Quality of Service Improvement in Hybrid Network using Enhanced Quality of Service Oriented Distributed Routing Protocol

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***Abstract*— As wireless communications gains popularity, significant research has been devoted to supporting real time transmission with stringent quality of service requirements for wireless applications. At the same time, a wireless hybrid network that integrates a mobile wireless adhoc network and a wireless infrastructure network has been proven to be a better alternative for the next generation wireless network. Quality of service Oriented Distributed routing protocol enhance the Quality of Service capability of hybrid networks. In this paper improve the quality of Quality of service Oriented Distributed routing protocol and develop a protocol Enhanced Quality of service Oriented Distributed routing protocol. The Enhanced Quality Of service Oriented Distributed routing protocol is mobility resilient than Quality of service Oriented Distributed routing protocol. The Enhanced Quality of service Oriented Distributed routing protocol improves the throughput and decreased the overhead. Hence this model shows that Enhanced Quality of service Oriented Distributed routing protocol can provide high Quality of Service performance in terms of overhead, transmission delay and mobility resilient. This also increase the energy efficiency of Quality of service Oriented Distributed routing protocol and avoid the energy harvesting problem by using Enhanced Quality of service Oriented Distributed routing protocol. Hence it leads to develop a high efficiency hybrid network using Enhanced Quality of service Oriented Distributed routing protocol.**

Keywords—*: Infrastructure Wireless Network, Adhoc Mode Network, Hybrid Wireless Network, Quality of Service Distributed oriented Routing Protocol.*

I. INTRODUCTION

Nowadays, people wish to watch videos, play games, watch TV and make long-distance conferencing via wireless mobile devices. The emergence and the envisioned future of real-time and multimedia applications have stimulated the need of high Quality of Service (QoS) support in wireless and mobile networking environments [1]. The QoS support reduces end-to-end transmission delay and enhances throughput to guarantee the seamless communication between mobile devices and wireless infrastructures. In concert hybrid wireless networks (i.e., multi-hop cellular networks) have been proven to be a better network structure for the next generation wireless networks [2–5], and can help to deal with the inflexible end-to-end QoS requirements of different applications. Hybrid networks synergistically combine infrastructure networks and MANETs to leverage each other. Specifically, infrastructure networks improve the scalability of MANETs, while MANETs automatically establish self organizing networks, extending the coverage of the infrastructure networks. Hybrid wireless network have the characteristics of high mobility and fluctuating bandwidth. So guarantying the QoS still remains an open question.

II. EXISTING SYSTEM

As wireless communication gains popularity, significant research has been devoted to supporting real-time transmission with for wireless applications. At the same time, a wireless hybrid network that integrates a mobile wireless ad hoc network (MANET) and a wireless infrastructure network has been stringent Quality of Service (QoS) requirements proven to be a better alternative for the next generation wireless networks. By directly adopting resource reservation-based QoS routing for MANETs, hybrids networks inherit invalid reservation and race condition problems in MANETs. How to guarantee the QoS in hybrid networks remains an open problem. In this paper, we propose a QoS-Oriented Distributed routing protocol (QOD) to enhance the QoS support capability of hybrid networks. Taking advantage of fewer transmission hops and any cast transmission features of the hybrid networks, QOD transforms the packet routing problem to a resource scheduling problem. QOD incorporates five algorithms: (1) a QoS-guaranteed neighbor selection algorithm to meet the transmission delay requirement, (2) a distributed packet scheduling algorithm to further reduce transmission delay,(3) a mobility-based segment resizing algorithm that adaptively adjusts segment size according to node mobility in order to reduce transmission time, (4) a traffic redundant elimination algorithm to increase the transmission throughput, and (5) a data redundancy elimination based transmission algorithm to eliminate the redundant data to further improve the transmission QoS. Analytical and simulation results based on the random way-point model and the real human mobility model show that QOD can provide high QoS performance in terms of overhead, transmission delay, mobility resilience and scalability.

