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Routing Approaches in Mobile Ad-Hoc Networks

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Abstract:

In this paper, the adoption of Tree based routing method to gain an ability to be enlarged to accommodate the growth in mobile adhoc networks has been proposed The main aim of tree based routing is to keep, at any connection point complete routing information about the connection point or redistribution point which are close to it and in part only information about connection point located at a great degree. A mobile adhoc network is a type of wireless adhoc network that can change locations and has the ability to configure itself. In MANETs the terminal equipments are able to move quickly or easily and wireless connections to connect to various networks like a standard wireless connection or another medium like cellular or satellite transmission.

Keywords— **Ad Hoc Networking, routing, MANET.**

I.INTRODUCTION

Ad hoc networks are self-configurable and autonomous systems consisting of routers and hosts, who are able to support movability and organize themselves arbitrarily, the topology of the adhoc network changes dynamically and unpredictably. The ad hoc networks can be either constructed or destructed quickly and autonomously with any administrative infrastructure. As it is Wireless network it inherits the traditional problem of Wireless networking. In MANET the channel is unprotected from outside signal, the wireless media is unreliable as compared to the wired media, hidden terminal and expose terminal phenomenon may occur, The channel has time varying and asymmetric propagation properties. With these problems there are some other challenges.

Depends up on the need the network will grow, so we should know how well a network system can adapt to increased demands. There is no central administration. Hence every device communicate with each other, it is not that much easy to find out the faults.Due to the random movement of mobile devices frequent topology changes will occur. This will lead to route changes, frequent network partitions and information losses. The autonomy of each node results in asymmetric links. It is difficult problem to implement adhoc addressing scheme, because the MAC address of device is used in standalone ad hoc network.

II.DATA TRANSMISSION IN MANET

The many-to-one scenario is obtained by intermediate routers combining received messages into a single message that is routed towards the base station. This process is called aggregation. Here intermediate nodes collect messages from their siblings aggregate them and send a single aggregated message up to their root. In this way, the base station receives a single message containing all the readings from the leaves. This solution is scalable (permitting an unlimited amount of senders) as long as aggregated data do not grow in size. There are two scenarios:

- **Lossy aggregation:** Here, the message output by aggregation contains less information than the set of messages input to aggregation.
- **Lossless aggregation:** occurs when no information loss is affordable during aggregation. It happens in applications where the root multicasts a data request to the leaves and the leaves react by sending one. At the end of the process, the root knows which symbol was transmitted by each leaf. This implies that the actual informational content transmitted by leaves will be less than the bit-length of the messages they use.

III. DIFFERENT ROUTING PROTOCOLS:

There are various types of protocols ready to be used nowadays that are supported by network infrastructure to be worthy for consideration. But need alteration before they can be useful within a network no longer connected to internet infrastructure. Hong (2002) separates them into three categories: Flat routing, Hierarchical routing, Geographic-position-assisted routing.

A.FLAT ROUTING PROTOCOLS: Flat adhoc routing protocols comprise those protocols that don't setup hierarchies with clusters of nodes. Special nodes acting as the head of the cluster. Different routing algorithms inside or outside certain regions. All nodes in this approach play an equal role in routing. Here the addressing scheme is flat. Again there are two sub categories: proactive and reactive protocols

B. PROACTIVE PROTOCOLS: Setup tables required for routing regardless of any traffic that would require routing functionalities. This is also called as Table driven protocols. Many protocols belonging to this group are based on link-state algorithm as known from fixed networks. Link-state algorithms flood their information about neighbors periodically or event triggered (Kurose 2003).

C. REACTIVE PROTOCALS: These protocols try to avoid the disadvantage by setting up a path between sender and receiver only if a Communication is waiting. Ex: DSR Johnson, 1996.AODV Perkins, 2001a,on demand version of DSDV Destination-Sequenced Distance Vector (DSDV): It belongs to the category of proactive protocol. Here each node in the network maintains an update route to each other node by exchanging both periodic and event-triggered routing updates (hello packets). The periodic updates occur at specific intervals, while the event-triggered ones are transmitted whenever a change in the topology occurs and, therefore, they introduce time-variable overhead. It utilizes node sequence numbers for route selection and to pick up the most recent information. If a node learns two different paths to the same destination, it selects the one with the larger sequence number. If both have the same sequence number, the node picks up the one with the shortest hop count. If both the metrics are the same, the choice is arbitrary. DSDV contains two different types of updating: incremental and full. The first includes only the entries changed from the last full update. The second one requires the transmission of the whole routing table, when the number of changed entries exceeds the space available.

