A QOS-ORIENTED DISTRIBUTED ROUTING PROTOCOL FOR HYBRID WIRELESS NETWORKS WITH QUALIFIED NEIGHBOR NODE SELECTION

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Abstract - ***With the increasing level of wireless communication in today's environment, people often required QOS for sharing their data between the nodes. For affording QOS to the user, many researchers proposed a very few methods to provide QOS guaranteed routing for hybrid networks, they strive to improve the network capacity and reliability but they evade constrain in QOS. For this problem our main objective of this paper is to improve the QOS and efficiency of routing approach with constrains over hybrid wireless data streaming using QOD protocol. This aims to develop the QOS based reliable architecture against the hybrid wireless routing issues. The system also aims at providing both proactive and reactive solutions for effective routing. The goal of this paper is to providing efficient dynamic routing management to deal the challenges of data transmission and slicing based approach is selected to filter the neighbor nodes through which the next hop transmission occurs.***

Key Words: *Hybrid Wireless Network, Distributed Routing protocol, QOD.*

1. INTRODUCTION

Hybrid wireless network is an extension to an infrastructure network, where a mobile host may connect to an access point (AP) using multi hop wireless routes via other mobile hosts. The APs are configured to operate on one of multiple available channels. Mobile hosts and wireless routers can select their operating channels dynamically through channel switching Hybrid wireless networks (i.e., multihop cellular networks) have been proven to be a better network structure for the next generation wireless networks. It can help to tackle the stringent end to end QoS requirements of different applications. Hybrid networks synergistically combine infrastructure networks and MANETs to leverage each other. For example it integrates a mobile Wireless Ad Hoc Network (MANET) and wireless infrastructure has proved a better alternative next generation wireless networks

Hybrid wireless networks (i.e., multi hop cellular networks) have been proven to be a better network structure for the next generation wireless networks and can help to tackle the stringent 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.

In a vehicle opportunistic access network (an instance of hybrid networks), people in vehicles need to upload or download videos from remote Internet servers through access points (APs) (i.e., base stations) spreading out in a city. Since it is unlikely that the base stations cover the entire city to maintain sufficiently strong signal everywhere to support an application requiring high link rates, the vehicles themselves can form a MANET to extend the coverage of the base stations, providing continuous network connections.

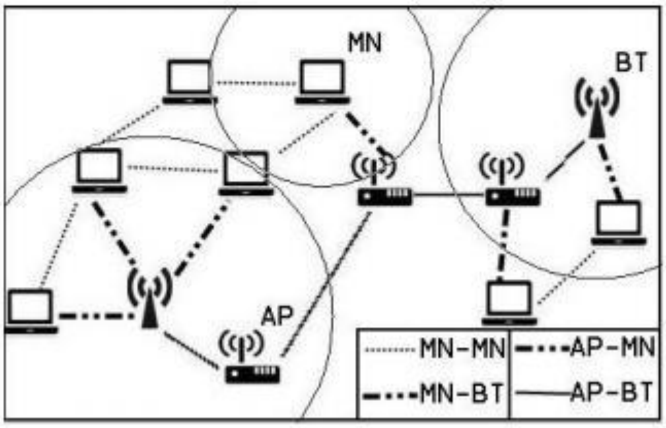


Fig1. Hybrid Wireless Network

In the above figure which shows the integration of wired and wireless networks, uses base stations to avoid overwhelming burden of relaying packets between source and destination if required. Presenting robust multicast routing in those dynamic network environments is a significant challenge for sustaining these applications. In a few wireless multicast applications, the source and intermediary nodes are mobile for transferring the data, but the multicast recipients locations are fixed and known they also sent the packet in the same intermediate node.

Conversely, in other wireless multicast applications, all nodes, with the multicast destinations, are mobile. In this paper, in order to support any type of multicast service to the target devices, the source nodes must recognize the locations of the multicast target or destination nodes. This can be affording by a service discovery protocol that sits outside the routing protocol, revising the source with the current location of the sink nodes. Moreover, the routing protocol can take for granted knowledge of the sinks locations. We can utilize this knowledge to design a distributed QOS routing protocol.