III. PROPOSED SYSTEM

As wireless communications gains popularity, significant research has been devoted to supporting real time transmission with stringent quality of service requirements for wireless applications. At the same time, a wireless hybrid network that integrates a mobile adhoc network and a wireless infrastructure network has been proven to be a better alternative for the next generation wireless network. Quality of service Oriented Distributed routing protocol enhance the Quality of Service capability of hybrid networks. In this paper improve the quality of Quality of service Oriented Distributed routing protocol and develop a protocol Enhanced Quality of service Oriented Distributed routing protocol. The Enhanced Quality Of service Oriented Distributed routing protocol is mobility resilient than Quality of service Oriented Distributed routing protocol. The Enhanced Quality of service Oriented Distributed routing protocol improves the throughput and decreased the overhead. Hence this model shows that Enhanced Quality of service Oriented Distributed routing protocol can provide high Quality of Service performance in terms of overhead, transmission delay and mobility resilient. This also increase the energy efficiency of Quality of service Oriented Distributed routing protocol and avoid the energy harvesting problem by using Enhanced Quality of service Oriented Distributed routing protocol. Hence it leads to develop a high efficiency hybrid network using Enhanced Quality of service Oriented Distributed routing protocol.

1) Hybrid Wireless Network

A wireless hybrid network that integrates a mobile wireless ad hoc network (MANET) and a wireless infrastructure network. Multi-hop cellular networks (also called hybrid networks) appear to be a promising combination of the dynamics of mobile ad hoc networks and the reliability of infrastructure wireless networks. These hybrid networks offers several advantages for users as well as operators. The network topology can be dynamically adapted to the respective needs reducing installation costs for the provider, the overall coverage area can be extended and nodes can reduce their energy consumption for transmitting packets due to shorter distances. However, several weaknesses known from mobile ad hoc networks persist. In the context of hybrid networks new possibilities to deal with these weaknesses become available. Besides the security and routing issues the cooperation among nodes is of great importance.

2) Introduction To Manet

Hybrid network is the integration of Manet and wireless infrastructure network. This is the best alternative for next generation network. Ad-hoc networks are mobile networks that operate in the absence of any fixed infrastructure, employing peer-to-peer communication to establish network connectivity. These networks have a wide range of applications such as disaster relief and field operations, war front activities, and communication between automobiles activities and it is a self starting dynamic network comprising of mobile nodes, where each and every participation node voluntarily transmit the packets destined to some remote node using wireless (radio signal) transmission. An ad hoc network doesn't have any centralized arbitrator or server. In MANET each and every mobile node is assumed to be moving with more or less relative speed in arbitrary direction [13]. Because of that there is no long term guaranteed path from any one node to other node [12]. MANET have very enterprising use in emergency scenarios like military operations & disaster relief operation where there is need of communication network immediately following some major event, or some temporary requirement like conference & seminar at new place where there is no earlier network infrastructure exist and need alternative solution[11][10].

Ad hoc network [1][2] is a network where there is no existence of wireless infrastructure for networking, Instead each node communicates with each other using their sole transmitter receiver only. In this kind of network each and every node does participate voluntarily in transit packet that flow to and from different nodes. Each node do follow same routing algorithm to route different packets. Thus this kind of network have limited homogenous feature. There are not many wireless products that follow this proposed technology.

3) Wireless Infrastructure Network

Network with existing infrastructure is a network where exists a wireless access point or earlier wireless hardware support for each node to connect to networks. Here nodes do not participate in any kind of transit services. They communicate to access points to send & receive packets from other nodes. In this kind of network different access point can follow different wireless protocol like 802.11 b or 802.11g and still can communicate with each other. There exist several wireless products based on this kind of technology .Most wireless networks are based on the IEEE® 802.11 standards [4]. A basic wireless network consists of multiple stations communicating with radios that broadcast in either the 2.4GHz or 5GHz band, though this varies according to the locale and is also changing to enable communication in the 2.3GHz and 4.9GHz ranges.802.11 networks are organized in two ways. In infrastructure mode, one station acts as a master with all the other stations associating to it, the network is known as a BSS, and the master station is termed an access point (AP). In a BSS, all communication passes through the AP; even when one station wants to communicate with another wireless station, messages must go through the AP. In the second form of network, there is no master and stations communicate directly. This form of network is termed an IBSS and is commonly known as an ad-hoc network.

