AN APPROACH ON DATA DELIVERY IN MOBILE AD HOC NETWORKS

Vikram Narayandas*

P.Ravinder Kumar*

Abstract:

In this paper we are trying to addresses the problem of delivering data packets for highly dynamic mobile ad hoc networks in a reliable and timely manner. Most existing ad hoc routing protocols are susceptible to node mobility, especially for large-scale networks. Driven by this issue, we propose an efficient Position based Opportunistic Routing protocol (POR) which takes advantage of the stateless property of geographic routing and the broadcast nature of wireless medium. When a data packet is sent out, some of the neighbor nodes that have overheard the transmission will serve as forwarding candidates, and take turn to forward the packet if it is not relayed by the specific best forwarder within a certain period of time. By utilizing such in-the-air backup, communication is maintained without being interrupted. The additional latency incurred by local route recovery is greatly reduced and the duplicate relaying caused by packet reroute is also decreased.

Keywords: Opportunistic Routing protocol (POR), reliable data delivery, mobile ad hoc network.

* Associate Professor CSE Department, Jaya Prakash Narayan college of Engineering

1 .INTRODUCTION:

The purpose of the MANET working group is to standardize IP routing protocol functionality suitable for wireless routing application within both static and dynamic topologies with increased dynamics due to node motion or other factors. Security is a critical issue in a mobile ad hoc network (MANET). As compared with an infrastructured or wired network, a MANET poses many new challenges in security. Mobile ad-hoc network is deployed in applications such as disaster recovery and distributed collaborative computing, where routes are mostly multi-hop and network hosts communicate via packet radios Fig 1.Architecture of mobile adhoc networks

.

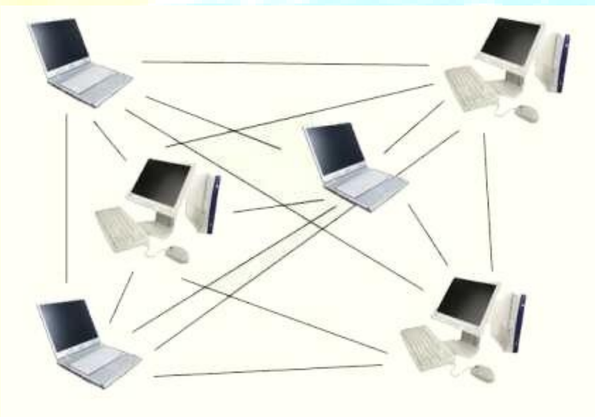

Fig 1.Architecture of mobile adhoc networks

Mobile Ad Hoc Networks (MANETs) are attractive for military communications that may take place in hostile battlefield environments. In such situations, the ability to reliably share secret information in the presence of adversaries is vital. Adversaries may attempt both passive and active forms of attack to gain unauthorized access to classified information, modify the information, or disrupt the information flow .Passive attacks do not disrupt network operation because the adversary snoops network traffic without making any alterations

Mobile Ad Hoc Networks (MANETs) are comprised of highly mobile nodes that communicate with one another without relying on a preexisting network infrastructure. Due to their mobile nature, nodes may frequently join and leave the network without notice. Nodes can directly communicate with neighbors, which are within direct transmission range, but must rely on intermediate nodes to forward packets to distant nodes, which are beyond the direct transmission range. Furthermore, nodes may be highly heterogeneous with respect to processing power, battery life, transmission range, and mobility patterns

Routing in ad hoc networks presents great challenge because the nodes in ad hoc networks can move freely and the topology changes continuously and unpredictably. A great effort has been made to design ad hoc routing protocols. Multipath routing technique is a promising choice since the use of multiple paths in a MANET could diminish the effect of unreliable wireless links and the constant topological changes. Several multipath routing schemes have been proposed to improve the reliability, fault-tolerance, end-to-end delay for bursty traffic, as well as to achieve load balancing etc.The design of POR is based on geographic routing and opportunistic forwarding. The nodes are assumed to be aware of its own location and the positions of its direct neighbours. Neighborhood location information can be exchanged using one-hop beacon or piggyback in the data packet's header. While for the position of the destination, we assume that a location registration and look-up service which maps node addresses to locations is available just as in . It could be realized using many kinds of location service. In our scenario, some efficient and reliable way is also available. Mobile Ad-hoc Networks (MANETs) are networks of mobile nodes communicating over multi-hop wireless links without the support of any infrastructure such as base stations.

