Volume 4, Issue 9, September 2014 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Comparative Analysis of Stable Link Management for Improvement of Quality of Service in Manets

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Abstract-Mobile Ad-hoc Networks (MANETs) allow wireless nodes to form a network without requiring a fixed Infrastructure. Ad hoc network is a network which basically consists of nodes that use a wireless interface to send information from source to destination. Since the nodes in a network of this kind can serve as routers and hosts, they can forward packets on behalf of other nodes and run user applications. The ease of deployment and the infrastructure-less nature of Mobile Ad hoc Networks (MANETs) make them highly desirable for present communication technology. MANET is probably the most well-known example of this networking structure being developed around for over twenty years. Furthermore, the multi-hop ad hoc networking structure is often used for building sensor networks to study, control, and monitor events and phenomena. Though considerable research has been done in this area. In this paper, we are analyzing the performance of advanced AODV routing protocol based on throughput of receiving packets and Average End-to-End Delay via increasing number of nodes and observing its effect on Quality of Service (QoS) of Mobile Adhoc Network. For our simulation we had used a discrete event simulator known as NS2.

Keywords- AODV, Hand off, Link Failure, MANETs, Reliable Routing, RREQ, SLM-AODV

I. INTRODUCTION

Wireless networks have become increasingly popular in the computing industry since their emergence in the 1970s. This is particularly true within the past decade which has seen wireless networks being adapted to enable mobility. There are currently two variations of mobile wireless networks. The first is known as infrastructure networks,[1] i.e., those networks with fixed and wired gateways. The bridges for these networks are known as base stations.

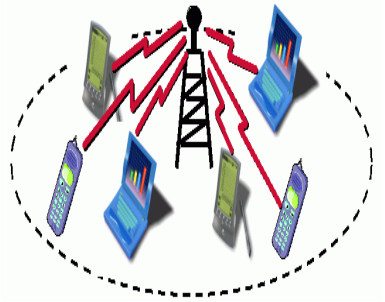

Figure 1: Infrastructure based network[1]

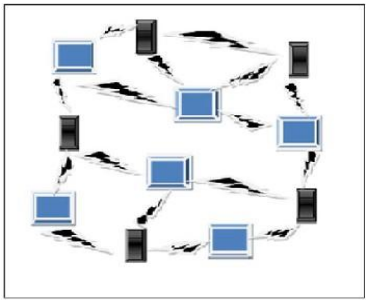

Figure 2 :Infrastructure less network[2]

A mobile unit within these networks connects to, and communicates with, the nearest base station that is within its communication radius. As the mobile travels out of range of one base station and into the range of another, a "handoff" occurs from the old base station to the new, and the mobile is able to continue communication seamlessly throughout the network.Typical application of this type of network include office wireless local area networks (WLANs).The second type of mobile wireless network is the infrastructure-less mobile network, commonly known as an ad-hoc network. Infrastructure-less networks have no fixed routers,[1,2]all nodes are capable of movement and can be connected dynamically in an arbitrary manner.

Nodes of these networks function as routers which discover and maintain routes to other nodes in the network. Mobile means moving and ad-hoc means temporary without any infrastructure. So, mobile ad-hoc network is a collection of wireless mobile nodes which have the ability to communicate with each other without having fixed network infrastructure or any central base station.[5] The nodes themselves are responsible for creation, operation and maintenance of the network. Each node in the MANET is equipped with a wireless transmitter and receiver, with the aid of which it communicates with the other nodes in its wireless vicinity. The nodes which are not in wireless vicinity, communicate with each other hop by hop following a set of rules (routing protocol) for the hopping sequence to be followed.

II. APPLICATIONS OF MANETS

The ease of deployment of MANET makes it an attractive choice for variety of applications [9]:

- *Defense Applications*: They can be used in a military setting where troops can exchange strategic information on the move.
- *Civilian Applications*: MANETs also have civilian applications, for example in mobile conferencing. Mobile conferencing is very useful for business meetings and seminars involving a large group of people. The participants can directly communicate with each other without the need for being physically close to a central access point or gateway.
- *Field Applications*: It is also useful for people doing field work such as geologists,cartographers or archaeologists who may want to communicate with their colleagues on the field.
- *Emergencies and Rescue Operations*: In emergencies and disaster struck areas, MANETs can be rapidly deployed to allow firefighters, paramedics and security personnel to communicate with each other and coordinate the relief effort. This capability would be indispensible in areas afflicted with hurricanes or other natural disasters, or areas in areas targeted by terrorism, where any pre- existing network infrastructure would have been destroyed .

