ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 3, Issue 2, pp: (1125-1129), Month: April - June 2015, Available at: www.researchpublish.com

Distributed Routing Protocol for Hybrid Wireless Networks to Improve QoS

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Abstract: **Due to the admiring uses of wireless communication, significant exploration has been centered to supporting real time transmission with strict Quality of Service necessities for remote applications. Along with this, a hybrid wireless network which is a combination of Mobile wireless Adhoc network and wireless infrastructure network has been demonstrated superior to different remote systems for forthcoming era. By immediate utilization of reservation-based QoS routing for MANETs, hybrid networks confronts the issue like invalid reservation and race condition in MANETs. Subsequently it is hard to ensure the QoS in hybrid networks. So Here it needs to propose a Distributed routing protocol for hybrid wireless networks i.e, QOD to enhance QoS. Making utilization of two features of hybrid networks that are lessened transmission hops and anycast transmission, the packet routing issue has been changed over to resource scheduling issue. QOD incorporates four algorithms: 1) a Qualified neighbor selection algorithm to reduce transmission delay, 2) a distributed packet scheduling algorithm to meet transmission delay requirement, 3) a segment resizing algorithm based on mobility of neighbor's in order to reduce transmission time, 4) a redundant traffic elimination algorithm to build the transmission throughput. Experimental studies exhibit that QOD can give high QoS performance regarding transmission throughput, transmission delay, routing overhead, and mobility resilience.**

Keywords: **Hybrid wireless networks, mobile wireless ad hoc network, quality of service, routing algorithms.**

I. INTRODUCTION

The fast advancement of remote systems has animated various remote applications that have been utilized as a part of wide territories, for example, business, crisis administrations, military, instruction, and amusement. The quantity of WiFi able cell phones including tablets and handheld gadgets (e.g., cell phone and tablet PC) has been expanding quickly. For instance, the quantity of remote Internet clients has tripled worldwide in the most recent three years, and the quantity of cell phone clients in US has expanded from 92.8 million in 2011 to 121.4 million in 2012, and will stretch around 207 million by 2017 [1] . These days, individuals wish to watch videos, play diversions, stare at the TV, and make long separation conferencing by means of remote cell phones "on the go." Therefore, feature outflowing applications, for example, Qik [2] , Flixwagon [3] , and FaceTime [4] on the base remote systems have gotten expanding consideration as of late. These applications utilize a foundation to straightforwardly join versatile clients for feature viewing or cooperation continuously. The boundless utilization of remote and cell phones and the expanding interest for remote interactive media administrations (e.g., portable gaming, online TV, and online gatherings) are broadly sent. The wide rise of media applications have empowered the need of high Quality of Service (QoS) Support in remote and portable systems administration situations [5]. The QoS Support decreases end to- end transmission delay and improves throughput to ensure the consistent correspondence between cell phones and remote bases.

A. Related Work:

Mobile Adhoc Network (MANET)

A dominant part of QoS routing conventions are based on resource reservation , in which a source node sends test messages to a destination to find and store ways fulfilling a given QoS necessities. Perkins et al.developed the AODV routing protocol [6] by including information of the extreme delay and least accessible transfer speed of every neighbor in a node's routing table. Jiang et al. proposed to hold the resources from the nodes with higher connection stability to lessen the impacts of node portability. Liao et al. proposed an expansion of the DSR routing protocol by holding resources in view of time slots. Venataramanan et al. proposed a scheduling mechanism to guarantee the smallest buffer utilization of the nodes in the sending way to base stations. In any case, theseworks concentrate on amplifying system limit based on scheduling but neglected to ensure QoS delay performance

Wireless Infrastructure Network

Existing methodologies for giving ensured services in the infrastructure networks are in view of two models:

Integrated Services (IntServ) [7] and Differentiated Services (DiffServ) [8]. IntServ is a stateful model that uses Resource reservation for individual stream, and uses affirmation control and a scheduler to keep up the QoS of traffic management. In contrast, DiffServ is a stateless model which utilizes coarsegrained class-based instrument for traffic administration. A number of queing scheduling algorithms have been proposed for DiffServ to further minimize packet droppings also, bandwidth utilization.