B. Development Of Eqod From Conventional Protocols

1) Path reliability and Load balancing protocol in Mobile Adhoc Network.

In this paper we introduce a novel end-to-end approach for achieving the dual goal of enhanced reliability under path failures and multi-path load balancing in mobile ad hoc networks (MANETs). These goals are achieved by fully exploiting the presence of multiple paths in mobile ad hoc networks in order to jointly attack the problems of frequent route failures and load balancing. More specifically, we built a disjoint-path identification mechanism for maintaining multiple Routes between two endpoints on top of the Stream Control Transmission Protocol (SCTP), and the Dynamic Source Routing (DSR) protocol. A number of additional modifications are incorporated to the SCTP protocol in order to allow its smooth operation. The proposed approach differs from previously related work since it consist an entirely end-to-end scheme built on top of a transport layer protocol. We provide both analytical and simulation results that prove the efficiency of our approach over a wide range of mobility scenarios.

2) Load balancing and Resource reservation protocol in Mobile Adhoc Network

To ensure uninterrupted communication in the presence of node movement, it is necessary to discover a new route efficiently. More specifically, if an intermediate node finds that it cannot reach the next hop on the route to the destination, then that intermediate node needs to find an alternate route to the destination. For uninterrupted communication, it is necessary that a new route be available as soon as a node becomes unreachable. In other words, it is necessary to identify alternate routes even before a node moves away or fails. While identifying and using alternate routes, it is important to ensure that other flows using that alternate route are not affected and that appropriate bandwidth is available for the rerouted flow. However, one cannot simply reserve the entire requested bandwidth for a data transmission on the alternate routes, as it will lead to underutilization of the network bandwidth in the case where no nodes move. Based on the above discussion, in this paper, we focus on two conflicting goals that need to be met in ad-hoc networks: (1) ensuring the availability of an alternate route that provides the required bandwidth, and (2) maximizing the available bandwidth when no node moves/fails. But it does not consider the mobility. Through High mobility, Heavy load cause packet dropping. So we moves to the Reliable and Multicast protocol in Mobile Adhoc Network.

3) Reliable and Multicast protocol in Mobile Adhoc Network.

In recent years, a number of applications of ad-hoc networks have been proposed. Many of them are based on the availability of a robust and reliable multicast protocol. In this paper, we address the issue of reliability and propose a scalable method to improve packet delivery of multicast routing protocols and decrease the variation in the number of packets received by different nodes. The proposed protocol works in two phases. In the first phase, any suitable protocol is used to multicast a message to the group, while in the second concurrent phase; the gossip protocol tries to recover lost messages. Our proposed gossip protocol is called Anonymous Gossip (AG) since nodes need not know the other group members for gossip to be successful. This is extremely desirable for mobile nodes that have limited resources, and where the knowledge of group membership is difficult to obtain. As a first step, anonymous gossip is implemented over MAODV without much overhead and its performance is studied. Simulations show that the packet delivery of MAODV is significantly improved and the variation in number of packets delivered is decreased. In this multi cast packet delivery cause the packet dropping and congestion. Hence we prefer Dynamic source routing protocol in Mobile Adhoc Network.

4) Dynamic source routing protocol in Mobile Adhoc Network

An ad hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any established centralized administration. In such an environment, it may be necessary for one mobile host to enlist the aid of other hosts in forwarding a packet to its destination, due to the limited range of each mobile host's wireless transmissions. This paper presents a protocol for routing in ad hoc networks that uses dynamic source routing. The protocol adapts quickly to routing changes when host movement is frequent, yet requires little or no overhead during periods in which hosts move less frequently. Based on results from a packet-level simulation of mobile hosts operating in an ad hoc network, the protocol performs well over a variety of environmental conditions such as host density and movement rates. For all but the highest rates of host movement simulated, the overhead of the protocol is quite low, falling to just 1% of total data packets transmitted for moderate movement rates in a network of 24 mobile hosts. In all cases, the difference in length between the routes used and the optimal route lengths is negligible, and in most cases, route lengths are on average within a factor of 1.01 of optimal. Here the node changes very randomly. So there is a chance of collision.

