Performance Evaluation of Route Repairing Mechanism and Comparison with AODV

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Abstract—In this paper, we propose a Performance Evaluation of Route Repairing Mechanism and Comparison with AODV. Route Repairing Mechanism will be implementing in Proactive Source Routing (PSR) Protocol. It is much better than the DSDV routing to facilitate source routing and also which is smaller overhead than the Distance Vector based protocols. In this first we are making to Route Repairing mechanism in PSR, when any one of the hop is failures. In this proposing system it does not go back towards source node when the path is failures, there itself only finds another path by using neighbouring node. In this performance evaluation those most important factors like Throughput, Packet Deliver Ratio and Delay. Route repair mechanism of PSR removes the lack of efficiencies in the MANET and also analysis of the proactive and reactive protocols. Tests are using computer simulation in Network Simulator 2 (ns-2).

Keywords— mobile ad hoc networks (MANETs), opportunistic data forwarding, and proactive routing.

I. INTRODUCTION

A mobile ad hoc network (MANET) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires. In this each device is free to move in any direction independently, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. They may contain one or multiple and different transceivers between nodes. This results in a highly dynamic, autonomous topology.

MANETs are a kind of Wireless ad hoc network that usually has a routable networking environment on top of a Link Layer ad hoc network. MANETs consist of a peer-to-peer, self-forming, self-healing network in contrast to a mesh network which has a central controller (to determine, optimize, and distribute the routing table). The two most important operations at the network layer, i.e., data forwarding and routing are distinct concepts.

Data forwarding regulates how packets are taken from one link and put on another. Routing determines what path a data packet should follow from the source node to the destination. The latter essentially provides the former with control input.

Opportunistic data forwarding represents a promising solution to utilize the broadcast nature of wireless communication links. Opportunistic data forwarding refers to a way in which data packets are handled in a multihop wireless network. In this paper we are considering that hops for transferring the data packets from source to the destination.

Many protocols have been proposed for MANETs. These protocols can be divided into three categories: proactive, reactive, and hybrid. Proactive methods maintain routes to all nodes, including nodes to which no packets are sent. Such methods react to topology changes, even if no traffic is affected by the changes. They are also called table-driven methods. Reactive methods are based on demand for data transmission. Routes between hosts are determined only when they are explicitly needed to forward packets. Reactive methods are also called on-demand methods.

They can significantly reduce routing overhead when the traffic is low complexity and the topology changes less dramatically, since they do not need to update route information periodically and do not need to find and maintain routes on which there is no traffic. Hybrid methods combine proactive and reactive methods to find efficient routes, without much control overhead. In this paper, we propose a low complexity proactive source routing (PSR) protocol to facilitate opportunistic data forwarding in MANETs [1]. In PSR, each node maintains a breadth-first search spanning tree of the network rooted at it only.

This information is periodically exchanged among neighboring nodes for updated network topology information. Thus, PSR allows a node to have full-path information to all other nodes in the network, although the communication cost is only linear to the number of the nodes. This allows it to support both source routing and conventional IP forwarding. In this paper represents that route repairing mechanism and then comparing with AODV. In this simulation evaluates performance of route repairing of PSR with AODV.

The remainder of this paper is organized as follows. Section II Literature Survey on routing protocol in MANETs. Section III describes the System Architecture details of our proposed routing scheme. The computer simulation, related experiment settings, and comparisons between Route Repairing PSR and AODV Performance Evaluation presented in Section IV. Section V concludes this paper with a discussion of future research.
II. LITERATURE SURVEY

In Ad hoc Networks is having lack of infrastructure and it implies that any computation on the network needs to be carried out in the decentralized manner. And in this approach discussed about the problems in an ad hoc networking can be formulated as problems in distributed computing, an ad hoc network does not have an associated fixed topology for the absence of the central infrastructure. In this two paradigms underlie internet routing protocols are distance vector (DV) and Link state (LS) algorithms. These are requires that continual exchange of global routing information.

In contrast to proactive algorithms, reactive routing protocols cache topological information and update the cached information on-demand. The reactive protocols avoid the prohibitive cost of information maintenance of proactive protocols, and tend to work well in practice. While the idea of aggressive caching and occasional update results in good average performance, in this worst case the latency could be high.

Link-Layer-and-Above Diversity in Multihop Wireless Networks [2] this techniques is causes of channel diversity in wireless communications, and how it is perceived in different layers of multihop wireless networks. To promote new research innovations in this area, we concentrate on link-layer diversity and speculate on the challenges and potential of diversity schemes at the network layer. In speculate on the problem of how to utilize channel diversity at the link layer and above. By reviewing the typical approaches in the literature and focusing on two recent explorations, investigate the challenges involved and describe existing solutions. Diversity in wireless networking sometimes called channel diversity or link diversity refers to the phenomenon where transmissions at different channels, for example, frequency band, time slot, and so on, possess different reception conditions. A diversity scheme utilizes such a phenomenon for more reliable transmission.