Geographic routing (GR) uses location information to forward data packets, in a hop-by-hop routing fashion. Greedy forwarding is used to select next hop forwarder with the largest positive progress towards the destination while void handling mechanism is triggered to route around communication voids. No end-to end routes need to be maintained, leading to GR's high efficiency and scalability. GR is very sensitive to the inaccuracy of location information. If the node moves out of the sender's coverage area, the transmission will fail. Geographic routing (also called geo routing or position-based routing) is routing principle that relies on geographic position information. It is mainly proposed for wireless networks and based on the idea that the source sends a message to the geographic location of the destination instead of using the network address. The idea of using position information for routing was first proposed in the 1980s in the area of packet radio networks and interconnection networks. Geographic routing requires that each node can determine its own location and that the source is aware of the location of the destination. With this information a message can be routed to the destination without knowledge of the network topology or a prior route discovery.

There are various approaches, such as single-path, multi-path and -flooding based strategies. Most single-path strategies rely on two techniques: greedy forwarding and face routing. Greedy forwarding tries to bring the message closer to the destination in each step using only local information. Thus, each node forwards the message to the neighbor that is most suitable from a local point of view. The most suitable neighbor can be the one who minimizes the distance to the destination in each step (Greedy). Alternatively, one can consider another notion of progress, namely the projected distance on the source-destination-line (MFR, NFP), or the minimum angle between neighbor and destination (Compass Routing). Not all of these strategies are loop-free, i.e. a message can circulate among nodes in a certain constellation. The availability of small, inexpensive low-power GPS receivers and techniques for finding relative coordinates based on signal strengths, and the need for the design of power-efficient and scalable networks provided justification for applying position-based routing methods in ad hoc networks. Ad hoc sensor networks are useful for both service and application implementation. Services that can be enabled by availability of position include routing and querying. At application level, position is required in order to label the reported data in a sensor network, whereas position and orientation enable tracking. Nodes may have local capabilities such as the possibility of measuring ranges to neighbors, angle of arrival, or global capabilities, such as GPS and digital compasses.

We propose a novel Position based Opportunistic Routing protocol (POR) is proposed, in which several forwarding candidates cache the packet that has been received using MAC interception. If the best forwarder does not forward the packet in certain time slots, suboptimal candidates will take turn to forward the packet according to a locally formed order. In this way, as long as one of the candidates succeeds in receiving and forwarding the packet, the data transmission will not be interrupted. Potential multi-paths are exploited on the- fly on a per-packet basis, leading to POR's excellent robustness. Position based opportunistic routing mechanism which can be deployed without complex modification to MAC protocol and achieve multiple receptions without losing the benefit of collision avoidance. Opportunistic routing can still be achieved while handling communication voids. The Architecture diagram shows How the Communication will happen in the MANET using POR.Here Various Mobile Nodes are created at run time. The Neat architecture diagram is shown in the below

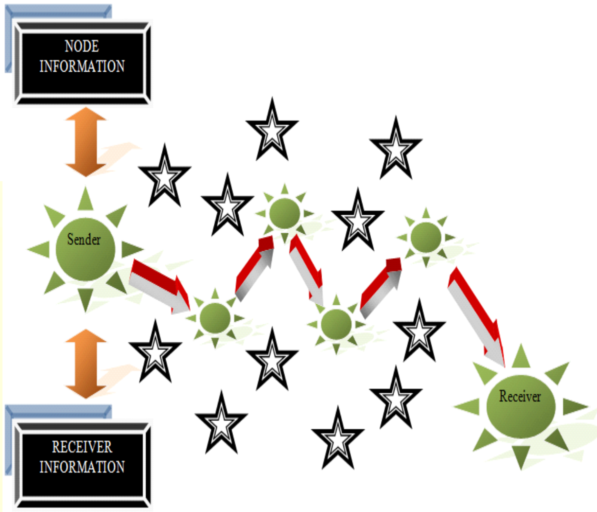

Figure 1: Architecture of Communication in the MANET using POR.

