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Real Time Region Specific Multi Factor Approximation Based Routing For Qos Development In MANET

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Abstract:

Mobile Ad-Hoc Networks, routing performance is significant in achieving service quality. The performance of using most QoS parameters to achieve high-performance routing has been well studied. I have already mentioned many ways to implement efficient routing on MANET but having difficulty achieving greater performance. An efficient, real-time, region-specific, multi-factor approximation plan utilizes routing performance for high-quality service. The strategy split the group location in to number of districts and the rundown of courses to arrive at the objective has been recognized. For each route identified, the list of nodes falls under different network region has been identified. At each route, the method estimates the regional traffic and inters region traffic factors. Similarly, the nodes energy, speed, hop count has been considered to measure various Quality of Service support measures. The approximation is performed in different level namely traffic, hop count, mobility speed in measuring the support measures. Finally, for each route, this method evaluates QoS support and selects a single path to make data transfer based on the value of the QoS support measurement. The proposed method improves routing performance and improves the quality of MANET service.

Index Terms: MANET, Multi Factor Approximation, Regional Factors, Routing, Quality of Service support Measures.

1. Introduction:

The application of mobile adhoc network has no extend and has been used by the entire world. This allows the access of service can be done independent of nodes location. As it has been framed by the collection of mobile nodes and there is no restriction on the direction, mobility and speed, it encourages the topological change at each second. However, the nodes has the freedom in direction, movement and speed, they cannot directly communicate with the destination node. The transmission mobile of the versatile hubs limits them in discussing communicating with the destination. This encourages the cooperative transmission to be performed at any data transmission. The source hub distinguishes the course between the objections and sends the information bundle through a number of central hubs.

In the data packets are transmitted in an integrated transmission, all nodes in the path lose a certain amount of energy. It affects the life of the node and the network. Similarly, as packets are sent through higher hop numbers the delays increase and the performance is affected. In addition, the energy-awareness pathway selects the path with the most energy to the target. This increases traffic on the route, increases the frequency of delays and delays and increases pocket loss. All of these improve network performance. This increases the delay and reduces the performance when sending packets on less congested routes.

However, the network has number of paths between any basis and end; the routes will be flowing through number of region of the network. The first few neighbors or hop of the route would be present in the same region of source or destination, but the remaining hops will be having higher chance of moving through the other region. Similarly, in each region the amount of traffic present will be varying and it is necessary to consider the regional traffic. Not all the nodes present in the entire region would be accessing a service and would produce higher traffic. By considering the regional traffic, the feasible route can be identified.

Multi factor approximation is a procedure of selecting an optimal route according to traffic, energy, hop count, mobility, and direction and speed of mobile nodes present in the route. For example, the mobility speed of nodes of a region will be varying than other region. Similarly, at any region, the number of nodes moving towards the hop present in the route selected will be varying between the regions. On the other side, the direction of the nodes moving in any region should be considered because they will support the detection of the future path to the goal. Similarly, the energy of the nodes and hop count should be considered in approximating a suitability of any route to perform efficient routing to improve the QoS performance.

The Quality of Service (QoS) performance has been measured in variety of parameter where each of them is linked together. An efficient real time region specific multi factor approximation has been presented. The multi factor approximation approach, approximate the route selection according to different factors like traffic, hop count, energy, mobility, and direction.

2. Related Works:

In the many approaches to QoS-based routing issues. This section describes a set of methods mentioned by various researchers for the development of QoS.

In [1], Authors propose a common search algorithm for associative cache memory configuration. This is faster if it is in the O (n) complex intermediate mobile node cache (n is the number of bits required to represent the search field). There are many ways to search for goals. Another major problem with the DSR is that the track maintenance mechanism does not repair broken connections locally. In addition, outdated cache information can cause conflicts during the route discovery / reconstruction phase.

In [2], this is an augmentation of the current Ad Hoc On-Demand Distance Vector convention. This calculation utilizes determinants like Packet Forwarding Trust, Energy Level, and Time of Availability (ToA) to decide the elements of a versatile hub. Determiners are coordinated into the vague rationale model to work out the last certainty, an incentive for the versatile hub, which is utilized to layout an incorporated steering way.