5) Stateless protocol for real time applications

In this paper, we present a real-time communication protocol for sensor networks, called SPEED. The protocol provides three types of real-time communication services, namely, real-time unicast, real-time area-multicast and real-time area-any cast. SPEED is specifically tailored to be a stateless, localized algorithm with minimal control overhead. End-to-end soft real-time communication is achieved by maintaining a desired delivery speed across the sensor network through a novel combination of feedback control and non-deterministic geographic forwarding. SPEED is a highly efficient and scalable protocol for sensor networks where the resources of each node are scarce. Theoretical analysis, simulation experiments and a real implementation on Berkeley motes are provided to validate our claims. Here we used a Real time protocol and it provides the Quality of Service in only Real time applications.

6) Multipath Routing protocol in Mobile Adhoc Network

In order to achieve better throughput, load balancing and congestion avoidance multipath routing has been widely studied and used in wired networks. The good results inspired the researchers in mobile Ad Hoc area and many multipath routing protocols have been proposed. Each of these protocols has a different approach to problem and a different objective to achieve. To best of our knowledge, there is not a comprehensive comparative study among these protocols. In our study, we have examined multipath routing protocols and compared them with respect to our framework. There is no winner of the comparison, but there are important inferences for researchers who will design new routing protocols. This multi path protocol is somewhat similar to the multi cast. Hence the same problem collision and packet dropping occurs here.

7) A differentiated quality of service oriented multimedia multicast protocol

In Modern Multimedia communication, there are some flows that have constraints different from others and the required QoS for each flow is not the same. Furthermore, in MC communications, all the users do not want or are not able to receive the same QoS[9]. These constraints imply that new communication mechanisms have to take into account the user requirements in order to provide an ad hoc service to each user and to avoid wasting the network resources. This dissertation proposes a new differentiated QoS multicast architecture, based on client/server proxies, called M-FPTP, which relays many MC LANs by single partially reliable links. This architecture provides a different QoS to each LAN depending on the users requirements. For doing so, it is also provided a network model

called Hierarchies Graph (HG) which represents at the same time the network performances and the users QoS constraints. Nevertheless, the application of standard tree creation methods on an HG can lead to source overloading problems. It is then proposed a new algorithm called Degree-Bounded Shortest-Path-Tree (DgB-SPT) which solves this problem. However, the deployment of such a service needs a new protocol in order to collect users' requirements and correctly deploy the proxies. This protocol is called Simple Session Protocol for QoS MC (SSP-QoM). The proposed solutions have been modeled, verified, validated and tested by using UML 2.0 and TAU G2 CASE tool.

8) QoS oriented Opportunistic Routing protocol for Wireless Sensor Networks

In this propose QOR, short for QoS oriented Opportunistic Routing protocol for data collection in Wireless Sensor Networks. Unlike classic routing schemes, QOR takes advantage of opportunistic links to provide faster and more reliable transmissions. Our contribution is threefold. First, propose a joint routing structure and addressing scheme that allows identifying a limited set of nodes than can become opportunistic relayers between a source sensor and the sink. Second, define an original cascaded acknowledgement mechanism that brings reliable acknowledgment and replication-free forwarding to the opportunistic communication scheme. Finally, the performance evaluation assesses that QOR efficiently uses opportunistic links to provide reliable and replication-free data delivery. In this protocol we should identify the limited set of nodes before packet transmission. So this protocol takes some delay for packet transmission.

9) Quality-of-service-oriented protocol for supporting multimedia services over a stratospheric platform communication network

A quality-of-service-oriented medium access protocol "MAC" protocol is suggested for delivering multimedia services through a stratospheric aeronautical platform wireless communication system. The invented protocol exploits the statistical multiplexing of asynchronous transfer mode "ATM" technology. Combing the reservation- and contention-based access schemes in a single protocol allows the platform communication system at an altitude of 20 km to guarantee the service quality requirements for the diverse services. Exploiting the flexibility of the protocol as well as the low encountered propagation delay of the wireless link permit constant bit rate "CBR", variable bit rate "VBR" and available bit rate "ABR" services to be efficiently multiplexed without violating quality constraints. The effects of channel capacity and its associated limitations on the network performance are discussed and pragmatic solutions are suggested. Different service priority schemes are presented and numerical results are discussed. The obtained results dictate the wireless ATM platform communication as a promising means for the next-generation wireless communication system.

