Performance Optimization in Geographical Based Routing Protocol in MANETS

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Abstract--- *MANET deals with the wireless links of concern resources. Each device connects using the dynamically configuration in the whole network. To require the more than one hop communicate as intermediate node between source nodes to destination node during the lack of available the transmission range. In the research paper, there is analysis of performance of GRP with proposed algorithm MGRP. The performance analyzed by using OPNET MODELER 14.5" Simulator. The simulation performance parameters are - Packet Dropped, Total Number of Backtracks, Delay, Traffic Sent and Throughput for comparing existing GRP and proposed algorithms MGRP.*

Keywords-- *MANET, GRP, OPNET Modeler 14.5*

INTRODUCTION

Within the transmission range the mobile nodes can communicates through broadcast medium in the network. In the MANET, the limited available of bandwidth and computing resources i.e. hardware and battery powers enable less traffic in the network. The signal strength and propagation delay [1] varies as per the time and circumstances. The transmitters, receivers and antennas [2] use as resources in the network. The nodes work in the network acts as router [3], [4] forwarding data packet for other nodes. MAC protocol responsible to shares the medium due to arbitrary access. The local neighborhood zone [5], the MAC protocol transfer the messages and acknowledgement to source node from destination node. In the wireless sensor network (WSN) the communication process by MAC. The numerous function of MAC protocol are battery checking, resource checking and delay checking during the data transmission. The cooperative and delay tolerance [6] handles by Sensor-MAC (S-MAC).MANET ROUTING PROTOCOLSWhen we want the data packets transmission from sender node to destination node, we need a dedicated path or a route that is decided by various routing protocols. In this research paper, there is Geographical Routing Protocol (GRP) performance improvement by optimization route by alternative route.

Geographical Routing Protocol *(GRP)*In the Geographical Routing Protocol, every mobile node communicates within the range of particular regions is known as Geocast communication as per figure 1. The location information about concern nodes and its associate neighbor node of particular regions have kept in the GRP Protocol. To minimization topology storage and associate cost [7], independently by dynamic nature in the GRP. The combination the feature of reactive and Geographical Routing Protocol (GRP) [8], to reduce the route discovery process and delay by reactive technique and to search the optimal path for routing by using GRP.

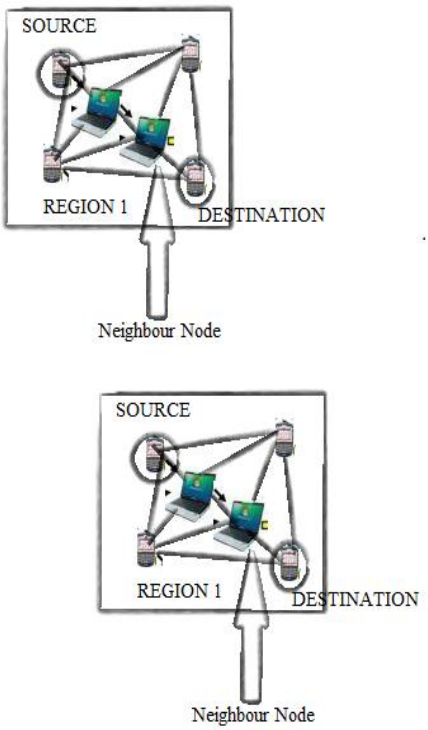

Fig 1: Geographical Routing Protocol with regions (Geocast Communication

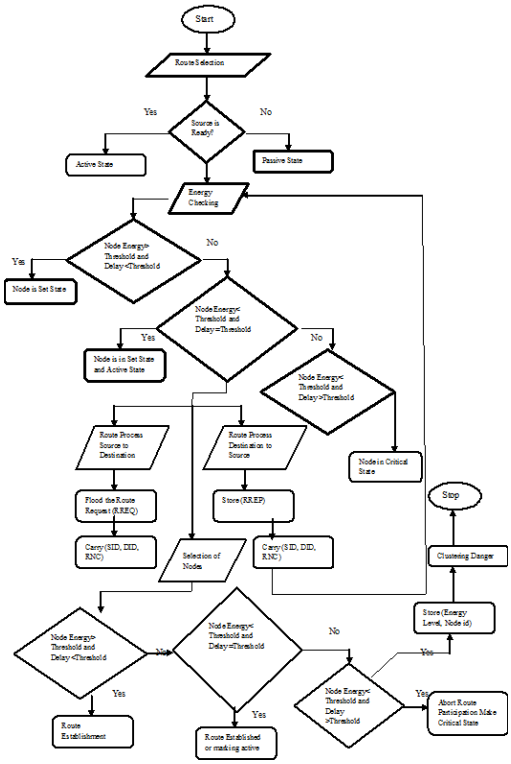

Fig 2: Flow Chart of Modified Geographical Routing Protocol (MGRP)

