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Design and Implementation of IRTIV: Intelligent Routing protocol using real time Traffic for Mobile Ad Hoc Networks

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Abstract: Wireless networking is an emerging technology that will allow users to access information and services regardless of their geographic position. In contrast to infrastructure based networks, in wireless 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. This feature presents a great challenge to the design of a routing scheme since link bandwidth is very limited and the network topology changes as users roam. This thesis investigates the behavior of existing traditional routing algorithms and proposes and implements a new routing approach for ad hoc wireless networks: IRTIV: Intelligent Routing protocol using real time Traffic Routing. IRTIV: Intelligent Routing protocol using real time Traffic Routing is similar to Link State routing, but uses a IRTIV: Intelligent Routing protocol using real time Traffic technique to reduce the consumption of bandwidth by control overhead.

Keywords: DSRC, IRTIV MAC, Routing, Security, RSU, Vehicular communications, WAVE.

INTRODUCTION

Implementations of safety information such as speed limits and road conditions are used in many parts of the world but still more work is required to avoid car accidents in which millions of people around the world die and many are injured. Vehicular Ad Hoc Networks (VANET) is versatile tool to collect and distribute safety information to massively reduce the number of accidents by warning drivers about the danger before they actually face it. Such networks encompass of sensors and On Board Units (OBU) installed in the car as well as Road Side Units (RSU). The information collected from the sensors on the vehicles can be exhibited to the driver, propelled to the RSU or even broadcasted to other vehicles depending on its mode and significance. The RSU distributes statistics from road sensors, weather centers, traffic control centers along with the data received to the vehicles and also affords commercial services for instance parking space booking, Internet access and gas payment. The network makes widespread utilize of wireless communications to achieve its goals.

The wireless communications reached a height of saturation, a lot more expansion are required to execute such a complex system. Wireless networking is an emerging technology that will allow users to access information and services electronically, regardless of their geographic position. This has led to lower prices and higher data rates, which are the two main reasons why mobile computing is expected to see increasingly widespread use and relevance. Most available wireless systems rely on a base station for harmonization and other services. The usage of this wireless communication in covering all roads with such infrastructure is practically too expensive. Ad hoc networks have been premeditated for some time but VANET will form the biggest ad hoc network ever implemented as for as the issues of stability, reliability and scalability are of concern. VANET is a combination of an architectural network and ad hoc network. This unique characteristic collective with high speed nodes set hurdles to the design of the network.

In this paper we provide an overview of the technologies and ongoing research related to VANET. The VANET systems around the world are reviewed. IRTIV details and simulation results of IRTIV and ADOV of vehicular ad-hoc network are discussed and finally the paper is concluded.

The original motives behind this paper is to design a new mechanism that offer advantages for routing in wireless ad-hoc networks and implement vehicular communications is to develop a routing protocol for wireless ad-hoc networks were safety on the road and creating an environment, the routing strategy must scale well to large populations and handle mobility.

In addition, the routing protocol must perform well in terms of fast convergence, low routing delay, and low control overhead traffic. This primary involved researching existing routing protocols to determine their strengths and weaknesses.

Using this analysis, a new mechanism was developed that enhances routing in the mobile ad-hoc environment. This mechanism was then implemented in a software environment. Once the implementation was completed, simulation and analysis of the protocol was performed to evaluate the advantages of the new mechanism.

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1 LITERATURE REVIEW

1.1 Ad Hoc Routing Protocols

Since the advent of the Defense Advanced Research Projects Agency (DARPA) packet radio networks in the early 1970s [1], numerous protocols have been developed for ad hoc mobile networks. These routing protocols must deal with the typical limitations of these networks, which include low bandwidth and high error rates. The following is a list of desirable properties for an ad hoc wireless routing protocol:

- **Distributed operation:** The protocol should be distributed, meaning that it should not be dependent on a centralized controlling node. This makes the system more robust to failure and growth.
- **Fast convergence:** Routes should be quickly determined in the presence of network changes. This means that when topology changes occur, the protocol should be able to quickly determine optimal new routes.
- **Loop free:** To have good overall performance, the routing protocol should supply routes that are loop-free. This avoids wasting bandwidth and CPU resources.
- **Optimal routes:** It is important for the protocol to find routes with the least number of hops. This reduces bandwidth and CPU consumption. In addition, it leads to lower overall routing delay.
- **Low overhead control traffic:** Bandwidth in a wireless network is a limited resource. The protocol should minimize the amount of overhead control messages for routing.