10) QoS-Oriented Asynchronous Clustering Protocol in Wireless Sensor Networks

In this propose a QoS-oriented events-driven asynchronous clustering protocol, called EEAC (Energy-Efficient Asynchronous Clustering), which can deliver traffic in a timely and reliable manner. In EEAC, clustering starts asynchronously according to a probability, determined by cluster-heads' data transmission rate and residual energy. EEAC avoids time synchronization and adopts composite formula to elect cluster heads. Simulation results show that EEAC ensures the real-time transmission of sensitive data, reduces the packet loss rate, and evenly distributes nodal energy consumption, thus prolonging network lifetime. But when the energy increases, the node mobility is also increase in the node. This leads to link failure.

11) Zone Routing Protocol

Zone Routing Protocol or ZRP is a hybrid routing protocol that uses both proactive and reactive routing protocols when sending information over the network. ZRP was designed to speed up delivery and reduce processing overhead. It does this by selecting the most efficient type of protocol to use throughout the route.

12) Adhoc On demand Distance Vector Protocol

Ad Hoc On-Demand Distance-Vector routing protocol provides fast and efficient route establishment between mobile nodes that need to communicate with each other[14]. Since AODV has been specifically designed for ad hoc wireless networks, it has minimal control overhead and route acquisition latency. In addition to unicast routing, AODV supports multicast and broadcast as well. Moreover, AODV can be extended to support Quality of Service (QoS). The goal of this paper is to take a closer look at these QoS extensions. Since the QoS extensions are relatively new concept, it is not that clear yet how to properly utilize them. They may introduce some problems as well.

13) .Quality Of Service Oriented Distributed Routing Protocol

The above protocols can't completely provide the quality of service in the manet.It cause the invalid reservation and race condition problem. So propose a QoS-Oriented Distributed routing protocol (QOD) to enhance the QoS support capability of hybrid networks. Taking advantage of fewer transmission hops and any cast transmission features of the hybrid networks, QOD transforms the packet routing problem to a resource scheduling problem. QOD incorporates five algorithms: (1)A QoS-guaranteed neighbor selection algorithm to meet the transmission delay requirement.(2)A distributed packet scheduling algorithm to further reduce transmission delay.(3) A mobility-based segment resizing algorithm that adaptively adjusts segment size according to node mobility in order to reduce transmission time.(4) A traffic redundant elimination algorithm to increase the transmission throughput.(5) A data redundancy elimination based transmission algorithm to eliminate the redundant data to further improve the transmission QoS.

14) Enhanced Qod

In this improve the quality of QOD and develop a protocol EQOD.The EQOD is mobility resilient than QOD.The EQOD improves the throughput and decreased the overhead. Hence this model shows that EQOD can provide high QOS performance in terms of overhead, transmission delay and mobility resilient. In this also analyze the energy from the EQOD protocol and avoid the energy harvesting problem. In QOD the mobility is about 140km/hr, but in EQOD the mobility is about 72km/hr.When the mobility of the EQOD decreased, it decreases the channel break down and improve the quality.

IV. PERFORMANCE EVALUATION OF QOD AND EQOD

A. *Throughput versus Mobility*

The throughput of QOD is in the range of 58,000 Packets. But the EQOD has the throughput of 78,000 Packets. Hence the Quality of service has to be increased. This is shown in Fig 1.EQOD has a tremendous rise in the case of throughput.

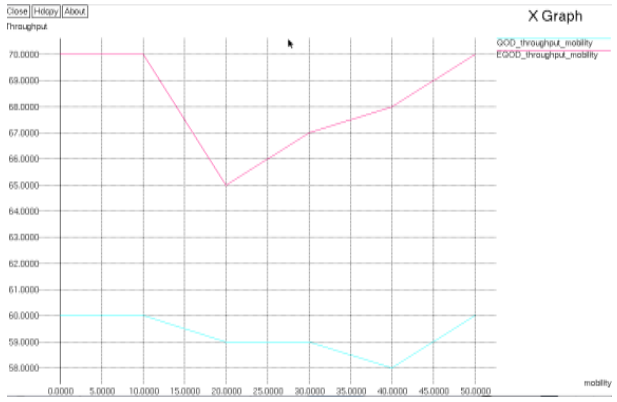

Fig 1 Output waveform for Throughput versus mobility

B. *Packet Delivery Ratio versus Mobility*

The packet delivery ratio of QOD is about 45,000-50000 packets. But the EQOD has the packet delivery ratio of 90000-95000 packets. The packet delivery ratio of QOD and EQOD is shown in Fig 2.

