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Hello Messaging based Aodv Routing Protocol and Its Simulation

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Abstract

Routing is the method, which is used to maintain, the wireless communication of ad-hoc network. It has various discoveries and different paths between every node within a network. The process of preparing Routing table itself is called Routing. Routing uses the concept of switching. In switching an incoming packet is transferred to destination using MAC address. It is done within the network. The efficiency of a dynamic ad-hoc routing protocols is mainly based on the changes in network topology. The transmission via wireless medium increase the security of message transmission. It prevents the unauthorized access and provides security and offers authentication and access-control to the transmission of Messages. The, increasing day-by-day use of wireless media has reduced the works of humans and their access to the wireless devices. As, everything has its Merits and Demerits the, wireless media also have both Merits and Demerits, the disadvantage as included minimizing size and cost security and loss, mobility signal fading etc.

In this paper, we adaptively optimize the performance of AODV protocol using simulation results. The proposed fuzzy algorithm used to model the uncertainty measurements for updating local connectivity successfully in time and provide an overview of the Research Issues and Challenges in wireless networks and wireless network performance.

Keywords: Hello messages, AODV, wireless communication, Ad-hoc Network

INTRODUCTION

Every node is working as router in mobile, ad-hoc network, which is having no infrastructure. In this network, each node has its own local neighbors and it will communicate to these neighbors, that are out of its transmission range and it called as Multihop. These networks suffer from nodes mobility causes continual link breaks. Local Connectivity Management is one of the techniques to update, the routing protocol knowledge about these neighbors. One of those techniques is periodically broadcasting short beacon messages (called hello messages)[1].

We adaptively optimize the maximum time period that taken before the node transfer the next hello message to its neighbors in this paper. During a fixed period of time the number of sent hello messages has been directly affected. The co-relation between the periodical interval for the transmission of hello message and reconstruction of topology deals with optimization. The decision of increasing or decreasing the frequency of hello messages is made during a fixed period of time through a fuzzy logic system. Fuzzy set theory provides high flexibility and it is used to model complex systems.

Ad-hoc On Demand Distance Vector (AODV) [9] routing protocol is used in this method. Routers are used as per needed by per node and they determined the route, as it is a reactive routing protocol. The, two parameter used are: Hello-Interval (HI) and allowed-hello-loss. The link between the neighbors and the node is broken, only when the neighbor does not get any packet (hello message) for allowed hello-loss.

The growth in wireless networks [2] over the last few years resembles the rapid growth of the internet over the last decade. Wireless communication is done with each other not via visible medium in spite of this wireless networks are used. The immense growth of internet-wireless, wireless home networking & cellular telephony enjoys wireless communication [4]. WLAN technology [3] allow high speed of wireless network access and mobile network access.

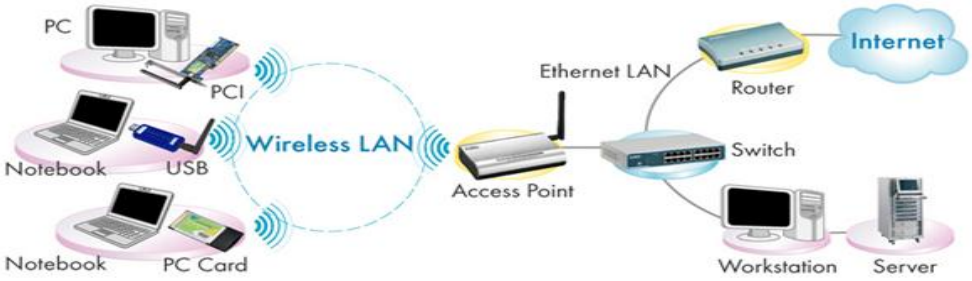


Figure 1: Infrastructure wireless network

The stored data, can be accessed by all people, even when are outside in travelling journeys etc. Wireless communication is hacked by hacker for exploiting the networks. Security Measurements are used to prevent the unauthorized access.

