Online On:

www.ijpret.com

How to Cite This Article:

Supriya S. Telsang, IJPRET, 2016; Volume 4 (9): 114-125

PAPER-QR CODE

INTRODUCTION

Mobile Ad-hoc networks are a type of wireless networks having certain specific characteristics which differentiates them from certain conventional wireless networks. The challenges in Ad-hoc networks are the lack of a centralized authority and an infrastructure. Such type of applications are used in battlefields and in areas affected by floods and earthquakes where the deployment of any wired or wireless network quickly is not feasible. They are also used in areas where fast and efficient deployment is a major concern. Though Ad-hoc network is an instance of a mobile and wireless network, the protocols that exists for mobile and wireless networks can't be used as it is for ad-hoc networks

In a mobile network the nodes move randomly. Due to this movement the topology of the network gets changed. Therefore even after a route is established, it cannot be considered as a permanent route through to the end of conversation. The major causes for route loss in such network are:

1) Route breakup due to energy drop in the routing nodes
2) The nodes participating in a routing move apart from each other breaking the radio link.
3) In urban areas, due to obstacles like buildings.
4) Signal interference and fading.

Link stability is an important factor, affecting the relative performance of MANET routing protocols. From the perspective of the network layer, changes in link connectivity trigger routing events such as routing failures and routing updates. These events affect the performance of a routing protocol, e.g., by increasing packet delivery time or decreasing the fraction of delivered packets, and lead to routing overhead, e.g., for route discovery or route update messages. This paper focuses on simulation issues related to stability.

- **RELATED WORK**

A wireless network is an emerging new technology that will allow users to access information and services electronically, regardless of their geographic position. Wireless networks can be classified in two types:- infrastructure network and infrastructure less (ad hoc) networks. Infrastructure network consists of a network with fixed and wired gateways. A mobile host communicates with a bridge in the network (called base station) within its communication radius.

In contrast to infrastructure based networks, in ad hoc networks all nodes are mobile and can be connected dynamically in an arbitrary manner. All nodes of these networks behave as routers and take part in discovery and maintenance of routes to other nodes in the network. Ad hoc networks are very useful in emergency search-and-rescue operations, meetings or conventions in which persons wish to quickly share information, and data acquisition operations in inhospitable terrain.

There are proposed routing protocols for these ad hoc networks. These routing protocols can be divided into two categories:

- Pro-active (Table-driven)
- Reactive (On-demand)

In Table-driven routing protocols each node maintains one or more tables containing routing information to every other node in the network. All nodes update these tables so as to maintain a consistent and up-to-date view of the network. When the network topology changes the nodes propagate update messages throughout the network in order to maintain consistent and up-to-date routing information about the whole network. These routing protocols differ in the method by which the topology change information is distributed across the network and the number of necessary routing-related tables. Examples of Table-driven routing protocols are Destination-sequenced Distance vector routing(DSDV) Protocol, Optimized Link state routing protocol(OSLR),Wireless routing protocol(WRP), Mobile Mesh Routing Protocol(MMRP), Hierarchical State Routing protocol(HSR).

In contrast to table-driven routing protocols, on-demand routing protocols does not maintain all up-to-date routes at every node, instead the routes are created as and when required. When a source wants to send to a destination, it invokes the route discovery mechanisms to find the path to the destination. The route remains valid till the destination is reachable or until the route is no longer needed.

Examples are Ad hoc On-demand Distance Vector (AODV)[2], Associativity Based Routing(ABR)[3], Dynamic Source Routing Protocol(DSR)[4], Mobile Ad-hoc On-Demand Data Delivery Protocol (MAODDP),Temporally-Ordered Routing Algorithm routing protocol(TORA).

ODMRP (On-Demand Multicast Routing Protocol), is a mesh-based, multicast scheme and uses a forwarding group concept (only a subset of nodes forwards the multicast packets via scoped flooding). It applies on-demand procedures to dynamically build routes and maintain multicast group membership. ODMRP is well suited for ad hoc wireless networks with mobile hosts where bandwidth is limited, topology changes frequently, and power is constrained.