Link-layer diversity schemes in wireless networks. Because of the proposed in differing contexts, and may carry different names in the literature, such as selection diversity, multicast/group request-to-send (RTS), opportunistic scheduling, link-layer any cast, and so on. Multi-user diversity first was addressed as a link-layer scheduling scheme by Knopp and Humblet [3] in cellular communication networks and later was incorporated in CDMA systems. Recently, the exploration of link-layer diversity in multihop wireless networks has attracted considerable research attention. In addition to multi-user diversity, it also was used to address such issues as head-of-line (HOL) blocking and opportunistic rate adaptation. These proposals are built upon the RTS/clear-to-send (CTS)/DATA/ACK four-way handshake of IEEE 802.11, given its predominance and availability in the area of multihop wireless networking, and are collectively referred to as multicast RTS (MRTS).

Today’s Research on cooperative commutation at the link layer and above had been little until ExOR [4]. ExOR is a milestone piece of work in this area and it is an elegant way to utilize the broadcasting nature of wireless links to achieve cooperative communication at the link and network layers of static multihop wireless networks. Here, we further extend the scenarios that the idea behind ExOR can be used, dubbed as Cooperative Opportunistic Routing in Mobile Ad hoc Networks (CORMAN). We test CORMAN using the Nakagami fading model in ns-2 and compare it to the well-understood AODV in an array of mobile network scenarios. The performance improvement of CORMAN that we have observed is substantial. Contributions in our solution are highlighted as follows.

- We use a Route Repairing proactive source routing protocol so that each node has complete knowledge of how to route data to all other nodes in the network at any time.
- The opportunistic data forwarding scheme in CORMAN allows some packets to reach the destination in fewer hops than AODV.
- The proactive routing (PSR) in CORMAN maintains full-on route information.

In proposing system PSR and Compares to AODV, in this comparisons has only a fraction of the end-to-end delay and variance for two reasons.

- The opportunistic data forwarding scheme in CORMAN allows some packets to reach the destination in fewer hops than AODV.
- The proactive routing (PSR) in CORMAN maintains full-on route information.

In this paper, we propose a low complexity route repairing mechanism and comparing with AODV. We observed performance evaluation of Throughput, End-to-End delay and Packet Deliver Ratio.

III. SYSTEM ARCHITECTURE

In this Architecture will be describes that to find the low complexity routing mechanism for MANET. The basic technique proposed in the paper is to use hop-by-hop routing selection for packets. The sender broadcasts a batch of packets to the nodes with a list of forwarding nodes in Priority. These packets are transforming from the selected hops from source to the destination. Periodically each iteration is carries similarly and also if any one of the hops failures occurs at that time packet will be dropped in this mechanism that failure node will be correct it based on that of the nearest neighbors node. Then it will be creates that alternative node then it will be creates that path. Then it will be sends the packets from source node to the destination nodes.

In this mechanism nodes are periodically broadcast the tree structure to their best knowledge. Based on the information collected from neighbors during the most recent iteration, in each iteration nodes will be creates that different hops from source to destination by considering this architecture involves that five important modules.
BFST Construction: This module constructs BFST tree with its neighborhood based on Hello Message received from Neighboring nodes.

Neighbourhood Trimming: This module removes nodes in BFST tree when there is no message from a Neighbour node.

Tree Update: This module compresses the BFST tree and send to neighbor and based on the response, it updates the BFST Tree.

Packet Forwarding: This module forwards the data packet to next hop node based on the BFST tree.

BFST Tree: In this considers that all the updated tree and also it is going to sends to the packet forwarder.

In this mechanism tree will be updates each iterations and it will be responds to each of the nodes while packets are transforming from source node to the destination nodes. Neighbourhood trimming removes nodes in BFST tree when there is no message from a Neighbour node. The periodically broadcast routing messages in PSR also double as “hello” messages for a node to identify which other nodes are its neighbors. When a neighbor is deemed lost, its contribution to the network connectivity should be removed hence it is called as Neighbourhood Trimming.

This architecture will be explains about the construction of the low complexity Route Repairing mechanism in Proactive Source Routing Protocol for MANET. The will be very advantages for the in shortest time packets are reaching from the source to destination.

IV. SIMULATION SETUP

In this paper for experimental purposes, we considered ns2 simulator. NS, a network simulator which was developed by Berkeley University, is used for simulation purposes. NS2 helps in developing tools for simulation results display, analysis and converters that convert network topologies to NS formats. NS2 is written in C++ and OTcl (Object-oriented tool command language).

Table. I show that the simulation parameters are used in this setup and also which will be describes that the experimental setup procedure in NS2.