2. LITERATURE REVIEW

Some authors proposed a resource provision method in hybrid networks modeled by and mobile WiMax to provide service with high reliability. IntServ is a stateful model that uses resource reservation for individual flow, and uses admission control and a scheduler to maintain the QoS of traffic flows. In difference, DiffServ is a stateless form which uses coarse grained class-based apparatus for traffic management. Queuing scheduling algorithms have been proposed for DiffServ to further minimize packet droppings and bandwidth consumption and proposed a dynamic packet service (DPS) model to provide unicast IntServ-guaranteed service and Diffserv like scalability. In existing approaches for providing guaranteed services in the infrastructure networks are based on two models: integrated services (IntServ) and differentiated service (DiffServ).Very few methods have been proposed to provide QoS guaranteed routing for hybrid networks. Most of the routing protocols only try to improve the network capacity and reliability to indirectly provide QoS service but bypass the constraints in QoS routing that require the protocols to provide guaranteed service and proposed a resource provision method in hybrid networks modeled by IEEE802.16e and mobile WiMax to provide service with high reliability also tried to select "best" relay that has the maximum instantaneous value of a metric which can achieve higher bandwidth efficiency for data transmission. Considered cooperative networks that use physical layer relaying strategies, which take advantage of the broadcast nature of wireless channels and allow the destination to cooperatively "combine" signals sent by both the source and the relay to restore the original signal and proposed a semi distributed relaying algorithm to jointly optimize relay selection and power allotment of the system proposed to utilize the first-order finite state Markov channels to approximate the time variations of the average received signal-to-noise ratio (SNR) for the packet transmission and use the adaptive modulation and coding scheme to achieve high spectral efficiency and presented a framework of link capacity analysis for optimal transmission over uplink transmission in multi hop cellular networks proposed a two-hop packet forwarding mechanism, in which the source node adaptively chooses direct transmission and forward transmission to base stations. Unlike the above works, QOD aims to provide QoS guaranteed routing. QOD fully takes advantage of the widely deployed APs, and novelly considers the packet routing problem as a resource scheduling problem between nodes and APs. RAP and SPEED give a high delivering priority to the packets with longer distance/delay to the destination. However, both methods require each sensor to know its own location, thus they are not suitable for a highly dynamic environment and proposed to improve routing reliability by multipath routing. Nevertheless, the surplus transmission of the packets may lead to high power consumption.

3. PROBLEM DEFINITION

The main problem of the QOS routing protocol is attempts to directly adapt the QoS solutions for infrastructure networks to MANETs generally do not have great success. Numerous reservation-based QoS routing protocols have been proposed for MANETs that create routes formed by nodes and links that reserve their resources to fulfill QoS requirements. Although these protocols can increase the QoS of the MANETs to a certain extent, they suffer from invalid reservation and race condition problems. Invalid reservation problem means that the reserved resources become useless if the data transmission path between a source node and a destination node breaks. Due this problem the qualified neighbor nodes identification is tough in worst case scenario (where number of nodes is very large).

To overcome the problem, an application is required and it should be capable of implementing the neighbor nodes identification efficiently. On this basis, a slicing based approach is selected to filter the neighbor nodes through which the next hop transmission occurs. And also the unnecessary transmission is avoided

4. PROPOSED SYSTEM

The proposed system contains all existing system implementation. Also, it contains options for qualified neighbor node detection in worst case scenario. A slicing based approach is selected to filter the neighbor nodes through which the next hop transmission occurs.

5. PROPOSED ARCHITECTURE

5.1. QOD PROTOCOL MODE

QoS-Oriented Distributed routing protocol (QOD). Usually, a hybrid network has widespread base stations. The data transmission in hybrid networks has two features. First, an AP can be a source or a destination to any mobile node. Second, the number of transmission hops between a mobile node and an AP is small. The first feature allows a stream to have any cast transmission along multiple transmission paths to its destination through base stations, and the second feature enables a source node to connect to an AP through an intermediate node. Taking full advantage of the two features, QOD transforms the packet routing problem into a dynamic resource scheduling problem.