The mobile self-organizing sorted out organization's energy cost calculation in light of fake honey bee settlement [3] improves the energy utilization of the MANET's Dynamic Source Routing (DSR) convention using the Artificial Bee Colony (ABC) calculation. The proposed computation is called BEEDSR. The ABC computation is used to perceive the most effective way from source to objective to oversee energy issues. The exhibition of the BEEDSR calculation is equivalent to that of the DSR and the Bee Inspired Protocol.

Mobile ad hoc network design and performance analysis, using responsive routing protocols [4] To investigate the plan and execution of portable impromptu organizations, utilize responsive steering conventions, (for example, adhoc on-request far off vector AODV and transitory AOMDV). Adhoc on Demand Multipath Distance Vector.

In [5], proposes new energy awareness is referred to as the routing protocol, to as Mobility and Energy Aware AODV (MEAODV) protocol.

Different approaches to mobile ad hoc networks: routing protocols, features and characteristics [6]. They can modify and reconfigure each other according to different network topologies and node motion. Due to the inherent inconsistency in strategic situations, these features below attack primarily military users. MANET technology evolved in self-defence and evolved from the results of military research. MANET applications, key features, and different types of protocols.

An Energy efficient dynamic improvement routing algorithm [7] for mobile transient networks using the probability broadcast algorithm to improve the flood mechanism and avoid broadcast storm problems on the MANET. Dynamic prophylactic routing algorithms have been developed to deal with pocket duplication and errors caused by noise in wireless channels. The conversion Probability approval is determined by the number of hubs in the adjoining MANET Environment.

In [8], the creator upgrades AODV utilizes clocks and impulses to distinguish and detach incorporated dark opening assaults by coordinating new lightweight innovation. The proposed procedure permits MANET hubs to recognize and disengage dark opening hubs during dynamic geography advances.

Reliable and optimal routing is used in mobile ad hoc networks, emphasizing service quality, routing mechanism optimization, bionic meta-heuristics, and ant colony upgrade [9]. Simulate the conduct of insects to tackle complex aggregate issues. ACO calculations incorporate enhancement strategies, learning expansion, and powerful and adaptable techniques. In the Trust and ANT-based Routing (TABR) characterize a subterranean insect-based directing calculation that joins confided in values to distinguish effective, solid and ideal ways on the MANET.

In [10], anonymously describes hybrid technologies for mitigating MANET attacks using one-way trapdoor protocols, hash functions, and elliptical cryptography.

Assessing the MANET Routing Protocol Performance under Blackout Attack Using the OPNET Simulator [11] Proposes a security system to keep data from black hole attacks in the MANET Routing Protocol. Finally, OPNET simulator is compared and simulation analysis and results are calculated.

In [12], every hub appoints a nearby standing worth to the excess hubs in the organization and to the following hub. Observe the best steering way and diminish the pocket misfortune rate utilizing the designated standing worth. It accept that the hub has a fixed directing conduct, yet additionally incorporates a component that recognizes changes in the hub conduct.

In [13], the author proposes a reputation management system that includes collecting reputation information and calculating reputation values to combat malicious attacks and improve network performance. To improve the efficiency of trust information collection, a new trust collection mechanism. Designed a model that calculates node reputation value based on subjective belief and recommended belief.

Detecting attacker hubs and forcing fines utilizing different procedures, for example, the note consolidating strategy arranges a hub as an assault hub provided it concurs with adjoining hubs [14]. Assuming a hub presumes an aggressor or sinkhole hub in the way, that hub associates with the adjoining hubs, deciding the sinking hub. To expect steering assaults, this framework presents a directing booking framework. The recently scholarly way will be refreshed solely after checking that there is no aggressor hub in the note's directing table.

QoS-enabled cross-layer multicast directing [15] depicts cross-layer multicast steering (CLMR) on portable specially appointed networks, utilizing a multicast steering convention to upgrade QoS. Wood tasks and wood the executive's costs have been changed to work on the nature of administration. CLMR utilizes the PHY layer, the application layer, and the steering layer to handle QoS-based correspondences.