RELATED WORK

The utilization of hello message in Local Connectivity Management (LCM) in various comparisons are used as metric, for those ad-hoc routing protocols. Research has also focused on the usage of mathematical methods to estimate the stability of the links in ad-hoc networks. The lifetime expectations of these methods mainly depend on the choice of links we use. The, main creator of AODV protocol Perkins *et al.[9]* gives detailed description why hello messages has been used and the disadvantages of using these message. They mentioned that they will investigate other ways to eliminate drawbacks of these messages. The frequency optimizations of hello messages remove all of its disadvantages and give its advantages, which are mentioned in this page.

Lundgren *et al.* [10] evidence says that sometimes mismatch occur between the actual connectivity status and the router due to unreliable implement action of hello message. This mismatch is known as "*communication gray zones*". In these zones in spite of neighbor's reach ability are sensed by hello message but the actual data message cannot be exchanged between router and its neighbors. To, remove this drawback one such routing protocol [5] called position-based routing protocols, are introduced. The presence and the current position are indicated by these protocols.

In this each node broadcast a sort hello message to have the presence. GPS tracking is used on topology-based routing protocols. The proposed method of wireless network communication [4] can be extended for these types of protocols and the main focus, in these references is mainly on topology-based routing protocol only.

TYPES OF WIRELESS NETWORK

Taxonomy Of Wireless Networks

The wireless communication is one of important adapting feature for the latest technologies. In the wireless communication the packets are arranged in small segments and transmitted, this is the distinguishing features which are not present in other networks.

IEEE 802.11

A computer is also called a host, workstation, node and Wireless Local Area Network (WLAN) communication is the main feature of IEEE 802.11. It was developed and the standard was first introduced in 1997. It was envisioned for home and office environments for wireless local area connectivity and supports three types of transmission technologies. The IEEE 802.11 mainly works for 3 types as technologies which is in generally used for transmission namely:

- Direct Sequence Spread Spectrum (DSSS)
- Frequency Hopping Spread Spectrum (FHSS)
- Infrared (IR)

IEEE 802.11 has two types of wireless networks, namely, the infrastructure networks and the ad hoc networks.

Infrastructure Networks

The infrastructure type of wireless network (Fig 1) is a network with an Access Point (AP), in which all stations (STAs) must be associated with an AP to access the network. Stations communicate with each other through the AP. In infrastructure wireless network device installations can be set up with a fixed topology to which a wireless host can connect via a fixed point known as a base station or an access point. The latter is connected to the backbone network often via a wired link. Cellular network and most of the wireless local area networks (WLANs) operate as static infrastructure networks. All wireless hosts within the transmission coverage of the base station can connect to it and use it to communicate with the backbone network. The communications initiated

from or destined to a wireless host have to pass through the base station to which the host connects directly.

Ad Hoc Networks

Ad-hoc networks are the second access Methods for, the wireless communication. Ad-hoc network, is used where there is not all user can reach. It is also, called independent mode of access of network. The topology and wireless communication is use in ad-hoc network, an example of ad-hoc network is packet radio network. The users in one region can directly communicate within the transmission range of the receiver. If the sender wants to communicate with the receiver, which is out of transmission range, then it should have to firstly convey the message to the user, which is inside range, Then this receiver acts as new sender & send to the user which is out of the converge transmission. This provides a relay to the sender that Message transmitted to transmission. The main purpose of this transmission is that it offers flexibility and easiness to the transfer of the message. No fixed infrastructure network is needed. Ad-hoc network does not have any device to connect the links. In spite of advantages, there are still various drawbacks of ad-hoc network. It is complex system routing because of various topology changes due to the host mobility. Secondly it is quite difficult. Normal Users cannot predict the actual message transmission.