2. PROBLEM DEFINITION:

Traditional topology based MANET routing protocols are quite susceptible to node mobility.GR is very sensitive to the inaccuracy of location information. In the operation of greedy forwarding, the neighbour which is relatively far away from the sender is chosen as the next hop. If the node moves out of the sender's coverage area, the transmission will fail. The concept of such multicast like routing strategy has already been demonstrated in opportunistic routing However, most of them use link state- style topology database to select and prioritize the forwarding candidates. In order to acquire the internodes loss rates, periodic network-wide measurement is required, which is impractical for mobile environment. Recently, location aided opportunistic routing has been proposed, which directly uses location information to guide packet forwarding. However, just like the other opportunistic routing protocols, it is still designed for static mesh networks and focuses on network throughput.

3. RELATED WORK:

Position based Opportunistic Routing protocol (POR) is proposed, in which several forwarding candidates cache the packet that has been received using MAC interception. If the best forwarder does not forward the packet in certain time slots, suboptimal candidates will take turn to forward the packet according to a locally formed order. In this way, as long as one of the candidates succeeds in receiving and forwarding the packet, the data transmission will not be interrupted. Potential multi-paths are exploited on the- fly on a per-packet basis, leading to POR's excellent robustness.

Mobile ad hoc networks consist of nodes that are often vulnerable to failure. As such, it is important to provide redundancy in terms of providing multiple node disjoint paths from a source to a destination.

We first propose a modified version of the popular AODV protocol that allows us to discover multiple node-disjoint paths from a source to a destination. We find that very few of such paths can be found. Furthermore, as distances between sources and destinations increase, bottlenecks inevitably occur and thus, the possibility of finding multiple paths is considerably reduced. We conclude that it is necessary to place what we call reliable nodes (in terms of both being robust to failure and being secure) in the network for efficient operations. We propose a deployment strategy that determines the positions and the trajectories of these reliable nodes such that we can achieve a framework for reliably routing information. We define a notion of a reliable path which is made up of multiple segments, each of which either entirely consists of reliable nodes, or contains a preset number of multiple paths between the end points of the segment. We show that the probability of establishing a reliable path between a random source and destination pair increases considerably even with a low percentage of reliable nodes when we control their positions and trajectories in accordance with our algorithm. Multipath routing is one way of improving the reliability of the transmitted information. While multipath routing may be used for various other reasons such as load-balancing, congestion avoidance, lower frequency of route inquiries and to achieve a lower overall routing overhead our objective is to primarily design a multipath routing framework for providing enhanced robustness to node failures. Our first goal towards this is to design a routing protocol that would allow us to find multiple node-disjoint paths from a given source to a destination. We primarily look at reliability in terms of providing robustness to node failures in ad hoc networks. Node failures may be intermittent, i.e., for short periods or for long periods of time, and due to various reasons.DSR and TORA have the ability to find multiple paths. In DSR, by using the information received from multiple route queries which might traverse distinct paths, the destination can attempt to construct multiple node-disjoint paths. However, due to its inherent nature (as in AODV, described in the next section), DSR can find only a small fraction of the possible node-disjoint paths if used without any modifications.TORA builds and maintains multiple loop free paths using Directed Acyclic Graph (DAG) rooted at the destination; however, it does not find node-disjoint paths.

AODV combines the use of destination sequence numbers in DSDV with an on-demand route discovery technique. If a source needs a route to a destination, it invokes a network-wide flood of a route request or RREQ message. In response, either the destination or an intermediate node that knows a route to the destination sends a route reply or RREP message back to the source along the path on which the RREQ message was received.

M. Mauve and H. Hartenstein described Communications voids, where geographic greedy forwarding fails to move a packet further towards its destination, are an important issue for geographic routing in wireless networks. This article presents an overview of the void problem and surveys the currently available void-handling techniques for geographic routing. In the survey, we classify these void-handling techniques into six categories, each designed with a different approach, that is, planar-graph-based, geometric, flooding-based, cost based, heuristic, and hybrid. We present its basic principle and illustrate some classic techniques as well as the latest advances. We also provide a qualitative comparison of these techniques and discuss some possible directions of future research.