Hybrid Wireless Networks

Very few methods have been proposed to give QoSguaranteed routing for hybrid networks. The vast majority of the routing protocols just attempt to enhance the system limit and reliability to indirectly provide QoS service but bypass the constraints in QoS routing that require the protocols to provide guaranteed give ensured Services. Jiang et al. [9] proposed an resource procurement strategy in hybrid networks displayed by IEEE802.16e and portable WiMax to furnish services with high reliability.

B. Existing System:

Due to the admiring uses of wireless communication, meaningful research has been focused to supporting real-time transmission with strict Quality of Service requirements for wireless applications. Along with this, a wireless hybrid network which is a combination of Mobile wireless Adhoc network and a wireless infrastructure networks has been proven better than other wireless networks for upcoming generation. By direct use of resource reservation-based QoS routing for MANETs, hybrid network faces the problem like invalid reservation and race condition in MANETs. Invalid reservation is nothing but if the transmission path from source to destination breaks then the resources which are reserved will be wasted. Race condition problem is nothing but allocating single resource twice along two different QoS paths. Hence it is difficult to guarantee the QoS in hybrid networks.

In the remote systems, QoS procurement (e.g., Intserv , RSVP [10]) has been proposed for QoS routing, which frequently requires node confer, admission control, resource reservation, and need planning of scheduling packets . However, it is more hard to ensure QoS in MANETs because of their interesting components including client portability, channel change errors,and restricted data transmission. Various reservation-based QoS routing protocols have been proposed for MANETs that make courses framed by hubs and connections that save their assets to satisfy QoS necessities. In spite of the fact that these protocols can build the QoS of the MANETs to a certain degree, they experience the ill effects of invalid reservation and race condition issues [11]. A large portion of the present works in Hybrid networks by considering AODV routing protocol in which QoS routing is based on reserving resources concentrate on expanding system limit or routing reliability, however can't give QoS-ensured administrations.

C. Proposed System:

Here the aim is to present a QoS enabled Distributed routing protocol for Hybrid Wireless Networks i.e, QOD and compare it with a traditional routing protocol i.e. AODV (Adhoc On Demand Distance Vector) in terms of Various performance metrics that are Throughput, transmission delay, overhead, and packet delivery ratio.Distributed routing protocol which is used to improve the QoS support for hybrid networks i.e, QOD will transforms the packet routing problem to resource scheduling problem which has four algorithms. They are in the Below figure-