PROPOSED WORK

In the proposed work, to improves the performance by making alternative route, if primary route is broken. In the energy check process, to check the energy level of node, to compare the node energy with energy threshold, if any node having weak energy then ignores the nodes for participation for routing that enables to quickly services and provides optimal technique for routing. The weak energy nodes don't consider for routing because in that case to needs to follow the alternative route that takes the large amount of time means increase the delay for transfer data packets for routing. To provides Quality of Service (QoS) by filter the group of nodes as cluster. To fulfill the requirement for the proposed algorithms technique called Modified-Geographical Routing Protocol (MGRP) is used.

RESULTS & DISCUSSION

In the proposed algorithm to enhances the performance as compared to Geographical Routing Protocol (GRP). Various performance parameters have been analyzed performance comparison.

Simulation Setup

In this paper, the network is created by using OPNET Modeler 14.5 simulator, a wireless Ad hoc network with size 5×5 Kilometer scale Office type. In the figure 3, the simulator setup consists of 25 mobile nodes (Workstations), Rx Group config (Receiver Group Configuration Mobility). There are two scenarios: first scenario implements the Geographical Routing Protocol. In the Second scenario there is performance improved in the Geographical Routing Protocol (GRP).

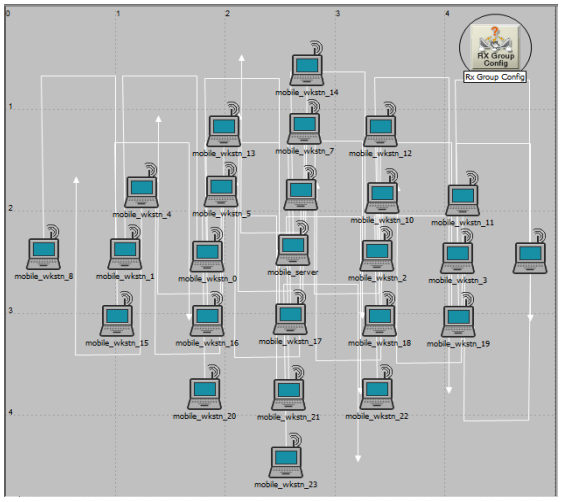

Fig 3: Simulator setup having 25 Mobile nodes

TABLE 1
SIMULATION PARAMETERS

Simulation Parameters	**Values**
Simulator Version	Opnet Modeler 14.5
Network Scale	Office Type
Network Size	5×5 Kilometer
Technology Used	MANET
Routing Protocols	GRP
Number of Mobiles nodes	25
Simulation Time	1 Hour
Physical characteristics	Direct Sequence
Data Rate (bps)	1 Mbps

Performance Evaluation:

Packet Dropped (bits/sec):
In the figure 4, to represent the graph of packet dropped in the two scenarios: existing protocol GRP and proposed algorithm MGRP. During time period 0 to 540 seconds no packet will be dropped both GRP and MGRP. During time period 576 to 828 seconds GRP scenario packet dropped but MGRP no packet dropped. During the time period 864 seconds GRP has been 2503.031 bits/sec packet dropped but MGRP has been 53.94667 bits/sec packet dropped, because MGRP has been followed the alternative route.