In recent years, with the rapid application of Global Positioning System (GPS) and the progress on self configuring localization mechanisms, it has regained significant attention, as it provides a promising solution for information delivery in next-generation wireless networks, for example, Mobile Ad Hoc Networks (MANETs), Vehicular Ad Hoc Networks (VANETs), Wireless Sensor Networks (WSNs), and Wireless Mesh Networks (WMNs).Different from topology-based routing, geographic routing exploits the geographic information1 instead of topological connectivity information to move data packets to gradually approach and eventually reach the intended destination. In most geographic routing protocols, only one-hop geographic information of neighboring nodes is exploited. Thus, geographic routing does not require the establishment or maintenance of complete routes from sources to destinations. Nodes do not have to store routing tables. There is no need to transmit routing messages to update route states either. The localized operation and the stateless feature of geographic routing make it simple and scalable. Geographic routing also enables a geocasting service, which supports the delivery of packets to all nodes in a specified geographic region .Geographic routing mainly relies on an extremely simple geographic greedy-forwarding strategy at every hop to move a data packet to a locally optimal next-hop node with a positive progress towards the destination node. However, greedy forwarding may not always be possible. For example, what if all the neighboring nodes of a sender are farther away from the destination node than the sender itself? That is, a sender fails to locate a next-hop node in its neighborhood which has a positive geographic progress towards the destination node. Communications void is a challenging problem for geographic routing and, in order to enable the use of geographic routing in next-generation wire-less networks, this problem must be tackled. Although a dense deployment of wireless nodes can reduce the likelihood of the occurrence of a void in the network, it is still possible for some packets to encounter voids that are induced by obstacles, unreliable nodes, the boundaries of a wireless network, and the like. These packets have to be discarded when only a single greedy-forwarding strategy is used, even though a topologically valid path to the destination node may still exist. Thus, it is imperative to design a void-handling technique for geographic routing in an effective and efficient manner.

We present an overview of ad hoc routing protocols that make forwarding decisions based on the geographical position of a packet's destination. Other than the destination's position, each node need know only its own position and the position of its one-hop neighbors in order to forward packets. Since it is not necessary to maintain explicit routes, position-based routing does scale well even if the network is highly dynamic. This is a major advantage in a mobile ad hoc network where the topology may change frequently. The main prerequisite for position-based routing is that a sender can obtain the current position of the destination. Therefore, recently proposed location services are discussed in addition to position-based packet forwarding strategies. We provide a qualitative comparison of the approaches in both areas and investigate opportunities for future research.

4. Position-based routing algorithm:

Position-Based Routing is the recent availability of small inexpensive GPS receivers and techniques for finding the relative coordinates based on signal strengths, and also the require for designing power efficient and scalable networks.

Position-based routing algorithms eliminate some of the limitations of topology-based routing by using additional information. They require that information about the physical position of the participating nodes be available. Commonly, each node determines its own position through the use of GPS or some other type of positioning service, a survey of these methods can be found in. A location service is used by the sender of a packet to determine the position of the destination and to include it in the packet's destination address. Position-based routing thus does not require the establishment or maintenance of routes. The nodes have neither to store routing tables nor to transmit messages to keep routing tables up to date. Position-based routing supports the delivery of packets to all nodes in a given geographic region in a natural way. This type of service is called geocasting. Routing in multi-hop wireless networks is challenging mainly due to unreliable wireless links/channels. Geographic opportunistic routing (GOR) was proposed to cope with the unreliable transmissions by exploiting the broadcast nature of the wireless medium and the spatial diversity of network topology. The capability of supporting multiple channel rates, which is common in the current wireless systems, has not been carefully studied for GOR.

We carry out a study on the impacts of multiple rates, as well as candidate selection, prioritization and coordination, on the performance of GOR.We propose a new local metric, opportunistic effective one-hop throughput (OEOT), to characterize the trade-off between the packet advancement and one-hop packet forwarding time. We further propose a local rate adaptation and candidate selection algorithm to approach the optimum of this metric.

Routing in Multi-Hop-Wireless networks is very challenging mainly due to variable and unreliable wireless channel conditions. Traditional routing schemes for multi-hop wireless networks have followed the concept of routing in wired networks by abstracting the wireless links as wired links, and finding the shortest path between a source and destination. Recently, a new routing paradigm, known as opportunistic routing, was proposed to mitigate the impact of link quality variations by exploiting the broadcast nature of the wireless medium and the spatial diversity of network topology. Some variants of opportunistic routing schemes use nodes' location information to define the forwarding candidate set and prioritize candidates. In this paper, we mainly focus on this kind of opportunistic routing by assuming that nodes' location information is available., we carry out a comprehensive study on multi rate, candidate selection, prioritization, and coordination and examine their impacts on the performance of GOR.Based on our analysis, we propose a new local metric, the opportunistic effective one-hop throughput (OEOT), to characterize the trade-off between the packet advancement and one-hop packet forwarding time under different data rates. We further propose a rate adaptation and candidate selection algorithm to approach the local optimum of this metric.