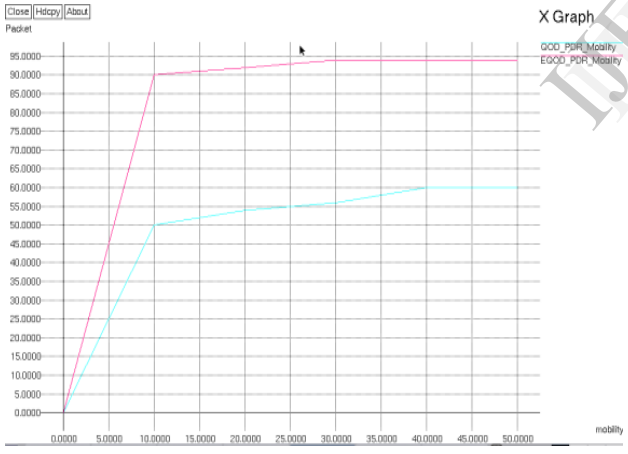

Fig 2 Output waveform for PDR versus mobility

C. *Delays versus Mobility*

The delay of QOD is about 50000ms.But the EQOD has the delay of 30000ms.The packet delivery ratio of QOD and EQOD is shown in Fig.3.

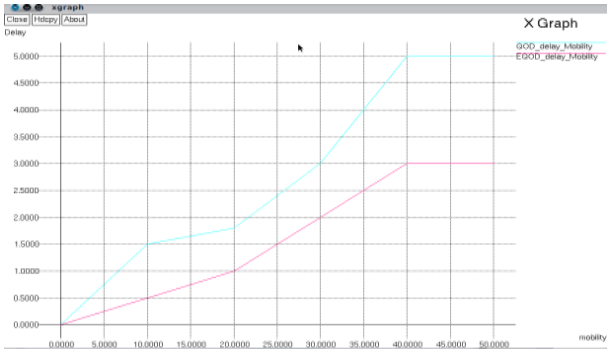

Fig 3 Output waveform for Delay versus mobility

D. *Throughput versus Access point*

The throughput of QOD is 58000 packets. But the QOD has the throughput of 78000 packets. Hence the Quality of service has to be increased in terms of throughput is shown in Fig 4.

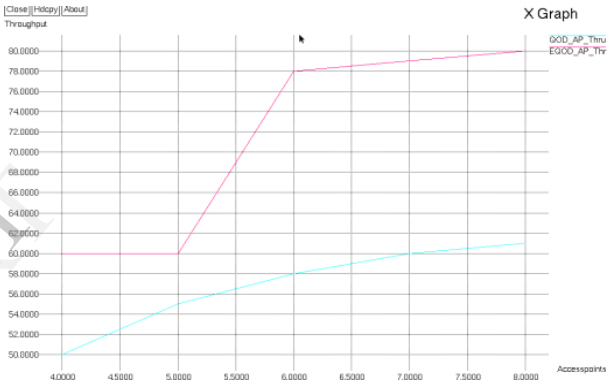

Fig 4 Output waveform for Throughput versus AP

E. *Energy versus Mobility*

The rise in energy efficiency in the case of EQOD is depicted in Fig 5.

