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Detection of Disappeared Node Using LLFR Algorithm in MANET

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Abstract: Mobile ad hoc networks (MANETs) are ideal for situations where a fixed infrastructure is unavailable or infeasible. MANET may suffer from network partitioning.Because where a fixed infrastructure is unavailable (or) infeasible. Overcome this problem use new class of the mobile ad hoc network is called autonomous mobile mesh network (AMMNET).Its capable of following the mesh clients and adapt the topology for communication. And network topology to ensure good connectivity for both inter and intragroup communication. AMMNET is robust against network partitioning and providing high throughput for the clients. There is a issue in AMMNET is link breakage .The proposed system presents to recover the link failure using Local Link Failure(LLFR)algorithm for detecting the disappeared node. LLFR algorithm for Ad hoc networks that establishes recovery from link failures spontaneously at the point of link breakage. In such cases, a reliable link failure recovery is the main criteria that will determine the performance of the network in terms of Quality of Service (QoS).Failure of link cause disappearing mobile clients to recover this node using LLFR algorithm and to produce efficient performance.
Key words: Mobile mesh networks, dynamic topology deployment, client tracking, Routing, Link Failure.

I. INTRODUCTION

Mobile ad hoc networks (MANETs) are ideal for situations where a fixed infrastructure is unavailable or infeasible. Today's MANETs, however, may suffer from network partitioning. This limitation makes MANETs unsuitable for applications such as crisis management and battlefield communications, in which team members might need to work in groups scattered in the application terrain. In such applications, intergroup communication is crucial to the team collaboration.

To address this weakness, we introduce in this paper new class of ad-hoc network called Autonomous Mobile Mesh Network (AMMNET). Unlike conventional mesh networks, the mobile mesh nodes of a mobility pattern of the clients. Our simulation results indicate that AMMNET is robust against network partitioning and capable of providing high relay throughput for the mobile clients. AMMNET are capable of following the mesh clients in the application terrain, and organizing themselves into a suitable network topology to ensure good connectivity for both intra-and intergroup communications. Distributed client tracking solution to deal with the dynamic nature of client mobility, and present techniques for dynamic topology adaptation. When topology adaptation every time it cause increasing the size of the network because of this link failure may occur. In this paper find out the disappear node using the Local Link Failure Recovery (LLFR) algorithm.

Similar to stationary wireless mesh networks, an AMMNET is a mesh-based infrastructure that forwards data for mobile clients. A client can connect to any nearby mesh node, which helps relay data to the destination mesh node via multihop forwarding. For ease of description, In This paper we use the terms "mesh node" and "router" interchangeably. Like stationary wireless mesh networks, where routers are deployed in fixed locations, routers in an AMMNET can forward data for mobile clients along the routing paths built by any existing ad hoc routing protocols, for example, AODV. Unlike stationary wireless mesh networks, where routers are deployed at fixed locations, routers in an AMMNET are mobile platforms with autonomous movement capability they are equipped with positioning devices such as GPS, to provide navigational aid while tracking mobile clients. Clients are not required to know their locations, and only need to periodically probe beacon messages. Once mesh nodes receive the beacon messages, they can detect the clients within its transmission range. With this capability, mesh nodes can continuously monitor the mobility pattern of the clients and move with them to provide them seamless connectivity.