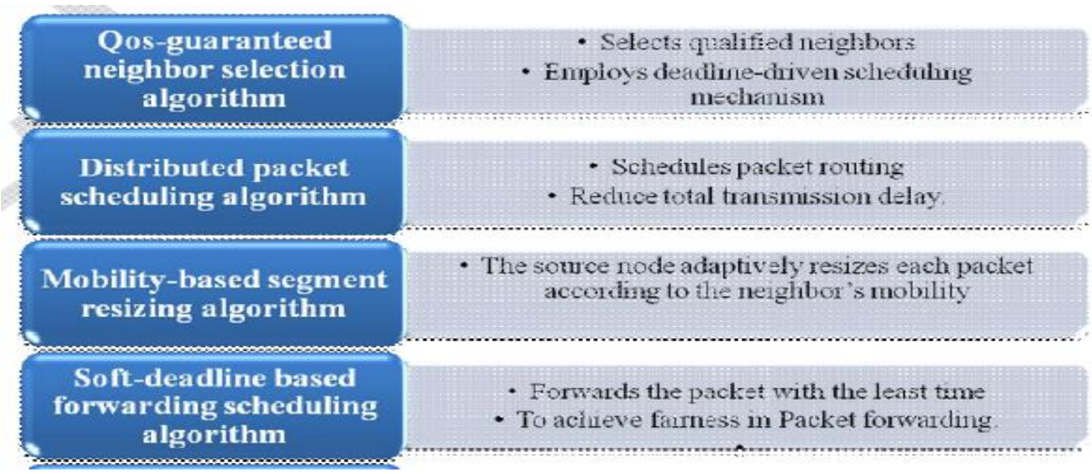

Figure.1 QOD Algorithms

D. System Architecture:

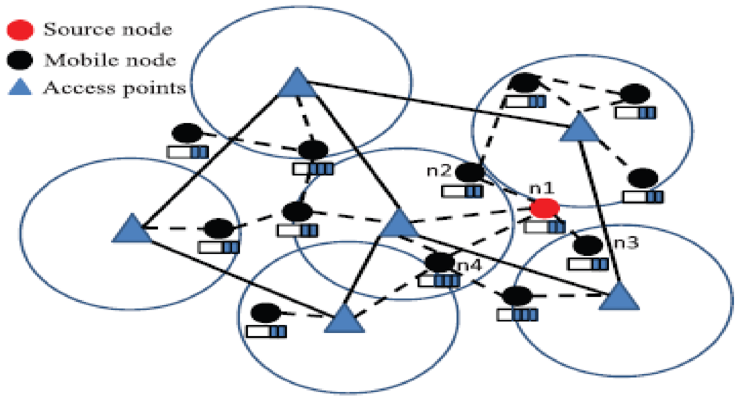

Figure.2 Model Architecture for Hybrid Wireless Networks

Fig.2 shows the network model of a hybrid network. For example, when a source node n1 wants to upload files to an Internet server through APs, it can choose to send packets to the Aps directly by itself or require its neighbor nodes n2, n3, or n4 to assist the packet transmission.

E. Performance Metrices and Simulation Setup:

We evaluate the performance according to the following metrics:

1. Average End-to-end Delay: It is the total time taken by the nodes to transmit the data to the destination.

2. Throughput: It is the amount of data delivered per unit of time.

3. Routing overhead: It is sum of all control packets sent by all nodes in network to discover and maintain route.

Table.1 Simulation Setup

Simulation Parameters	Simulation Values
Channel Type	Wireless channel
Propagation model	Two ray ground
Network interface type	Phy/wireless phy
Interface queue type	Queue/prique
Transmission range	250m
Network dimension	800x800
Queue capacity	50
MAC protocol	IEEE 802.11
Simulation time	300sec

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II. RESULTS & PERFORMANCE ANALYSIS

A. Throughput v/s Number of Nodes:

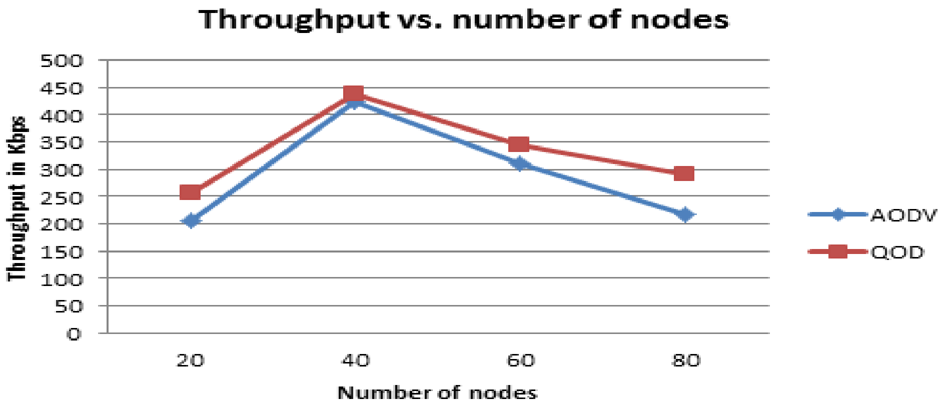

Figure.3 Throughput v/s number of nodes

In above figure 3 we can observe that QOD has high throughput compared to AODV. The throughput increase in QOD is caused by the increased number of nodes in the system, which leads to an increasing number of neighbours of a node, enabling it to have more number of available resources for packet traffic scheduling.