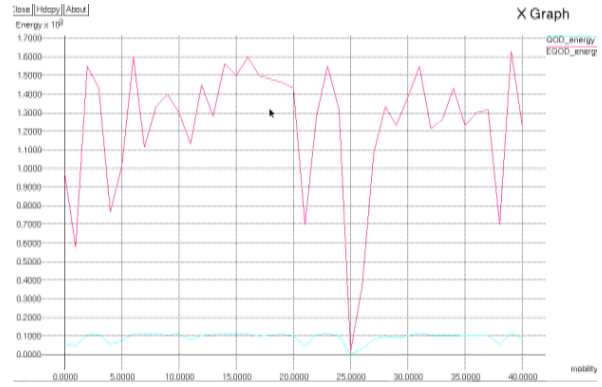

Fig 5 Output waveform for Energy versus mobility

F. Congestion versus Mobility

The congestion of QOD is about 18000packets/node. But the EQOD has probably no congestion. Hence the Quality of service has to be achieved in EQOD. The congestion of QOD and EQOD is depicted in Fig 6.

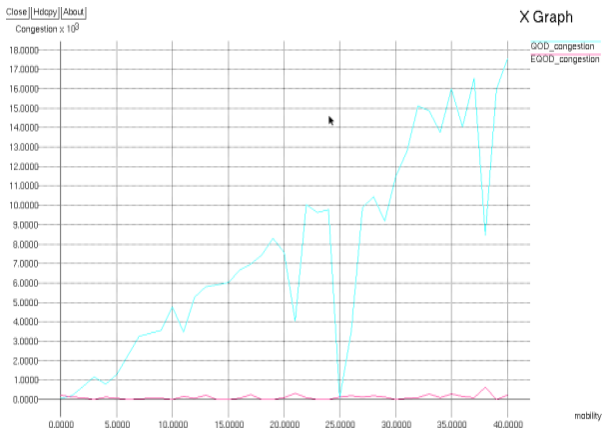

Fig 6 Output waveform for Congestion versus mobility

G. Collision versus Mobility

The collision of QOD is about 24000 packets/node. But the EQOD has the collision of 1000packets/node. Hence the Quality of service in terms of collision is achieved. The collision of QOD and EQOD is depicted in Fig 7.

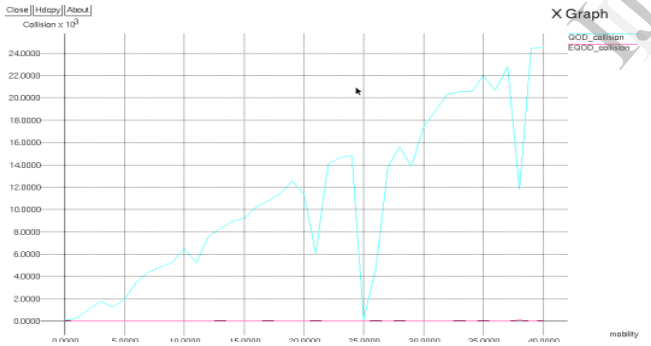

Fig 7 Output waveform for Collision versus mobility

V. CONCLUSION

A wireless hybrid network that integrates a mobile wireless ad hoc network (MANET) and a wireless infrastructure network has been proven to be a better alternative for the next generation wireless networks. By directly adopting resource reservation-based Quality of Service (QoS) routing for MANETs, hybrids networks inherit invalid reservation and race condition problems in MANETs. It leads to developing a protocol Quality of service Oriented distributed routing protocol (QOD) to provide the Quality of Service (QoS) to hybrid network. Taking advantage of fewer transmission hops and any cast transmission features of the hybrid networks, Quality of service Oriented Distributed routing protocol (QOD) transforms the packet routing problem to a resource scheduling problem. Analytical and simulation results based on the random way-point model and the real human mobility model show that Quality of service Oriented Distributed routing protocol (QOD) can provide high QoS performance in terms of overhead, transmission delay, mobility-resilience and scalability. In this paper improve the quality of Quality of service Oriented Distributed routing protocol(QOD) and develop a protocol Enhanced Quality of service Oriented Distributed routing protocol(EQOD).The EQOD is mobility resilient than QOD.The EQOD improves the throughput and decreased the overhead. Hence this model shows that EQOD can provide high QOS performance in terms of overhead, transmission delay and mobility resilient. This also analyzes the energy from the EQOD protocol and avoids the energy harvesting problem. In QOD the mobility is about 140km/hr, but in EQOD the mobility is about 72km/hr.When the mobility of the EQOD decreased, it decreases the channel break down and improve the quality.

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