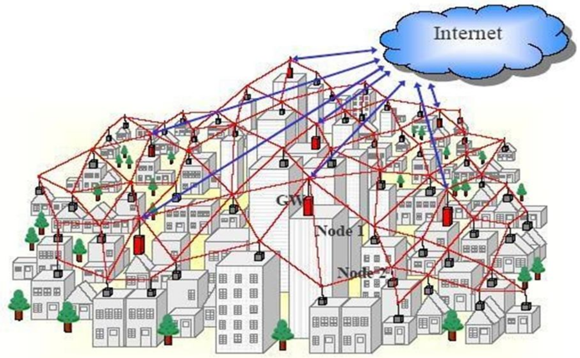

Fig1: MESH network

AMMNET is a mesh-based infrastructure that forwards data for mobile client's .A client can connect to any nearby mesh node. AMMNET is robust against network partitioning and capable of providing high relay throughput for the mobile clients. When AMMNET suffer from link failure we developed the Local Link Failure Recovery algorithm (LLFR) for Ad hoc networks that establishes recovery from link failures spontaneously at the point of link breakage. In such cases, a reliable link failure recovery is the main criteria that will determine the performance of the network in terms of Quality of Service (QoS).The LLFR is deployed in each node collects RREP in the RREP Buffer Table (RBT) stack in the highest order of signal strength, which gets triggered during link failures. Once a link failure is detected, the intermediate node searches for an alternate path around the faulty area by choosing the first RREP that is stacked in the RBT and establishes a new route to the intended destination for sending the data packets without any time delay. The simulation results show that the performance parameters like packet delivery ratio, throughput, average end to end delay and routing overhead are better compared to the traditional AODV and other link failure recovery techniques, using this techniques to recover the disappear node.

II. RELATED WORK

A. Stationary wireless mesh networks

In the last few years, stationary wireless mesh networks have been developed to enable last-mile wireless broadband access Past work on stationary mesh networks focuses on routing traffic in a mesh topology to best utilize the network capacity. Some literatures further study how to utilize non overlapping channels and explicitly control the network topology to improve the network capacity of a stationary mesh. Our work builds on the concept of such a stationary mesh-based infrastructure, and extends it to enable communication among partitioned mobile clients.

We study dynamic deployment of an AMMNET in this work, and leave utilizing non overlapping channels to improve network capacity as our future study.

B. Sensor covering

Our work on router deployment is also related to recent work on sensor covering in a stationary sensor network. These schemes ensure that each point in a target field is in the interior of at least k different sensors. Several work [31], [32], [33] further takes energy efficiency into account, and assigns each sensor a sleep-active schedule to guarantee sensor cover and, at the same time, prolong the lifetime of a sensor network. More recently, some work exploits sensor mobility to improve the performance of sensor covering. A self-deployment protocol is proposed to enable randomly scattered sensors to automatically move to the target planned positions. Instead of deploying stationary sensor nodes to cover the entire monitoring field, an alternative is proposed in to use mobile mules to move around different monitor ingareas and gather data along the traversed paths. All the above studies focus on deploying sensor nodes to monitor a given target area. Our work differs from the sensor coverage schemes in that it builds a dynamic mesh infrastructure for mobile clients that have unpredictable moving patterns and move around a non predefined application terrain.

C. Location tracking

On the other hand, there is much work that has been done on the problem of tracking the geometric location of a mobile node. Most of the localization technologies measure the distance between nodes and use this range information to estimate the location of a client. Some other range-free schemes only use node connectivity and hop-count information to estimate node locations without explicitly measuring every link distance. Compared to those localization schemes designed to minimize the estimation error of node locations, an AMMNET only needs to track mobile clients, and does not require the exact location information of each client. These localization technologies, however, can be integrated with AMMNET to improve the accuracy of client tracking.

D. Connectivity Control

In MSS, connectivity of the network is crucial throughout the lifetime of specific missions in order to meet the coordination requirement. Motivated by the significance of the aforementioned problem, numerous efforts have been focused on the connectivity control, where the interconnection among distinctive sensors was operated in a self-organized multi-hop manner, also called *ad hoc*. To preserve global connectedness, various control approaches including graph Laplacian based approach, power iteration algorithm, artificial potential field, and navigation function based method have been introduced. These approaches aimed at maintaining and increasing communication links. Other research focused on reducing communication links while maintaining global connectedness. Zavlanos proposed a hybrid control system consisting of a market-based control strategy and a potential field based motion controller. In 2012 explained the objectives of both connectivity and coverage, and the proposed approach required only local knowledge of network structure. Connectivity control approaches were further applied to the problem of connectivity preserving coordination, including flocking, rendezvous and formation control. The aforementioned works, however, neglected the possibility that single and multiple failures in networked sensors may occur during the reconfiguration under certain missions.

E. Connectivity Restoration Subjected to Failure Of Single Cut-Vertex Sensors

The connectivity restoration with respect to the failure of single cut-vertices has been extensively investigated. In several algorithms were proposed for achieving a 2-connectivity fault-tolerant configuration in multi-robot networks by moving a subset (block) of mobile robots. Block movement can maintain the topology within the subset, but requires a significantly large movement distance. A similar idea of achieving k-connectivity was investigated, the proposed algorithm aimed at repair k-connectivity with a minimal number of sensors. A distributed Actor Recovery Algorithm (DARA) was presented in to address the 1- and 2-connectivity requirements in WSAN with 2-hop neigh boring information, DARA aimed to move a minimal number of actors in restoration by choosing the appropriate candidate, and then moving the candidate to substitute the failed actor.