All systems strive to achieve high performance in achieving the quality of service parameters.

3. Real Time Region Specific Multi Factor Approximation Based Routing:

The proposed real-time, region-specific, multi-factor approximation algorithm will first find the path between the source and the target. Then, for each route, this method detects that the hop number is in a different area and makes different approximations based on this. Based on the results of various approximations, this method evaluates traffic support, energy support, mobility support, and hop number support. This method calculates the QoS support activity of different ways according to the values of different support activities. The method selects a single path to the target based on the value of the QoS support measurement. The detailed method is described in this section.

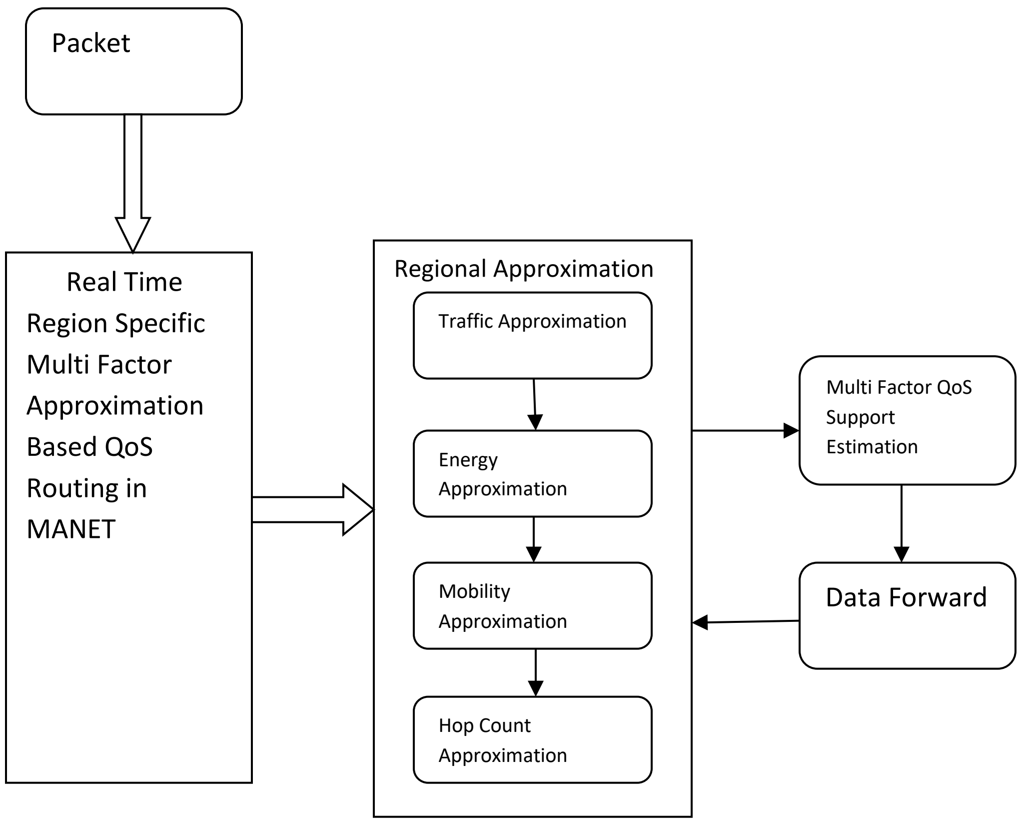

Figure 1: Architecture of proposed region specific multi factor approximation scheme

The Figure 1, shows the framework proposed a multi-factor area-specific approximation for effective routing on MANET. This section describes the detailed method.

3.1 Route Discovery:

Initially, as with the AODV routing protocol, available paths between source and destination were identified. The source node transmits the RMA-RREQ message to the network, which receives it from its neighbors. After receiving the RMA-RREQ message, a search is performed on its neighboring table to find the target Node ID. If so, it is assumed that it has a path to reach the goal. Otherwise, the same pocket is already multicast to neighbors. If there is a route, then the node attaches the node id to the route in reverse path, and tags the energy, speed, direction with the route. Generated RMA-RREP message has been forwarded to the node from where the route request is received. Similarly, each node attaches the information and sends the reply to the source. On receiving the RMQ-RREP message, the source extracts the route and hop details with the other data attached. Extracted data and route has been added to the route table. Updated route table Used to do routing.

