ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Special Issue 1, March 2017

Effective Improvement of Multicast Capacity in Hybrid Network Using Genetic Algorithm Based MAODV

K.R.Kavitha[1], S.Jebakumargomerrajadurai.[2], Dr.K.Ramasamy[3]

[1] PG Student, Department of Electronics and Communication Engineering, P.S.R Rengasamy College of Engineering for Women, Sivakasi, Tamilnadu, India

[2] Assistant Professor, Department of Electronics and Communication Engineering, P.S.R Rengasamy College of Engineering for Women, Sivakasi, Tamilnadu, India

[3] Principal , Department of Electronics and Communication Engineering, P.S.R Rengasamy College of Engineering for Women, Sivakasi, Tamilnadu, India

ABSTRACT: Hybrid network is a combination of both cellular and adhoc network. A hybrid network is to increase coverage area. In disaster situation adhoc network are easily deployed and drawback is linkfailure due to mobility of nodes and that information passing to rescue team is difficult. In hybrid network is to overcome the above problem. In this paper, we proposed an effective method to increase the multicast capacity in hybrid network using a Genetic algorithm and compare the performance analysis of AOMDVandMAODV for measuring parameters of Routing Overhead, Packet Delivery Ratio. MAODV protocol is used in the hybrid network. Genetic algorithm used to provide a path when a link break occurs in MAODV protocol**.**

KEYWORDS: Multicast, Hybrid network, MAODV, AOMDV,Genetic algorithm.

I.INTRODUCTION

In hybrid network increase coverage area in which wireless devices are connected each other through the wifi interface without dependent on wireless infrastructure.Multicast is employed in the hybrid network . Multicast is used for group communication, i.e information to be delivered from single sources to a group of receivers. In multicast are used in the network it has efficient to use bandwidth and to decrease the traffic load in the network.Multicast routing protocol in the hybrid network used in military, search and rescue operation in disaster situation.In militaryhigher officer forward the information to the group of soldiers by multicast.In multicast techniques are used it to provide faster information sharing and it reduce the timetaken when compared to unicast. The Multicast network single source sends data to the group of receiver.In military or disaster situation information forward only to selected particular path using multicast so that avoiding flooding in the network.The multicast tree is a variable according to the topology link changes by using the multicast approach in military and disaster situation information to groups of receivers to save many people.By implementing a dynamic hybrid multicast scheduling algorithm to improve the multicast in the hybrid network.MAODV protocols are used for multicast capacity in the hybrid network.Genetic algorithm is used to improve the multicast in the hybrid network.

II. RELATED WORK

Directed hypergraph and multigraph is proposed ,it provides to overcome the optimization problem and the drawback is high complexity of phase trasitions and increases cost in connectivity[1]
Spatial-temporal scheduling is proposed to provide a bandwidth efficiency ,increase throughput and drawback is scalability poor[2]

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The Heterogeneous cluster traffic is proposed,to provide a uniform data deliver to users and drawback is how to form clusters in a network and cluster sizes is not variable.[3]
The physical interference model is proposed to provide a capacity region for delay tolerant network where the wireless terminals are mobile.[4]
Dynamic algorithm is proposed ,it provide to overcome the multicast group selection problem and the drawback is algorithm achieve a near optimal solution in most scenarios[5]
An IGMP protocol is proposed, thenumber of active wireless nodes in the system high density of nodes can generate many collisions or low throughput due to sensing times.[6]
Hybrid extended network and hybrid dense networkaccess link between ordinary adhoc nodes and BS are different from those among ordinary adhoc nodes, the strategies are difficult to derive.[7]
The Hybrid wireless network is proposed to provide an efficient bandwidth allocation and drawback is performance degrades[8]
The Hybrid wireless network is proposed to provide efficient bandwidth, reliability and drawback are interference occur and throughput decreases[10]
.