B. End-to-End Delay v/s Number of Nodes:

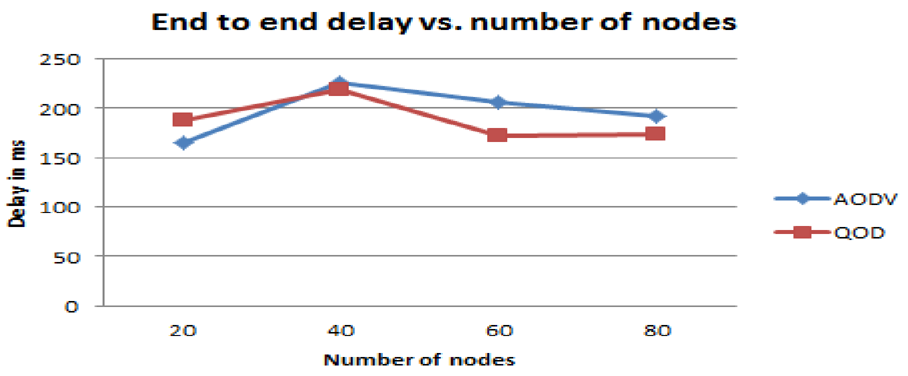

Figure.4 End-to-End Delay v/s Number of Nodes

In above figure 4 we can observe that QOD has lesser delay compared to AODV. As the number of nodes increase ,more packets are generated, every packet in the scheduling queue needs to wait for more time to be forwarded out which leads to higher delay in QOD but has lesser delay compared to the AODV, as the probability of link failure is less.

C. Overhead v/s Number of Nodes:

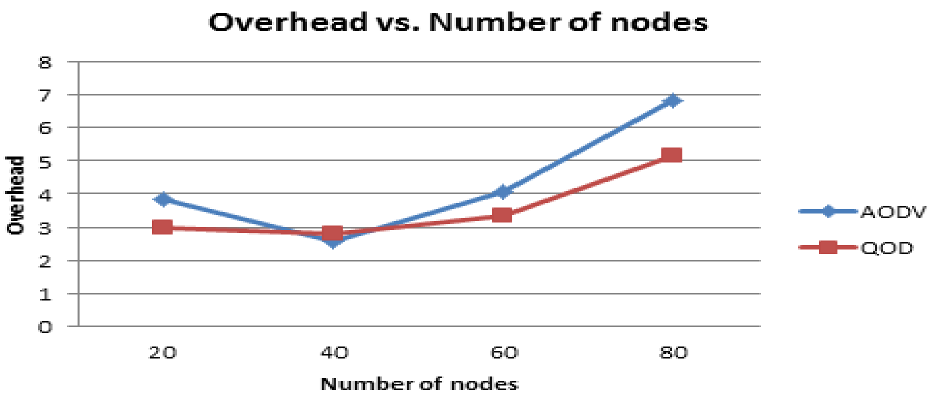

Figure.5 Overhead v/s Number of Nodes

In above figure 5 we can observe that QOD has lesser overhead compared to AODV. In QOD as the number of nodes increase the source node needs to exchange its status information with its neighbour nodes periodically during the packet transmission time for packet scheduling therefore it causes increase in overhead but experiences less overhead compared to AODV as there is no need for exchanging control messages more.

III. CONCLUSION

Hybrid wireless networks that coordinate MANETs and infrastructure wireless networks has been demonstrated superior to different remote systems for forthcoming era . Direct reception of the QoS routing strategies in MANETs into hybrid networks acquires their disadvantages. Here it proposed a distributed routing protocol for hybrid networks i.e, QOD to improve quality of service.In QOD by exploiting the extraordinary features of hybrid networks, i.e., any cast transmission and lessened transmission hops, the packet routing issue has been changed over to resource scheduling issue. In particular, in QOD, if a source node is not inside of the transmission scope of the AP, a source node chooses close-by neighbors that can give QoS administrations to forward its packet to base stations in a circulated way. The source node plans the packets streams to neighbors based on their queing condition, channel condition, and portability, expecting to lessen transmission time and expand system limit. The neighbors then forward packets to base stations, which further forward packets to the destination. It is watched that the proposed QOD builds the QoS of the system contrasted with the AODV.

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