INTERNATIONAL JOURNAL OF ENHANCED RESEARCH IN SCIENCE TECHNOLOGY & ENGINEERING
VOL. 2, ISSUE 2, FEB. 2013 ISSN NO: 2319-7463

Congestion Control in Manet using Efficient Local Route Repair Method

Kishan Singh Rao[1], Prof. Laxmi Shrivastava[2]
Department of Electronics Engineering, Madhav Institute of Technology and Science Gwalior
[1]raokishan029@gmail.com, [2]lselex@yahoo.com

Abstract— AODV protocol is an on demand reactive protocol, which exhibits congestion during high mobility and multiple data packet stream to a common destination. This may result in decaying the performance of AODV. The proposed modification is aim controlled congestion by applying efficient local route repair method. When the link failure is detected at intermediate node, a help message has broadcasts to neighbor's nodes. The neighbor's node that have shortest route to destination, will reply to help. On the reply message, the new route has established and data now can be transmitted through this route. The results show that AODV-ELRR performs better in terms of packet delivery ratio, normalized routing load, end to end delay and packet loss than classic AODV. The simulation is done through network Simulator-2 (ns2).

Keywords- AODV, Active Route, Congestion, Local Route Repair, MANET, Ns2,

I. INTRODUCTION

A mobile Ad-Hoc network (MANET) [1] is a self configuring, no-infrastructure network of mobile devices connected by wireless link. Each device in a MANET is free to move independently in any direction. Each must forward traffic unrelated to its own use, and therefore be a router, the primary challenge in building a MANET'S equipping each device continuously maintain the information required to properly route traffic. Such network may operate own self or may connected to larger internet. MANET nodes consist of wireless transmitters and receivers, equipped with antennas that may be omnidirectional, highly directional. They are used in situations where no fixed infrastructure is available or has been damaged due to natural or manmade disaster. Mobile ad-Hoc networks can turn the dream of getting connected "anywhere and at any time" in to reality. Typical application examples include a disaster recovery or military operation. Not bound to specific situations, these networks may equally show better performance in other places. As an example, a group of peoples with laptops can be imagined in a business meeting at a place where no network services are present. They can easily network their machines by forming an Ad-Hoc network. In mobile Ad-Hoc network, a message sent by a mobile node may be received simultaneously by all of its neighboring nodes. Messages directed to mobile nodes not within the sender's transmission range must be forwarded by neighbors, which thus act as routers.

Due to mobility it is not possible to establish fixed paths for message delivery through the network. Therefore, a number of routing protocol has been proposed for Ad-Hoc wireless networks. Such protocols are classified as proactive or reactive, depending on whether they keep routes continuously updated, or whether they react on demand.

II. AD-HOC ON DEMAND DISTANCE VECTOR (AODV)

The Ad-Hoc On- Demand Distance Vector routing protocol builds on the joint mechanism of DSDV algorithm and DSR.AODV is an improvement on DSDV because it typically minimizes the number of required broadcasts by creating routes on an on-demand basis, as opposed to maintaining a complete list of routes as in the DSDV algorithm. AODV uses a broadcast route discovery mechanism as is also used in DSR algorithm. Instead of source routing, however AODV relies on dynamically establishing route table entries at intermediate nodes. The combination of these techniques 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.

A. Lcal Repair in AODV

The AODV [2],[3]used local route repair algorithms for repairing the breakage routes. In local route repair, the node detecting the route break broadcast a route error (REER) message to source. Then source node broadcast route request (RREQ) message to its neighbor's to search fresh route to destination. The nodes have any route to destination or it is self-destination reply to RREQ and sends route reply (RREP) message to source. The route has determined and then data send to destination through this fresh route.

The following steps are taken for this purpose.

Step1. If route error has detected then broadcast a RREQ message to neighbor's.

Step2. If any route is available, reply to RREQ message.

Step3. Transmit the data by alternative route.

Step4. If any route is not available then drop the packet.