There are many research groups both in industry and in academia that are attempting to provide solutions to routing in ad hoc wireless networks. Much of the research is brought together by the Internet Engineering Task Force (IETF), which is a large open international community of designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. IETF has a working group named MANET (Mobile Ad-hoc Networks) that is working in the field of ad-hoc networks [2]. MANET and independent research groups have produced many different ad hoc routing protocols. Among them, the following proposed protocols will be analyzed in the next sections:

- Dynamic Destination-Sequenced Distance Vector (DSDV)
- Wireless Routing Protocol (WRP)
- Clusterhead Gateway Switch Routing (CGSR)
- Zone-based Hierarchical Link State (ZHLS)
- Ad Hoc On Demand Distance Vector (AODV)
- Temporally-Ordered Routing Algorithm(TORA)
- Dynamic Source Routing (DSR)
- Associativity-Based Routing (ABR)
- Signal Stability Routing (SSR)

These protocols have been selected to be analyzed because they constitute a good representation of current proposed Table-Drive and On-Demand techniques as applied to mobile ad hoc networks. DSDV, WRP, CGSR, and ZHLS are table driven routing protocols and AODV, TORA, DSR, ABR, and SSR are on-demand routing protocols.

1.1.1 Destination Sequenced Distance Vector

DSDV[3] is a hop-by-hop distance vector routing protocol where each node has a routing table that stores next-hop and number of hops for all reachable destinations. Like distance-vector, DSDV requires that each node periodically broadcast routing updates. The advantage with DSDV over traditional distance vector protocols is that DSDV guarantees loop-free routes.

To guarantee loop-free routes, DSDV uses a sequence number to tag each route. The sequence number shows the freshness of a route and routes with higher sequence numbers are favorable. A route R is considered more favorable than S if R has a greater sequence number, or, if the routes have the same sequence number, but R has a lower hop count. The sequence number is increased when node A detects that a route destination D has broken. So the next time node A advertises its routes, it will advertise the route to D with an infinite hop-count and a sequence number that is larger than before.

DSDV basically is distance vector with small adjustments to make it better suited for ad-hoc networks. These adjustments consist of triggered updates that will take care of topology changes in the time between broadcasts. To reduce the amount of information in these packets, there are two types of update messages defined: full and incremental. The full broadcast carries all available routing information and the incremental broadcast only carries the information that has changed since the last broadcast.

1.1.2 The Wireless Routing Protocol- WRP

The Wireless Routing Protocol (WRP) [4] is a table-based distance-vector routing protocol. Each node in the network maintains a Distance table, a Routing table, a Link-Cost table and a Message Retransmission list.

The Distance table of a node x contains the distance of each destination node y via each neighbor z of x. It also contains the downstream neighbor of z through which this path is realized. The Routing table of node x contains the distance of each destination node y from node x, the predecessor and the successor of node x on this path. It also contains a tag to identify if the entry is a simple path, a loop or invalid. Storing predecessor and successor in the table is beneficial in detecting loops and avoiding counting-to-infinity problems. The Link-Cost table contains cost of link to each neighbor of the node and the number of timeouts since an error-free message was received from that neighbor. The Message Retransmission list (MRL) contains information to let a node know which of its neighbor has not acknowledged its update message and to retransmit update message to that neighbor.

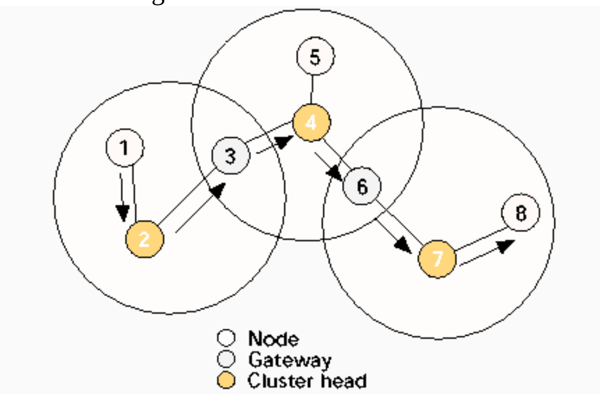
Node exchange routing tables with their neighbors using update messages periodically as well as on link changes.