Algorithm steps:

Input: Neighbor Table (Nt), Path Table (Rt), Packet P

Output: Path Table (Rt), Neighbor Table (Nt)

Start

Read Packet P, neighbor table NT, Route Table Rt.

Generate RMA-RREQ message.

RMA-RREQ = {Source ID, Dest.ID.}

Initialize Broadcast Timer Br T.

Broadcast RMA-RREQ and start Br T.

While Br T runs

Receive RMA-RREP.

Extract route $R = \int Route \in RMARREP$

Add to route table $RT = \sum (Route \in RT) \cup R$

End

Neighbor receives the RMA-RREQ.

If neighbor found a route or entry in neighbor table then

Generate RMA-RREP = {Node Id, Energy, Mobility, and Direction}

Send in reverse path.

Else

Forward to neighbors and wait for the reply.

End

Stop

The path detection process is proposed in the above algorithm, and the algorithm will find the available paths based on the transmission mechanism. The algorithm also collects the traffic, speed, and direction of each hop available in the route. Identified and indexed values are used to perform route selection further.

3.2 Traffic Approximation:

The traffic approximation is the process of measuring the traffic value at different diagonals. Any route towards the destination would contain different traffic value Tv, which is introduced by various data transmission performed in and around the nodes of the route. Consider the route R, which contains N number of nodes and each has different location which fall on different region. So, the traffic is not only introduced by the source but also some other node would also generate a traffic which flow through the part of nodes.

Among N nodes, consider there exist set of nodes rs{ N-k}, where k<n and each node n of set rs, falls in different region than the region of source node s, then the amount of traffic introduced through the region r of node s and the amount of traffic introduced by the nodes of set rs and the regional nodes can be measured. In order to choose an efficient route, the amount of traffic introduced by the inter regional nodes and the amount of traffic introduced by the other regional node should be measured. By measuring both the measures, the traffic approximation can be performed to compute the traffic support measure.

The volume of traffic introduced by the nodes located in the region r where the source is located can be measured as follows:

The list of nodes located in the source nodes region can be measured as follows:

Source Regional Nodes Srn = $\int_{\mathrm{i}=1}^{\mathrm{size(R)}} \sum \mathrm{R(i).location} \in \mathrm{s.region}$ --(1)

Then the list of nodes located in the other region can be measured as follows:

External region nodes Ern = $\int_{\mathrm{i}=1}^{\mathrm{size(R)}} \sum \mathrm{R(i).location} \ni \mathrm{s.region}$ --(2)

Now the amount of traffic introduced in each region can be measured as follows:

Source region traffic Srt = $\int_{\mathrm{i}=1}^{\mathrm{size(Srn)}} \frac{\sum \mathrm{Srn(i).traffic}}{\mathrm{size(Srn)}}$ -- (3)

The amount of traffic produced by the external region nodes can be measured as follows:

External region traffic Ert = $\int_{\mathrm{i}=1}^{\mathrm{size(Ern)}} \frac{\sum \mathrm{Ern(i).traffic}}{\mathrm{size(Srn)}}$ -- (4)

Compute traffic support $Ts = Srt \times Ert$ -- (5)

Similarly, can measure the traffic support values for any route, routing.

3.3 Energy Approximation:

The data transmission in any network takes certain amount of network cost. In MANET, the mobile nodes involve in transmission lose their energy. By involving in continuous transmission leads to the death of mobile nodes. So the energy parameter has been considered. It is necessary to consider the energy support of the route before getting into the data transmission. Consider the route r has n number of nodes. Among them, each has certain amount of energy according to their initial energy Ie and number of transmission involved. The support of energy provided by the route r has been measured as follows:

First of all need to monitor the traffic conditions in any way because it is the selected node route should be capable of sustaining for the traffic condition. So, first the amount of traffic at each hop or node should be measured. It has been performed as follows:

Node list $Nl = \sum Nodes \in r$ -- (6)

From the route table Rt, the value of traffic at each node n present in Node list Nl can be obtained. According to that, with the energy constant μ which represent the power in joules required for any node to perform data transmission. According to this, amount of traffic present and the energy value at the node can be used to estimate the traffic support of any specific hop node H. It is measured as follows:

Energy support $Es = \int_{i=1}^{size(Nl)} \frac{Nl(i).Energy}{Nl(i).Traffic \times \mu}$ --(7)

If the value of Es is greater than a specific threshold, the hop is suitable to involve in data transmission further. Otherwise, the node will dead after sometime which lead to route rediscovery and retransmission.