D.Ad Hoc on-Demand Distance Vector Routing (AODV): It belongs to the category of reactive protocol. Reactive routing gives up maintaining a route between all pairs of nodes and it discovers the routes when needed, commonly by flooding the network with a route request. AODV route discovery bases on a broadcast network search and a unicast reply containing the discovered path. AODV relies on node sequence numbers for loop avoidance and for selecting the most recent path. To route a packet, a node first checks if a route is available in the routing table. If so, that route can be used, otherwise the node has to start a route discovery procedure.

E. Dynamic Source Routing: Here each packet stores the whole path in the header allowing so a simpler forwarding process with respect to the hop-by-hop forwarding exploited by AODV. Here each node maintains several routes toward the same destination which can be used in the case of link failures. DSR enables nodes to promiscuously listen to control packets not addressed to themselves. In such a way, nodes can utilize the source routes carried in both DSR control messages and data packets to gratuitously learn routing information for other network destinations.

IV. Proposed Tree-Based Routing

This routing method contains a distribute hash table and a location-based addressing schema for a scalable routing service. Here each node stores routes toward sets of nodes, and the cardinality of the sets depend on the overlay distance between the source and the destination addresses. It adopts a hierarchical approach, which allows one to reduce the routing state information stored by each node with respect to a flat approach from O(n) to O(log(n)), where n is the number of nodes in the network. New routing method resorts to a multi-path strategy: the address space structure is augmented by storing multiple routes toward each set of nodes. With regards to the address space overlay, the multi-path approach improves the tolerance of the tree structure against mobility as well as channel impairments while, with reference to the packet forwarding, it improves the performance by means of route diversity.

1.Architecture of the proposed method

New routing method resorts to a network-layer architecture in which each node has a permanent unique id, to identify the node in the network, and a transient network address that reflects the node's topological location inside the network. Nodes acquire network addresses by listening for the routing update packets exchanged by neighbors. In overlay network model is a tree-based structure offers simple and manageable procedures for address allocation. It contains low fault-tolerance as well as traffic congestion vulnerability since there exists only one path between any pair of nodes

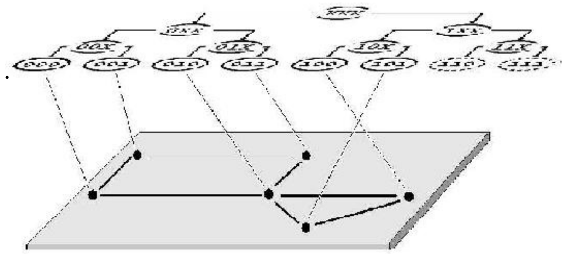

Fig 1: New routing method address space overlay

The address overlay embeds only a partial knowledge about the physical network topology, since only a subset of the available communication links is used for the routing. For such reasons, we propose to augment the tree structure by storing in the routing tables multiple next hops towards the same sibling. New routing method is an iterative one through the address tree, based on a hierarchical form of multi-path proactive distance-vector routing. New routing method routing tables have n sections, one for each sibling. The k^{th} section stores the available routes (the next hops) towards a node belonging to the level-k sibling. The hierarchical feature of New routing method is based on the concept of sibling and it allows nodes to reduce the routing state information, and the routing update size. It assures that routes toward far nodes remain valid despite local topology changes occurred in the vicinity of these nodes. Since the routing process is based on the network addresses, they have to be efficiently distributed across the network.

2. Processes of new method

In the architecture, the address allocation process allows nodes to acquire a valid network address, while the route discovery process is responsible of both routing-tables building and updating. The services provided by these processes are exploited by the packet forwarding process, which is in charge of both choosing the best route and forwarding the packets through. The address discovery process supplies the mapping between identifiers and network addresses, by resorting to the packet forwarding services. Finally, the link quality estimation process assesses the quality of the available links, supporting so the other processes.

A) Address Allocation Process: New routing method exploits a stateful approach based on multiple disjoint allocation tables. When a new node joins the network, it listens for the hello packets exchanged by neighbors to acquire a valid and available address. It guarantees that nodes, which share the same address form a connected sub-graph in the network topology is known as the prefix constraint one. The detection of duplicate addresses resorts to the subtree identifier concept: we define as subtree id the lowest node id of all the nodes whose network addresses belong to that subtree. The subtree ids allow New routing method to detect the presence of the same address in two disconnected parts of the network.