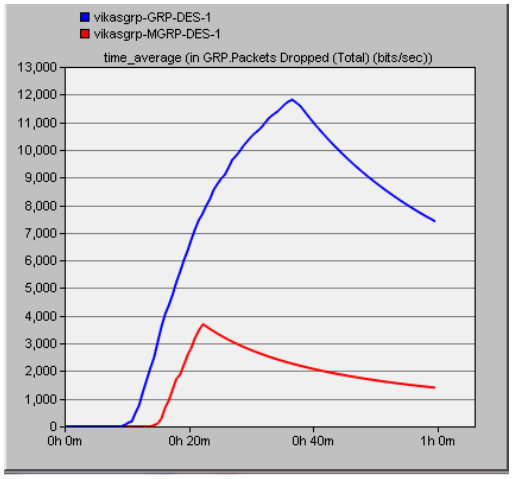

Fig 4: Packet Dropped

TABLE 2
PACKET DROPPED

Time (sec)	vikasgrp-GRP-DES-1: GRP.Packets Dropped (Total) (bits/sec)	vikasgrp-MGRP-DES-1: GRP.Packets Dropped (Total) (bits/sec)
0	0	0
36	0	0
72	0	0
108	0	0
144	0	0
180	0	0
216	0	0
252	0	0
288	0	0
324	0	0
360	0	0
396	0	0
432	0	0
468	0	0
504	0	0
540	0	0
576	50.87582	0
612	133.5926	0
648	190.6901	0
684	500.3222	0
720	785.5767	0
756	1260.404	0
792	1683.333	0
828	2119.722	0
864	2503.031	53.94667
900	3074.897	108.6325
936	3627.004	313.7449
972	4084.079	697.4206
1008	4405.87	966.6897
1044	4790.407	1359.304
1080	5236.703	1735.634

As per table 2, Packet Dropped in the MGRP proposed algorithm lower as compared to GRP, because optimization of the route during the transfer data packets from source node to destination node. If the throughput is high than packet dropped will be lesser. Throughput is inversely proportional to packet dropped.

Total number of backtracks:

In the figure 5, to represent the graph of total number of backtracks in the two scenarios: existing protocol GRP and proposed algorithm MGRP. During the time period 0 to 36 seconds no number of backtracks processed. During the time period 72 seconds GRP has been 1 backtrack and MGRP has been 2 backtracks. In the time period 108 seconds GRP has been 4 backtracks and MGRP has been 11 backtracks. In case of MGRP, total number of backtrack more than GRP.

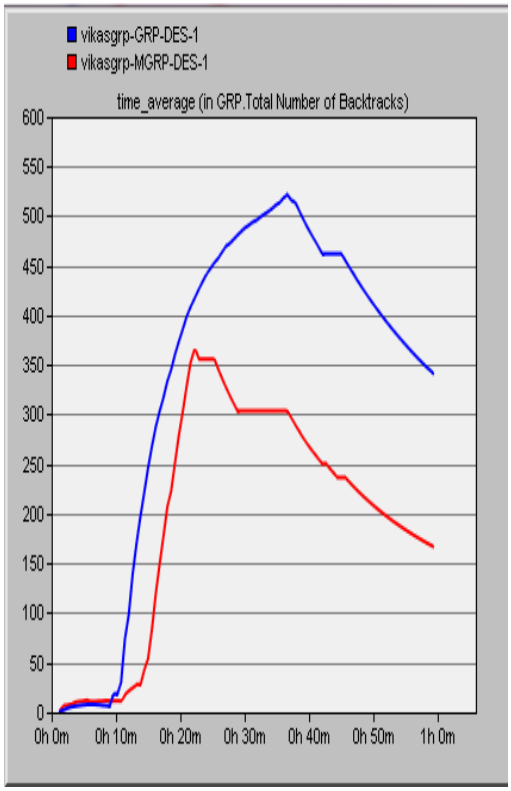

Fig 5: Total Number of Backtracks

TABLE 3
TOTAL NUMBER OF BACKTRACKS

Time (sec)	vikasgrp-GRP-DES-1: GRP.Total	vikasgrp-MGRP-DES-1: GRP.Total
	Number of Backtracks	Number of Backtracks
0	#N/A	#N/A
36	#N/A	#N/A
72	1	2
108	4	11
144	8	9
180	9	10
216	9	19
252	10	14
288	11	14
324	11	18
360	#N/A	1
396	#N/A	#N/A
432	5	14
468	3	13
504	3	16
540	#N/A	9
576	151	#N/A
612	15	#N/A
648	195	8
684	687	118
720	471	76
756	785	73
792	696	81
828	686	29
864	680	329
900	749	290
936	725	701
972	722	914
1008	667	836
1044	652	854
1080	742	944

As per table 3, Total number of Backtracks in the MGRP proposed algorithm higher as compared to GRP, because number of received path enhance process from source to destination node successful reached means no need to return the data packets from destination to source node.