In ODMRP, group membership and multicast routes are established and updated by the source *on demand*. Similar to on-demand unicast routing protocols, a request phase and a reply phase comprise the protocol (see Fig. 1). While a multicast source has packets to send, it periodically broadcasts to the entire network a member advertising packet, called a JOIN REQUEST.

This periodic transmission refreshes the membership information and updates the route as follows. When a node receives a non-duplicate JOIN REQUEST, it stores the upstream node ID (i.e., backward learning) and rebroadcasts the packet. When the JOIN REQUEST packet reaches a multicast receiver, the receiver creates or updates the source entry in its Member Table. While valid entries exist in the Member Table, JOIN TABLES are broadcasted periodically to the neighbors. When a node receives a JOIN TABLE, it checks if the next node ID of one of the entries matches its own ID. If it does, the node realizes that it is on the path to the source and thus is part of the forwarding group. It then sets the FG Flag and broadcasts its own JOIN TABLE built upon matched entries. The JOIN TABLE is thus propagated by each forwarding group member until it reaches the multicast source via the shortest path. This process constructs (or updates) the routes from sources to receivers and builds a mesh of nodes, the *forwarding group*.

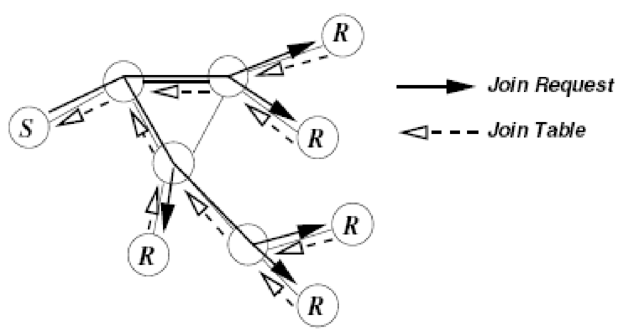

Fig. 1. On-Demand Procedure for Membership Setup and Maintenance.

We have visualized the forwarding group concept in Fig. 2.The forwarding group is a set of nodes in charge of forwarding multicast packets. It supports shortest paths between any member pairs. All nodes inside the bubble. (Multicast members and forwarding group nodes) forward multicast data packets. Note that a multicast receiver can also be a forwarding group node if it is on the path between a multicast source and another receiver. The mesh provides richer connectivity among multicast members compared to trees. Flooding redundancy among forwarding group helps overcome node displacements and channel fading. Hence, unlike trees, frequent reconfigurations are not required. Fig. 3 is an example to show the robustness of a mesh configuration. Three sources (S1, S2 and S3) send multicast data packets to three receivers (R1, R2 and R3) via three forwarding group nodes (A, B and C). Suppose the route from S1 to R2 is S-A-B-R2. In a tree configuration, if the link between nodes and breaks or fails, cannot receive any packets from until the tree is reconfigured. ODMRP, on the other hand, already has a redundant route (e.g S1-A-C-B-R2) to deliver packets without going through the broken link between nodes A and B.

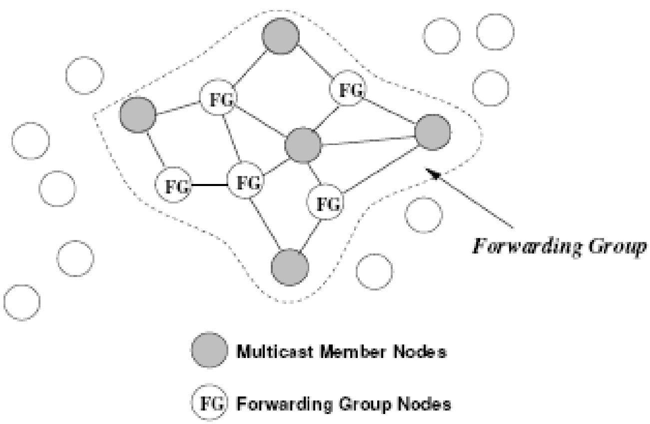

Fig. 2. The Forwarding Group Concept.