In AODV, a route discovery phase is implemented on-demand when a route fails and the route maintenance phase starts by flooding a route error message over the network. By its architecture, the AODV increases its route discovery process quite frequently thereby increasing the overhead. To improve the problem of overhead caused during route discovery process, several studies has been established like the partial reestablishment approach and the multipath approach. In partial re-establishment approach, the routing protocol finds an alternate route during the route maintenance phase. In multipath approach, the routing protocol establishes many routes during the route discovery phase. As the Multipath AODV establishes possible number of multiple routes regardless the route efficiency, there can be a large number of inefficient routes associated with the route discovery process which leads to enormous routing overhead. The packet drop and latency is more in multipath AODV, as this protocol depends on unused routes too. Even though multipath routing is significantly better than single path routing, the performance advantage is too small. The Bypass-AODV uses cross-layer MAC-notification to determine mobility related link failure and sets up a bypass between the broken link end-nodes via an alternative node while keeping the remaining nodes of the route as it is. The performance of Bypass-AODV is enhanced compared to the traditional AODV, as the error recovery phase is eliminated thereby reducing routing overheads and packet drop ratio. The Bypass-AODV transmits the packets via the newly constructed bypass route eluding packet drop. The performance of Bypass-AODV is best at

high node density, when the distance between the end nodes is greater than or equal to three hops. At low density of nodes where node connectivity is low, Bypass-AODV is not suitable due to occurrence of collision. Mobility prediction and routing is used to overcome route failures by obtaining local route repair, when a link break is about to occur. The mobility information from each node is used to predict the instant when the link between two neighbors will break. The location and motion pattern of each neigh boring node is recorded via an extended-hello message that is generated from nodes belonging to the active routes. The information pertaining to location and mobility of the nodes is constantly reproduced between neighbors and hence incurs huge overheads. A new QoS routing protocol is proposed which provides spanning tree based path

Selection by avoiding congestion, balancing the load

And energy paving way to avoid data loss simultaneously minimizing the communication overhead without reducing the network performance.

III. OVERVIEW OF THE SYSTEM

Mobile ad hoc networks (MANETs) are ideal for situations where a fixed infrastructure is unavailable or infeasible. Today's MANETs, however, may suffer from network partitioning. This limitation makes MANETs unsuitable for applications such as crisis management and battlefield communications, in which team members might need to work in groups scattered in the application terrain. In such applications, intergroup communication is crucial to the team collaboration.

To address this weakness, we introduce in this paper a new class of ad-hoc network called Autonomous Mobile Mesh Network (AMMNET). Unlike conventional mesh networks, the mobile mesh nodes of a mobility pattern of the clients. Our simulation results indicate that AMMNET is robust against network partitioning and capable of providing high relay throughput for the mobile clients. AMMNET are capable of following the mesh clients in the application terrain, and organizing themselves into a suitable network topology to ensure good connectivity for both intra-and intergroup communications. Distributed client tracking solution to deal with the dynamic nature of client mobility, and present techniques for dynamic topology adaptation .when topology adaptation every time cause increasing the size of the network because of this link failure may occur. In this paper find out the disappear node using the Local Link Failure Recovery (LLFR) algorithm.

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IV. DESIGN

The proposed new class of the MANET is called AMMNET are capable of following the mesh clients in the application terrain, and organizing themselves into a suitable network topology to ensure good connectivity for both intra- and intergroup communications and its include adapting to intragroup movement, reclaiming redundant routers, interconnecting groups and topology adaptation which is include local adaptation and global adaptation for connectivity of users and also to recover the link failure to detecting the disappeared node using the LLFR algorithm.

A. *Classification of the mobile mesh node*

1) *Intragroup routers*: A mesh node is an intragroup router if it detects at least one client within its radio range and is in charge of monitoring the movement of clients in its range. Intragroup routers that monitor the same group of clients can communicate with each other via multihop routing.
2) *Intergroup routers:* A mesh node is an intergroup router, i.e., square nodes if it plays the role of a relay node helping to interconnect different groups. For each group, we designate at least one intergroup router that can communicate with any intragroup routers of that group via multihop forwarding as the bridge router.
3) *Free routers:* A mesh node is a free router if it is neither an intragroup router nor an intergroup router.