The nodes present on the response list of update message (formed using MRL) are required to acknowledge the receipt of update message. If there is no change in routing table since last update, the node is required to send an idle

Hello message to ensure connectivity. On receiving an update message, the node modifies its distance table and looks for better paths using new information. Any new path so found is relayed back to the original nodes so that they can update their tables. The node also updates its routing table if the new path is better than the existing path. On receiving an ACK, the mode updates its MRL. A unique feature of this algorithm is that it checks the consistency of all its neighbors every time it detects a change in link of any of its neighbors.

1.3 Clusterhead Gateway Switching Routing- CGSR
Clusterhead Gateway Switch Routing (CGSR)[5] uses as basis the DSDV Routing algorithm described in the previous section. The protocol differs in the type of addressing and network organization scheme employed. Instead of a “flat” network, CGSR is a clustered multihop mobile wireless network. It routes traffic from source to destination using a hierarchical cluster-head-to-gateway routing approach. A packet sent by a node is first routed to its cluster head, and then the packet is routed from the cluster head to a gateway to another cluster head, and so on until the cluster head of the destination node is reached. The packet is then transmitted to the destination.

Error! Reference source not found. illustrates an example of this routing scheme. Using this method, each node must keep a “cluster member table” where it stores the destination cluster head for each mobile node in the network. These cluster member tables are broadcast by each node periodically using the DSDV algorithm. Nodes update their cluster member tables on reception of such a table from a neighbor.



Routing from node 1 to node 8.

1.1.3 Zone-based Hierarchical Link State

In Zone-based Hierarchical Link State , the network is divided into non-overlapping zones. ZHLS defines two levels of topologies: 1) node level and 2) zone level. A node level topology describes how nodes of a zone are connected to each other physically. A virtual link between two zones exists if at least one node of a zone is physically connected to some node of the other zone. Zone level topology tells how zones are connected together. Unlike other hierarchical protocols, there are no zone heads. The zone level topological information is distributed to all nodes.

There are two types of Link State Packets (LSP) as well: node LSP and zone LSP. A node LSP of a node contains its neighbor node information and is propagated within the zone whereas a zone LSP contains the zone information and is propagated globally. Each node only knows the node connectivity within its zone and the zone connectivity of the whole network. So given the zone id and the node id of a destination, the packet is routed based on the zone id till it reaches the correct zone. Then in that zone, it is routed based on node id. A <zone id, node id> of the destination is sufficient for routing so it is adaptable to changing topologies.

1.1.4 Ad Hoc On Demand Distance Vector- AODV

Ad hoc On-demand Distance Vector Routing (AODV) [6, 7] is an improvement on the DSDV algorithm. AODV minimizes the number of broadcasts by creating routes on-demand as opposed to DSDV that maintains the list of all the routes.

To find a path to the destination, the source broadcasts a route request (RREQ) packet. The neighbors in turn broadcast the packet to their neighbors until it reaches an intermediate node that has a recent route information about the destination or until it reaches the destination. A node discards a route request packet that it has already seen. The route request packet uses sequence numbers to ensure that the routes are loop free and that the intermediate node replies to route requests are the most recent.

When a node forwards a route request packet to its neighbors, it also records in its tables the node from which the first copy of the request came. This information is used to construct the reverse path for the route reply packet. AODV uses only symmetric links because the route reply packet follows the reverse path of route request packet. As the route reply packet traverses back to the source, the nodes along the path enter the forward route into their tables.

If the source moves then it can reinitiate route discovery to the destination. If one of the intermediate nodes move then the moved nodes neighbor realizes the link failure and sends a link failure notification to its upstream neighbors and so on until it reaches the source upon which the source can reinitiate route discovery if needed.

The protocol also uses HELLO messages that are broadcast periodically to the immediate neighbors. These HELLO messages are local advertisements for the continued presence of the node to its neighbors. If HELLO messages stop coming from a particular node, the neighbor can assume that the node has moved away and notify the affected set of nodes by sending them a link failure notification.

1.1.4 Temporally-Ordered Routing Algorithm- TORA

Temporally Ordered Routing Algorithm (TORA) is a distributed source-initiated on-demand routing protocol [8]. The basic underlying algorithm is one in a family referred to as link reversal algorithms. TORA is designed to minimize reaction to topological changes. A key concept in this design is that control messages are

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typically localized to a very small set of nodes. It guarantees that all routes are loop-free (although temporary loops may form), and typically provides multiple routes for any source/destination pair.

