Performance Analysis of Ad hoc Network using link quality in dynamic Mobile environment

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Abstract- **A Mobile Ad Hoc Networks (MANET) is a group of wireless mobile nodes dynamically forming a network for data transfer without any pre-existing infrastructure or centralized administration. A wireless network with a high density of nodes and within a single collision domain has a high probability of congestion, decreasing the performance significantly.. Routing in ad hoc wireless networks has been an active area of research for many years. In static ad hoc wireless networks, minimal hop count paths can have poor performance because they tend to include wireless links between distant nodes.**

The main objective is to decrease the network overheads without affecting the QoS of the network in highly dynamic ad hoc networks. Highly dynamic and dense network have to maintain acceptable level of service to data packets and limit the network control overheads.

1. INTRODUCTION

This article guides Wireless technology is a radical paradigm change which enables communication between devices from any location without connected cables, using radio waves to maintain communication channels. The rapid technological advances and innovations in the past few decades have drastically reduced the size and energy requirements of the wireless devices. The advances in access to wireless broadband internet and multimedia content have increased popularity of wireless communication

An ad hoc wireless network consists of a set of mobile hosts operating without the aid of an established infrastructure. The hosts are free to move randomly and arrange themselves arbitrarily; so the network's topology keeps changing quickly. MANET consisting of several home-computing devices. AODV enables mobile nodes to receive routes to the desired destination very fast.

The operations of AODV are all loop-free, and offer fast convergence when the ad-hoc network topology changes by avoiding the Bellman-Ford 'counting to infinity' problem. Typically, this means when a node changes its position within the network. When link breaks, AODV notifies all the concerned nodes so that they are able to avoid and invalidate the routes using this lost link

Wireless mobile networks based on the cellular concept depends on infrastructure support of base stations, which acts as access points to the mobile devices to route messages to and from mobile nodes in specified transmission area. WLAN, Global System for Mobile Communications (GSM), Wireless local loop (WLL) are wireless networks based on this concept. Whereas MANET does not require any pre-existing fixed network infrastructure; centralized message passing device is not required for communicating between mobile nodes

In MANET, topology is highly dynamic and random. In addition, the distribution of nodes and, eventually, their capability of self-organizing play an important role.

Ad hoc wireless networks inherit the traditional problems of wireless and mobile communications, such as bandwidth optimization, power control, and transmission quality enhancement. In addition, the multihop nature and the lack of fixed infrastructure generate new research problems such as discovery, and maintenance, as well as ad hoc addressing and self-routing.

The routing of the data packets in an ad-hoc network is complex due to the dynamic nature of the network. Nodes in an ad hoc network can move freely in and out of the network.This frequent change in topology of the network makes it difficult to maintain the correct routes. It is of critical importance that communication among the nodes is maintained

2. THEORETICAL BACKGROUND

The routing algorithms for MANET are inherited from conventional algorithms which are subject to much criticism as they do not consider ad hoc network characteristics such as mobility and resource constraints

The AODV algorithm allows dynamic, self-starting, multihop routing between all mobile nodes participating in a wireless ad-hoc network by Perkins et al (2003). AODV enables mobile nodes to receive routes to the desired destination very fast. It does not require the nodes to maintain the routes that are no longer needed in a current communication. AODV allows the nodes to respond very quickly to link breakages and changes in network The operations of AODV are all loop-free, and offer fast convergence when the ad-hoc network topology changes by avoiding the Bellman-Ford 'counting to infinity' problem. Typically, this means when a node changes its position within the network. When link breaks, AODV notifies all the concerned nodes so that they are able to avoid and invalidate the routes using this lost link

The AODV routing protocol is created for mobile ad-hoc networks with tens to thousands of participating mobile nodes. AODV can effectively be used for low, moderate, and relatively high mobility rates, as well as a variety of data traffic levels. AODV is formed for networks where the nodes can all trust each other, either by the use of preconfigured keys, or because it is known that there are no malicious intruder nodes in the network. AODV has been modeled to minimize the propagation of control traffic and prevent overhead on data traffic, in order to enhance both, the scalability and the performance of ad-hoc networks.