B. *Algorithm for distributed client tracking*

Algorithm describes how the mobile mesh nodes automatically adapt their locations to tracking mobile clients present how the mobile mesh nodes automatically adapt their locations to tracking mobile clients.

1) *Algorithm 1. Distributed Client Tracking for Router r.*

1: for each Beacon message interval do

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2: switch mode of router r do
3: case Intra-group
4: if detect missing clients then
5: Request the client list from neighboring intra-group routers;
6: if all its clients are covered by neighbors then
7: Switch to the intergroup mode;
8: else
9: Assign free routers to navigate its coverage boundary;
10: end if
11: end if
12: case Intergroup Bridge
13: Piggyback its location in the forwarded packets
14: Retrieve the locations of other bridge router and the identity of the intergroup routers along bridge networks from the forwarded packets
15: Initiate topology adaptation if necessary
16: case Free
17: if receive the tracking request from intra-group routers then
18: Navigate the assigned segment to detect the missing clients;
19: if locate the missing clients then
20: Switch to the intra-group mode;
21: Request some of the free routers to follow this new intra-group router;
22: end if
23: end if
24: end switch
25: end for
26: return

C. Topology adaptation

The protocol discussed so far ensures that the mesh nodes maintain the connectivity for all clients.

1) Algorithm 2. Topology Adaptation (initiated by router r).

Input: (Collected in Algorithm 1)
Rb: set of bridge routers known by r opportunistically; Lb: location of router b 2 Rb;
Ri: set of intergroup routers connecting all known bridge routers b 2 Rb;
1: if number of free routers in r's group < _ then
2: Call Algorithm 3 to perform global adaptation;
3: else
4: Compute the single star topology S for Rb;
5: Build a bridge network B connecting to any bridge router b0 62 Rb;
6: N0 i number of intergroup routers needed for S and B;
7: if N0 i _ _jRij then
8: Trigger the assigned intergroup routers to adapt their topology to S [B after a three-way handshaking;
9: Reclaim the rest of intergroup routers to the free-router poor;
10: end if
11: end if
12: return

D. Implementation of LLFR algorithm

Local Link Failure Recovery algorithm (LLFR) for Ad hoc networks that establishes recovery from link failures spontaneously at the point of link breakage The LLFR algorithm implemented with AODV routing protocol is described below:

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1: If link failure detected then
2: Go to step 4
3: Else data packet is transmitted
4: LLFR is activated
5: The intermediate node receives RERR act as the source node
6: Select the first entry in the RBT stack as the immediate node
7: Create alternate path using RBT information in each node
8: Transmit data packets via alternate path to destination
9: Update the new route to the source node

V. LLFR MODEL

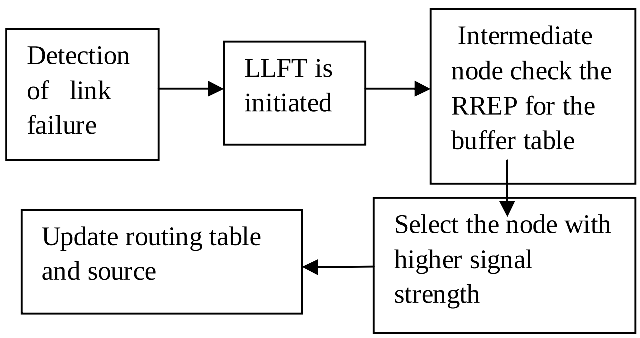

Fig4: LLFR model

VI. FLOW DIAGRAM

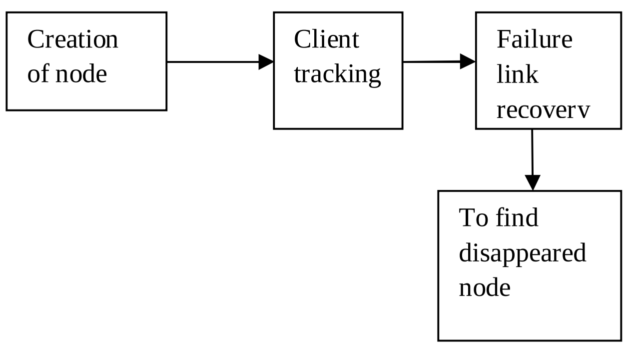

Fig5: Data flow diagram for MANET with disappeared node by failure link recovery

VII. IMPLEMENTATION

The proposed system presents to the recover the link failure using Local Link Failure (LLFR) algorithm for detecting the disappear node. LLFR algorithm for Ad hoc networks that establishes recovery from link failures spontaneously at the point of link breakage. In such cases, a reliable link failure recovery is the main criteria that will determine the performance of the network in terms of Quality of Service (QoS). The simulation results show that the performance parameters like packet delivery ratio, throughput, average end to end delay and routing overhead are better compared to the traditional AODV and other link failure recovery techniques ,using this techniques to recover the disappear node

