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Efficient Approach of Routing for Ad Hoc Network

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I. ABSTRACT & INTRODUCTION TO AD HOC NETWORKS

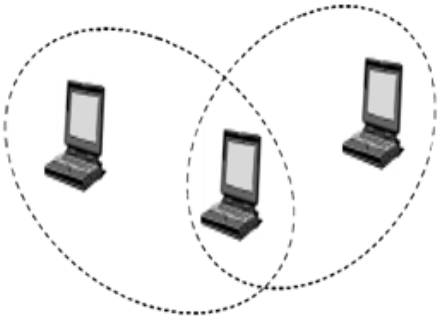
Due to recent technological advances in laptop computers and wireless data communication devices the Wireless communication between mobile users is becoming more popular than ever before. The lower prices and higher data rates, which are the two main reasons why mobile computing continues to enjoy rapid growth. There are two distinct approaches for enabling wireless communication between two hosts.

The first approach is to let the existing cellular network infrastructure carry data as well as voice. It suffers from the problem of handoff, which tries to handle the situation when a connection should be smoothly handed over from one base station to another base station without noticeable delay or packet loss. Moreover networks based on the cellular infrastructure are limited to places where there exists such a cellular network infrastructure.

The second approach is to form an ad-hoc network among all users wanting to communicate with each other. This means that all users participating in the ad-hoc network must be willing to forward data packets to make sure that the packets are delivered from source to destination. This form of networking is limited in range by the individual nodes transmission ranges and is typically smaller compared to the range of cellular systems. This does not mean that the cellular approach is better than the ad-hoc approach.

II. ROUTING

Routing protocols are needed whenever delivered data packets need to be handed over several nodes to arrive at their destinations. Routing protocols have to find routes for packet delivery and make sure the packets are delivered to the correct destinations



Ad hoc Network with three node

III. THE PROPOSED SMART DSR PROTOCOL

Epidemic routing approach assume unlimited capacity of buffer, source and destination are always disconnected, and use a broadcast approach for delivery. This scheme faces the problem of buffer handling. To solve this problem of Epidemic routing Spray and Wait protocol was given in which a replication number is assign to a message and distributes message copies to a number carrying nodes and then waits until a carrying node meets the destination. A number of solutions employ some form of 'probability to deliver' metric in order to further reduce the overhead associated with Epidemic Routing. However, if the connection does not lasts long enough, there will be no guarantee that all messages will be transmitted.

Motivation for Selecting DSR

a) It is a popular protocol for Ad hoc network

b) Our approach need less modification in DSR as compare to that in other schemes like AODV, DSDV and TORA.

Smart DSR Protocol

Smart DSR Protocol is an extension of DSR Protocol which can delivers data from a source to a destination even there is no path between source and destination. This protocol will work as normal DSR if the network is fully connected and when the network is not

fully connected then also this protocol will make it ensure that data will be delivered from a source to a destination.

Smart Node parameter

Which node will become the smart node there may be following parameter for that

A node can be a smart node on behalf of the number of neighbors seen by node per unit time. If a node seen maximum number of neighbors it will indicate that mobility of node is high and there is a chance that the node will come near to the destination frequently.

A node can be the smart node if the routing table of node is big which indicate that node is well connected to the network.

Distance from the source may be a parameter for the smart node selection parameter, because if a node is far away from the source will indicate closer to the destination.

If a node is storing data for a concerned destination then it can be used to avoid creating more smart nodes in the network.

Proposed Smart DSR Protocol

The proposed smart protocol will go for RREQ/RREP, RREQ/SRREP and SRREQ/SRREP cycle. We use the following symbolic notation for the proposed smart DSR protocol.

RREQ	Route Request
RREP	Route Reply
SRREQ	Smart Route Request
SRREP	Smart Route Reply

States of Node

During the Extended DSR protocol node can be in various state those are explain below

Node has Data to Send

This event is explained by the following algorithim1. A node initiates a RREQ message if it is the original source of this message, or it initiates a SRREQ message if it is storing data on behalf of other node.

Algorithim1:-

If node has data **Then** Node send a RREQ
If node receives a RREP **then** Protocol will use DSR
Else
If node receives SRREP **then** wait for RREP
Else then node will select Smart node and node sends data to the smart node

Node Receives a SRREQ

This event is explained by the following algorithm 2. When a node receives a SRREQ it checks whether, it is the destination for this request.

Algorithim2:-

If a node A receive PRREQ
Then
If A = Destination **Then** Protocol will use DSR
Else
If A is a Smart Node
Then A store SRREQ in database.
A send PRREP to source and broadcast PRREQ.
A wait for data if data is available then **A** store data.

If it is the destination then the node sends a back RREP otherwise this node is not the original destination for this request then this node makes calculation for smart node selection parameters, if the parameter values are above some defined threshold then, the node sends a SRREP. At the end it simply forwards the SRREQ.

When a Node Receives a SRREP This situation is also Explain in Algorithim2. When a smart/original source gets an original reply from a node. It simply sends data to destination.

If node gets a Smart reply then it will store this reply in a data structure and wait for route retries time out and then used some functions to evaluate the smart route replies to choose some nodes to become smart node.