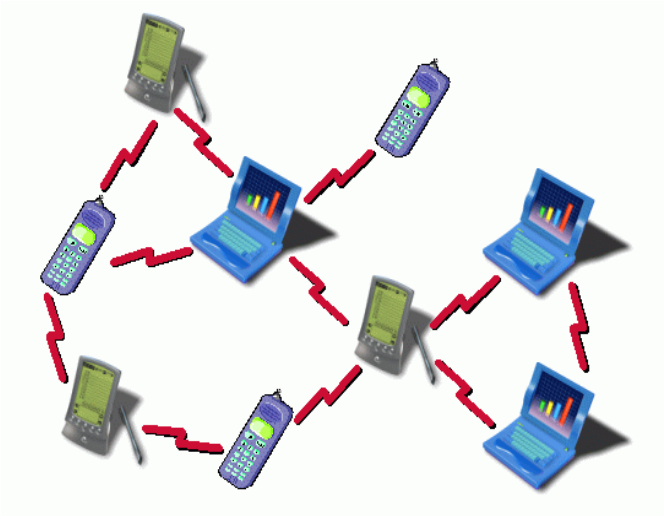


Figure 2: Ad Hoc wireless network

AODV WITH FUZZY HELLO INTERVAL

This part of the paper deals with the, the proposed concept using fuzzy Hello Intervals values that is used with AODV protocol for the transmission of hello messages. In this part we have further classifications, as two subsections; in this section we study the effect of some node parameters on Hello Intervals.

Algorithm: Effect of Node Transmission Power and Node Speed on HI

The transmission of Hello messages is done between the nodes and its neighbors on the basis of main parameters. Transmission power is one of the proposed main parameter for determining the present nodes neighbors in the ad-hoc network. Transmission power abbreviated as, (*TrPower*) is the power strength through which the signal transmission takes place between the nodes. The free space propagation model [12], determines the signal power degraded in the transmission of hello messages of the proposed system.

The received signal strength is given by:

$$P_r(d) = \frac{P_t G_t G_r \lambda^2}{(4\pi)^2 d^2 L}$$

Where,

P_r stands for receive powers (in watts),

P_t stands for transmit powers(in watts),

G_t and G_r are the transmit and receive antenna gains,

d is the separated distance between the transmitter-receiver,

L is a system loss factor (*L* = 1 in our simulations which indicates no loss in the system hardware), and λ is the carrier wavelength (in meters) which is related to the carrier frequency (*fc*) as:

$\lambda = \frac{c}{f_c}$ Where *c* is the speed of light (3 × 10^8 m/s).

```
#include <stdio.h>
int main()
{
 Long  Gt, Gr, Pt, Pr ;
 Printf(%l%l%l,&Gt&Gr&Pt)
  for (Gt=1;Gt<Pr; Gt++)
 {
  for(Gr=1;Gr<Pr; Gr++)
   {
for(Pt=1;Pt<Pr; Pt++)
    Value (Pt*Gt*Gr);
     Printf("%l ",Pr);
  }
 }
```

For Node Speed on HI

Network Topology concept is mainly used in dynamic routing changes of ad-hoc networks. As the mobility of nodes is not restricted, due to which it causes the routing protocols of dynamic changes.

If the transmission between the neighboring nodes is faster, due to this sometimes causes links break down between these two nodes and increases probability of breaking links and loss of information. The movements of transmission of message between the nodes are measured by the speed. High-speed transmission between the nodes has huge probability of loosing links between the current neighbors and acquired the default nodes.

Galluccio et.al. [11]Calculated the neighborhood time, *Tn*, between two node *n1* and *n2* as:

$$T_n = \frac{2 \times \sqrt{R^2 - P_{n1}^2}}{v_{n1}}$$

Where *R* is the transmission range, Pn_1 is the position of *n1* according to *n2*, and v_{n1} is the relative velocity and can be calculated as:

$$v_{n_1}^{'} = \sqrt{v_{n_1}^2 + v_{n_2}^2 - 2v_{n1}v_{n2}\cos(\phi)}$$

Where v_{n1} is the magnitude of the vector v_{n1}, v_{n2} is the magnitude of the vector v_{n2}, and Φ is the angle between them. This assumption of T_n is accurate only with constant relative velocity.

{

int n_1, n_2, T_n, R, P_{n1}, v_{n1},v_{n2},v_{n*};

float ϕ;

for (n_1=0; n_1<T_n; n_1++)

for(n_2=0;n_2<T_n;n_2++)

}

Value (v_{n1}*)

CalculateTime(Tn) / for transmission data

}

Fuzzification,Inference and Defuzzification :

Fuzzification is a mathematical process where the crisp input values are transformed into the membership values of the fuzzy logic. There is a continuous sequencing of fuzzification, inference and defuzzification is used. Firstly, the process of fuzzification is done, and then the inference engine calculates the fuzzy output using the fuzzy rules.

