

A Survey Based on Quality of Service (QoS) and Multipath Routing in Mobile Ad Hoc Networks (MANET)

Mr. Chirag K Gohel¹ Ravikant T Vanjara²

¹Assistant Professor ²P.G Student

^{1,2}Department of Computer (IT) Engineering

¹Marwadi Education Foundation, Rajkot ²Gujarat Technological University, Ahmedabad

Abstract— Due to various characteristics of MANET, it is very challenging. QoS is crucial and very important concept for multimedia or real time traffic application in MANET. QoS is very difficult to guarantee in MANET because of its changing topology compared to wired network. Different QoS metrics i.e. delay, throughput, bandwidth, jitter, energy and link stability is important. Multipath routing is used in order to support QoS. In multipath routing, there are multiple routes between the sender and receiver while exchanging data. But QoS parameters is important while exchanging data between sender and receiver for real time and non-real traffic applications. There is lots off ongoing research on QoS but no proper solution is suggested yet. This paper presents various issues, description and challenges of QoS and multipath routing.

Key words: Mobile Ad Hoc Network (MANET), Quality of Service (QoS), Multipath Routing

I. INTRODUCTION

As technology is growing, the portability of wireless devices is becoming more popular and powerful with the need of multimedia or real time application like audio, video. Also the delivery of data along with the time plays a crucial role in today's generation. Now in MANET, routing is the major problem while exchanging the data because of dynamic or changing topology. In MANET, mobile node can itself acts as a host or router and message pass through this node. MANET supports multi-hop communication so there is no centralized infrastructure.

Now reserving resources and sustaining QoS while the network condition constantly changes is very challenging [1]. So for real time application data flows, how much bandwidth is reserved and the amount of delay is important.

II. QUALITY OF SERVICE (QOS) IN MANET

QoS is needed to support real time data transmission in MANET. But QoS support is restricted in MANET due to limited resources. So it is important that the resources must be utilized properly. Routing is the major issues for supporting QoS because of the node mobility. Task of QoS routing is to optimize the network resources while satisfying the application requirement [2].

The QoS concept of quality is one in which the requirements of some applications and users are more critical than others, which means that some traffic needs preferential treatment. The goal of QoS is to provide preferential delivery service for the applications that need it by ensuring sufficient bandwidth, controlling latency and jitter, and reducing data loss. For applications such as emergency search and rescue operations, availability of network is the key QoS parameter.

QoS routing is a routing process that guarantees to support to a set of QoS parameters (delay, bandwidth and jitter) during establishing routes [3]. QoS routing is used for real time application mainly for audio, email and video. There is also problem of link breakage due to mobility to node, so it lacks of QoS for real time applications.

III. MULTIPATH ROUTING IN MANET

Random mobility behavior in MANET causes poor route availability and has impact in network communication performance. Multipath routing is used in order to support QoS. In multipath routing, there are multiple routes between the sender and receiver while exchanging data. Here QoS parameters is important while exchanging data between sender and receiver for real time and non-real time traffic applications. Multi-hop communication is needed due to limited transmission range of mobile nodes. Multi-hop communication means, data is transmitted through the intermediate nodes.

MANET protocols are classified as: Table Driven (Proactive) and On-Demand (Reactive) Protocols. In Table Driven protocol, every nodes maintains the network information in the form of routing tables and periodic update is done whereas in On-Demand routing, no information about the network is maintained. Path is established as and when needed. No periodic update us done in on-Demand routing protocols.

Multipath routing in MANET support better QoS and provides benefits such as load balancing, less overhead, less delay, bandwidth aggregation and fault tolerance [4]. In Multipath routing, there are multiple paths between source and destination. Among the multiple paths, best path is selected on the basis of available resources and QoS parameters (delay, bandwidth and link stability).

IV. SURVEY OF RELATED WORK

In [8], authors have proposed a Cross-layer design. Their system offers a dynamic resource allocation where more than one or all three traffic classes can be communicated at the same time in one frame. They have introduced their design with not only the intention of providing QoS in a multimedia wireless system, but also makes the resource allocation process more efficient. Their technique will increase data link layer throughput and lower average delays. However, their cross layer design increases the stability and delay but bandwidth is not considered.

In [13], authors have used a cross layer TDMA scheme, in which a slot is reserved for sending data packets. During this transmission, no neighbour node transmit the data in the same slot. It means the slot is not used by other nodes. Authors have mainly focus on optimizing the network throughput. For this, authors have considered bandwidth and delay as their required parameters for QoS

routing in TDMA. Their protocol selects paths considering impact factor of a node. Node which has low impact on network will be given first priority.

In [15], authors have shown an enhancement of QoS routing with throughput and delay conditions. Guaranteeing valid data path for sufficiently longer period of time is a very daunting problem in MANET owing to its highly dynamic nature. Here in this paper, author have considered delay, stability and bandwidth for routing but it does not distinguish real time flows and non-real time flows for bandwidth and delay requirements. Also this routing applies to single path routing only.

In [16], authors have proposed a multi-path source routing protocol. They have considered bandwidth and reliability as QoS metrics. During routing discovery phase, the protocol chooses several multiple alternate paths that meet the QoS requirements and the ideal number of multi-path routing. The paths are selected to satisfy the trade-off between load balancing and network overhead.

In [17], authors have proposed a Greedy-based backup Routing (GBR) protocol. Their protocol has considered both route length and link lifetime in order to achieve high route stability. In their GBR, the primary path is constructed based on a greedy forwarding mechanism, whereas the local-backup path for each link is determined according to the link life-time. Nevertheless, with Greedy-based backup routing protocol the stability of data link and route link is maintained but delay and bandwidth are not considered.

V. CONCLUSION

In this paper, we have discussed basic concept of QoS and how multipath routing is used to support QoS for real time and non-real time applications in MANET. We have identified problem related to QoS and multipath routing that affects the network performance. To provide efficient Quality of Service in MANET, there is need to establish new architecture and services for routine network controls such that it minimize the overhead and increase network performance.

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