B. Congestion in AODV

When multiple data stream sent to common destination congestion has occurred [4][5]. The mobility and traffic load are main factor which influence the AODV and starts congestion in network. Newsday congestion is big problem in network. In AODV it is due mobility of node, on demand route establishment, and link breakage due to movement of mobile nodes. In a network with shared resources, where multiple senders compete for link bandwidth, it is necessary to adjust the data rate used by each sender in order not to overload the network. Packets that arrive at a router and cannot be forwarded are dropped, consequently an excessive amount of packets arriving at a network bottleneck leads to many packet drops. These dropped packets might already have travelled a long way in the network and thus consumed significant resources. Additionally, the lost packets often trigger retransmission, which means that even more packets are sent into the network. Thus network congestion can severely deteriorate network throughput. If no appropriate congestion control is performed this can lead to a congestion collapse of the network, where almost no data is successfully delivered. Such a situation occurred on the early Internet.

III. PROPOSED MODIFICATION

The proposed efficient local route repair (AODV- ELRR) has used to solve the drawback of existing repair scheme or long delay. The operation of ELRR consists of four parts which are route error detection, sending "HELP" message, examining the possibilities of Efficient Local Route Repair and finishing the ELRR.

Step1. Route Error Detection

Assume that a source node establishes a route to a destination node in on demand manner and they communicate with each other. During data transmission node B cannot act as a part of the route anymore because of some reason a moving and power off in fig (a).In on demand routing protocols, nodes periodically checks the connectivity with their former and latter nodes that function as an active route. For example, there is a link layer notification ,nodes can be aware of the former and latter nodes existence when they receive ACK message after data transmission or CTS message after sending RTS message. Nodes also can check the connectivity by passive acknowledgement. This mechanism is activated when link layer notification is not available in AODV, nodes sends "HELLO" message to check connectivity with neighbor nodes. Using above mechanism, node A notices the disconnection with node B and executes efficient local route repair (ELRR) process.

Step2. Sending "HELP" Message

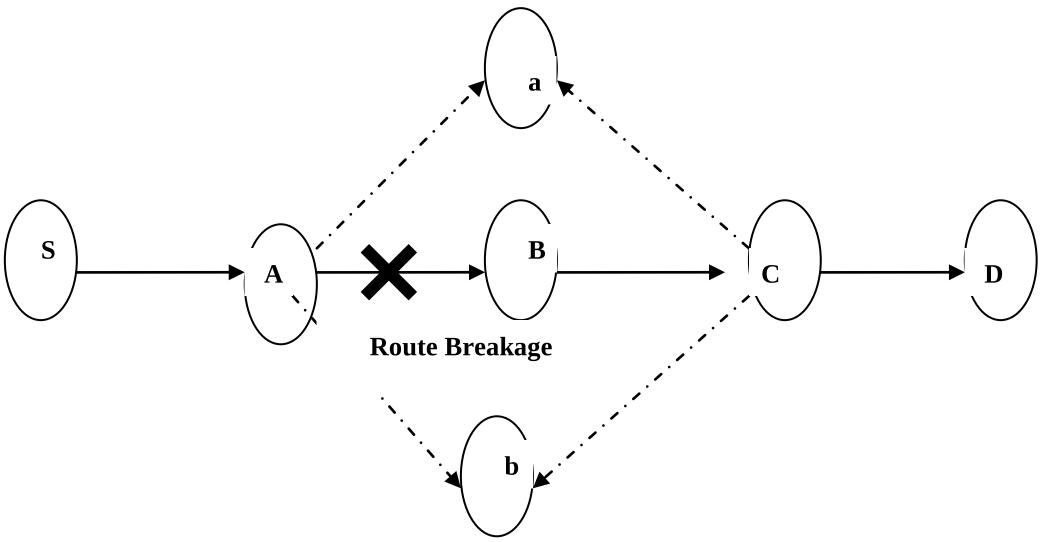
After noticing a link disconnection nodes activate the efficient local route repair. Primary they broadcasts "HELP" message aiming for any node which with the transmission range from them. It is because they do not have any information about how many neighbor nodes exist. The route where the transmission occurs is identified by source and destination IP address. Nodes own address specifies who detects the route error, and error node's address is for overhearing nodes which have three entries including error node. Fig (b) shows the "HELP" message broadcasting.