3. METHODOLOGY & EXPECTED OUTCOME

Step 1: Start

Step 2: Before starting transmission your network is in ideal condition

Step 3: whenever you confirming that your network in in ideal condition then you are able to start transmission.

Step 4: after that read the parameter using normal transmission.

Step 5: then start transmission using Swarm Intelligence technique which in ACO.

Step 6: it uses two techniques.

1) Forward Agent
2) Backward Agent

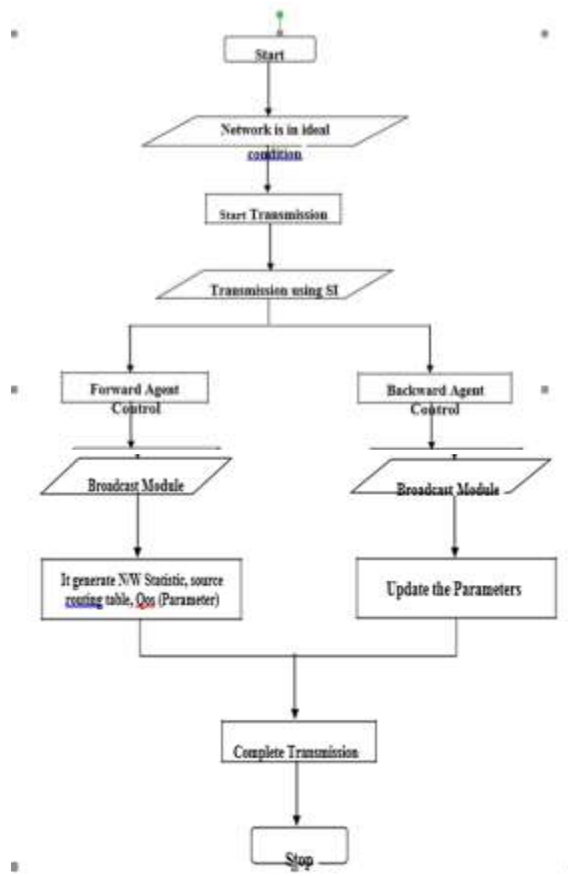
Step 7: Both has its own Broadcast Module

Step 8: Forward Agent uses the Network Statistics, Routing Table information, Link quality, and also using different parameter of quality of services.

Step 9: backward agent is used for updating the status of all parameter.

Step 9: Complete transmission.

Step 10: Stop.



Swarm Intelligence

SI-based routing protocols commonly use two types of agents to collect routing information, named respectively forward/ backward ants in ACO-based protocols and forward/backward scouts in bee-inspired protocols. Forward ants/scouts are launched by source nodes to find a path to a specified destination. We call them forward agents. Once a forward agent reaches its destination, it travels back to the source node as a backward ant/scout. Therefore, we generically call them backward agents. Some protocols use other types of agents to participate in the routing process.

1) Forward Agent:

The main duty of a forward agent is to discover a path to reach a specific destination. Additionally, on its way to the destination, it collects routing information (e.g., experienced delay, minimum remaining energy). The forward agent control module contains three components: (i) agent generation unit, (ii) forwarding engine and (iii) parameter update module. The agent generation unit generates forward agents according to a proactive (e.g., periodically), reactive/on-demand (e.g., following a link failure or a new route is required), or hybrid schedule (see [17] for more detailed discussion on reactive vs. proactive generation strategies). Once a forward agent is generated, the forwarding engine controls its transmission from node to node. The forwarding engine either unicasts the agent to one of its neighbors or broadcasts it to all or to a selected subset of the neighbors. In most ACO-based routing schemes, next hop selection is controlled by a stochastic decision policy based on assigning the selection probabilities as a function of pheromone and heuristic values. Pheromone values are collectively learned and adapted over time by the mobile (backward) agents. At the beginning of the learning process all the next hops have equal pheromone values, such that next hop selection is mainly driven by the heuristic values

2) Backward Agent

The backward agents control module consists of a generation block and of a forwarding engine. The generation block reactively decides whether to generate or not a backward agent in response to a forward agent received at the destination (e.g., if the forward agent has found a low-quality path, it might be appropriate not to generate the backward agent). Backward agents can also be generated proactively, as is done. If the backward agent is being generated, it inherits all the information gathered by the forward one and retraces its path back to the source node.