TORA can be separated into three basic functions: 1) creating routes, 2) marinating routes, and 3) erasing routes. The creation of routes basically assigns directions to links in an unidirected network or portion of the network, building a directed acyclic graph (DAG) rooted at the destination.

TORA associates a height with each node in the network. All messages in the network flow downstream, from a node with higher height to a node with lower height. Routes are discovered using Query (QRY) and Update (UPD) packets. When a node with no downstream links needs a route to a destination, it will broadcast a QRY packet. This QRY packet will propagate through the network until it reaches a node that has a route or the destination itself.

1.1.5 Dynamic Source Routing- DSR

Dynamic Source Routing (DSR)[9,10] is a source-routed on-demand routing protocol. Source routing means that each packet in its header carries the complete ordered list of nodes through which the packet must pass. DSR uses no periodic routing messages (ie. no router advertisements), thereby reducing network bandwidth overhead and avoiding large routing updates throughout the ad-hoc network. Instead, DSR maintains a route cache, containing the source routes that it is aware of. It updates entries in the routes cache when it learns about new routes. The two basic modes of operation in DSR are 1) route discovery and 2) route maintenance.

When the source node wants to send a packet to a destination, it looks up its route cache to determine if it already contains a route to the destination. If it finds that an unexpired route to the destination exists, then it uses this route to send the packet. But if the node does not have such a route, then it initiates the route discovery process by broadcasting a route request packet. The route request packet contains the address of the source and the destination and a unique identification number. Each intermediate node checks whether it knows of a route to the destination. If it does not, it appends its address to the route record of the packet and forwards the packet to its neighbors. To limit the number of route requests propagated, a node processes the route request packet only if it has not already seen the packet and it's address is not present in the route record of the packet.

A route reply is generated when either the destination or an intermediate node with current information about the destination receives the route request packet. A route request packet reaching a such node contains the sequence of hops taken from the source to this node in its route record.

As the route request packet propagates through the network, the route record is formed. If the route reply is generated by the destination then it places the route record from route request packet into the route reply packet. On the other hand, if the node generating the route reply is an intermediate node then it appends its cached route for the destination to the route record of route request packet and puts that into the route reply packet.

1.1.6 Associativity-Based Routing- ABR

The Associativity Based Routing (ABR) protocol is a new approach for routing as proposed in[11,12]. ABR defines a new metric for routing known as the degree of association stability. It is free from loops, deadlock, and packet duplicates. In ABR, a route is selected based on associativity states of nodes. The routes thus selected are liked to be long-lived. All node generate periodic beacons to signify its existence. When a neighbor node receives a beacon, it updates its associativity tables. For every beacon received, a node increments its associativity tick with respect to the node from which it received the beacon. Association stability means connection stability of one node with respect to another node over time and space. A high value of associativity tick with respect to a node indicates a low state of node mobility, while a low value of associativity tick may indicate a high state of node mobility. Associativity ticks are reset when the neighbors of a node or the node itself move out of proximity. The fundamental objective of ABR is to find longer-lived routes for ad hoc mobile networks. The three phases of ABR are Route discovery, Route reconstruction (RRC) and Route deletion.

1.1.7 Signal Stability-Based Routing- SSR

Signal Stability-Based Routing protocol (SSR) as presented in [13], an on-demand routing protocol that selects routes based on the signal strength between nodes and a node's location stability. This route selection criterion has the effect of choosing routes that have "stronger" connectivity. SSR comprises of two cooperative protocols: the Dynamic Routing Protocol (DRP) and the Static Routing Protocol (SRP).

The DRP maintains the Signal Stability Table (SST) and Routing Table (RT). The SST stores the signal strength of neighboring nodes obtained by periodic beacons from the link layer of each neighboring node. Signal strength is either recorded as a strong or weak channel. All transmissions are received by DRP and processed. After updating the appropriate table entries, the DRP passes the packet to the SRP.

