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Analyse the Performance Metric of Power Aware Routing in Mobile AdHoc Networks

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Abstract - A mobile adhoc network is a group of wireless mobile nodes that communicate with one another without any fine-tuned networking infrastructure. Since the nodes in this network are mobile, the puissance management and energy conservation become very critical in mobile adhoc network. The nodes in this network have constrained battery power and circumscribed computational power with a modicum of recollection. Such nodes must conserve energy during routing to perpetuate their usefulness and increment network lifetime. Power management is one of the most paramount issues in manet (Mobile Ad-Hoc Network). Computation & routing in manet is vigorously co-cognate with Power resources which in this particular case only Battery. Resent trend is to minimize the puissance consumption and maximizing the computation without hampering the quality of accommodation of a manet. There are many subsisting energy conservation protocol predicated on electing a routing backbone for ecumenical connectivity are oblivious to durability of the network. Then it will be more energy efficient if we could utilize the battery resource of a node that has more power than its neighbour nodes for routing and computation. So here we focus to distribute the work load and the routing load of a node has lower energy to other nodes which have comparatively higher energy. By this way it will endeavor to obviate the node; having low battery; go down as much as possible. Hence this will increment the network durability. Moreover if an energy consumption strategy for particular computation job could be engendered to distribute the work load with considering the routing energy then it will be more efficient.
Keywords: Adhoc network, Mobile Ad Hoc Network, AODV routing protocol.

I. INTRODUCTION

Mobile Ad- Hoc networking has gained an important part of the interest of researchers and become very popular this past few years, due to its potential and possibilities. With a MANET computing is not restrained on locality, time nor on mobility. Computing therefore can be done anywhere and anytime! IEEE 802.11 which are the official standards for wireless communication take only single-hop networks into account. Therefore routing protocols, for network without infrastructures, have to be developed. These protocols determine how messages can be forwarded, from a source node to a destination node which is out of the range of the former, using other mobile nodes of the network. Routing, which includes for example maintenance and discovery of routes, is one of the very challenging areas in communication. Many protocols have been proposed [1] – [3] under which AODV [4] (Ad-Hoc On-demand Distance Vector).Numerous simulations of routing protocols have been made using different simulators, such as ns and GloMoSim. Simulators though cannot take into account of all the factors that can come up in real life and performance and connectivity of mobile Ad-Hoc network depend and are limited also by such factors. Routing algorithms are being developed for commercial purposes and thus will be used outside of laboratories and simulators. There was our motivation to evaluate the behavior of a routing protocol in real-life scenarios which can come up in everyday life. As routing protocol AODV has been chosen, since in our opinion the ideas behind it are very promising.

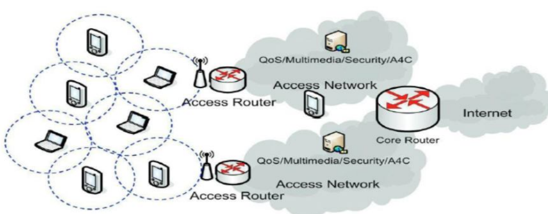

Figure No. 1 Mobile Ad hoc NETwork

Specifically we decided to perform real life experiments and comparisons using the two implementations of AODV developed at the University of California in Santa Barbara (UCSB), USA and the Uppsala University (UU), Sweden. The impact of varying packet size, route length and mobility in Ad- Hoc networks on connectivity, packet loss, Route Discovery Time and throughput was tested. In possible real life experiences, where each node has exactly one up- and one downstream neighbor, distance get with increasing number of hops fast extremely long. This can lead, when doing experiments with many nodes, to problems. There was our second motivation to discover if there is another possibility than using simulators, to evaluate networks and how well this would reflect results obtained in a similar real life set-up.

Advantage was taken of the possibility of dropping messages at a node from other specified nodes. That way the real life set-up was moved into a room where distances are short. In this paper we first give an introduction to Ad-Hoc Mobile Networks and different routing methods.

II. TERMINOLOGY

A. Packet
A unit of data. A message is made out of several packets.

B. Transmission Range
The area in which the signal of a sending node can be received.

C. Node
Participant of the network such as a laptop computer or a mobile phone.

D. Source Node
Node that wants to send a message.

E. Destination Node
Node which is the intended receiver of the message.

F. Intermediate Node
All the nodes of a route which forward packets.

G. Route
Path made out of different nodes to connect the source to the destination node.

H. Hop
The number of hops of a route is one smaller than the number of its containing nodes.

I. Flooding
The easiest way of routing. A message is send to all the machines and forwarded from those machines until the destination of the messages is reached.