III. ROUTING PROTOCOL IN MANETS

According to differences in network topology reaction, the routing protocols in MANET can be categorized into table-driven routing protocol and reactive routing protocol.[3] The table-driven routing protocols attempt to maintain consistent, up to date routing information from each node to every other node in the network whereas reactive routing protocol creates routes only when desired by the source node. Destination sequenced distance vector (DSDV) is a typical table-driven protocol. While the typical reactive routing protocol includes Ad hoc on demand vector routing (AODV) and dynamic source routing (DSR).

A. THE ADHOC ON DEMAND DISTANCE VECTOR ALGORITHM

Our basic proposal can be called a pure on demand route acquisition system nodes that do not lie on active paths neither maintain any routing information nor participate in any periodic routing table exchanges Further a node does not have to discover and maintain a route to another node until the two need to communicate unless the former node is offering its services as an intermediate forwarding station to maintain connectivity between two other nodes When the local connectivity of the mobile node is of interest each mobile node can become aware of the other nodes in its neighborhood by the use of several techniques including local (not system wide) broadcasts known as hello messages The routing tables of the nodes within the neighborhood are organized to optimize response time to local movements and provide quick response time for requests for establishment of new routes. The algorithm's primary objectives are[3,4]:

- To broadcast discovery packets only when necessary.
- To distinguish between local connectivity management (neighborhood detection) and general topology maintenance.
- To disseminate information about changes in local connectivity to those neighboring mobile nodes that are likely to need the information.

AODV uses a broadcast route discovery mechanism as is also used with modifications in the Dynamic Source Routing DSR algorithm Instead of source routing however AODV relies on dynamically establishing route table entries at intermediate nodes This difference pays off in networks with many nodes where a larger overhead is incurred by carrying source routes in each data packet To maintain the most recent routing information between nodes we borrow the concept of destination sequence numbers from DSDV. Unlike in DSDV however each adhoc node maintains a monotonically increasing sequence number counter which is used to supersede stale cached routes The combination of these technique yields an algorithm that uses bandwidth efficiently by minimizing the network load for control and data traffic is responsive to changes in topology and ensures loop free routing.

B. SLM-AODV

When the route is needed, the source sends the RREQ packet to his entire neighbor after that node check if RREQ retry is less than Retry threshold (RET) then it select the route on the basis of signal strength of the RREQ packet.

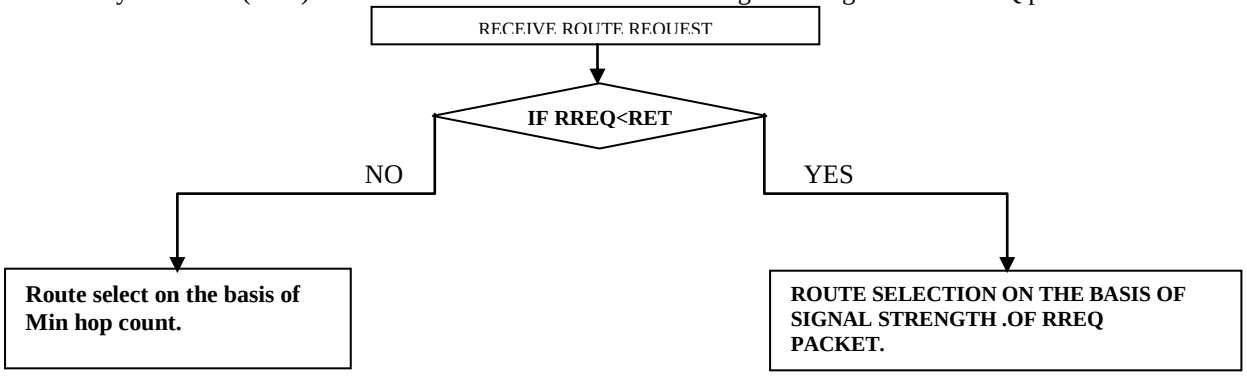

Figure 3: Route selection procedure in SLM-AODV

It means it compare the signal strength of RREQ packet of the sender's node if it is greater than signal threshold value then intermediate node receive this packet otherwise it discard this packet with the help of this approach routing protocol search the stable path to the destination, on the basis of signal strength if there is no route to the destination so node again send the RREQ packet to the neighbor node and RREQ retry is also increase by one, [6,7]if it greater than Retry Threshold value then it switch to normal AODV and find the route on the basis of minimum hop count so we can always find the best path among available path even in the distant node.

IV. SIMULATION PARAMETERS

The simulation parameter has shown in Table 1. Here, we designed and implemented our test bed using Network Simulator (NS-2.35) to test the performance of both Routing algorithms. The data transmission rate is 4 packets/sec. The total simulation time is 100 second.