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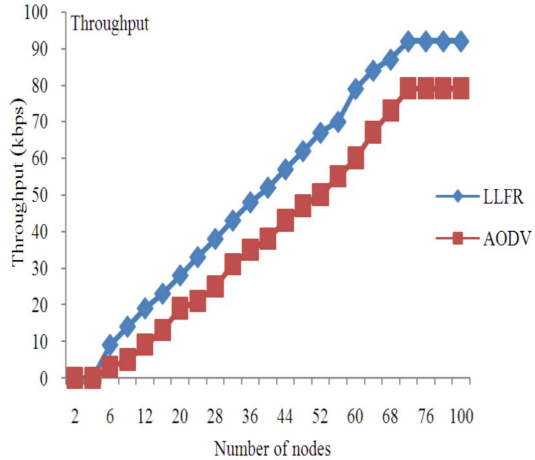

Fig6: Throughput

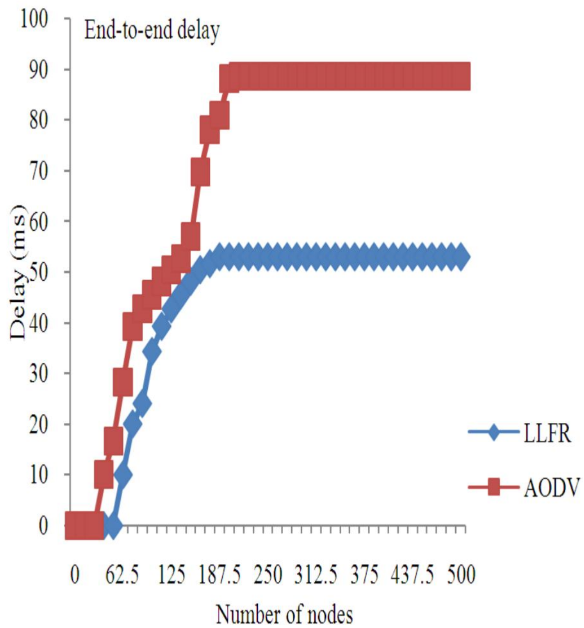

Fig7: End to end delay

Fig6 show that the throughput of AODV with LLFR is significantly better compared to AODV in the event of link failure. The LLFR achieves better throughput when compared to the other case, as the alternate path chosen by the LLFR is reliable leading to better throughput. There is negligible chance of data packet loss in case of stream of data such as voice or video as the intermediate node in no time triggers the LLFR algorithm and starts routing the data via a reliable alternate path. The average end to end delay is reduced considerably in the LLFR as referred in **Fig7.**

VIII. CONCLUSIONS

Mobile infrastructure Called AMMNET. Unlike conventional mobile ad hoc networks that suffer network partitions when the user groups move apart, the mobile mesh routers of an AMMNET track the users and dynamically adapt the network topology to seamlessly support both their intragroup and intergroup communications. Since this mobile infrastructure follows the users, full connectivity can be achieved without the need and high cost of providing network coverage for the entire application terrain at all time as in traditional stationary infrastructure. A novel scheme for Ad hoc networks to recover from link failure called the Local Link Failure Recovery Algorithm (LLFR) with AODV routing protocol for Ad hoc networks that establishes recovery from link

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failures spontaneously at the point of link breakage. In such cases, a reliable link failure recovery is the main criteria that will determine the performance of the network in terms of Quality of Service (QoS).

REFERENCES

[1] Ali Khosrozadeh1, Abolfazle Akbari2, Maryam Bagheri 3 and NedaBeikmahdavi4, "A New Algorithm AODV Routing Protocol in Mobile ADHOC Networks", Int. J Latest Trends Computing

[2] AODV, "Ad-hoc On-demand Distance Vector Routing", RFC 3561. C.E. Perkins, and E.M. Royer, Ad-hoc On-demand Distance Vector Routing, in: Proceedings of the 2th IEEE Workshop on Mobile Computing Systems and Applications, New Orleans, LA, February 1999, pp.90-100.