4.1. Characteristics:

a) Loop-freedom: routing protocols should be inherently loop-free, to avoid timeout or memorizing past traffic as cumbersome exit strategies

b) Distributed operation: Localized algorithms are distributed algorithms that resemble greedy algorithms, where simple local behavior achieves a desired global objective

c) Path strategy: The shortest path route is an example of a single path strategy, where one copy of the message is in the network at any time

d) Metrics: Most routing schemes use hop count as the metrics, where hop count is the number of transmissions on a route from a source to destination.

e) Message delivery: delivery property assumes the application of an ideal, collision free, medium access scheme, such as time division multiple access, or acknowledgement/retransmission Scheme Delivery rate is the ratio of numbers of messages received by destination and sent by senders. The primary goal of every routing scheme is to delivery the message, and the best assurance one can offer is to design routing scheme that will guarantee delivery.

f) Scalability: simplified criterion is applied that a routing scheme is scalable if it is loop-free, localized and single-path. The message delivery can be guaranteed in the static case, but hard to handle the loops in the case of node mobility. The loops are named by their positions.

g) Robustness: the accuracy of destination position is important. This talk only concentrates on the fixed node destination.

4.2. Location service in Manet

In order to learn the current position of a specific node, the help of a location service is needed. Mobile nodes register their current position with the service. When a node does not know the position of a desired communication partner, it contacts the location service and requests that information. In classic cellular networks, there are dedicated position servers (with well-known addresses) that maintain position information about the nodes in the network. With respect to the classification, this is a some-for-all approach since the servers are some specific nodes, each maintaining position information about all mobile nodes. In mobile ad hoc networks, such a centralized approach is aviable only as an external service that can be reached via non ad- hoc means. There are two main reasons for this. First, it would be difficult to obtain the position of a position server if the server were part of the ad hoc network itself. This would represent a chicken-and-egg problem: without a position server, it is not possible to get position information, but without the position information the server cannot be reached. Second, since an ad hoc network is dynamic, it might be difficult to guarantee that at least one position server will be present in a given ad hoc network.

5. Methodology:

Position based Opportunistic Routing protocol (POR) is proposed, in which several forwarding candidates cache the packet that has been received using MAC interception. If the best forwarder does not forward the packet in certain time slots, suboptimal candidates will take turn to forward the packet according to a locally formed order. In this way, as long as one of the candidates succeeds in receiving and forwarding the packet, the data transmission will not be interrupted. Potential multi-paths are exploited on the- fly on a per-packet basis, leading to POR's excellent robustness.

Methodologies are the process of analyzing the principles or procedure of a Reliable Data Deliver In MANET using POR.

5.1. MOBILE NODE CREATION :

The Main purpose of the mobile node creation is to creating the mobile node dynamically at specified location. Because mobile nodes are always dynamic in nature so static nodes will not a valid one in our project. During the mobile node creation, we also predict the Following Details about the mobile node:

1. Each mobile node name
2. Mobile node location (Point)
3. Local Host Address
4. Mobile Node Port number

5.2 DISTANCE CALCULATION:

The main purpose of the distance calculation method is to calculate the distance between the each node. Because distance calculation between each plays an vital role in the Priority Selection of the NEXT-HOP-FORWARDER in the mobile network.

5.3. PRIORITY SELECTION BETWEEN MOBILE NODES:

This is very important module in our Paper Because if the Sender wants to send one data to the Receiver, first the Sender wants to choose One Next-Hop-Node among its neighbors, it is very important because if a sender does not choose the Next-Hop-Node, it can't able to analyze which node is reliable to carry the data to the receiver. So by using Priority-Selection algorithm we can able to select Next-Hop node from available Neighbors.

5.4. DISTANCE CALCULATION:

This Method explains how the Connection will be implemented between each Next-Hop-Node in Uni Cast Manner. By using Priority-Selection Algorithm we have already implemented priority selection of Next-Hop-Nodes in the previous module. These Next-Hop-Nodes only can able to carry the data from the Sender to Receiver. Now We want to create the connections between each Next-Hop-Node from sender to receiver. This process only achieved in this module. The main purpose of this module is to Message Transferring from Sender to Receiver. Here each Next-Hop-Node acts as a Sender and transfer the data to the next node.