Step3. Determining the Possibilities of ELRR

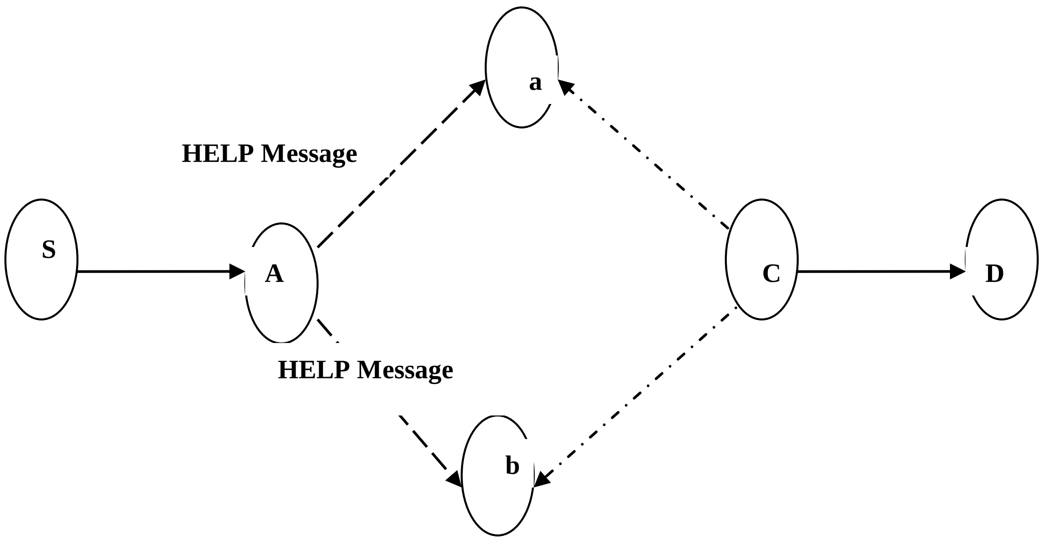
When overhearing nodes who receive "HELP" message examine their tables if they can replace the error node. i.e. they know about latter node of error node. They send approval message as the answer the "HELP" message.The approval messages are transmitted to former node. When multiple nodes answer to "HELP" message former node chooses the earliest message. If overhearing nodes does not have enough information to recover route error, they do not answer the "HELP" message.

Step4. Finishing the Efficient Local Route Repair

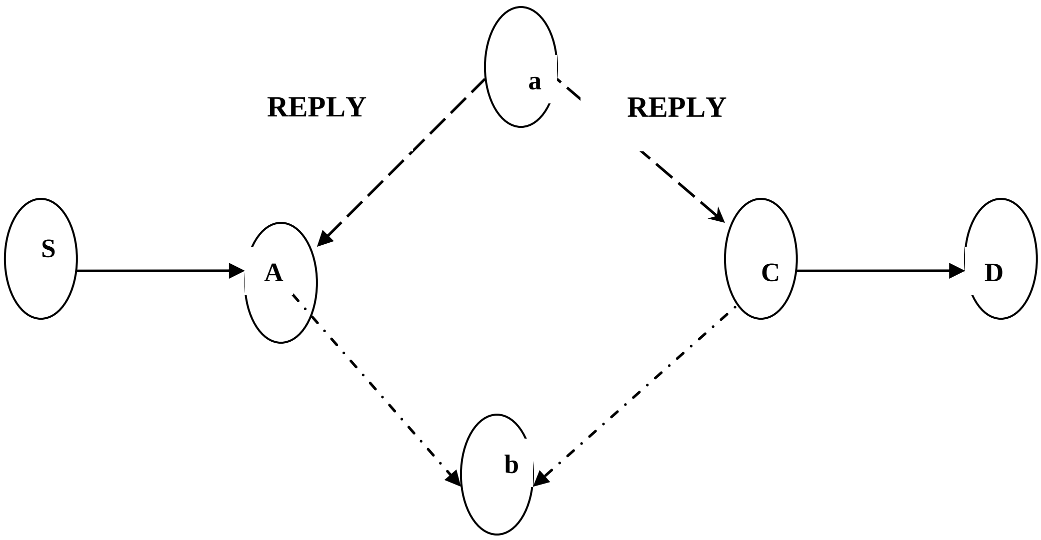
After receiving approval message from overhearing node, former and latter node change their routing table then, the efficient local route repair is over. If former nodes do not receive any approval message, they send a route error message to source node, and a route may be reconstructed. In fig (d), a new route is constructed after efficient local route repair.