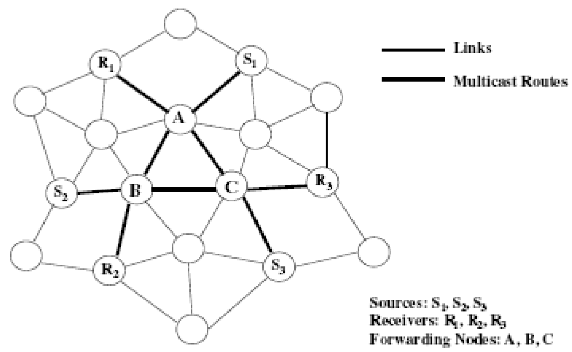

Fig. 3. Why a Mesh?

The design aspects of ODMRP allows the protocol to configure the multicasting group depending upon the neighbors feasibility, which is find out by transmitting periodic Hello beacons. In ODMRP, a group of nodes containing the transmitters, the receivers, the routers forms a group where all packets are routed through these group members only. But if we consider a highly mobile (Probability of movement>=0.5) Environment, the group has to be reconfigured quiet consistently. This reconfiguration would require immense amount of control overhead. Thus a lot of bandwidth would be wasted to keep the throughput high.

Another issue that affects the performance of ODMRP is the energy drain out by the nodes because of huge energy dropout due to multi-destination transmission.

Hence it was essential to improve the existing ODMRP to satisfy the required performances under high mobility and offered load.

This work therefore could target at improving the ODMRP to meet the energy constraints.

So our proposed scheme is to find the stable route based on the residual energy which gives high reliability and better quality of service support.

- **PROPOSED SYSTEM**

o *Implementation*

In MANETs, one of the major issues is to maintain a reliable stable route between the nodes in spite of mobility of nodes. To achieve this, a stable routing protocol is required that keeps the route reliable for a standard period of transmission. To achieve this purpose, a new reliable routing protocol is proposed that works in two phases. In first phase the routing takes place based on the signal strength of the node. If no neighbor node is found and the route selection process is failed, then the process switches to second phase where route selection is done based on residual energy of the nodes.

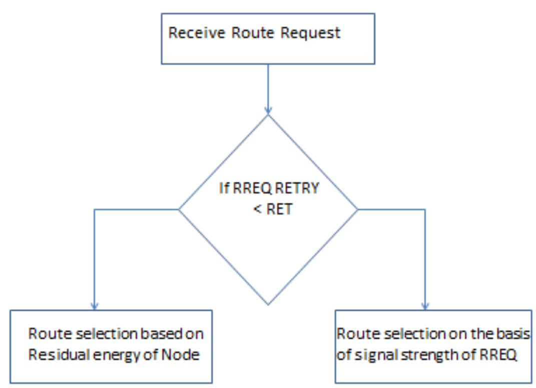

Figure 4: Flow of control of TPS-ODMRP

Figure 4 shows the flow of control in TPS-ODMRP protocol. The process of selecting a route in this system is as follows, when a transmission is needed, a route has to be created; to do this the source sends the RREQ packet to all the neighbors. On receiving this packet the node checks if RREQ retry is less than Retry Threshold, then it selects the route whose signal threshold value is greater. If the signal threshold value is greater, then intermediate node will receive this packet else it discards the packet. This approach helps the node to select a stable path to the destination on the basis of signal strength. If there is no route found to the destination, the node again sends the RREQ packet to the neighbor node and RREQ retry value will be increased. If the RREQ retry value crosses or greater than Retry threshold value, then the routing process will be carried out alternate method based on residual energy of a node. As there is always an alternative in the form of EODMRP, a more stable routing can be experimented in order to find a still better path than that of an ODMRP.

- *Calculation of RSSI value*

Performance of TPS-ODMRP has to be evaluated; to do this first the calculation of RSSI value is needed [6]. The calculation process is done using the following parameters and formulas.