Traffic Sent (packets/sec)*:*

In the figure 6, to represent the graph of traffic sent (packets/sec) in the two scenarios: existing protocol GRP and proposed algorithm MGRP. During the time period 0 to 36 seconds no traffic sent by sender node to destination node. In the time period 72 seconds the GRP and MGRP have been traffic sent 2.027778 packets/sec.. In the time period 180 seconds the GRP has been traffic sent 13.64352 packets/sec and MGRP have been traffic sent 2.027778 packets/sec and

MGRP has been traffic sent 13.52778 packets/sec

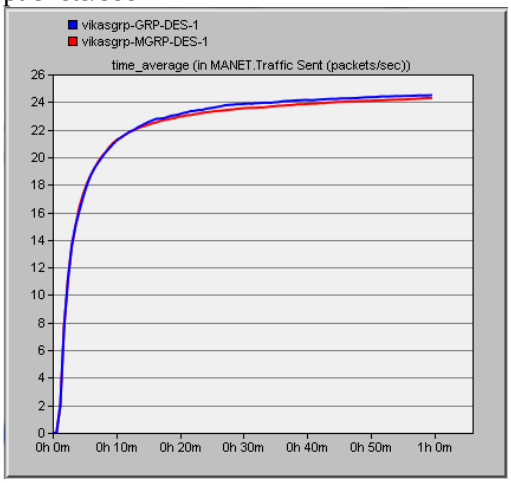

Fig 6: Traffic Sent (packets/sec)

TABLE 4
TRAFFIC SENT (packets/sec)

Time (sec)	vikasgrp-GRP-DES-1: MANET.Traffic Sent (packets/sec)	vikasgrp-MGRP-DES-1: MANET.Traffic Sent (packets/sec)
0	0	0
36	0	0
72	2.027778	2.027778
108	7.736111	7.826389
144	11.07778	11.25
180	13.64352	13.52778
216	15.0754	15.08333
252	16.14236	16.44792
288	17.15432	17.3858
324	18.03056	18.14167
360	18.7197	18.77525
396	19.27778	19.24306
432	19.6688	19.75
468	20.06349	20.14087
504	20.43704	20.46852
540	20.70139	20.84722
576	21.04902	21.14052
612	21.28086	21.32099
648	21.47807	21.45468
684	21.65556	21.65694
720	21.83466	21.83598
756	21.94444	21.95581
792	22.13889	22.07005
828	22.27778	22.18519
864	22.42444	22.26
900	22.55876	22.36325
936	22.66975	22.45679
972	22.77976	22.51786
1008	22.79023	22.6159
1044	22.82685	22.68611
1080	22.91846	22.73029

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As per table 4, Traffic Sent in the MGRP proposed algorithm lower as compared to GRP, because there is no restriction during transmission data from source to destination node.

Delay (bits/sec):

In the figure 7, to represent the graph of delay (bits/sec) in the two scenarios: existing protocol GRP and proposed algorithm MGRP. During the time period 0 second the delay of GRP is 0.002163 bits/sec and MGRP is 0.001965 bits/sec. In the time period 36 seconds the delay GRP is 0.001511 bits/sec and MGRP is 0.001412 bits/sec.

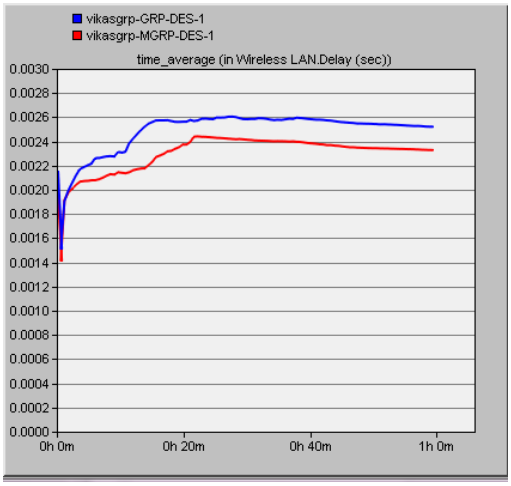

Fig 7: Delay (bits/sec)

TABLE 5
DELAY (bits/ sec)