III. MULTICAST AD HOC ON-DEMAND DISTANCE VECTOR ROUTING

Multicast adhoc on-demand distance vector routing protocol(MAODV) is used.It is the extension of AODV protocols.It is under the shared tree based structure.MAODV uses group leader to update sequence number periodically. In MAODV protocol group leader is the first node in group if any node wants to communicate in the tree it first addressed the group leader by sending route request message to the group leader. MAODV is used in adhoc networks to create a tree structure to deliver data to the destination.Here group leader is assign in network which decides the path to deliver the data to destination. In military the group of soldiers receives data from higher officers in fast manner.Multicast in the hybrid network i.e MAODV protocols are used in adhoc network only and data enter into another network called cellular network through gateway to deliver the data from adhoc network to a cellular network with the TCP or UDP connection to deliver data to user .Then the groupleader reply the node to calculate the distance of node to communicate.The information is passed to only selected node in network not all nodes in the network.Each multicast has the same sequence number and a unique address.If any node want to leave a group, send a message to group leader.Then it provide a route request to non participate node to initiate to join the tree.Group leader periodically maintain the table of multicast group address and next hop address and that group leader receive a GRPH message.If the GRPH message is received by non participating node, it immediately initiate the groupleader to provide a new single group leader for newly connected network.Main advantage of MAODV protocol is to reduce the control overhead and it avoid the loop forming in tree.

IV.GENETIC ALGORITHM BASED MAODV

Multicast in the hybrid network implemented the following problem arise. Multicast data to be delivered in hybrid network the traffic occurs, then packet drop increases and reduce the throughput and then the problem in cluster sizes depend data to be forward in the network.This problem can be resolved by using Genetic algorithm to reduce packet drop and increase throughput and increase the cluster sizes depend on size of packet.
MAODV protocols are used to deliver data in the hybrid network i.e adhoc network, creating tree structure and assign a groupleader forward data to intermediate nodes finally reached the destination.In cellular network data from adhoc network enter through the gateway network by tcp or udp connection.. If the cluster size depends on the type of data.MAODV protocol used in hybrid network it cause a link break to occur. So the genetic algorithm used in hybrid network it produces a optimized path when link break occur in the network.

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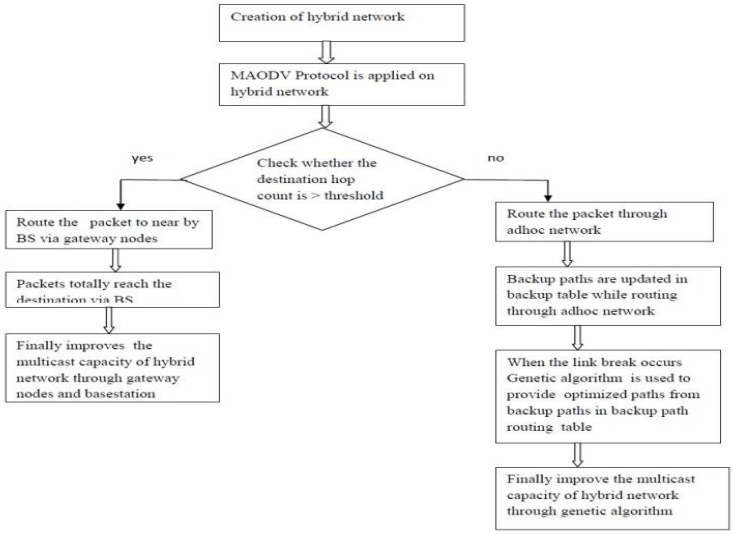

Fig1Flow chart of genetic algorithm

By using this algorithm toavoid flooding in network and data to be delivered only the selected route to reach the destination.Unicast data transmission from source to destination it produce lots of time to reach the destination.
Multicast session started and then compare the performance analysis of the Packet Delivery Ratio and Routing Overhead in the hybrid network.

V.PERFORMANCE EVALUATION

In this section simulation results are confronted.