2 IRTIV: INTELLIGENT ROUTING PROTOCOL

2.1 Protocol Overview

In this chapter, a new routing scheme for ad-hoc wireless networks is presented. The goal is to provide an accurate routing solution while the control overhead is kept low. The proposed scheme is named “IRTIV: Intelligent Routing protocol using real time Traffic Routing” due to the novel ‘IRTIV: Intelligent Routing protocol using real time Traffic’ updating mechanism. Similar to Link State Routing, IRTIV: Intelligent Routing protocol using real time Traffic Routing generates accurate routing decisions by taking advantage of the global network information. However, this information is disseminated in a method to reduce overhead control traffic caused by traditional

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flooding. Instead, it exchanges information about closer nodes more frequently than it does about farther nodes. So, each node gets accurate information about neighbors and the detail and accuracy of information decreases as the distance from the node increases.

2.2 Table-Driven Design

IRTIV: Intelligent Routing protocol using real time Traffic Routing determines routing decisions using a table-driven routing mechanism similar to link state. The table-driven ad hoc routing approach uses a connectionless approach of forwarding packets, with no regard to when and how frequently such routes are desired. It relies on an underlying routing table update mechanism that involves the constant propagation of routing information. A table-driven mechanism was selected over an on-demand mechanism based on the following properties:

- On-Demand routing protocols on the average create longer routes than table driven routing protocols [14].
- On-Demand routing protocols are more sensitive to traffic load than Table-Driven in that routing overhead traffic and latency increase as data traffic source/destination pairs increase.
- On-Demand Routing incurs higher average packet delay than Table Driving routing which results from latency caused by route discovery from new destinations and less optimal routes.
- Table-Driven routing accuracy is less sensitive to topology changes. Since every node has a 'view' of the entire network, routes are less disrupted when there is link breakage (route reconstruction can be resolved locally).
- Table-Driven protocols are easier to debug and to account for routes since the entire network topology and route tables are stored at each node, whereas On-Demand routing only contain routes that are source initiated and these routes are difficult to track over time.

For these reasons, a table driven scheme for the ad hoc routing protocol was chosen. Link state was chosen over distance vector because of faster speed of convergence and shorter-lived routing loops.[15] Link state topology information is disseminated in special link-state packets where each node receives a global view of the network rather than the view seen by each node's neighbor. IRTIV: Intelligent Routing protocol using real time Traffic routing takes advantage of this feature by implementing a novel updating mechanism to reduce control overhead traffic. There are 3 main tasks in the routing protocol:

1) **Neighbor Discovery**: responsible for establishing and maintaining neighbor relationships.
2) **Information Dissemination**: responsible for disseminating Link State Packets(LSP), which contain neighbor link information, to other nodes in the network.
3) **Route Computation**: responsible for computing routes to each destination using the information of the LSPs.

Each node initially starts with an empty neighbor list and an empty topology table. After its local variables are initialized, it invokes the *Neighbor Discovery* mechanism to acquire neighbors and maintain current neighbor relationships. LSPs in the network are distributed using the *Information Dissemination* mechanism. Each node has a database consisting of the collection of LSPs originated by each node in the network. From this database, the node uses the *Route Computation* mechanism to yield a routing table for the protocol. This process is periodically repeated.

3. SIMULATION RESULTS AND DISCUSSION

Simulation is carried out to determine the effectiveness of proposed protocol IRTIV. The primary goal of this simulation is to analyze proposed protocol IRTIV by comparing it with other protocol i. e. AODV. The values of simulation parameters are summarized in Table.

Table 3.1: Simulation parameters

Parameters	Value
Number of nodes	10-50 (in steps of 10)
Initial energy	100 J
Data packet size	512 bytes
Transmission range	250 m
Transmission power	0.05 J
Receiving power	0.04 J
Simulation Time	10 sec

Network simulator (NS2) is used to simulate all types of network. It is a discrete event driven simulator and start packet sending for specified time. Results are generated in the form of graph. Performance metrics are evaluated to check QoS of a presented protocol.

3.1 Performance Metrics

3.1.1 Energy consumption: This is the amount of energy consumed by sensor nodes during the period of network lifetime in transmitting, receiving, computation, idle and sleep. The unit of energy consumption used in the simulation is Joule. Lower the energy consumption better is the performance of the network. The formula for energy of node

Energy of node E= Initial energy – (Tx energy + Rx energy) * no.of packets

Where, Tx = transmission energy
Rx = receiving energy

3.1.2 Packet delivery ratio: It is the percentage of ratio between the number of packets sent by sources and the number of received packets at the sink or destination. Higher the packet delivery ratio better is the performance of the network

Packet Delivery Ratio = (Total packets received / Total packets sent) * 100

3.1.3 Throughput: It is the average rate of successful message delivery over a communication channel which is measured in bits per second i.e. bps.