[3] C.F. Chiasserini, and R.R. Rao, Pulsed "Battery Discharge in Communication Devices", in: Proceedings of The Fifth Annual ACM/IEEE International Conference on Mobile Computing and Networking (MOBICOM-99), August 15-19, 1999, Seattle, WA, pp.88-95.

[4] C.-K. Toh, "Long-lived Ad-hoc Routing based on the Concept of Associativity", IETF MANET Working Group Inter Draft.

[5] DSR, "Dynamic Source Routing Protocol", IETF MANET Working Group Inter Draft.

[6] Elizabeth M. Belding-Royer, and Charles E. Perkins, "Evolution and Future Directions of the Ad-hoc On-demand Distance Vector Routingprotocol",www.elsevier.com/locate/adhoc, Ad-hoc Networks 1 (2003)125-150.

[7] E. Dahlman, S. Parkvall, and J. Sko¨ ld, 4G LTE/LTE-Advanced for Mobile Broadband. Academic, 2011.

[8] L. Nuaymi, WiMAX: Technology for Broadband Wireless Access. John Wiley & Sons, 2007.

[9] K. Fall, "A Delay-Tolerant Network Architecture for Challenged Internets," Proc. ACM Special Interest Group on Data Comm., 2003.

[10] A. Petkova, K.A. Hua, and S. Koompairojn, "Processing Approximate Rank Queries in a Wireless Mobile Sensor Environment," Proc. 11th Int'l Conf. Mobile Data Management (MDM), 2010.

[11] "QuadrocopterLLC,"http://quadrocopter.us/, 2013.

[12] R. Roy, "Handbook of Mobility Models and Mobile Ad Hoc Networks".

[13] Mahesh K. Marina, and Samir R. Das, "Ad-hoc On-demand Multi-path Distance Vector Routing", ACM SIGMOBILE Mobile Computing and Communications Review Special Feature on the First AODV Next Generation Workshop, July, 2002.

[14] Mei-yu Feng, Sheng Cheng, Xu Zhang, and Wei Ding, "A Self-Healing Routing Scheme Based on AODV in Adhoc Networks", 0-7695-2216-5/04, 2004, IEEE.

[15] OLSR, "Optimized Link State Routing Protocol", RFC 3626.

[16] P.R. Jasmine Jeni, 2A. Vimala Julie and 3A. Messiah Bose, "An enhanced route failure recovery Model for mobile ad hoc networks", Journal of Computer Science 10 (8): 1561-1568, 2014 ISSN: 1549-3636© 2014SciencePublicationsdoi:10.3844/jcssp.2014.1561.1568 Published Online 10 (8) 2014.

[17] Suhua Tang, and Bing Zhang, "A Robust AODV Protocol with Local Update", In: Proceedings of the 10th Asia-Pacific Conference on Communications and 5th International Symposium on Multi-Dimensional Mobile Communications.

[18] TBRPF, "Topology Dissemination Based on Reverse Path Forwarding", RFC 3684.

[19] Theodore S. Rappaport, "Wireless Communications Principles and Practice", Prentice Hall, December, 2001.

[20] V.Bharghavan, A. Demers, S. Shenker, and L.Zhang, "MACAW: A Media Access Protocol for Wireless LAN's," ACM SIGCOMM, 1994

[21] Yusuke Sakurai, and Jiro Katto, "AODV Multi-path Extension using Source Route".

[22] "Lists with Optimized Route Establishment", In: Proceedings of the International Workshop on Wireless Ad-hoc Networks (IWWAN), 2004.

[23] ZhenqiangMi, Member, IEEE, Yang, Ruochen Yu, and Hao Ding "Distributed Connectivity Restoration for Mobile Sensor Systems with Limited Information", IEEE SENSORS JOURNAL, VOL. 14, NO. 11, NOVEMBER 2014.

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Cinthiya S has received his B.E degree in Computer Science and Engineering from Avinashilingam University, Coimbatore. She is currently pursuing her M.E degree in Software Engineering from Anna University Regional Campus, Coimbatore. Tamilnadu, India.