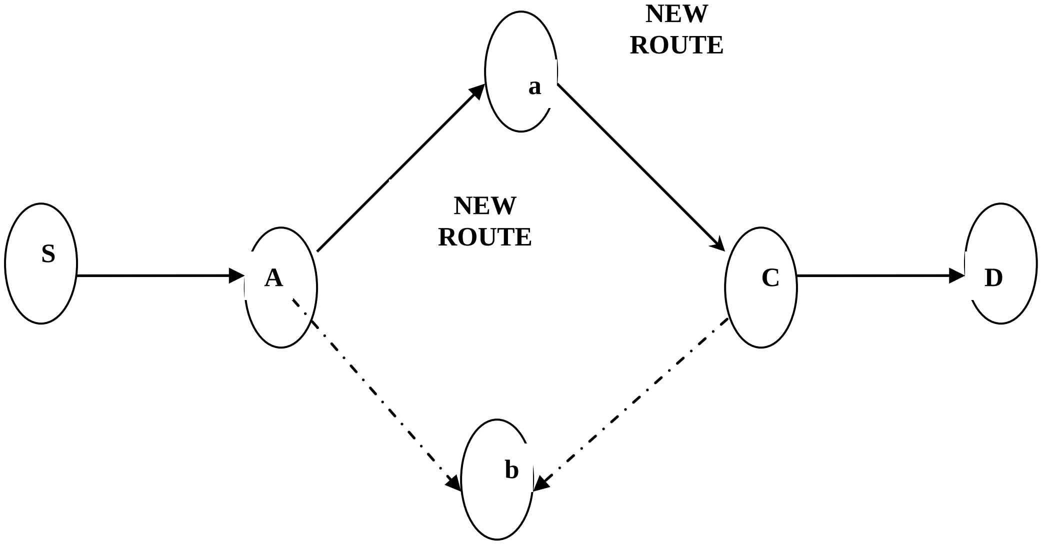
(a) Detection of Route Breakage



(b) Help message



(c) Replying the Help message



(d) Finishing Efficient Local Route Repair method

Figure1. Efficient Local Route Repair Method in AODV

IV. SIMULATION RESULT

A. *Simulation Model.*

Node Movement and Topology Generation[7],[8]:Instead of specifying and control each node, position and movement pattern ,in this paper a CMU Tool ,"setdest " has used to generate large number of nodes and their movements. The tool use a random waypoint model.

Traffic Pattern Generation (cbrgen) [9],[10],[11]: random traffic of cbr can be setup between mobile nodes using a traffic scenario generator script ;in order to create a traffic connection file this need to define the type of traffic connection (cbr or tcp),the number of nodes and maximum number of connection to be setup between them ,a random seed, and in case of CBR connection ,a rate whose inverse value is used to compute the time interval between the CBR packets .

$ ns cbrgen.tcl [-type cbr/tcp] [–nn node] [-seed seed] [-mc connection] [-rate rate] >file name

TABLE I. SIMULATION PARAMETER

Sr. No.	P***arameter***	***Value***
1.	Area	1000*1000
2.	Number of Node	50
3.	Pause time	10 s
4.	Maximum speed	20 ms
5.	Traffic type	DP
6	Application type	CBR
7.	Data rate	4,6,8,10,12 packets per second
8.	Packet size	512 byte
9.	Simulation time	300 sec.
10.	Node Mobility	Random Waypoint

B. *Performance Xgraph*

There are numbers of performance metric by which gives the performance of AODV and AODV-ELRR. In this paper the performance metrics such as packet delivery ratio, average end to end delay, normalized routing load and packet loss has been calculated.