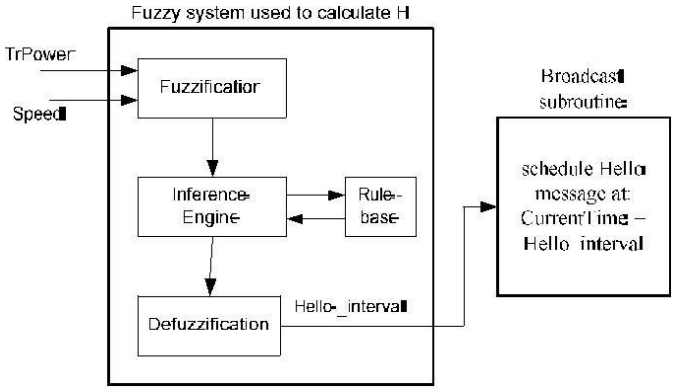


Figure 4: Block-diagram for the basic elements of the fuzzy system.

Defuzzification is a process used to convert the fuzzy output to a crisp value; Hello interval (HI) value in this case. The basic block diagram of the basic elements of the fuzzy system is shown in the figure of fuzzification, inference and defuzzification.

RSEARCH CHALLENGES OF WIRELESS NETWORKS

Since wireless networks are bandwidth limited, some of the key challenges in wireless networks are increase data rate, minimizing size, cost, low power networking, security of user and Quality of Service (QoS).

Signal Fading:

As in wireless communication, the message is propagated on an open changing route; unprotected mediums and signals can be distorted and weakened. As the same signal can disperse and travel on some other routes due to reflection, diffraction, congestion and scattering caused by different uncertain hurdles used by different hackers before it is received by receiver. Due to these different routes the dispersed signals on various paths may take different times to reach the destination.

Mobility

The wireless communication is not wired, so there is not at all any constraint like that of wired networks among devices. Ongoing mobility is maintained to roam the transmitted message here and there.

Power and Energy

To maintain the energy levels in any system it is necessary to have power conservation mechanism, all the devices should perform effectively and efficiently to work in different

surroundings. The transmission between the receiver and the sender must be done in intelligent manner so that time and task both are maintained for communication purpose.

Data Rate

The data compression algorithm and interference mitigation through error-resilient coding, power control, and the data transfer protocol is done by the various functions and techniques used by different routing methods. Thus it is important to have a well understanding of topic and knowledge that results a thought design in order to achieve high data transfer rates during transmission.

Security:

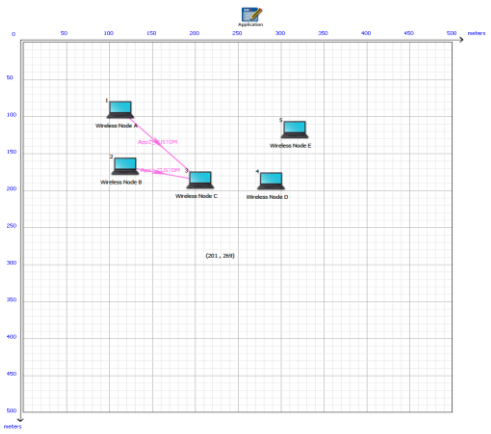
Security [6] is a big concern in wireless networking, especially in m-commerce and e-commerce applications Virtual private network (VPN) is an option to make access to fixed access networks reliable. Since hackers are getting smarter, it is imperative that wireless security features must be updated constantly.

