International Journal of Engineering Research and Reviews ISSN 2348-697X (Online)
Vol. 2, Issue 2, pp: (5-10), Month: April 2014 - June 2014, Available at: www.researchpublish.com

Investigation and Parameter Identification for Effecting QoS in MANET

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***Abstract*: Mobile Ad hoc networks (MANETs) are self-formed and self organized by a collection of mobile nodes, interconnected by multi-hop wireless paths in a strictly peer to peer fashion. Scalability of a routing protocol is its ability to support the continuous increase in the network parameters (such as mobility rate, traffic rate and network size) without degrading network performance. The goal of QoS provisioning is to achieve a more deterministic network behaviors, so that information carried by the network can be better delivered and network resources can be better utilized. We are analyzing the performance of reactive routing protocol via increasing number of nodes and observing its effect on Quality of Service (QoS) of Mobile Ad-hoc Network. The performance metrics comprises of QoS parameters such as packet delivery ratio, end to end delay, routing overhead, throughput and jitter. The effect of scalability on these QoS parameters is analyzed by varying number of nodes, packet size, time interval between packets and mobility rates**.

***Index Terms:* MANETs, QoS, Routing Protocols, Throughput, End to End delay.**

I. INTRODUCTION

A mobile ad hoc network (MANET) consists of mobile nodes that can communicate with each other through wireless links without an existence of fixed infrastructure, thus allowing users to set up the network fast and cost effective. For these characteristics, MANETs have been widely used in various application areas like military field, disaster relief, battlefields sports stadiums, Personal Area Networks, the organization of conferences and so on. The reliability of data transmission in the network cannot be guaranteed since MANETs are characterized by self-configured, dynamic changes of network topology, limited bandwidth, instability of link capacity and other resource constraints. The dynamic nature of an ad hoc network makes it extremely difficult to obtain accurate knowledge of the network state. Furthermore, constant updates of link state information are required to make optimal routing decisions, which results in extensive control overhead. Another characteristic of MANET's is mobility. All the nodes are allowed to move in different dimensions which result s in dynamic topology, since nodes are moving so they can go out of the range of network or come in the range of network at any time, a node which is part of one network at time can be part of another network. [1] In Mobile Ad hoc Networks each node has limited wireless transmission range, so the routing in MANETs depends on the cooperation of intermediate nodes. Three types of routing protocols have been defined for ad hoc networks:

Fig.: 1. Type of network Ad Hoc

II. CLASSIFICATION OF ROUTERING PROTOCOLS

The existing routing protocols in MANETs can be classified into three categories. Figure 2 shows the classification along with some examples of existing MANET protocols.

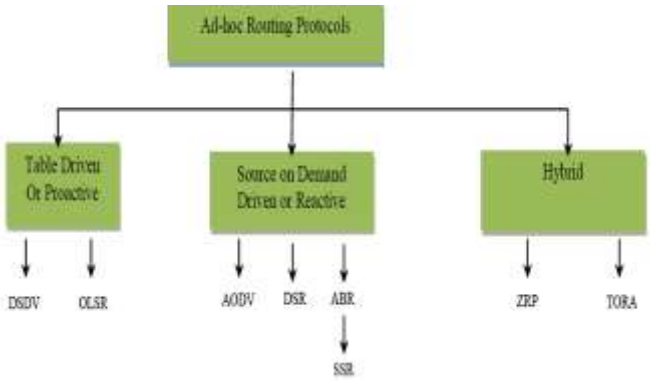

Figure 2: classification of routering protocols

A. AD-HOC ROUTING PROTCOLS

A1. PROACTIVE:

Its functioning is based on tables of routes. These protocols exchange information of control among the nodes of periodic form, which allows supporting current routes towards every node of the network. They are protocols that react when a new node appears or when it already is not inside the network, this exchange of information may damage the bandwidth of the application because of the overcharge of messages of control. The protocols more connections are DSDV and OLSR.

A2. REACTIVE:

The discovery of the route is realized only when a node wants to communicate with an actual destination. This process concludes when the route is discovered to the target node or when all the alternatives have been looked and one has not found any route. The difficulty with these protocols is the latency on having initiated the communications, has a reaction slower to discover changes in the topology of the network. More relations are DSR and AODV [2].

A3. HYBRID ROUTING:

They are used for not uniform protocols. They include procedures of proactive protocols and reagents in different levels of route ring, hereby, one tries to reduce the overcharge of the network generated by the proactive ones and to reduce the latency of the operations of search showed by the protocols reagents. The most known protocol is the ZRP.

B. ROUTING PROTOCOLS

B1. PROTOCOL DSR:

Protocol DSR (Dynamic Source Routing):- This protocol is characterized because it has two mechanisms: Discovery of route and Maintenance of route. [3]. they are based on the concept of source routing on whom the nodes support caches that there contains the target node and the list of nodes to come to It, this list is being updated according to new routes that are academic.