Throughput = (Size of the packet / Transmission time)

3.1.4 End to end delay: It is a time required for packets to reach to destination node from source node. Lower the end-to-end delay better is the performance of the network.

D = (Receiving time – Sending time) * No. of packets

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The following graphs demonstrate the comparison of various performance metrics of AODV and IRTIV.

3.1.1 Energy Consumption Over Time

Table 3.1.1 : Table for energy consumption over time

Time(ms)	AODV	IRTIV
10	4.569458	2.245000
20	5.379140	3.985314
30	6.597233	4.963966
40	8.534955	5.245000
50	8.097608	6.245000
60	9.952474	9.108198
70	11.613980	8.245000
80	11.464340	11.419429
90	12.899099	12.586951
100	13.798971	11.245000

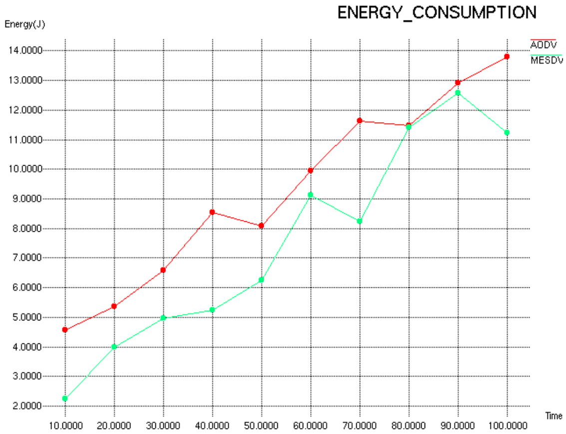

Figure 3.1.1: Comparison graph of Energy Consumption over time

Figure 3.1.1 shows the comparison graph of energy consumed over time between AODV and IRTIV. From the graph it can be analyzed that the energy consumed over time is much less in case of IRTIV as compared to AODV. This is because in AODV there is no check on energy level of nodes. This leads to packet drop which subsequently results in decrease in the packet ratio over time. As a result the source nodes have to retransmit the lost packets after timeout. As a result the energy consumption increases in case of AODV. In proposed IRTIV, as nodes with high level of energy are chosen for forwarding the packets resulting in decrease in packet drop and increase in packet delivery ratio over time. This leads to reduction in energy consumption and hence IRTIV consumes less energy over time as compared to AODV.

3.1.2 Packet delivery ratio over time

Table 3.1.2 : Table for packet delivery ratio over time

Time(ms)	AODV	IRTIV
10	52.806931	95.480799
20	49.528159	91.461141
30	53.778567	94.595456
40	54.306058	97.030864
50	56.409051	90.146082
60	51.884545	91.924396
70	50.466683	92.650456
80	54.221745	91.773800
90	52.880570	90.161113
100	53.717984	90.241077

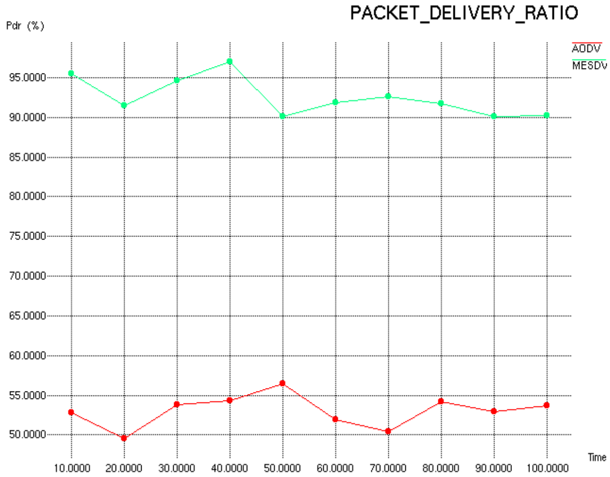

Figure 3.1.2: Comparison graph of Packet Delivery Ratio over time

Figure 3.1.2 shows the comparison graph of packet delivery ratio over time between AODV and IRTIV. From the above graph it can be analyzed that the packet delivery ratio over time is much better in case of IRTIV as compared to AODV. AODV maintains routes for as long as the route is active. It is likely that many link breakages along a route will occur during the lifetime of that route so it decreases its packet delivery ratio. IRTIV uses high energy nodes and with the help of Antnet algorithm, shortest path is obtained resulting in high packet delivery ratio.