Table I. Simulation Parameters

PARAMETER	VALUE
Simulation duration	100s
Topology area	1000 m x 1000 m
Number of nodes	50 to 100
Mobility speed	2 to 16 m/s
Mobility model	Random way point
Transmission range	250 m
Packet rate	4 packets/s
Packet size	512 b
Traffic type	Cbr

V. PERFORMANCE EVALUATION

In this section, the performance of SLM-AODV is evaluated using NS2.A comparison evaluation is done for the behavior of slm aodv on different number of nodes with parameters such as throughput, packet delivery ratio, end to end delay.[8,9] In this basically throughput ,packet delivery ratio and end to end delay are calculated for different no of nodes.

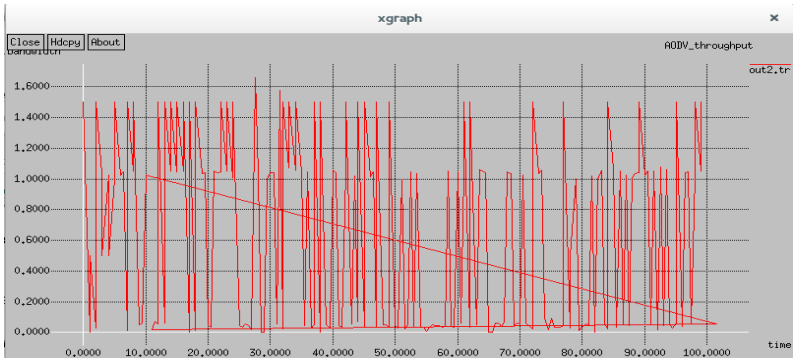

Figure 4: Throughput for 100 nodes in SLM AODV

Table II. Comparison For Different Number Of Nodes

Parameters	Evaluation for 50 nodes	Evaluation for 100 nodes
Average throughput	110 kbps	134 kbps
Average end to end dely	13.554 m/s	33.0657 m/s
Packet devery ratio	96.9%	99.6%

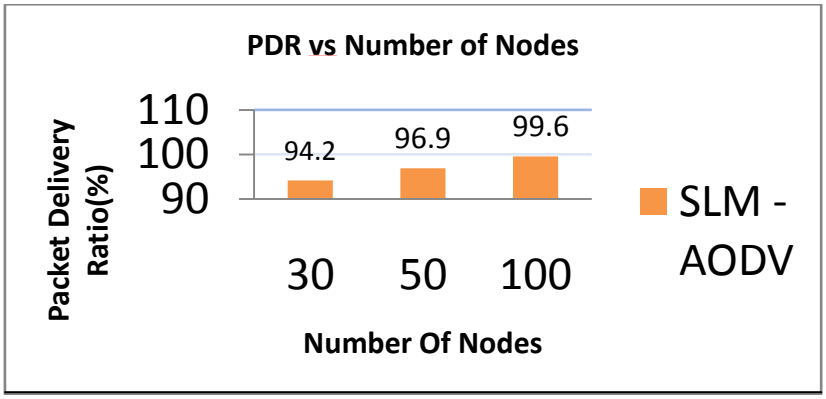

Figure 5: Comparison of different nodes for packet delivery ratio

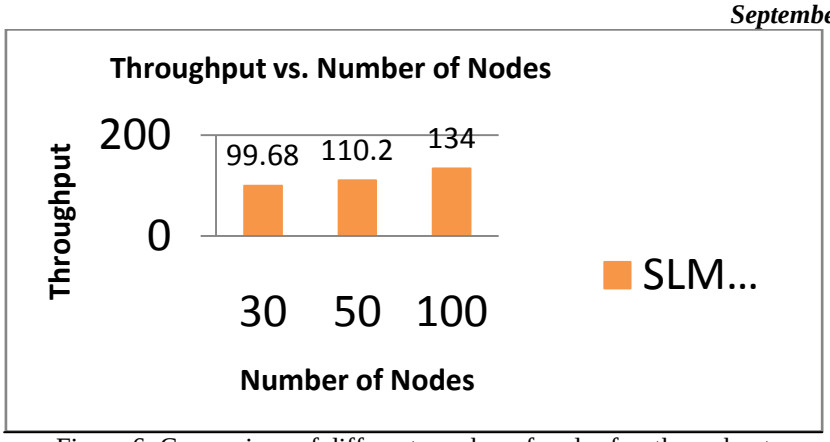

Figure 6: Comparison of different number of nodes for throughput

VI. CONCLUSION

1. For CBR traffic, SLM-AODV is more beneficial at highly mobile and dense network. As the number of node increases SLM-AODV gives high throughput value.
2. For CBR traffic, SLM-AODV performs slightly better than AODV in most cases. SLM-AODV always seems to offer better performance in terms of Packet Delivery ratio and throughput when the number of nodes are increased.
3. SLM-AODV not only enhance the network performance but also more reliable in data transmission as it reduces the network partition and packet loss in the networks.

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