J. Unicast
A message is send from one sender to exactly one receiver.

K. Multicast
A message is send from one sender to multiple receivers with a single send operation.

L. Local Broadcast
A message is send to all the nodes within the transmission range.

III. ROUTING IN MANET

Routing in a MANET is done with the goal of finding a short and optimized route from the source to the destination node. In this section we describe briefly ways in which such a route can be determined. Next to the two described protocols there exist also

Hybrid protocols, which are a combination of the other two.

A. Proactive Protocol

One possible routing protocol is a proactive protocol. The idea of such a protocol is to keep track of routes from a source to all destination in the network. That way as soon as a route to a destination is needed it can be selected in the routing table. Advantages of a proactive protocol are that communication experiences a minimal delay and routes are kept up to date. Disadvantages are the additional control traffic and that routes may break, as a result of mobility, before they are actually used or even that they will never be used at all,since no communication may be needed from a specific source to a destination.

An example of a proactive protocol is the Destination Sequence Distance Vector (DSDV) protocol [2]. In the DSDV algorithm each node keeps track of routing information, like number of hops to destination, sequence number of destination and the next hop on the route to the destination. The sequence number is provided by the destination host itself, to assure loop freedom. This means that the routes for a destination never form a cycle. Since topology may vary frequently, each node transmits periodically updates, including the nodes accessible from it and the length of the route to this node. When an other node receives such a update it compares the update with its own routing table and keeps the information with the highest sequence number. If the information in the update and those of its routing table have the same sequence number for a node, the entry with the shortest route is kept.

B. Reactive Protocol

Another way of routing in a MANET are reactive protocols or also called on demand protocols. They use the concept of acquiring information about routing only when needed.An advantage is that smaller bandwidth is needed for maintaining routing tables. A disadvantage is that when a route is needed we encounter a non negligible delay, since before using the route for a specific communication, it has to be determined. An example of a reactive protocol is the Dynamic Source Routing (DSR) protocol [3]. It is based on the two mechanisms of Route Discovery and Route Maintenance used to discover and maintain information about routes. Those two mechanisms are operated on demand.

When a route is needed and it is not already known by a node it sends a Route Request (RREQ) message to its neighbors. Those forward the message until it reaches the destination node. Each intermediate node updates the RREQ with its address. When a node sends a RREQ message it attaches to it a request ID. The request ID and the IP address of the node form a unique identifier. This is done in order to prevent that an intermediate node which receives twice the same RREQ message forwards it twice.

When the destination receives the RREQ it sends a Route Reply (RREP) message back to the source node by reversing the hop sequence recorded in the RREQ. When the source receives the RREP it can start communicating with the destination, by including the whole route in the header of each to be sent message.

IV. AODV ROUTING PROROCOL

A. Overview

AODV stands for Ad-Hoc On-Demand Distance Vector [4] and is, as the name already says, a reactive protocol, even though it still uses characteristics of a proactive protocol. AODV takes the interesting parts of DSR and DSDV, in the sense that it uses the concept of route discovery and route maintenance of DSR and the concept of sequence numbers and sending of periodic hello messages from DSDV.

Routes in AODV are discovered and established and maintained only when and as long as needed. To ensure loop freedom sequence numbers, which are created and updated by each node itself, are used. These allow also the nodes to select the most recent route to a given destination node.

AODV takes advantage of route tables. In these it stores routing information as destination and next hop addresses as well as the sequence number of a destination. Next to that a node also keeps a list of the precursor nodes, which route through it, to make route maintenance easier after link breakage. To prevent storing information and maintenance of routes that are not used anymore each route table entry has a lifetime. If during this time the route has not been used, the entry is discarded.

V. PROPOSED WORK

As it is already discussed, power always been a consequential issue in MANET, because most of the cases nodes are mobile contrivances and have no direct power supply but only battery which denotes inhibited power supply. This is the main reason for the trends to optimize the battery power which is not incipient but still a challenging one. Optimization at the routing layer is a well-