A Node Receives a HELLO Message

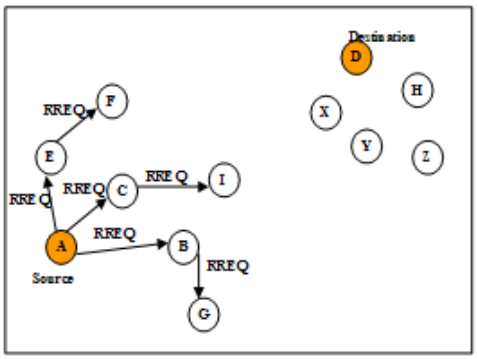
Whenever a node receives HELLO message it updates data structure like IT (Information Table) and neighborhood list to keep track of its neighbors.

A Node Senses a New locality

When a node realizes that it is in a new locality then it checks for locally stored data. If it finds some data then it initiates a Smart route request for that data.

Smart DSR with Example

We now take an example which help in understanding the various aspect of the protocol more easily. Figure show the sequence of Smart DSR protocol when a source a want to send a data to the destination D and the source and the Destination is not connected i.e. there is no path between source and the destination. Smart DSR protocol will work like DSR if there is a direct path between source and the destination by using single hop or multi hop but in case of no path between source and the destination the proposed protocol will work and deliver the data from source to the destination



A send RREQ

IV. IMPLEMENTATION OF THE SDSR ROUTING PROTOCOL ON NETWORK SIMULATOR

This chapter divided into three parts. The first part will describe the simulation tools. Since NS2 is very difficult for beginners, it might be useful to know the

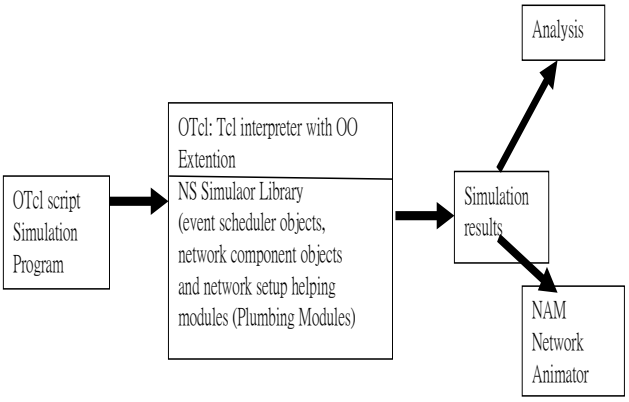
beginner's experience of using NS2.Many relevant tools used to analyze trace files will be introduced at a beginner level. The second part comprise the screenshots of proposed protocol and the third part will describe about the simulation graphs which analyze the performance and comparison of the proposed protocol with others protocols.

Introduction to NS2

NS is a discrete event simulator targeted at networking research. NS provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks.

Use of NS2

NS2 is an object oriented, discrete event driven network simulator. It is written in C++ and OTcl (Tcl (Tool command language) script language with Object-oriented extensions developed at MIT (Massachusetts Institute of Technology)). In order to reduce the processing time, the basic network component objects are written using C++. Each object has a matching OTcl object through an OTcl linkage.



V. CONCLUSIONS AND FUTURE WORK

With over a decade of research efforts aimed at improving their performance, mobile ad hoc networks have developed from an initial concept to a mature field with numerous Supporting protocols. Although many fundamental issues have been studied, MANETs are still in the development phase due to their design complexity. Therefore, a large research space remains open for further exploration. Among the many challenges for MANETs, offering QoS is of particular interest due to the popularity of real-time applications.

While there has been some research on protocols to support QoS in MANETs, there are still many unsolved problems in this domain. The work described in this dissertation has demonstrated the mobility of node as a bridge between two transmission areas and provide delivery of packets is such a scenario where source lies in one transmission area and the destination lies within another area.

VI. FUTURE ENHANCEMENT

As we proposed SDSR and analyze its performance on simulator, still there are many area where we can extend the research. The following list identifies areas of research which can be implemented in future.

In future we will implement the Acknowledgement scenario, when the smart node will deliver the packet to the destination on behalf of the source node; there is a need to generate an ACK for the source node by smart node. Source node will send the packet to the Smart node for delivery but how it knows about this fact that the delivery of the packet is successful or not. So an ACK mechanism by Smart node to the source node will be an area which can be explore in future.

As we proposed a Quality of service aware Routing protocol with QoS constraints as bandwidth and the delay. In future we will implement this protocol on simulator and analyze its performance. We will also compare our protocol with other existing protocols those provide multiple path from the source and the destination.

As we list out various parameters for Smart node selection, In future we will check the performance of SDSR by changing the parameter for smart node selection.

Security in wireless networks has traditionally been considered to be an issue to be addressed at the higher layers of the network. Wireless MANETS is at the top of communication technology drive because it is gaining a great position in the next generation of wireless networks. Due to the evolution of new technologies wireless is not secured as like others networking technologies. A lot of security concerns are needed to secure a wireless network. Secure communication can only be provided after successful authentication and a robust security network association is established. By keeping in mind the importance of security, the MANETS working groups has designed several security mechanisms to provide protection against unauthorized access and threats, but still facing a lot of challenging situations. MANET's security architecture deals with all of the basic wireless security requirements like authentication, authorization, access control, data integrity, confidentiality and privacy. This paper examines the threats which are associated with MAC layer and physical layer of MANETS and also proposes some enhancements to the existing model for improving the performance of the encryption algorithm and proposes some techniques in the existing model to enhance its functionality and capability.

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