6. APPLICATION AND FUTURE SCOPE:

The technology of Mobile Ad hoc Networking is somewhat synonymous with Mobile Packet Radio Networking (a term coined via during early military research in the 70's and 80's), Mobile Mesh Networking (a term that appeared in an article in The Economist regarding the structure of future military networks) and Mobile, Multihop, Wireless Networking (perhaps the most accurate term, although a bit cumbersome). There is current and future need for dynamic ad hoc networking technology. The emerging field of mobile and nomadic computing, with its current emphasis on mobile IP operation, should gradually broaden and require highly-adaptive mobile networking technology to effectively manage multihop, ad hoc network clusters which can operate autonomously or, more than likely, be attached at some point(s) to the fixed Internet.

In our Approach we have implemented the mobile communication in MANET using uni cast technique, but this is not enough for large scale networks so in future we can implement in Multicasting using PRIORITY-SELCTION Forwarding technique.

7. CONCLUSION:

We address the problem of reliable data delivery in highly dynamic mobile ad hoc networks. Inspired by opportunistic routing, we propose a novel MANET routing protocol POR which takes advantage of the stateless property of geographic routing and broadcast nature of wireless medium. The efficacy of the involvement of forwarding candidates against node mobility, as well as the overhead due to opportunistic forwarding is analyzed. On the other hand, inherited from geographic routing, the problem of communication void is also investigated. To work with the multicast forwarding style, a virtual destination based void handling scheme (VDVH) is proposed. By temporarily adjusting the direction of data flow, the advantage of greedy forwarding as well as the robustness brought about by opportunistic routing can still be achieved when handling communication voids. Traditional void handling method performs poorly in mobile environments while VDVH works quite well.

8. References

[1] S. Biswas and R. Morris, “Exor: opportunistic multi-hop routing for wireless networks,” in SIGCOMM ’05, 2005, pp. 133–144.

[2] S. Chachulski, M. Jennings, S. Katti, and D. Katabi, “Trading structure for randomness in wireless opportunistic routing,” in SIGCOMM ’07, 2007, pp. 169–180.

[3] J. Broch, D. A. Maltz, D. B. Johnson, Y.-C. Hu, and J. Jetcheva, “Performance comparison of multi-hop wireless ad hoc network routing protocols,” in MobiCom ’98. ACM, 1998, pp. 85–97.

[4] E. Rozner, J. Seshadri, Y. Mehta, and L. Qiu, “Soar: Simple opportunistic adaptive routing protocol for wireless mesh networks,” Mobile Computing, IEEE Transactions on, vol. 8, no. 12, pp. 1622 –1635, dec. 2009.

[5] A. Balasubramanian, R. Mahajan, A. Venkataramani, B. N. Levine, and J. Zahorjan, “Interactive wifi connectivity for moving vehicles,” in SIGCOMM ’08, 2008, pp. 427–438.

[6] K. Zeng, Z. Yang, and W. Lou, “Location-aided opportunistic forwarding in multirate and multihop wireless networks,” Vehicular Technology, IEEE Transactions on, vol. 58, no. 6, pp. 3032–3040, July 2009.

Author's Information

1. Vikram Narayandas M.Tech (CN) from Shadan College of Engineering, R.R Dist, B.Tech (CSIT) from Sree Datta college of Engineering, Hyderabad and. Currently he is working as Associate Professor in CSE Department at Jaya prakash Narayan College of Engineering, Mahabubnagar. And he has 6 years of experience in Teaching. His areas of interest include Computer networks, wire less networks, Data mining, Network Security, Software Engineering, Sensor Networks, and Cloud Computing. He is the membership of IJMRA, IACSIT, ISTE, IAENG, and CSTA. He is Peer reviewer on honorary basis of GJCST.He is Associate Editor for IJMRA .He is reviewer for IJSER. He has Published 14 papers in International Journals.

2.P.Ravinder Kumar M.Tech(WMC) from vardhaman college of engineering ,B.Tech(ECE) from JayaPrakash Narayana College of Engineering Currently he is working as Associate Professor at Jaya prakash Narayan college of engineering And has 9 years of Experience in teaching . His areas of interest include computer networks and communications, wireless networks, signal processing. He has Published 3 papers in International Journals.