Quality of Service (QoS):

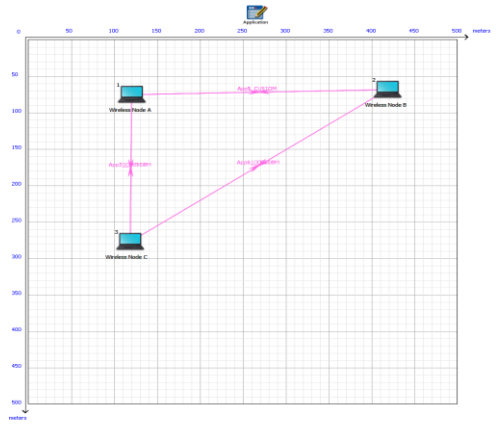
Quality of Service [8] is a measure of network performance that reflects the network's transmission quality and service availability. For each flow of network traffic, QoS can be characterized by four parameters:

- Reliability
- Jitter
- Bandwidth
- Delay

Simulation



Environment1



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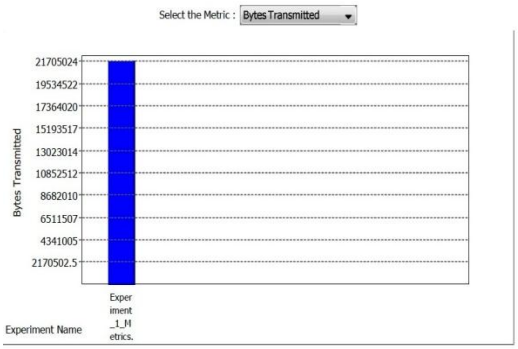

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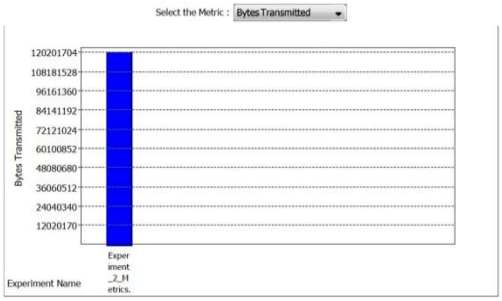
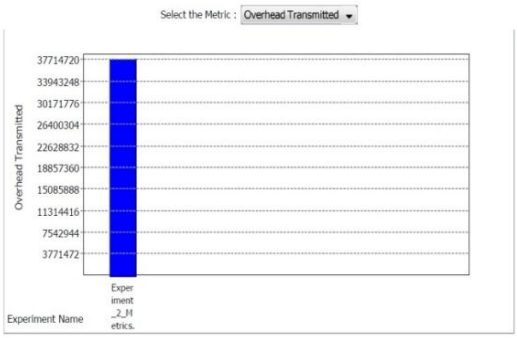


Environment2

Environment1



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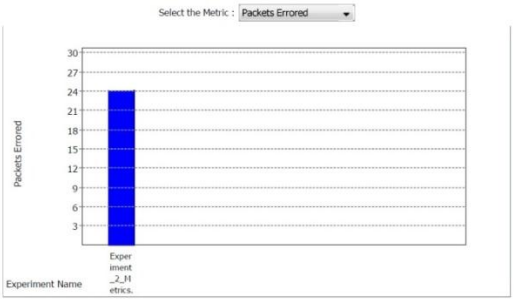

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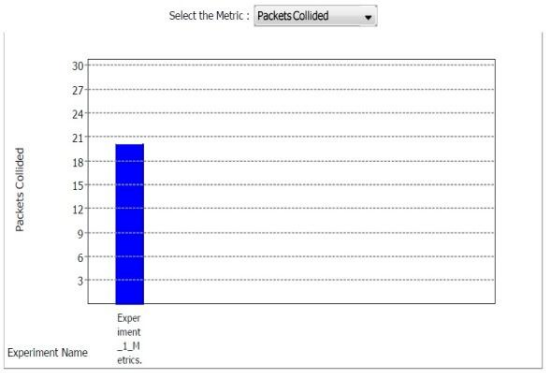

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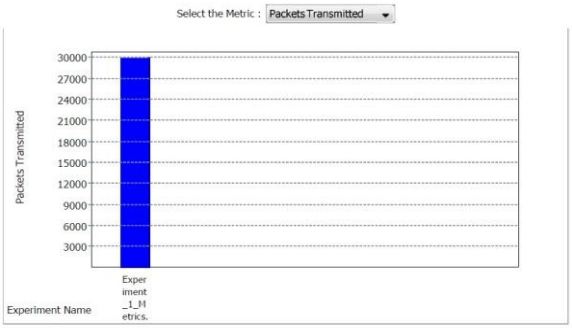