In DSR when a node wants to send a packet, It consults its cache to confirm if It has an available route towards this node, if he does not find it, then he will begin a discovery of route sending a RREQ (Route Request), which contains: looked delivery address, address of the node that originates the sending and an identifying only one. Every node that

receives the packet will check if it has a route towards the destination, but he will add his own direction in the record of routes of the packet and later he will forward the packet across all his links.

B2. PROTOCOL AODV:

Protocol AODV (Ad Hoc On-Demand Distance Vector Routing):- This protocol adds the concept of route ring under demand; it only includes information of the nodes with which
it has communication. The principal characteristic is that the nodes only exchange information of control, when they want to initiate a communication with another node.

This protocol avoids the formation of tresses and of account towards the infinite, due to the fact that it supports numbers of sequence for every target node and is this characteristic the one that avoids the overcharge in the network. The table of routes is kept while they are useful and It removes itself when It's not necessary, which produces a saving in the memory and traffic in the network.

III. QUALITY OF SERVICE

QoS stands for Quality of Services and the truth is that there is much debate on what exactly QoS is supposes to mean. Most vendors implement QoS protocols having in mind specific scenarios and taking into consideration different parameters, network topologies and variables. The United Nations Consultative Committee for International Telephony and Telegraphy (CCITT) Recommendation E.800 has defined QoS as: "The collective effect of service performance which determines the degree of satisfaction of a user of the service". This is a widely accepted definition since it doesn't makes any reference to any minimum characteristics, such as Bandwidth or Delay, or mechanisms, such as Admission Control, SLA, Signaling Protocol.

"Quality of Service is the collective effect of service performance which determines the degree of satisfaction of a user of the service". The provisioning of QoS based network services is in terms an extremely complex problem, and a significant part of this complexity dishonesty in the routing layer. The goals of QoS routing are twofold: selecting paths that can satisfy given QoS requirements of arriving communication requests, and achieving global efficiency in resource utilization [4].

C. FACTORS AFFECTING QOS PROTOCOL PERFORMANCE

When evaluating the performance of QoS protocols, a number of factors have a major impact on the results. Some of these parameters are a particular expression of characteristics of the MANET environment. They define the "scenario," whether in a simulation or in real life, and can be summarized as follows:

C1. NODE MOBILITY

This factor generally encompasses several parameters: the nodes' maximum and minimum speeds, speed pattern, and pause time. The node's speed pattern determines whether the node moves at uniform speed at all times or whether it is constantly varying, and also how it accelerates, for example, uni-formly or exponentially with time. The pause time determines the length of time nodes remain stationary between each peri-od of movement. Together with maximum and minimum speed, this parameter determines how often the network to-pology changes and thus how often network state information must be updated. This parameter has been the focus of many studies, for example, [5, and 6].

C2. NETWORK SIZE

QoS state has to be gathered or disseminated in some way for routing decisions to be made, the larger the network, the more difficult this becomes in terms of update latency and message overhead. This is the same as with all network state information, such as that used in best-effort protocols [7].

C3. NUMBER, TYPE AND DATA RATE OF TRAFFIC SOURCE

A smaller number of traffic sources results in fewer routes being required and vice versa. Traffic sources can be constant bit rate (CBR) or may generate bits or packets at a rate that var-ies with time according to the Poisson distribution, or any other mathematical model. The maximum data rate affects the number of packets in the network and hence the network load. All of these factors affect performance significantly [5].

C4. NODE TRANSMISSION POWER

Some nodes may have the ability to vary their transmission power. This is important, since at a higher power, nodes have more direct neighbors and hence connectivity increases, but the interference between nodes does as well. Transmission power control can also result in unidirectional links between nodes, which can affect the performance of routing protocols. This factor has also been studied extensively, for example, in [8, 9].

C5. CHANNEL CHARACTERISTICS

We discuss as an above, there are many reasons for the wireless channel being unreliable, that is, many reasons why bits, and hence data packets, may not be delivered correctly. These all affect the network's ability to provide QoS.

IV. RELATED WORK

Dr. Aditya Goel, Ajaii Sharma [10] "Performance Analysis of Mobile Ad-hoc Network Using AODV Protocol" in this title we discuss a new protocol that modifies AODV to improve its Performance using *Ant Colony algorithm*. The mobility behavior of nodes in the application is modeled by the random waypoint model through which random locations to which a node move are generated, and the associated speed and pause time are specified to control the frequency at which the network topology is changed. The *Optimized-AODV* protocol incorporates path accumulation during the route discovery process in AODV to attain extra routing information.