Specifically, in QOD, if a source node is not within the transmission range of the AP, a source node selects nearby neighbors that can provide QoS services to forward its packets to base stations in a distributed manner. The source node schedules the packet streams to neighbors based on their queuing condition, channel condition, and mobility, aiming to reduce transmission time and increase network capacity. The neighbors then forward packets to base stations, which further forward packets to the destination.

The proposed system is focus on the neighbor node selection for QoS-guaranteed transmission. QOD is the first work for QoS routing in hybrid networks. This thesis work makes five contributions.

QoS-guaranteed neighbor selection algorithm. The algorithm selects qualified neighbors and employs deadline-driven scheduling mechanism to guarantee QoS routing.

Distributed packet scheduling algorithm. After qualified neighbors are identified, this algorithm schedules packet routing. It assigns earlier generated packets to forwarders with higher queuing delays, while assigns more recently generated packets to forwarders with lower queuing delays to reduce total transmission delay.

Mobility-based segment resizing algorithm. The source node adaptively resizes each packet in its packet stream for each neighbor node according to the neighbor's mobility in order to increase the scheduling feasibility of the packets from the source node.

Soft-deadline based forwarding scheduling algorithm. In this algorithm, an intermediate node first forwards the packet with the least time allowed to wait before being forwarded out to achieve fairness in packet forwarding.

Data redundancy elimination based transmission. Due to the broadcasting feature of the wireless networks, the APs and mobile nodes can overhear and cache packets. This algorithm eliminates the redundant data to improve the QoS of the packet transmission.

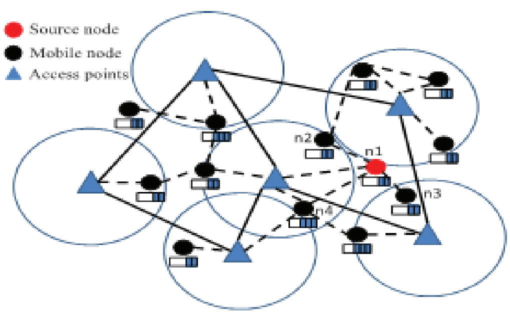


Fig. 2 Network Model of the Hybrid Networks

ALGORITHM FOR QOD ROUTING PROTOCOL:
if receive a packet forwarding request from a source node then
if this.SpaceUtility < threshold then
Reply to the source node.
end if
end if
if receive forwarding request replies for neighbor nodes then
Determine the packet size Sp(i) to each neighbor I based on

$$S_p(new) = \frac{\gamma}{v_i} S_p(unit),$$

Estimate the queuing delay Tw for the packet for each neighbor based on

$$T_w^{(x)} = \sum_{j=1}^{x-1} \left(T_{I-D}^{(j)} \cdot \lceil T_w^{(x)}/T_a^{(j)} \rceil\right)(0 < j < x)$$

Determine the qualified neighbors that can satisfy the deadline requirements based on Tw. Sort the qualified nodes in descending order of Tw. Allocate workload rate Ai for each node based on

$$\mathbf{A} = \begin{cases} W_g = \sum_{i=1}^{N_q} A_i \\ A_i \leq U_{as}(i) * W_i. \end{cases}$$

for each intermediate node ni in the sorted list do send packets to ni with transmission intervalSp(i) / Ai.
end for
end if

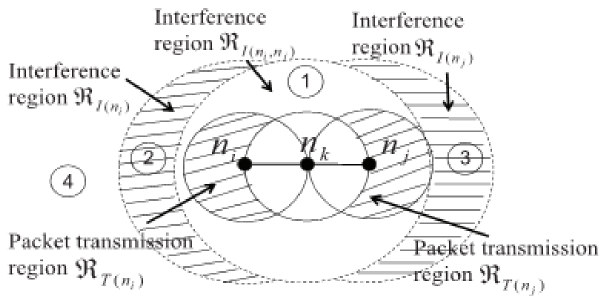


Fig. 3 QOS-Distributed Routing Protocol

6.GUARANTEE NEIGHBOR HOP SELECTION ALGORITHM (GNHSA).