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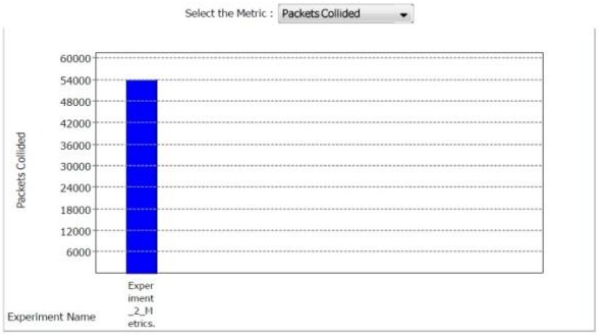

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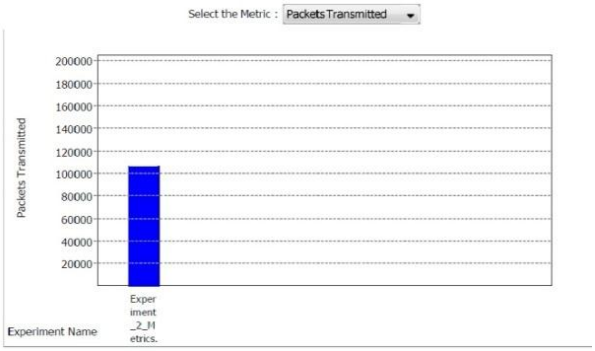

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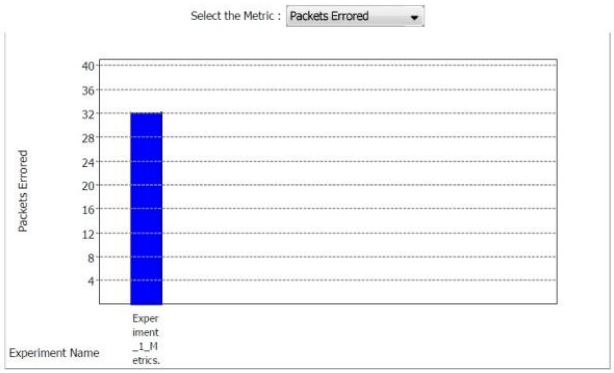
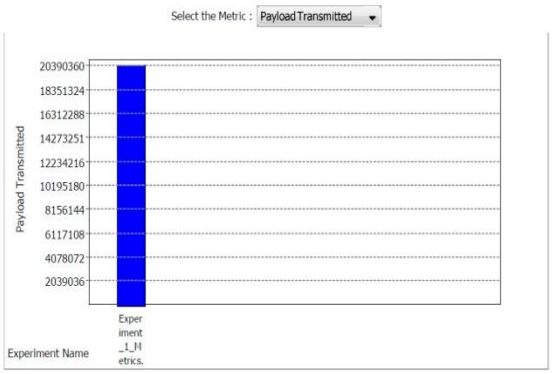


Environment1



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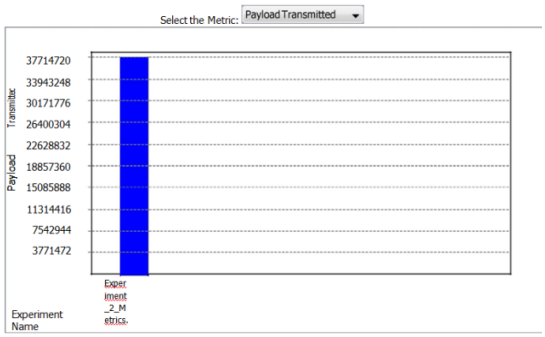

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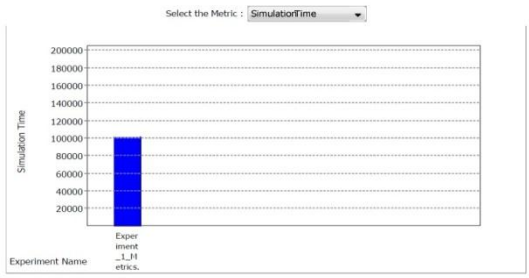