Simulation Environment

The simulation environment is created in NS2, a network simulator that offers support for simulating multihop wireless networks.NS2 uses object oriented Tcl (OTCL) as the front end and c++ as the backend tools. The simulation scenario is written using OTCL and it mainly considers routing protocol and traffic pattern as input. This simulation scenario file generates trace file as output. The AWK scripts are applied to elicit the needed values from the trace file to compute the desired parameters like PDR, Routing Overhead.

Simulation Results

The goal of our simulation is to analyze the behavior of the MAODV by deploying GA using Backup paths.

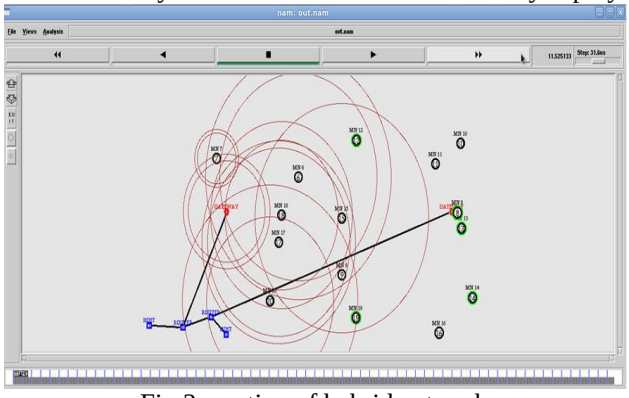

Fig 2 creation of hybrid network

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Create a hybrid network with host and router acts as a base station. Gateway is act as an entrance to another network. Mobile nodes act as adhoc network. Data is transmitted from cellular to adhoc network through the gateway nodes. Gateway is an entrance to another network. Host and router are connected to the gateway network. Data from the adhoc network to cellular network through the gateway network. Mobility and traffic files are generated for the nodes. Here 15 nodes are adhoc network, 2 hosts and 2 routers are base station. The Cellular network are connected by wire network.

Table 1 Packet Delivery Ratio for AOMDV

Simulation time(ms)	1 traffic source	5 traffic source	10traffic source
100	0.7848	0.7435	0.2630
200	0.8542	0.8292	0.4448
300	0.8568	0.7890	0.5027
400	0.8122	0.7750	0.4592
500	0.8268	0.7715	0.4207

Table 1 Shows the performance of AOMDV Packet Delivery Ratio for 1, 5, 10 traffic sources. The Packet Delivery Ratio decrease in AOMDV protocol when compared to MAODV and Genetic MAODV protocols.

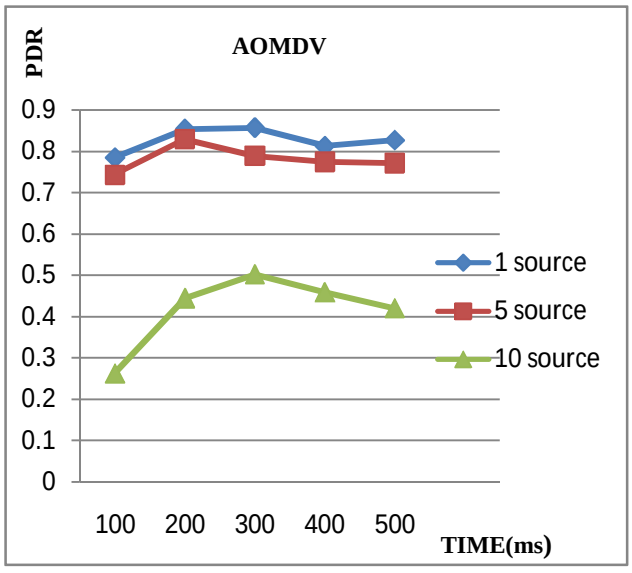

Fig 3: Packet Delivery Ratio for AOMDV

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Vol. 6, Special Issue 1, March 2017

Table 2 Routing Overhead for AOMDV

Simulation time(ms)	1traffic source	5traffic source	10traffic source
100	13878	19469	24457
200	29226	39524	50276
300	42410	58590	74291
400	55849	76181	96908
500	68719	93933	119894

Table 2 shows the AOMDV Routing Overhead for 1, 5, 10 Traffic sources .Control packet and data packet share the same bandwidth it creates a routing overhead.