INTERNATIONAL JOURNAL OF ENHANCED RESEARCH IN SCIENCE TECHNOLOGY & ENGINEERING
VOL. 2, ISSUE 2, FEB. 2013 ISSN NO: 2319-7463

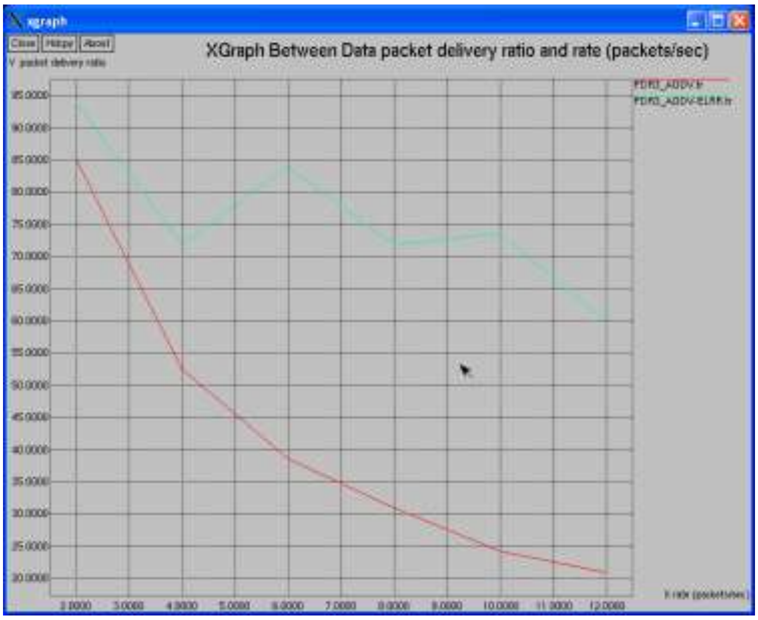


Figure2. X-graph for Packet delivery ratio v/s packet rate for 20 ms speed of nodes

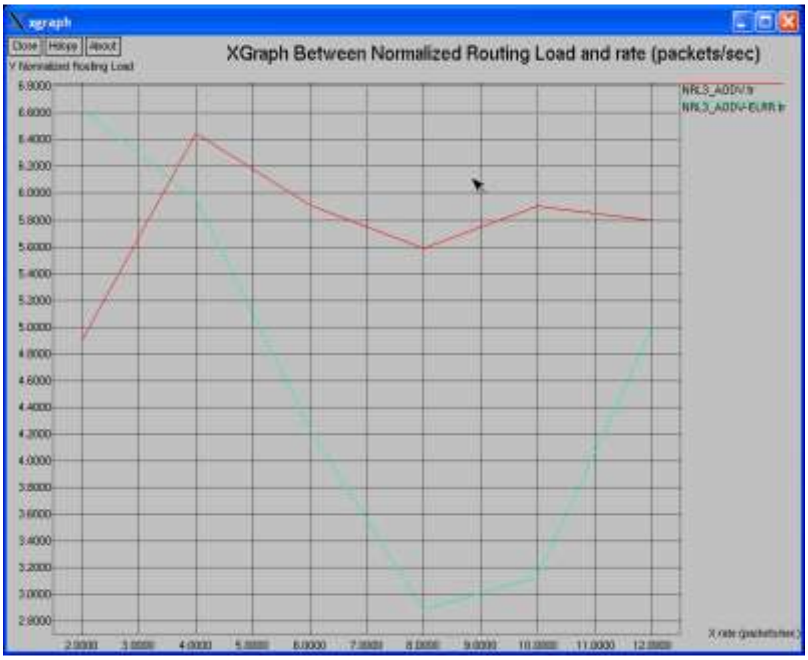


Figure3. X-graph for Packet delivery ratio v/s packet rate for 20 ms speed of nodes