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kenned approach for a MANET and AODV routing protocol is utilized as base routing protocol. Here optimization is done to maximize the life of the entire Network. Main focus is to eschew the node which has comparatively lesser power and more preponderant load whenever an alternative path is available. Consider a situation of a network of Figure:32. Consider that Node 3 is in decisive battery power or have much less power than Node 7. Here Routing path discovered from the source(Node 1) to destination(Node 5) will be 1-2- 3-4-5 because of the nature of AODV routing protocol though there is an alternative path through 6-7 which is 1-2-6-7-4-5. Figure: 3. A Network with 7 nodes. So, the main goal is to identify any node with critical condition depending on power and load and if an alternative route is available then reroute packets to eschew the critical node. This implicatively insinuates that all other nodes in the network are keeping the critical node alive as much as possible. This increases the life of the total network. This additionally endeavors to distribute the routing load over the nodes having more power and less working load and preserving power for the nodes having more local workload in the network. So, the main goal is to identify any node with critical condition depending on power and load and if an alternative route is available then reroute packets to eschew the critical node. This implicatively insinuates that all other nodes in the network are keeping the critical node alive as much as possible. This increases the life of the total network. This additionally endeavors to distribute the routing load over the nodes having more power and less working load and preserving power for the nodes having more local workload in the network.

But this does not include energy consumption for the internal computation puissance. For this load is distributed arbitrarily over every node in the network. load draws energy from the battery arbitrarily and periodically. Rank is additionally dependent on the load because energy

VI. RESULT ANALYSIS

For the result analysis the NS2 project is run in normal and expressed mode for 3000 seconds. And the output is observed in the output ide file as shown in following the figure. The corresponding residual power of each node with veneration to time is noted. These data input is utilized to plot chart utilizing xgraph. Here in the following graph the residual power of five nodes are plotted with veneration to time variation of 1, 500 seconds.

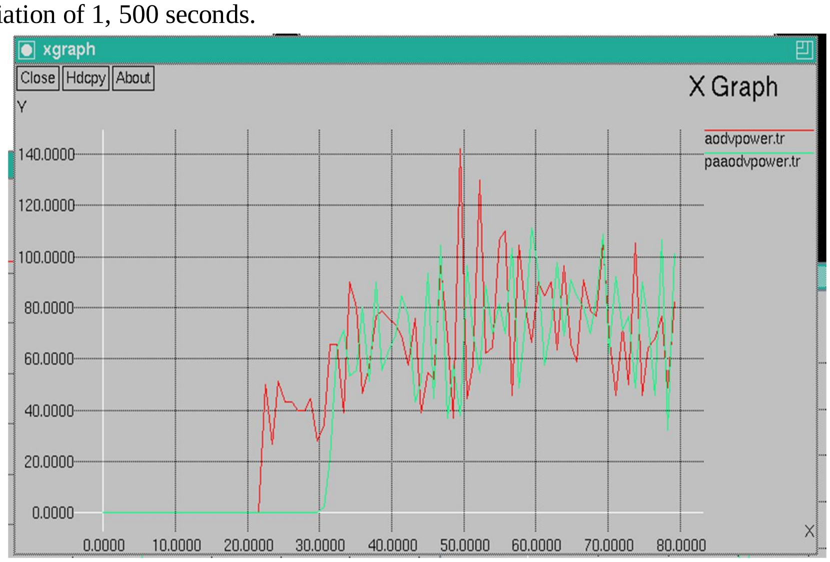

Fig. 2.simulation output

From the graph it is pellucid that the residual capacity of the five nodes does not differ much with each other with reverence to time when the proposed module is utilized. It shows that the puissance is utilized in a distributed manner throughout the network. But when the proposed module is not been used then as shown in the graph the energy differs much more when the proposed scheme is not used according to the same time interval under same constrains.

VII. CONCLUSION & FUTURE WORK

As described here the consumption of power of a node in mobile ad-hoc network is strongly related with the computation in that node & communication i.e. Routing procedure. Here load draws energy arbitrarily from battery of all the nodes in the network for the internal computations. And radio is connected as well to draw energy from battery for communication. Then rank is calculated according to these two parameters and with the avail of rank it is shown that any node which is to exhaust can be identified. Ergo the stability & life of the network is incremented by eschewing that node at the time of path revelation. It conspicuously reduces the routing load of that node. This preserves the node going down immediately. More over the module withal culls the route in which nodes have more residual puissance. And this way utilization of potency is distributed through all the possible nodes in the MANET network according to rank.

As this utilizes all possible alternate routes in the network rather than utilizing shortest path at the time of routing, the average residual power of the entire network will be decremented a little more expeditiously than the general one. Packet size of rout request of the routing protocol is incremented here to embed the rank. This increases the communication overhead.

In future more efficient rank may be proposed to optimize the average network puissance. The verbalized communication overhead may additionally be reduced by thoroughly redefining the structure of the message to embed rank. More over in future, load of a node; having critical battery power; could additionally be distributed over the network by estimating opportune communication power & available puissance. This will require more advanced rank calculation.

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