Pt = Transmitted power at distance d

Pr: Power received at distance d, Pt: Transmitted signal power, Gt: Transmitter gain (1.0 for all antennas), Gr: Receiver gain (1.0 for all antennas), d: Distance from the transmitter, L: Path loss (1.0 for all antennas) ,ht: Transmitter antenna height (1.5 m for all antennas), hr: Receiver antenna height (1.5 m for all antennas)

- *Pseudocode*

Stability of route is determined on the basis of residual energy of the nodes in the mesh. Residual energy of each node depends on various factors such as Size of packet, distance between the nodes, type of packet the node is transmitting .The packets transmitted may be data, Route Request or Route Reply packet.

$$\alpha + \beta = \chi. \qquad (1)$$

As nodes are mobile in ad-hoc network, Periodically, each node broadcasts a control packet to all the group members comprising of its node number and its residual energy. All the group members maintain a table of all these entries. Before transmitting the data to the next node, each node would calculate the residual energy of that node. If it satisfies the energy constraints i.e. the node having the maximum residual energy, the data would be transmitted.

Select number of nodes=10

For I from 0 to n

Place each Node (i) randomly over 10x10 cell.

End for.

Threshold distance, threshold speed and angular cement is selected.

/* Random way point model*/

for each node i

Randomly node (i) selects a node j for moving towards it such that (j! =I)

The velocity v(i) is specified.

End for

Node broadcast hello packet with its speed and direction information.

For each node I

For each receiving node j

If dis[I][j]<dth // threshold distance

J calculates the respective positional model of i.

End for

End for.

Source , destination and the number of destinations are randomly selected by the user.

For each node Enode is assigned.

Energy drop for transmitting Rreq to one node is Erreq.

Energy dropout for transmitting data is Edata.

Each source generates separate RREQ.

As RREQ is received by a node it checks which node will be closer in subsequent simulation cycle.

If (both current and the other node is moving in the same direction)

{

// They would be stable.

diff= velocity difference between nodes.

```
Flag_stable=true

 }

else

{

  //    they would be unstable.

Flag_stable=false

}
```

Calculate the next node as the one with least value for variable diff.

Path is established from source to each destination. Source multicasts the packet to each destination.

By knowing the residual energy of each node, if it meet the energy constraint data packets are sent. If the distance between any two nodes in a path exceeds the threshold distance path is said to be broken.

Outage is calculated.

It is demonstrated that even in high mobile topology paths are stable

SIMULATION RESULTS

Proposed model has been simulated in various network scenarios on Pentium 4 machine by using C language. Simulation is carried out extensively for different network parameters by using number of iterations."