Cumulative Energy support $CES = \frac{\sum_{i=1}^{size(Nl)} Nl(i).Es}{size(Nl)}$ --(8)

The energy support of any course addresses the reasonableness of any course to perform information transmission.

3.4 Mobility Approximation:

The mobility is an interesting factor in mobile adhoc network which can be used for optimized routing. In MANET, the nodes are moving in different direction and at different speed. So when have the route R, the intermediate nodes of the route R would be moving to the other location and introduce link failure. This is in turn introduces rediscovery of route and leads to higher latency and affect the throughput performance. So when consider the nodes of route located in various region, if there is higher moving nodes towards the location of existing intermediate node, then there is a higher chance of getting dynamic link towards the destination.

Consider the route R, which has k number of hops which are moving in different direction and speed. Among the nodes of route R, consider there are N-m number of nodes which are located in geographic region r, then it should be considered for its suitability to get selected for better data transmission. So the mobility support of any route should be measured and has been measured as follows:

Mobility support Ms = $\int_{i=1}^{size(R)} \frac{\sum R(i).Mobility \rightarrow OtherRegion}{\sum R(i).Mobility \leftarrow Region}$ -- (9)

Now the cumulative mobility support Ms can be measured as follows:

CMS = $\frac{\sum_{i=1}^{size(R)} Nl(i).Ms}{size(Nl)}$ -- (10)

The above equation (9,10) shows how the mobility support has been estimated. According to the value of CMS, a small set of routes can be performed.

3.5 Hop Count Approximation:

The number of hop present in the route selected route introduces various traffic and quality changes. If the hop count is higher, the amount of traffic and latency will be higher. Consider the route R which has k number of hops. Each hop will be introducing little delay or latency in the packet transmission. By considering the hop count, the route selection can be performed in efficient way.

The hop count support is estimated by the speed of the hubs present in the course. It has been estimated as:

Identify the number of nodes with least mobility Nlm = $\int_{i=1}^{size(R)} \sum R(i).speed < Mth$ -- (11)

Compute the hop count support Hcs = $^{Nlm}/_{size(R)}$ -- (12)

Estimated hop count support has been used in route selection process.

Region Approximation and Multi Factor QoS Support Estimation:

The partial approximation method uses the detected path. For each identified path, the method evaluates different functions. Traffic, hop number, movement and energy are all rated. Each approximation provides a support level for a specific parameter. The method uses support metrics for different parameters to estimate multi-factor QoS support values. This method selects a way to transfer data based on the value of MF QoS.

Algorithm steps:

Input: Route Table RT, Packet P

Output: Route R

Start

RT = Route Discovery (Source, Dest)

For each route R from RT

Tsm = Traffic-Approximation®

Esm = Energy-Approximation®

Msm = Mobility-Approximation®

Hsm = Hop-Approximation®

Compute MF QoS = $\frac{\text{Tsm}}{\text{Hsm}} \times \frac{\text{Esm}}{\text{Msm}}$

End

Route R = $\int_{\text{i}=1}^{\text{size(RT)}} \text{Max}(\text{RT}(\text{i}).\text{MFQoS})$

Send packets by selected route.

Stop

The working guideline of area based multifaceted estimation based steering calculation has been introduced. The technique finds the courses accessible and for each course, the strategy figure the traffic, energy, portability and jump count support. In light of these qualities, the MF Qos esteem has been estimated to pick more ideal course for information move.

4. Results and Discussion:

In the proposed multi-factor approximation-based sending algorithm implemented on the basis of real-time domain and its performance is evaluated under various parameters. This method is implemented in high level Java and its performance is evaluated under various restrictions. Compare the results obtained with other methods.