In ACO-based schemes retracing is executed using a source-routing approach, while the next hop approach is normally used in bee-inspired protocols. In ACO schemes, while retracing the forward path, at intermediate nodes the backward agent makes use of the routing information it carries on and of the information from the local routing information database (RID) to evaluate the quality of the forward and/or backward path. In turn, the agent communicates its evaluation and information to the agent communication module to update the RID.

4. TOOL TO BE USED

The NS-2 tool is strong program for network simulator which is open source tool & it uses two languages C++/OTcl & its build simulation environment. It is supporting wireless & wires networks in MANET.It allow us to do exercise with present network protocols. It also gives permission to perform correction of network protocols.

NS-2 endows mechanism to verify agitation of these mobile nodes & permit the simulation the capability of item move at source to destination nodes. So, we can identify path easily.NS-2 is useful for small & large dimension set of nodes.

Network Simulator NS-2 has many and expanding uses including:

To evaluate the performance of existing network protocols.

To evaluate new protocols before use.

To run large scale experiments those are not possible in real experiments. To simulate a variety of ip networks

NAM is an animations tool for viewing network simulation trace and real world packet trace data. The design theory behind NAM was to create an animator that is able to read large amount of animation data set and be extensible enough so that it could be used in different network visualization situation. In order to handle large amount of data set a minimum amount of information kept in memory. Events commands are kept in a file and reread from the file whenever necessary

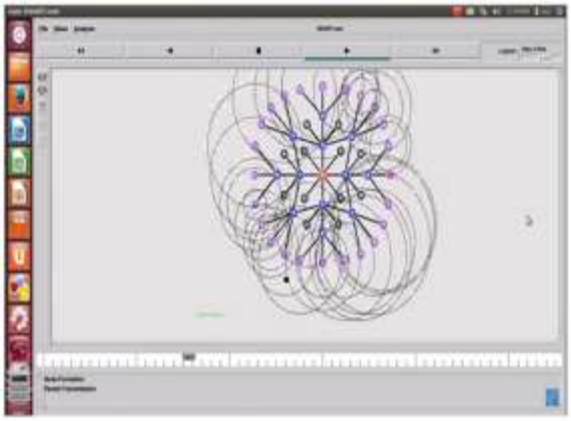


Figure 4.5: Creating Path using ACO

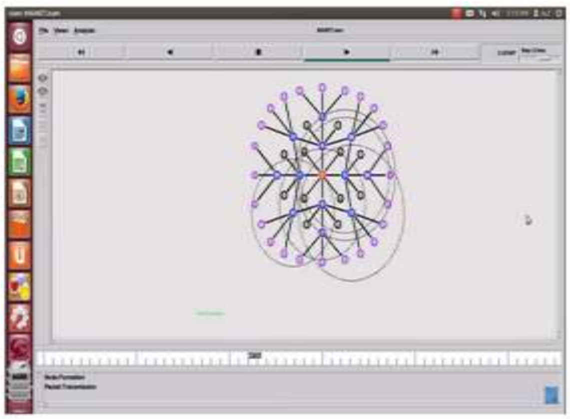


Figure 4.6: Start Simulation using ACO

5. RESULT ANALYSIS

Node Pause Time in second	Packet Delivery Ratio	
	AODV	ACO-AODV
20	0.8689	0.91427
40	0.8732	0.94457
60	0.8973	0.92147
80	0.8988	0.94268
100	0.9005	0.95123

6. CONCLUSION

In this study, it was proposed to improve the link quality by incorporating a link quality metric with ad hoc on demand distance vector routing protocol. A new link quality metric has defined to enhance AODV routing algorithm so that it is handling link quality between nodes to evaluate routes. And for that we have user here SI technique for link quality improperness.We have done more efficient, & decrease less time & send more PDR.It has improved Performance, increase link communication & correct throughput.

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