3.1.3 End-To-End delay over time

Table 3.1.3: Table for end-to-end delay over time

Time(ms)	AODV	IRTIV
10	16.61	11.77
20	18.18	15.69
30	17.87	14.53
40	18.03	15.10
50	18.23	15.71
60	14.38	6.10
70	17.04	12.51
80	17.60	13.78
90	13.40	3.86
100	18.81	17.05

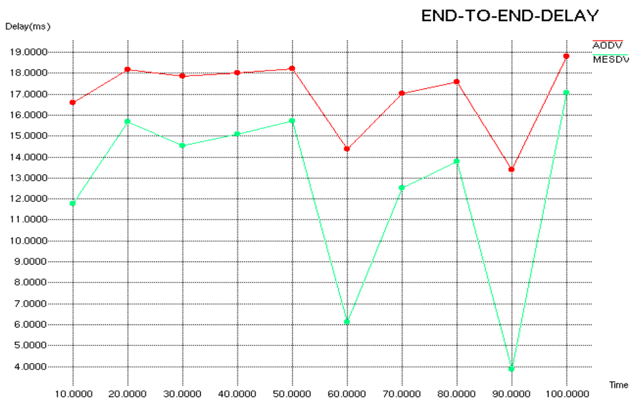

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Figure 3.1.3: Comparison graph of End-To-End Delay over time

Figure 3.1.3 shows the comparison graph of end-to-end delay over time between AODV and IRTIV. From the above graph it can be analyzed that the end-to-end delay over time is much less in case of IRTIV as compared to AODV. In AODV, there is a possible large delay from the moment the route is needed (a packet is ready to be sent) until the time the route is actually acquired. But in IRTIV, Using Antnet algorithm the shortest path to destination is found for forwarding the packet resulting in low delay. In IRTIV shortest path scheme is applied resulting in decrease in packet drop and increase in packet delivery ratio over time. This results in the decrease in end-to-end delay. Hence IRTIV has lesser delay over time as compared to AODV.

3.1.4 Throughput over Time

Table 3.1.4: Table for throughput over time

Time (ms)	AODV	IRTIV
10	83.20	109.06
20	86.30	102.16
30	83.89	99.76
40	86.54	102.40
50	87.41	103.27
60	91.50	107.37
70	82.13	97.99
80	83.55	109.42
90	80.34	106.20
100	84.72	100.59

Figure 3.1.4 shows the comparison of throughput over time between AODV and IRTIV. From the graph it can be analyzed the throughput over time is much better in case of IRTIV as compared to AODV. This is because in AODV, energy level of nodes is not checked. This leads to packet drop when low level energy nodes are taken in route which subsequently decreases the packet delivery ratio over time. As a result throughput of the network deteriorates. In IRTIV shortest path with nodes having high level of energy are chosen resulting in decrease in packet drop and increase in packet delivery ratio over time. This results in increase in throughput over time. Hence IRTIV has better throughput over time as compared to AODV.

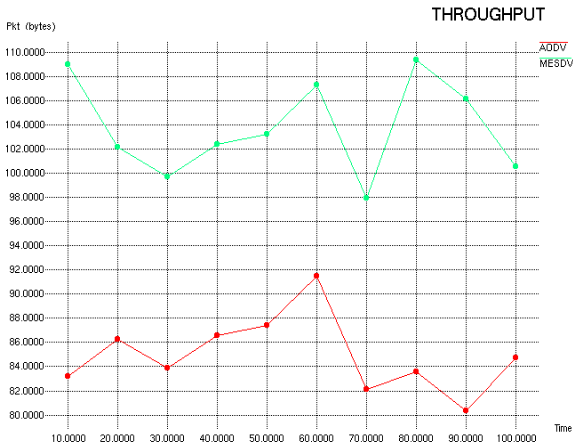

Figure 3.1.4: Comparison graph of Throughput over time

4. CONCLUSION AND SCOPE OF FUTURE WORK

4.1 Conclusion

A new routing scheme using a link-state foundation and employing a novel IRTIV: Intelligent Routing protocol using real time Traffic updating mechanism was designed and implemented. Called IRTIV: Intelligent Routing protocol using real time Traffic routing, this mechanism reduces the control overhead by disseminating topology information using the IRTIV: Intelligent Routing protocol using real time Traffic technique, where routing information is updated at different rates depending on the distance from the source.