B) Link Quality Estimation Process: It allows the packet forwarding process to choose the routes assuring the highest throughput and enables the address allocation process to converge to a steady state. To estimate the link quality, New routing method resorts to the hello packets and to a moving average filtering. Each node locally broadcasts the hellos with an average period T. As mentioned before, the link quality is also used in the routing process to compute the path cost by means of the expected transmission count (ETX). This metric estimate the expected number of packet transmissions required to successfully deliver a packet to the ultimate destination.

C) Path Discovery Process: It maintains a consistent routing state through the network by updating the routing tables with the information broadcasted by nodes with the hellos. A routing table is made up by L sections, where L is the network address length and the k^{th} section contains several routes. Each entry contains four fields: the network address of the next hop, the sibling id, the path cost and the route log. Differently, a routing update contains no more than L entries i.e. one entry for each sibling, and each entry contains the sibling id, the path cost and the route log. If a node stores multiple routes toward the same sibling, it will only record in the routing update the information concerning the best route, according to the path cost. Every process requires a loop detection mechanism to avoid that the information stored in a route update visits the same node more times.

D) Packet Forwarding Process: Here the route is singled out by taking into account the hierarchical feature of New routing method, by choosing, as next hop, the neighbor which shares the longest address prefix with the destination. If there are multiple neighbors sharing the longest address prefix, the node will select the one with the lowest route cost.

E) Address Discovery Process: This supplies the mapping between node identifiers and network addresses resorting to a distributed hash table (DHT).

It exploits the hierarchical nature of New routing method to address the challenges related to the design of both the two services provided by a DHT system, namely, association of information to peers and query forwarding to responsible peers. Since network addresses are assigned to nodes according to the network topology, there is no assurance that the peer location computed with the hash function is valid, i.e. it has been assigned to a node. To overcome such a drawback, we propose a distributed mechanism (indirect referencing), characterized by low communication overhead and absence of node coordination. Here the peer validation resorts only on the topological information stored in the routing table, without the need of explicit node coordination.

V. PERFORMANCE EVALUATION

In this section, we present a numerical performance analysis of the proposed protocol by resorting to NS-2. At this end, for the sake of performance comparison, we consider three commonly adopted routing protocols, namely AODV, DSR and DSDV. We ran a large set of experiments to explore the impact of several workloads and environmental parameters on the protocol performances by adopting the following three metrics: Packet delivery ratio (PDR) means the ratio between the number of data packets successfully received, hop count means the number of hops a data packet took to reach its destination and routing overhead means the ratio between the number of generated data packets and the total number of generated routing packets; Each experiment ran ten times, and for each metric we estimated both its average value and the standard deviation.

On the other hand, DSDV and AODV performances decrease rough linearly with the number of nodes. Finally, DSR outperforms all the remaining protocols only for small networks whereas, as the number of nodes increases, its performances become the worst and, with reference to largest networks, nearly an order of magnitude separates them from those of new routing method.

New routing method has been designed to prefer reliable paths, despite of the hop number. Moreover, its hierarchical nature is a potential source of path length inefficiency. However, its performances are comparable with those of AODV and DSR, which experience a path stretch, defined as the ratio between the discovered path length and the shortest path length, of roughly two. DSDV is able to discovery routes very close to the shortest ones Such a behavior is due to the choice of adopting a threshold based on the link quality in order to accept the routing updates from neighbors. Again, DSDV and AODV perform similarly in small networks but, when the number of nodes grows, AODV performs worst due to its reactive nature. In small networks, new routing method exhibits the highest overhead, since its routing update packets have fixed size, regardless of the node number. However, when the number of nodes grows, its behavior becomes comparable with those of the other proactive protocol, i.e. the DSDV. Data Load (Mb/s) The figure 1 shows that the proactive protocols are able to scale well in terms of data load, whereas both DSR and AODV performances are affected by this parameter. Among all the protocols, new routing method outperforms for nearly each data load. Moreover numerical results, not here reported, show that new routing method outperforms all the other protocols in terms of delivery ratios for rough every data load when the number of nodes exceeds 64.