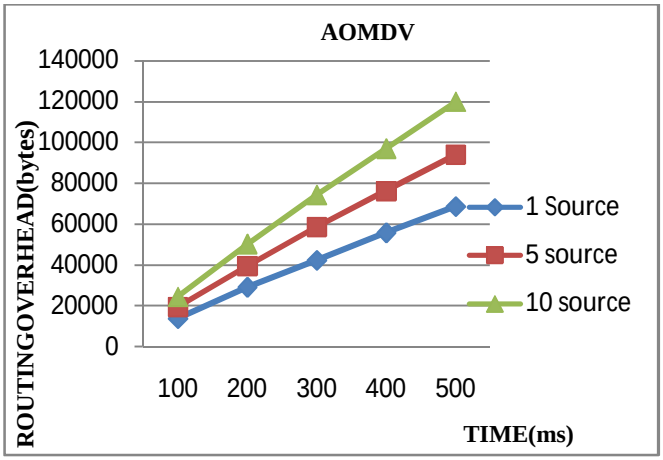

Fig:4 Routing Overhead for AOMDV

Table 3 Packet Delivery Ratio for Genetic AOMDV

Simulation time(ms)	1traffic source	5 traffic source	10traffic source
100	0.8574	0.5843	0.4800
200	0.9073	0.7302	0.5902
300	0.8767	0.7179	0.5700
400	0.8967	0.6869	0.6463
500	0.9035	0.6745	0.6157

Table 3 shows the Packet Delivery Ratio for Genetic AOMDV of traffic source 1,5,10.PDR decreases for 5 and 10 traffic sources.

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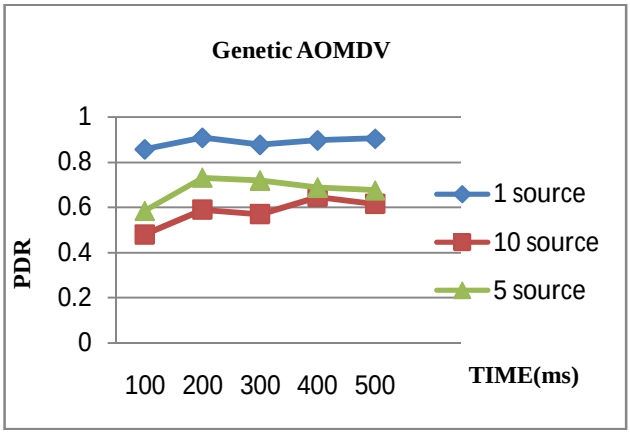

Fig 5: Packet Delivery Ratio for Genetic AOMDV

Table 4Routing Overhead for GeneticAOMDV

Simulation time(ms)	1traffic source	5traffic source	10traffic source
100	19878	20462	28467
200	50226	42524	62286
300	72410	60591	86859
400	80849	80185	144682
500	88326	98944	154587

Table 4 shows the Packet Delivery Ratio for Genetic AOMDV of traffic sources 1,5,10.

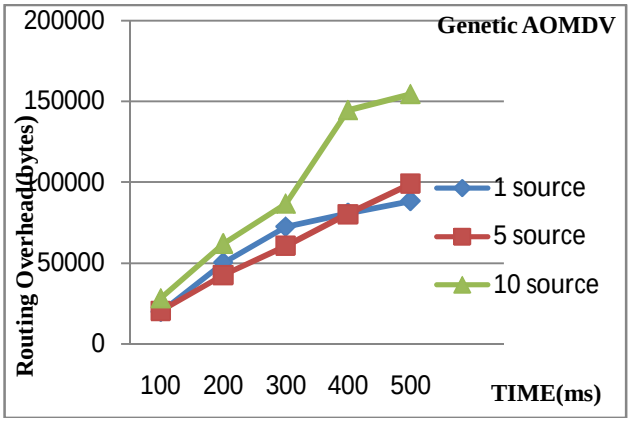

Fig 6 Routing Overhead for Genetic AOMDV

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Table 5 Packet Delivery Ratio for MAODV