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>SIMULATION PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routing Protocols</td>
<td>LPSR,AODV</td>
</tr>
<tr>
<td>Channel Type</td>
<td>Wireless channel</td>
</tr>
<tr>
<td>Connection Type</td>
<td>CBR</td>
</tr>
<tr>
<td>MAC Type</td>
<td>802.11</td>
</tr>
<tr>
<td>Radio propagation model</td>
<td>TwoRayGround</td>
</tr>
<tr>
<td>Network interface type</td>
<td>Phy/wireless phy</td>
</tr>
<tr>
<td>Interface queue type</td>
<td>Queue/Drop tail/PriQueue</td>
</tr>
<tr>
<td>Number of nodes</td>
<td>50</td>
</tr>
<tr>
<td>Simulation end</td>
<td>10min</td>
</tr>
</tbody>
</table>

Since many routing protocols’ performances are well known in the classic two-ray ground reflection propagation model, we select such a model as well in our simulation to present a consistent and comparable result.1 Without loss of generality, we select a 1-Mb/s nominal data rate at the IEEE 802.11 links to study the relative performance among the selected protocols. With the default physical-layer parameters of the simulator, the transmission range is approximately 250 m, and the carrier sensing range is about 550 m.

In this experiment setup we used above shown parameter, we are used wireless channel and constructed by using MAC Type is (802.11) it will be used physical layer specification for implementing wireless channel networks. Performance evaluation of this experiment is explained with the help of graph as explained in performance Evaluation. For graph representation we are used as gnu plot 4.6.

Radio propagation is used as (TwoRayGround), A radio propagation model, also known as the Radio Wave Propagation Model or the Radio Frequency Propagation Model, is an empirical mathematical formulation for the characterization of radio wave propagation as a function of Frequency, Distance and other considerations. A single model is usually developed to predict the behaviour of propagation for all similar links under similar constraints. Created with the goal of formalizing the way radio waves are propagated from one place to another, such models typically predict the path loss along a link or the effective coverage area of a transmitter.

In this experimental setup we used Drop Tail, is a very simple queue management algorithm used by Internet routers, in Tail Drop the traffic is not differentiated. Each packet is treated identically. With tail drop, when the queue is filled to its maximum capacity, the newly arriving packets are dropped until the queue has enough room to accept...
incoming traffic.

The name arises from the effect of the policy on incoming datagrams. Once a queue has been filled, the router begins discarding all additional datagrams, thus dropping the tail of the sequence of datagrams.

In our simulation we can be setup how many number of nodes are required, in this we constructed as 20 nodes and observed that simulation of the at shortest time it will be creates that path from failure of the hops.it will be considered previous of the failure hop and next of the failure hop through any of neighbouring node then it will sends the packets to specified destination.

V. PERFORMANCE EVALUATION

We study the performance of route repairing mechanism of PSR using computer simulator 2(ns2) we compare PSR against AODV, which is fundamentally different routing protocols in MANETs with verifying Network densities and node mobility rates. Our tests shows that the overhead of PSR is indeed only a fraction of that baseline protocols.PSR provides that global routing information at such a small, PSR offers similar or even better data delivery performance. The following metrics were employed for the purpose of performance analysis of protocols. Gnuplot can be started from a command line or from an icon according to the desktop environment. Running it from command line can take the syntax Gnuplot {OPTIONS} file1 file2...
Where, file1, file2, etc. are input file as in the load command.

Throughput: It is the number of packets/bytes received by source per unit time. It is an important metric for analyzing network protocols.

Packet Delivery Ratio (PDR): It is the ratio of actual packet delivered to total packets sent.

\[
\frac{\sum \text{Number of Packet Receive}}{\sum \text{Number of Packet send}}
\]

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In this performance analysis we compared LPSR with AODV. Fig. 2. Represents that performance evaluation of throughput.it is evaluating that if the number of nodes increases and observing that performance LPSR and AODV.in this LPSR maintained constant throughput if the nodes are increases but AODV number of nodes are increases throughput is decreases.

Fig. 3. will be shows that Delay computing the speed Vs delay.in this we observed that if the speed is increases does not effects on LPSR but in AODV delay is increases when the packet speed is increases. If the delay increases while sending the packets it effects on its delivering time.

Fig. 4. Show that Packet Deliver Ratio, it is computing with speed Vs Packet Deliver Ratio. In this AODV performance is varying if the speed of the packets transformation.LPSR is maintained that constant packet deliver ratio. Hence we can choose whenever we have to maintain constant deliver ratio, it will be avoids that packet dropping also.

In this work we observed that above explained performance of LPSR and AODV.In this we can say LPSR is better than AODV in Throughput, Delay and Packet Deliver Ratio.

CONCLUSION

In this paper we have identified that low complexity route for finding when the path failures.it will be very advantages, because of it will be avoids that re-establishing
the paths between the source and destination when the path is failures. Automatically it will be repairing that failure hops and generates that path to the destination. In this work we are comparing the LPSR and AODV. We observed Throughput, Delay and Packet Deliver Ratio. LPSR performance is better than AODV, if the number of packets is increases and varying with packet transmission speed. LPSR is better than AODV and other than packet transmission.

References