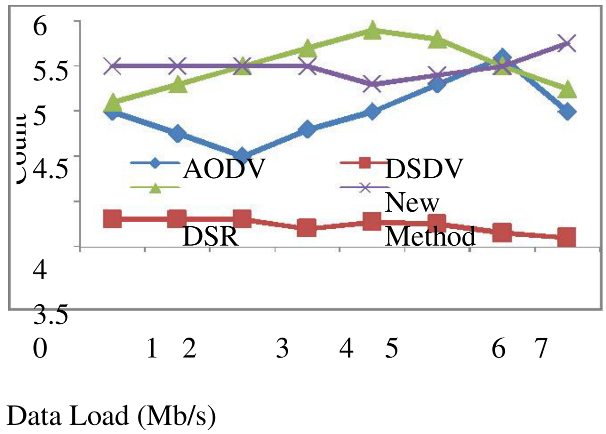

Fig 1: Hop count vs data load

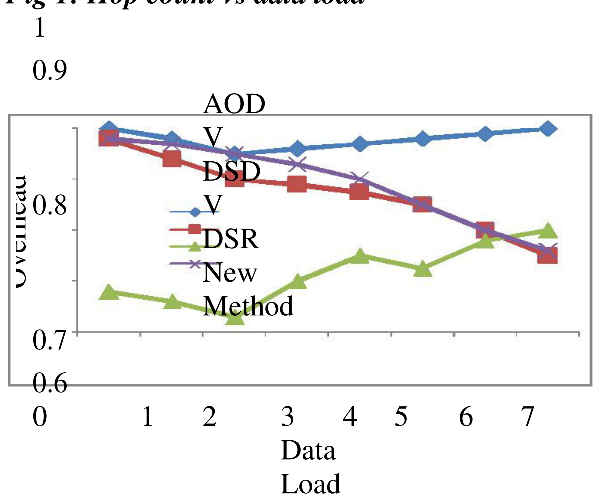

Fig 2: Routing overhead vs data load take

In the left side figure, the path lengths of proactive protocols are unaffected by the data load. DSDV routes have length closer to shortest ones. In the right side figure the proactive routing traffic does not depend on the data load, since the routing overhead decreases linearly with the data load, whereas the reactive routing traffic increases linearly with the data load.

VI.CONCLUSION

In this paper, the adoption of a new hierarchical routing method to achieve a scalable network layer for ad hoc networks has been proposed. The main concept of hierarchical routing is to keep, at any node, complete routing information about nodes which are close to it and partial information about nodes located further away.

It has been shown that the overhead needed by current networking protocols for ad hoc networks increases so fast with the number of nodes that it eventually consumes all of the available bandwidth also in networks with moderate size. One of the main reasons for such a lack of scalability is that they have been proposed for wired networks and modified to cope with ad hoc scenarios. More specifically, they are based on the assumption that node identity equals routing address that is, they exploit static addressing which of course is not yet valid in ad hoc scenarios. Recently, some routing protocols have exploited the idea of decoupling identification from location, by resorting to distribute hash table services, which are used to distribute the node's location information throughout the network. In this paper, we give a contribution toward such an approach by focusing our attention on the problem of implementing a scalable network layer. The new method is used to allow nodes to exploit hierarchical routing, limiting so the overhead introduced in the network and used to map the transient identifiers and node identities. Performance comparisons with three existing methods substantiate the effectiveness of the new proposed method for large ad-hoc networks operating in presence of channel hostility and moderate mobility. Since this new method adopts a multi-path strategy and the performances of these strategies are commonly evaluated by numerical simulations, an analytical framework to evaluate the performance gain achieved by multi-path routing has been proposed. By resorting to numerical simulations based on a widely adopted routing performance metric, packet delivery ratio, hop count and overhead, the proposed framework has been validated and the results show the effectiveness of new method.