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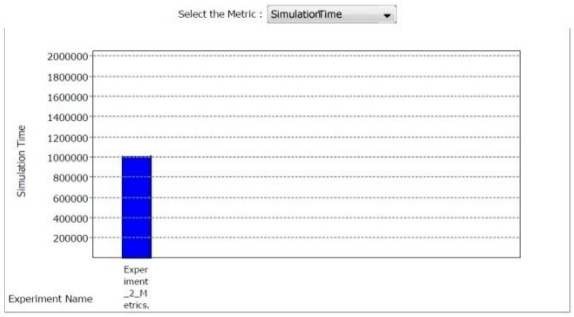

Environment2

SIMULATION AND RESULTS

We have simulated AODV using Netsim simulator developed by tetcos .This is suited for various routing algorithm having dynamic topologies. Our aim is to show that working of AODV is quick and accurate. AODV also works in large networks and calculating optimum values in every parameter. The network layer, application layer and transport layer has been properly configured for each node.

Simulation environment:-

We have created two different environments. In environment 1 we have taken 5 nodes(1,2,3,4,5) in which (1,3) and (2,3) are connected wirelessly as ad-hoc network. In environment 2, nodes (1,3) (2,3)(1,2) are connected in ad-hoc way where any node can transfer packet to any node .Nodes are placed randomly within a fixed size LxL grid . During the simulation nodes are free to move anywhere in grid area .If the nodes are larger in number then there is continuous change in topology of network. For both the simulation environment 1 and environment 2 we have calculated byte transmitted, overhead transmitted, packets collided , packets errata ,packet transmitted ,payload transmitted and simulation time as shown in graph and values in table1 shown below in results.

RESULTS

Our results show that AODV can find routes quickly and with accuracy. AODV is good choice for ad-hoc network. It is useful in battlefield communication, emergency, conferencing etc.

Table 1

Parameter	Environment 1	Environment 2
Bytes Transmitted	21705024	120201704
Overhead Transmitted	20390360	37714720
Packets collided	20	54000
Packets Errata	32	24
Packets Transmitted	30000	100000(approx)
Payload Transmitted	20390360	37714720
Simulation Time(sec)	100000	1000000

We have seen the final results in environment 1 and environment 2. The byte transferred is of major difference and has been increased in environment 2. Similarly for the overhead transmission the transmitted data has increased in environment 2. But the packets errata has decreased in environment 2 in spite of large volume of data being transferred in environment 2 .This shows the accuracy of the protocol as shown in table 1. The main focus of result is that the AODV protocol will be helpful for Ad-hoc network.

CONCLUSION

In this research paper, a novel approach for local connectivity management in ad-hoc routing protocols has been presented for the transmission of hello messages between the nodes and its neighbors. This wireless communication provides an efficient way, to the transmission of messages, as it is unprotected still the transmission is faster between the nodes. A logical idea is probably mainly used to optimize the nodes transmission range and speed and used to decide the hello messages interval. As the wireless communication the message is propagated is an open, Changing, unprotected medium, and the signals can be distorted and weakened. The routing procedure that has been developed has been used in

the context of the AODV routing protocol. There are various types of routing methods is used like- Distance vector routing and link state routing. The main advantages of using routing protocols that it provides no duplicate packets and no traffic problems. In spite of this entire if we use routing shortest path is not guaranteed but ad-hoc networks can work properly. The routing is mainly used for the internet purpose, where each node works as a host or hop. Military networks are used routing algorithms to determine the routers; they do not care of flooding at all. Various results produced by each methods provides that, the efficiency of the proposed AODV protocol method in terms of routing overhead, bytes transmitted ,packets errata ,packets collided and payload transmitted using simulation results. Overall, the work presented here has given us an insight that the ad-hoc routing protocols configuration parameters might be determined more accurately and dynamically.

FUTURE SCOPE

There is large need to increase the capabilities of protocol. AODV should support large population with optimum efficiency. We look for development of protocol for quality of service(qos) with fixed network and internet .In future we can develop error free environment as we have shown that the packets errata is decreased from 32 to 24 in spite of large volume of data in environment 2.

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