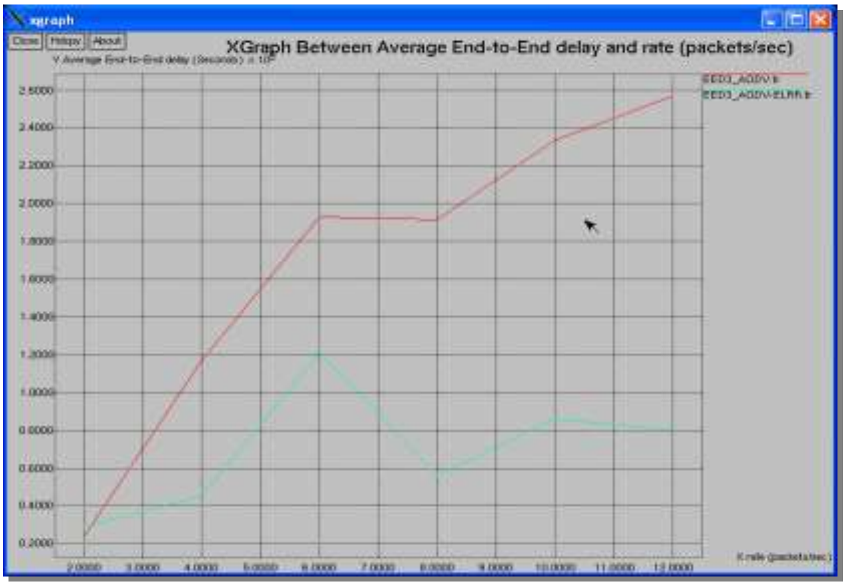


Figure4. X-graph for average end to end delay v/s packet rate for 20 ms speed of nodes

Figure 5. X-graph forpacket lossv/s packet rate for 20 ms speed of nodes

ACKNOWLEDGMENT

The authors grateful to Dr. Sanjeev jain,director mits Gwalior and Dr. S.S.Bhadoriya,Head,department of electronics for their keen interest in welfare of all research scholar.

VOL. 2, ISSUE 2, FEB. 2013 ISSN NO: 2319-7463

CONCLUSION/RESULTS

Figure 2 shows X-graph for PDR (%) v/s packets rate for 20 ms speed of nodes and 50 nodes. From figure 2 this can observe that packet delivery ratio for AODV_ELRR protocol is better than AODV protocol. In this as increased packet rate, PDR has increased more in AODV-ELRR. Figure 3 shows X-graph for NRL v/s packet rate for 20 ms speed of nodes and 50 nodes. From figure 3 this can observe that normalized routing load for AODV_ELRR is less than AODV protocol. In this as increased packet rate, NRL has decreased more in AODV-ELRR Figure 4 shows X-graph for average EED (%) v/s packet rate for 20 ms speed and 50 nodes. From figure 4 this can observe that average end to end delay for AODV_ELRR protocol is less than AODV protocol. In this as increased packet rate, average EED has decreased more in AODV-ELRR Figure 5 shows X-graph for packet loss (%) v/s packet rate for 50 nodes and 20 ms speed. From figure 5 this can observe that packet loss for AODV_ELRR protocol is less than AODV protocol. In this as increased packet rate, packet loss has decreased more in AODV-ELRR

REFERENCES

[1] Joo –Han Song and Victor C.M.Leung , "Efficient On Demand routing for Mobile adhioc wireless acess networks", ieee journal on selected area in communication ,vol -22, no. 7, September 2004.

[2] Charles E.perkins ,Elizabeth M.Royer," Ad-hoc on demand Destance Vector Routing .",proc.2nd IEEE FVksp.Mobile comp and app pp 90-100. Feb 1999networks", international journal on computer science and engineering (IJCSE) ISSN:0975-3397 vol. 3,no. 3 Mar 2011.

[3] www.ietf.org/rfc/rfc3561.txt

[4] G.S.Tomar ,"Modified Routing algorithm for Aodv in constrained condition.", second asia international conference on modeling & simulation .

[5] Renu kachhoria and sanjeev Sharma ,"An implementation in AODV based on active route time out between sensor nodes in wireless sensor networks", international journal on computer science and engineering (IJCSE) ISSN:0975-3397 vol. 3,no. 3 Mar 2011.

[6] Li Xiz ,Zhaohui liu, yue chang ,peng sun ," An improved AODV routing protocol based on congestion control and Routing Repair Mechanism", International Conference and Mobile Computing ,Jan-2009 PP:259-262.

[7] www.isi.edu/nsnam/ns/tutorial/nsscript7.html

[8] www.winlab.rutgers.edu/~zhibinwu/html/ns2-wireless-scene.tm

[9] www.cise.utl.edu/~helmy.../introduction to wireless _simulation.ppt

[10] www.cs.cornell.edu/people/egs/615/mobility-ns-1.ppt

[11] www.ece.iupu.edu/tutorials/ns2