Table 1: Simulation Details

Parameter	Value
Simulation Tool	Advanced Java
No of Nodes	100
Communication Range	100 meters
Area size	1000×1000 meters
Simulation Time	5 minutes

Table 1 illustrates the simulations used to evaluate the proposed algorithm. The performance of this algorithm is measured by various parameters. Rating results are shown in this section.

Table 2 the Performance on Throughput

Throughput Performance in %			
Time in Sec	BEEDSR **in %**	**TABR in %**	**MF Qos in %**
30	13	18	39
60	26	36	47
120	42	51	68
240	68	74	84
300	82	93	97

The efficiency of the algorithm is measured at various points of performance simulation and compared with the results of other algorithms. Throughout the simulation period, the proposed MF QoS algorithm gave higher performance than the other methods shows in Table 2.

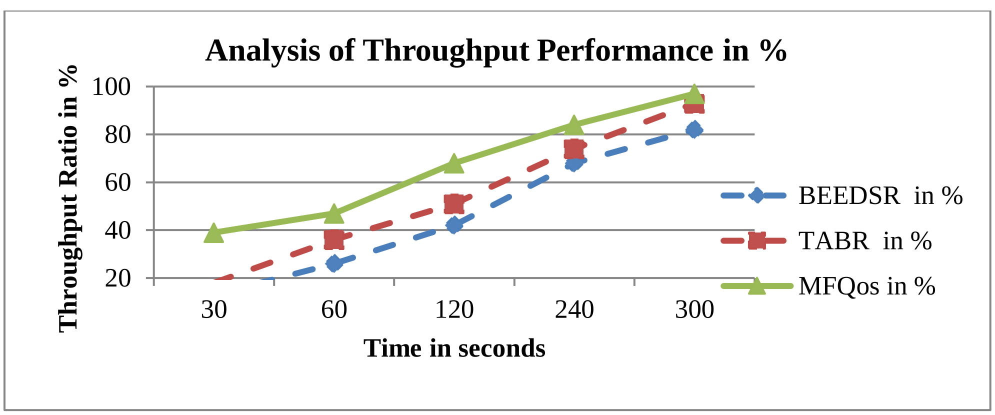

Figure 2 Performances on Throughput

The performance achieved by the various methods is compared with the results of other methods. Comparative results are shown in Figure 2. The MF QoS method significantly improves the performance compared to the previous methods.

Packet transfer rates produced by various means are measured Depending on the number of packets sent and received. Measure the performance of the pocket transfer rate and compare it with the results of other methods.

Table 3 Analysis of Packet Delivery Ratio

In the Packet Delivery ratio in %			
Time in Sec	**BEEDSR in %**	**TABR in %**	**MF QoS in %**
30	19	26	35
60	36	47	58
120	49	63	74
240	58	79	87
300	73	87	98

The results of the pocket delivery rate are measured and compared in Table 3. The results show that the proposed MF QoS algorithm produces more PDR than other methods.