Akhilesh Kumar, Ritesh Kumar Mishra [11]" Performance Evaluation of MANET Routing Protocol for Varying Number of Nodes" In this title , we are analyzing the performance of AODV, DSR and DSDV 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.

Mohamed amnai, youssef fakhri, jaafar abouchabaka,[12] "QoS routing and performance evaluation for mobile ad hoc networks using OLSR protocol" in this title we have studied the impact, respectively, of mobility models and the density of nodes on the performances (end-to-end delay, throughput and packet delivery ratio) of routing protocol (optimized link state routing) OLSR by using in the first a real-time VBR (mpeg-4) and secondly the constant bit rate (CBR) traffic. Finally we compare the performance on both cases. Experimentally, we considered the three mobility models as follows random waypoint, random direction and Mobgen steady state.

S. R. Biradar, Hiren H D Sarma, Kalpana Sharma,[13] "Analysis QoS Parameters for Mobile Ad-Hoc Network Routing Protocols" in this title we discuss a Routing protocols for mobile ad hoc networks has limitations such as frequent topology changes, limited battery power, bandwidth constraint, hidden and exposed node problem, high Bit Error Rate (BER) are major problems. Both proactive and reactive routing protocols prove to be inefficient in MANET. Protocol performance is compared with proactive and reactive protocols.

Sridhar Subramanian and Baskaran Ramachandran [14] "Trust Based Scheme for QoS Assurance in Mobile Ad-Hoc Networks" In this title we describe a Trust Based Reliable AODV [TBRAODV] protocol is presented which implements a trust value for each node. For every node trust value is calculated and based trust value nodes are allowed to participate in routing or else identified to become a misbehaving node. This enhances reliability in AODV routing and results in increase of PDR, decrease in delay and throughput is maintained.

Sachin Kumar Gupta & R. K. Saket [15] "Performance Metric Comparison Of AODV And DSSV Routing Protocols In MANETS Using Ns-2" In This title We Focus the most popular ones are Dynamic Source Routing (DSR), Ad-hoc On-demand Distance Vector (AODV), Temporally Ordered Routing Algorithm (TORA) and Destination-Sequenced Distance Vector (DSDV) routing protocol. The performance of AODV and DSDV routing protocol have been evaluated for Mobile Ad-hoc Networks (MANETs) in terms of throughput, the average end to end delay, jitter and drop etc. The performance of the AODV is better than the performance of the DSDV routing protocol.

Rajneesh Kumar Gujral, Manpreet Singh [16] "Analyzing the Impact of Scalability on QoS-aware Routing for MANETs" In this title , we are going to analyze the impact of scalability on various QoS Parameters for MANETs routing

protocols one proactive protocol (DSDV) and two prominent on demand source initiated routing protocols. The performance metrics comprises of QoS parameters such as packet delivery ratio, end to end delay, routing overhead, throughput and jitter. The effect of scalability on these QoS parameters is analyzed by varying number of nodes, packet size, time interval between packets and mobility rates.

Vemana Chary V. Sridhar David Solomon Raju [17] "Enhancement in QoS to AODV protocol for MANETS" in this title we discuss The Ad Hoc On-Demand Distance Vector (AODV) routing protocol is one of the well-known and efficient on-demand MANET protocols. AODV currently does not support Quality of Service (QoS) and has no load balancing mechanism. We discuss some enhancements to the AODV protocol to provide QoS and load balancing features by adding two extensions to the messages used during route discovery. A detailed packet layer simulation model with media access control (MAC) and physical layer models is used to study the performance of both the AODV and the QoS-AODV protocols. Important performance measures such as average delay, packet delivery fraction and normalized routing load is used in the comparison.

V. OUR CONTRIBUTION

In this study paper we investigate number of QoS improvement techniques and QoS effecting parameters, that study provide the direction to work in the field of QoS under dynamic routing, here we proposed QoS effect dependent parameter identification base improvement scheme, for that purpose we deploy mobile node and generate traffic for effeteness analyzing, and check the quality of service of the network, very first we identify percentage of data delivery from sender to receiver after that we analyze each participated node in the network and performance of the each link as well as node in the form of link bandwidth measurement for link capability and PDR of each node for node fairness service check. That work base we identify minimum data drop and maximum data drop node that help to identification of reason of data dropping by the node. And then we apply number of different criteria and technique to improve the performance of the maximum data drop node and overcome the problem of data drop. That work increase the performance of the network on the bases of QoS parameter.

All the above define work simulate and analyze using network simulation and evaluate the result in different condition and parameter base for checking quality of service of the network.

VI. CONCLUSION

In this paper we study about QoS effect parameter and various techniques for improving the quality of service of the network, and then we define our proposed scheme, that is further we implement through the simulation structure and analyze the performance of the network. Through all that work we also identify reason of data dropping and performance effeteness of the network, and then increase performance through behavioral analysis of the node as well as network.

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