Simulation time(ms)	1traffic source	5traffic source	10traffic source
100	1	0.9804	0.9478
200	1	0.9752	0.9468
300	0.9993	0.9751	0.8875
400	0.9995	0.9735	0.8576
500	0.9996	0.9732	0.8413

Table 5 shows the performance of MAODV protocol for packet delivery ratio of 1, 5,10 Traffic sources. It performances decreases due to link break occurred. It provides high routing overhead more routing packet are occurring.

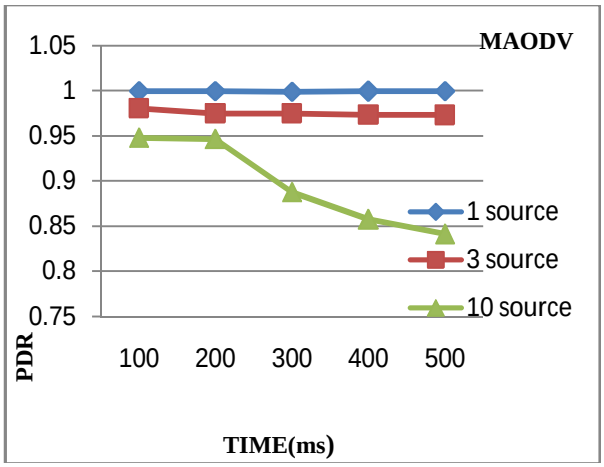

Fig:7 Packet Delivery Ratio for MAODV

Table 6 Routing Overhead for MAODV

Simulation time(ms)	**1traffic source**	**5traffic source**	**10traffic source**
100	2146	12715	28796
200	4046	27176	60732
300	6914	40490	82859
400	9930	51180	105309
500	12326	63468	124588

Table 6 shows the performance of Routing overhead for 1, 5, 10 Traffic sources. Routing overhead increase for the 10 traffic sources. Data packet and control packet share the same bandwidth.

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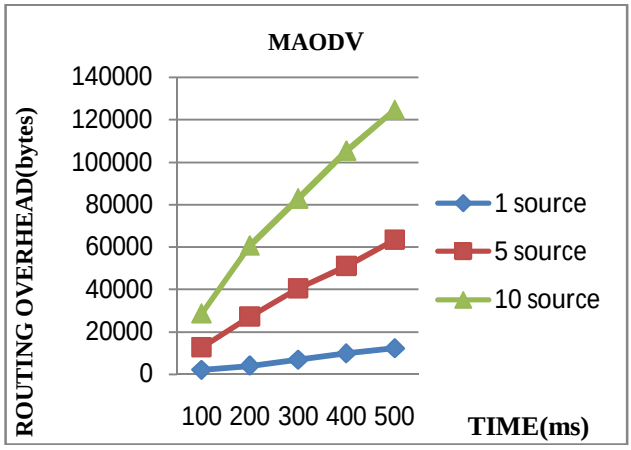

Fig:8 Routing Overhead for MAODV

Table 7 Packet Delivery Ratio for Genetic MAODV

Simulation time(ms)	1traffic source	5traffic source	10traffic source
100	0.9870	0.9917	0.9930
200	0.9906	0.9944	0.9958
300	0.9904	0.9949	0.9956
400	0.9898	0.9951	0.9939
500	0.9898	0.9950	0.9946

Table 7 shows the performance of Genetic algorithm is implemented in MAODV protocol, it provide an optimal path. It has better packet delivery ratio when compared to AOMDV and MAODVprotocols. Genetic algorithm in MAODV improves the multicast capacity in the hybrid network