References:

1. Boldyreva, "Efficient threshold signatures, multisignatures and blind signatures based on the Gap-Diffie-Hellman-group signature scheme", *Lecture Notes in Computer Science*, vol. 2567, pp. 31–46, 2008.
2. Leonard Kleinrock and Farouk Kamoun. Hierarchical routing for large networks; performance evaluation and optimization. *Computer Networks*, 1:155–174, 2009.
3. X. Hong, K. Xu, and M. Gerla. Scalable routing protocols for mobile ad hoc networks. *IEEE Network*, 16(4):11–21, July 2007.
4. R.Karthikeyan," Improved Apriori Algorithm for Mining Rules" in the International Journal of Advanced Research in biology Engineering science and Technology Volume 11, Issue 4, April 2016, Page No:71-77.
5. R.Karthikeyan,Dr.T.Geetha "Honeypots for Network Security", International journal for Research & Development in Technology.Volume 7.Issue 2 ,Jan 2017,Page No.:62-66 ISSN:2349-3585.
6. R.Karthikeyan,"A Survey on Position Based Routing in Mobile Adhoc Networks" in the international journal of P2P Network Trends and Technology, Volume 3 Issue 7 2013, ISSN:2249-2615, Page No.:81-88
7. R.Karthikeyan,"A Survey on Sensor Networks" in the International Journal for Research & Development in Technology Volume 7, Issue 1, Jan 2017, Page No:71-77
8. R.Karthikeyan,Dr.T.Geetha "Web Based Honeypots Network",in the International journal for Research & Development in Technology.Volume 7.Issue 2 ,Jan 2017,Page No.:67-73 ISSN:2349-3585.
9. R.Karthikeyan,Dr.T.Geetha,"A Simple Transmit Diversity Technique for Wireless Communication",in the International journal for Engineering and Techniques. Volume 3. Issue 1, Feb 2017, Page No.:56-61 ISSN:2395-1303.
10. R.Karthikeyan,Dr.T.Geetha "Strategy of Trible – E on Solving Trojan Defense in Cyber Crime Cases", International journal for Research &

Development in Technology.Volume 7.Issue 1 ,Jan 2017,Page No.:167-171.

11. .Karthikeyan,Dr.T.Geetha"Advanced Honey Pot Architecture for Network Threats Quantification" in the international journal of Engineering and Techniques, Volume 3 Issue 2, March 2017, ISSN:2395-1303, PP No.:92-96.
12. Elizabeth Belding-Royer. Routing approaches in mobile ad hoc networks. In *Ad Hoc Networking*, pages 275–300. IEEE PressWiley, 2008.
13. R.Karthikeyan,Dr.T.Geetha"Estimating Driving Behavior by a smart phone" in the international journal of Engineering and Techniques, Volume 3 Issue 2, March 2017, ISSN:2395-1303,PP No.:84-91.
14. R.Karthikeyan,Dr.T.Geetha" SAMI: Service-Based Arbitrated Multi-Tier Infrastructure for Cloud Computing" in the international journal for Research & Development in Technology, Volume 7 Issue 2, Jan 2017,ISSN(0):2349-3585, Pg.no:98-102
15. R.Karthikeyan,Dr.T.Geetha "FLIP-OFDM for Optical Wireless Communications" in the international journal of Engineering and Techniques, Volume 3 Issue 1, Jan - Feb 2017, ISSN:2395-1303,PP No.:115-120.
16. R.Karthikeyan,Dr.T.Geetha "Application Optimization in Mobile Cloud Computing" in the international journal of Engineering and Techniques, Volume 3 Issue 1, Jan - Feb 2017, ISSN:2395-1303,PP No.:121-125.
17. R.Karthikeyan,Dr.T.Geetha"The Sybil Attack" in the international journal of Engineering and Techniques, Volume 3 Issue 3, May - Jun 2017, ISSN:2395-1303,PP No.:121-125.
18. R.Karthikeyan,Dr.T.Geetha"Securing WMN Using Hybrid Honeypot System" in the international journal of Engineering and Techniques, Volume 3 Issue 3, May - Jun 2017, ISSN:2395-1303,PP No.:121-125.
19. R.Karthikeyan,Dr.T.Geetha "Automated Predictive big data analytics using Ontology based Semantics" in the international journal of Engineering and Techniques, Volume 3 Issue 3, May – Jun 2017, ISSN:2395-1303,PP No.:77-81.
20. R.Karthikeyan,Dr.T.Geetha"A Survey of logical Models for OLAP databases" in the international journal of Engineering and Techniques, Volume 3 Issue 3, May - Jun 2017, ISSN:2395-1303,PP No.:171-181
21. J. Broch, D.A.Maltz, D.B. Johnson, Y. Hu, and J.A. Jetcheva. A performance comparison of multi-hop wireless ad hoc network routing protocols. In
22. *MobiCom '09: Proceedings of the 10th annual ACM/IEEE international conference on Mobile computing and networking*, pps 85–97, 2009.
23. S. R. Das, R. Castaneda, and J. Yan. Comparative performance evaluation of routing protocols for mobile, ad hoc. In *IC3N '09: Proceedings of the International Conference on Computer Communications and Networks*, page 153, 2009.
24. R.Karthikeyan,Dr.T.Geetha"A Client Solution for Mitigating Cross Site Scripting Attacks" in the international journal of Engineering Science & Computing, Volume7,Issue6, June 2017, ISSN(0):2361-3361,PP No.:13063-13067.
25. R.Karthikeyan,Dr.T.Geetha"A Condensation Based Approach to Privacy Preserving Data Mining" in the international journal of Engineering Science & Computing, Volume7,Issue6, June 2017, ISSN(0):2361-3361,PP No.:13185-13189.
26. R.Karthikeyan,Dr.T.Geetha"Biometric for Mobile Security" in the international journal of Engineering Science & Computing, Volume7,Issue6, June 2017, ISSN(0):2361-3361,PP No.:13552-13555.
27. R.Karthikeyan,Dr.T.Geetha"Data Mining on Parallel Database Systems" in the international journal of Engineering Science & Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:13922-13927.
28. Elizabeth M. Royer and Chai-Keong Toh. A review of current routing protocols for ad hoc mobile wireless networks. *IEEE Personal Communications*, 6:46–55, 2009.
29. Charles Perkins and Pravin Bhagwat. Highly dynamic destination sequenced distance-vector routing for mobile computers. In *SIGCOMM '09: ACM Conference on Communications Architectures, Protocols and Applications*, pages 234–244, 2009.
30. R.Karthikeyan,Dr.T.Geetha"Ant Colony System for Graph Coloring Problem" in the international journal of Engineering Science &

Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:14120-14125.

31. R.Karthikeyan,Dr.T.Geetha”Classification of Peer –To- Peer Architectures and Applications” in the international journal of Engineering Science & Computing, Volume7,Issue8, Aug 2017, ISSN(0):2361-3361,PP No.:14394-14397
32. S.R. Das, E.M. Royer. Performance comparison of two on-demand routing protocols for ad hoc networks. In *INFOCOM 2009. Nineteenth Annual Joint Conference of the IEEE Computer and Communications Societies. Proceedings. IEEE*, volume 1, pages 3–12, 2009.
33. R.Karthikeyan,Dr.T.Geetha”Mobile Banking Services” in the international journal of Engineering Science & Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:14357-14361.
34. R.Karthikeyan,Dr.T.Geetha ”Neural Networks for Shortest Path Computation and Routing in Computer Networks” in the international journal of Engineering and Techniques, Volume 3 Issue 4, Aug 2017, ISSN:2395-1303,PP No.:86-91.
35. R.Karthikeyan,Dr.T.Geetha ”An Sight into Virtual Techniques Private Networks & IP Tunneling” in the international journal of Engineering and Techniques, Volume 3 Issue 4, Aug 2017, ISSN:2395-1303,PP No.:129-133.
36. Sabyasachi Roy, Dimitrios Koutsonikolas, Saumitra Das, and Y. Charlie Hu. High-throughput multicast.
37. Routing metrics in wireless mesh networks. *Ad Hoc Network*, 6(6):878–899, 2009.
38. P.P. Pham and S. Perreau. Performance analysis of reactive shortest path and multipath routing mechanism with load balance. *INFOCOM 2003: Twenty-Second Annual Joint Conference of the IEEE Computer and Communications Societies*, 1:251–259, 2008.
39. Tracy Camp, Jeff Boleng, and Vanessa Davies. A survey of mobility models for ad hoc network research. *Wireless Communications and Mobile Computing*, 2(5):483–502, 2009.
40. H. Pucha, S. M. Das, and Y. Hu. Imposed route reuse in ad hoc network routing protocols using structured peer-to-peer overlay routing. *IEEE Transactions on Parallel and Distributed Systems*, 17(12):1452–1467, 2009.
41. Mohit kumar, Rasmi Misra. An overview of MANET : History ,challenges and applications,Indian Journel of Computer Science and Engineering,vol.3 No.1 Feb-Mar 2012,ISSN:0976-5166
42. Karar Singh,Rama Shankar Yadav,Ran Vijay,A Review Paper On Ad Hoc Network Security,International Journel of Computer Science and Security,Volume(1):Issue(1)