Time (sec)	vikasgrp-GRP-DES-1: Wireless LAN.Delay (sec)	vikasgrp-MGRP-DES-1: Wireless LAN.Delay (sec)
0	0.002163	0.001965
36	0.001511	0.001412
72	0.001911	0.00192
108	0.001997	0.00198
144	0.002061	0.002014
180	0.002122	0.002044
216	0.002173	0.002068
252	0.002188	0.002072
288	0.002203	0.002074
324	0.002217	0.002079
360	0.002262	0.00208
396	0.002263	0.002088
432	0.00227	0.002101
468	0.002276	0.002117
504	0.002279	0.002129
540	0.002275	0.002126
576	0.002313	0.002145

612	0.002308	0.00214
648	0.002315	0.002137
684	0.002387	0.002146
720	0.002426	0.002162
756	0.00246	0.00217
792	0.002495	0.002176
828	0.002522	0.002178
864	0.002547	0.002204
900	0.002561	0.00223
936	0.002573	0.002272
972	0.002574	0.002283
1008	0.002574	0.002297
1044	0.002575	0.002318
1080	0.002568	0.002323

As per table 5, Delay in the MGRP proposed algorithm lower as compared to GRP, because of the selection of nodes and optimization of the active route of filtered nodes. The lower energy node discards for routing in the network

Throughput (bits/sec)*:*

In the figure 8, to represent the graph of throughput (bits/sec) in the two scenarios: existing protocol GRP and proposed algorithm MGRP. During the time period 0 second the throughput of GRP is 43531.11 bits/sec and MGRP is 49141.11 bits/sec. In the time period 36 seconds the throughput of GRP is 27076.11 bits/sec and MGRP is 33443.89 bits/sec.

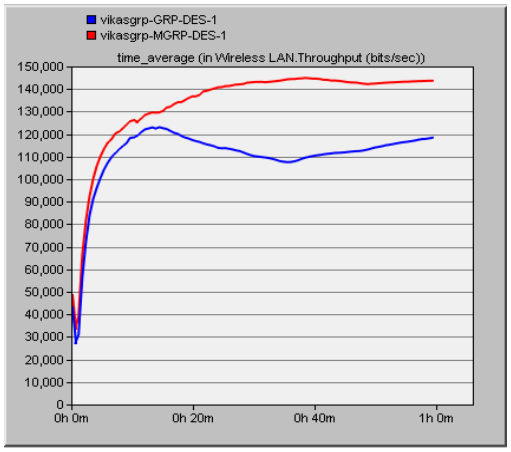

Fig 8: Throughput (bits/sec)

TABLE 6
THROUGHPUT (bits/sec)

Time (sec)	vikasgrp-GRP-DES-1: Wireless LAN.Throughput (bits/sec)	vikasgrp-MGRP-DES-1: Wireless LAN.Throughput (bits/sec)
0	43531.11	49141.11
36	27076.11	33443.89
72	31264.74	39359.33
108	56261.5	66171.39
144	72275.16	81798.53
180	84167.11	92591.22
216	91424.32	100363.7
252	96507.25	106175.7
288	100818.7	110426.3
324	104607.4	113743.6
360	107552.2	116480
396	109937.6	117865.6
432	111746	120397.6
468	113202.2	121132.6
504	114808.8	122520.6
540	115872	124261
576	118306.1	125730.4
612	118517.8	126160.1
648	119338.8	125435.7
684	120827.3	126983.9
720	122057.8	128407
756	122496.6	129064.3
792	122916.6	129592
828	122498.3	129521.5
864	123019.9	129631.6
900	122597.3	130318.2
936	122232.8	131742.6
972	121389.7	132203.4
1008	120550.5	133279.1
1044	120123	134101.3
1080	119156.8	134203.8

As per table 6, Throughput in the MGRP proposed algorithm higher as compared to GRP, because of optimization of the route before transfer of data from source node to destination node. The traffic optimization for transfer of data packets results in higher throughput.

CONCLUSIONS

In the research paper, the performance GRP has improved by implementation proposed algorithm MGRP. The performance parameters are as follows: In case of MGRP Packet Dropped is lower than GRP. In the MGRP Total Number of Backtracks is greater than GRP. In the MGRP Delay is lower than GRP. In the MGRP Media Access Delay is lower than GRP. In the MGRP Traffic Sent is lower than GRP. In the MGRP Throughput is greater than GRP. The performance of MGRP improved because optimizations the route by follow the alternative path

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