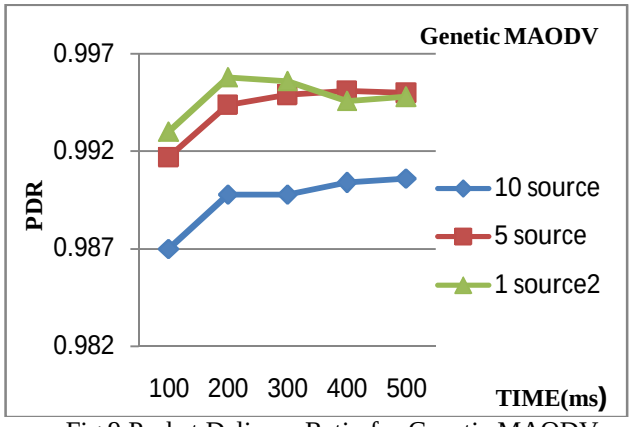

Fig 9 Packet Delivery Ratio for Genetic MAODV

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Table 8 Routing Overhead for Genetic MAODV

Simulation time(ms)	1 traffic source	5 traffic source	10 traffic source
100	1842	13162	24482
200	3425	26995	50485
300	5412	41031	76650
400	8425	55428	102432
500	10328	62626	114925

Table 8 shows the Genetic MAODV Routing Overhead for traffic source 1,5,10. Genetic MAODV improves the PDR for 1,5,10 traffic sources.when MAODV PDR decrease due to link break occur.

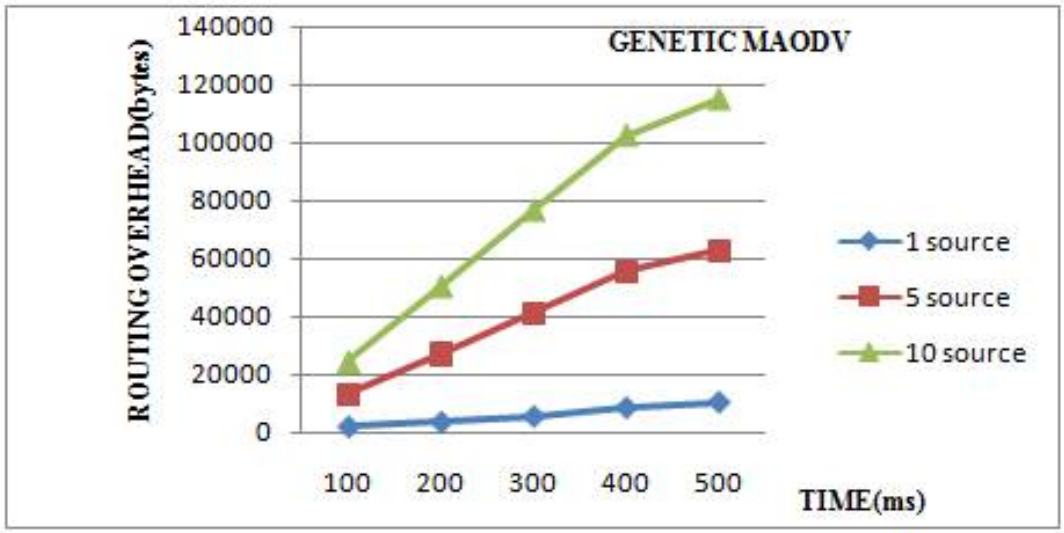

Fig 10Routing Overhead for Genetic MAODV

VI. CONCLUSIONS

Hybrid network is a combination of both cellular and adhoc network. Multicast data is forwarded from cellular to adhoc network. MAODV protocol is used in the hybrid network. The major drawback of MAODV protocol is when a link break occurs it fails to produce a desired packet delivery ratio. To improve the packet delivery ratio and to provide an optimum path for MAODV protocols during link break using a Genetic algorithm. It provides a backup path for MAODV protocols. Genetic algorithm improves the multicast capacity in the hybrid network. The Genetic algorithm is applied to MAODVand AOMDV protocols, MAODV protocol performs better than AOMDV because of group leader in that protocol and avoids the loop formation in a tree structure.

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Vol. 6, Special Issue 1, March 2017

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