Through simulation, IRTIV: Intelligent Routing protocol using real time Traffic routing has exhibited good performance in reducing overhead control traffic. It also performs well in terms of successful packet delivery in the presence of low mobility. Proper selection of the update interval time is necessary for good successful packet delivery in the presence of high mobility.

This thesis has given insight into the problems that arise when designing routing protocols in an ad hoc wireless network, shown correct implementation functionality, and demonstrated functionality and performance of the IRTIV: Intelligent Routing protocol using real time Traffic Routing Protocol

4.2 scope of future work

Current ad hoc routing approaches have introduced several new paradigms, such as exploiting user demand, the use of location, association parameters, and updating mechanisms. However, it is not clear that any particular algorithm or class of algorithm is the best for all scenarios, each protocol has definite advantages and disadvantages, and is well suited for certain situations. A key characteristic to the success of widespread use of a ad hoc wireless routing protocol is flexibility. A flexible ad hoc routing protocol could responsively invoke table-driven and/or on-demand approaches based on situations and communication requirements. The “toggle” between these two approaches may not be trivial since concerned nodes must be “in sync” with the toggling. Coexistence of both approaches may also exist in spatially clustered ad hoc groups, with intracluster employing table-driven approach and intercluster employing the demand-driven approach, or vice-versa. Further work is necessary to investigate the feasibility and performance of hybrid ad hoc routing approaches.

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REFERENCES

1. J. Jubin and J. Tornow, “The DARPA Packet Radio Network Protocols,” Proceedings of IEEE, vol. 75, no. 1, 1987, pp. 21-32

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2. Mobile Ad-hoc Networks (MANET). URL:www.ietf.org/html.charters/manet-charter.html. February 2000. Work in progress.
3. C. Perkins and P. Bhagwat, "Highly Dynamic Destination-Sequenced Distance-Vector Routing(DSDV) for Mobile Computers", Computer Communication Review, October 1994, pp.234-244.
4. S. Murthy and J.J. Garcia-Luna-Aceves, "An Efficient Routing Protocol for Wireless Networks," ACM Mobile Networks and Applications, Routing in Mobile Communication Networks, Oct. 1996, pp. 183-97.
5, C. Chiang, "Routing in Clustered Multihop, Mobile Wireless Networks with Fading Channel," Proceedings of IEEE SICON '97, April 1997, pp. 197-211.
6. C.E. Perkins and E.M. Royer, "Ad-hoc On-Demand Distance Vector Routing," Proceedings of 2nd IEEE Workshop of Mobile Computer Systems and Applications, Feb. 1999, pp. 90-100.
7. C. Perkins and E. Royer, "Ad Hoc On Demand Distance Vector(AODV) Routing," IETF Internet draft, Nov. 1998.
8. V. Park and M. Corson, "A Highly Adaptive Distributed Routing Algorithm for Mobile Wireless Networks," Proceedings of INFOCOM '97, Apr. 1997.
9. D. Johnson and D. Maltz, "The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks", October 1999 IETF Internet-Draft.
10. D. Johnson and D. Maltz, "The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks", October 1999 IETF Internet-Draft.
11. C. Toh, "A Novel Distributed Routing Protocol to Support Ad-Hoc Mobile Computing," Proceedings of 1996 IEEE 15th Annual International Conference on Computing and Communication, Mar. 1996, pp. 480-86.
12. C. Toh, "Associativity-Based Routing for Ad-Hoc Mobile Networks," Wireless Personal Communication, vol. 4, no.2, Mar. 1997, pp. 1-36.
13. R. Dube, "Signal Stability based Adaptive Routing for Ad-Hoc Mobile Networks," IEEE Personal Communication, Feb.1997, pp. 36-45.
14. A. Iwata, C.-C. Chiang, G. Pei, M. Gerla, and T.-W. Chen, "Scalable Routing Strategies for Ad Hoc Wireless Networks", IEEE Journal on Selected Areas in Communications, Aug. 1999, pp. 1369-79.
15. W. Zaumen and J. Aceves, "Dynamics of Distributed Shortest-path Routing Algorithms", Proceedings on Communication Architecture and Protocols, September 1991, pp 31-42.

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