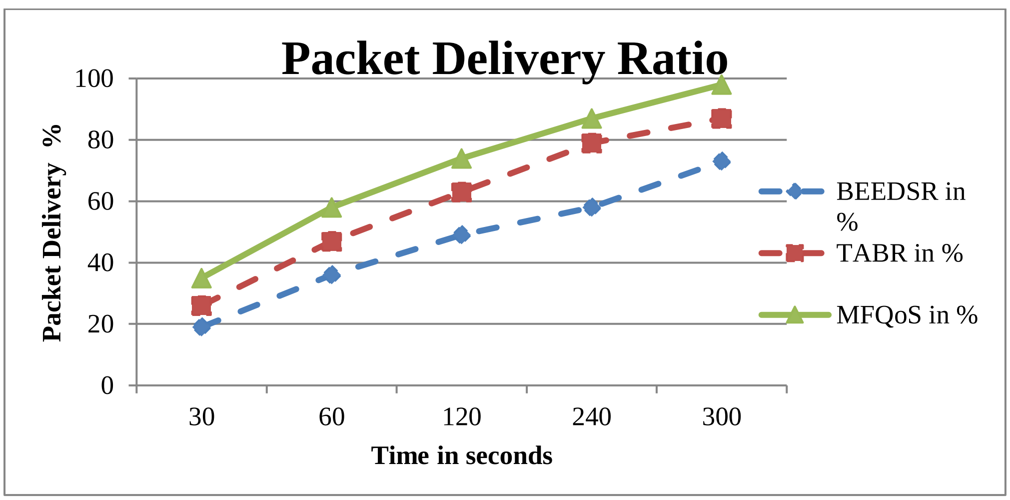

Figure 3: The Performance on PDR

Measured the execution of the PDR and contrasted it and the aftereffects of different approaches. A comparison is shown in Figure 3, where the MF QoS algorithm achieves a higher PDR than the previous methods.

Delay is a measure of how long it takes to send a packet between source and destination. It is measured in terms of the total time for a given number of packets and the number of packets.

Table 4 The Packet delay result

Latency in Seconds			
sending Packets/Sec	**BEEDSR in sec**	**TABR in sec**	**MF QoS in sec.**
5	4.5	3.2	1.7
10	6.8	5.6	2.8
15	7.2	6.8	4.4
30	8.9	7.4	5.8
60	9.4	9.2	6.5

Delays that happen in various ways are estimated. and shown in Table 4. The proposed MF QoS algorithm has lower latency than other methods.

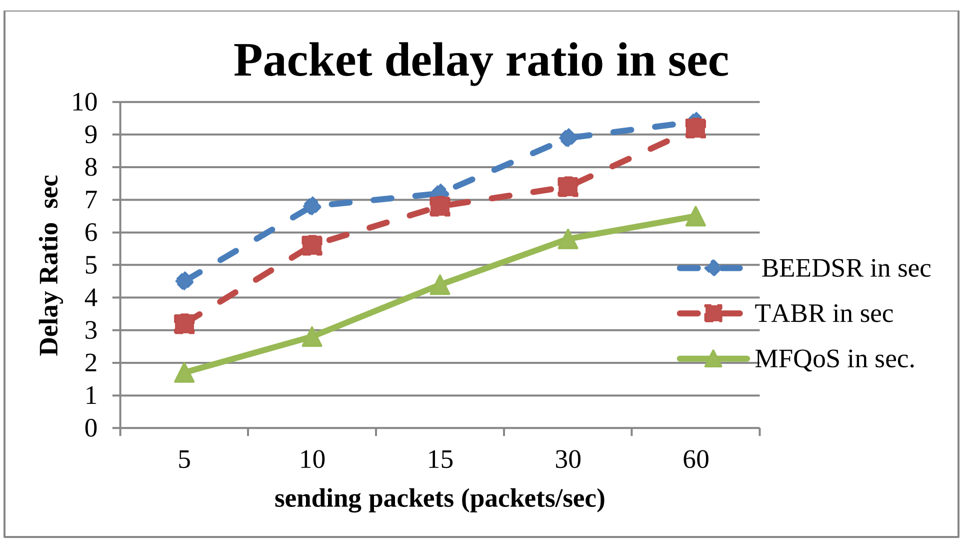

Figure 4 PDR of different methods

Figure 4 shows the packet delay ratio produced by various methods and the MFQoS algorithm has produced less latency value compare to other methods.

5. Conclusion:

A multifunctional approximate routing algorithm based on an efficient real-time partition is proposed. This method finds a path between the source and destination. For each path, this method approximates the different characteristics of different regions. Using this method, various support values are calculated based on the results of the regional approximation. This method uses the support value to calculate a versatile QoS support metric. This method selects a way to transfer data based on the value of MF QoS. Compared to other methods this method gave higher results in all QoS parameters.

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Biography

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She has 17 years of teaching experience in various Colleges. She has completed her NET in December 2018. She has organized a workshop and 7 seminars for the benefit of students. She has published a paper in Scopus indexed journal, 2 papers in International conferences, 3 papers in National conferences and a paper in state level conference. She has attended an International workshop and 2 National level workshop. Her research interest includes Mobile ad hoc Network, Data Mining and Network Security.

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