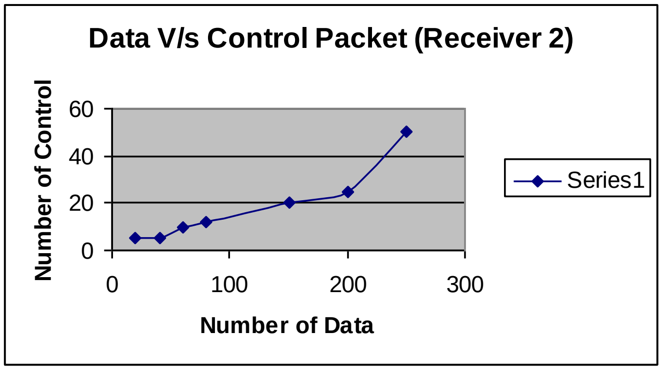

Figure 1

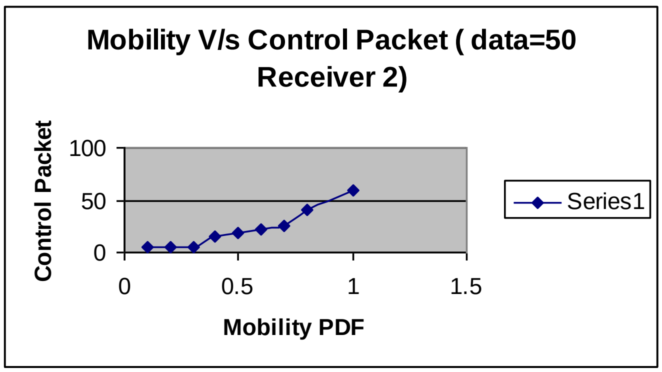

Figure 2

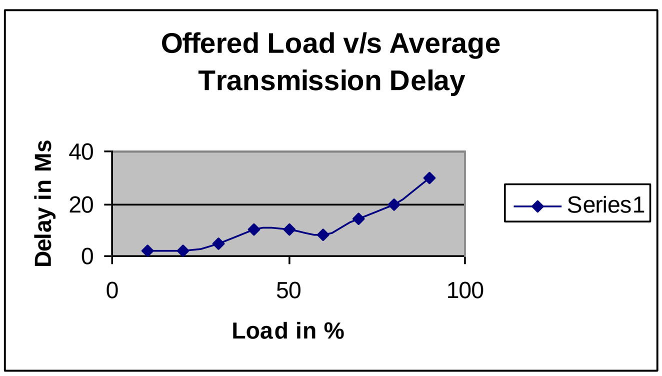

Figure 3

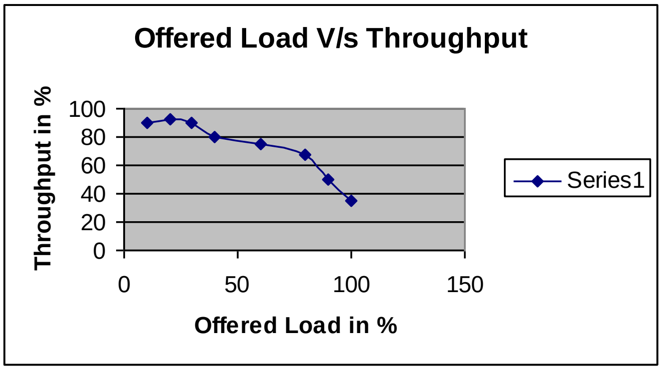

Figure 4

Fig 1 shows the number of data versus control packets. We observe that control packets have to be sent for each data to be sent to destination in the group. So increase in data packets increases the control packets.

Fig 2 shows the mobility versus number of control packets. Since all the nodes are mobile, more group reconfigurations had to be made so control packets generation increases.

Fig 3 shows offered load versus Average Delay. We observe that as the number of data sent increases, the number of calculations of residual energy performing for each node also increases which increases the delay for each node.

Fig 4 shows Offered load versus throughput. It is apparent that the throughput is quite high even when maximum load is offered. But in normal AODV as the offered load increases to 80% the throughput decades to zero.

- **CONCLUSION**

TPS-ODMRP is one of the most simplistic approaches in multicast routing. It provides two phase stability to the routing of packets. The performance clearly suggests that the route and the group longevity in this routing is much better than that of ODMRP. Beside ODMRP doesn’t provide good quality of service, which is so essential with the context of modern communication needs. Other aspects that our method stands out in comparison to other method are that the route maintenance doesn’t rely upon generation of RE-RREQ in case if there is a route breaks down. Rather the nodes forward the packet through the available routes from the other group members. In this selection criteria also, we have applied an energy threshold so that the calculated path is active for long and the requirement for further maintenance is minimized.

REFERENCES

1. E.M. Royer and C.E. Perkins, .Multicast Operation of the Ad-hoc On- Demand Distance Vector Routing Protocol to in *Proceedings of ACM/IEEE MOBICOM'99*, Seattle, WA, Aug. 1999.

2. Ad-hoc On-Demand Distance Vector Routing. Charles E. Perkins.

3. DSR: The Dynamic Source Routing Protocol for Multi-Hop Wireless Ad Hoc Networks, *David B. Johnson David A. Maltz Josh Broch,* Computer Science Department, Carnegie Mellon University, Pittsburgh, PA 15213-3891.

4. R. Bagrodia, M. Gerla, J. Hsu, W. Su, and S.-J. Lee. "A performance comparison study of ad hoc wireless multicast protocols", Proc. of the 19th Annual Joint Conf. of the IEEE Computer and Communications Societies, March 2000.

5. S. Corson and J. Macker. "Mobile ad hoc networking (MANET): Routing protocol performance issues and evaluation considerations", RFC 2501, January 1999.

6. Krupa A Talwarand Benakappa S M." An efficient route selection in Manet by Intelligent AODV" Journal of IJIRCCE, June 2014.