Delivering content at high bandwidth, however, remains a significant challenge for highly mobile users in vehicles, e.g., cars, buses, and trains. Existing technologies such as satellite-based broadcasting and FM-radios are widely deployed, but provide low bandwidth links. Cellular-3G provides higher bandwidth, but only with significant monthly costs. More importantly, cellular operators, overwhelmed by data usage on their networks, are implementing rate restrictions and Wi-Fi offloading to discourage mobile clients from using their mobile data services. Thus, it is believed that Wi-Fi info-stations are the ideal alternative for deploying location-aware information services to mobile users. With the ubiquity and high-bandwidth of Wi-Fi devices, content providers such as restaurants and tourism offices can easily deploy a small number of Wi-Fi info-stations that quickly deliver content to users passing by. Individual info-stations could be placed at key locations such as freeway exits into a city, and at street corners near the places of interest.

While sufficient for low-mobility users, Wi-Fi info-stations still face two challenges in delivering high-quality content to highly mobile users, e.g., users in moving vehicles. First, given the short time a vehicle is in range of the info-station, users do not have time to interact with roadside info-stations to choose the content they desire. So this study is chosen to design an efficient and scalable delivery system to distribute location-aware content for mobile users on the move. The title describes Starfish, an info-station-based content delivery system for highly mobile users. It begins by defining the problem of delivering location-aware content, and then describes designs for Starfish based on roadside info-stations using either wireless unicast or wireless broadcast.

This study presents two efficient broadcasting algorithms based on 1-hop neighbor information. In the first part of the thesis, sender-based broadcasting algorithms, specifically the algorithm proposed by achieve local optimality by selecting the minimum number of forwarding nodes in the lowest computational time complexity O (n log n), where n is the number of neighbors.

In the second part of the thesis, a simple and highly efficient receiver-based broadcasting algorithm is proposed. When nodes are uniformly distributed, it proves that the probability of two neighbor nodes broadcasting the same message exponentially decreases when the distance between them decreases or when the node density increases. Using the experimental evaluation, it is confirmed these results show that the number of broadcasts in the proposed receiver-based broadcasting algorithm can be even less than one of the best known approximations for the minimum number of required broadcasts.

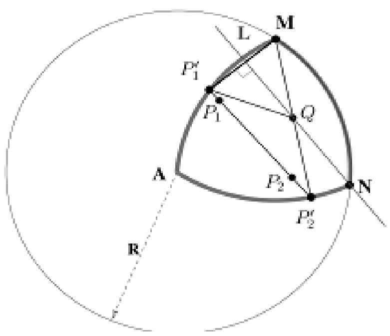


Fig. 4 Upper bound on the distance between nodes inside a bulged Network

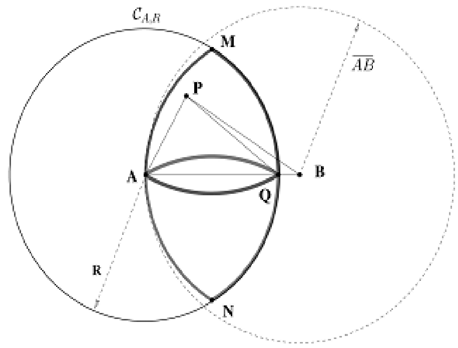


Fig.5 other properties of bulge Network

The QoS in hybrid wireless networks with high mobility and fluctuating bandwidth still remains an open question. In the infrastructure wireless networks, QoS provision has been proposed for QoS routing, which often requires node negotiation, admission control, resource reservation, and priority scheduling of packets . However, it is more difficult to guarantee QoS in MANETs due to their unique features including user mobility, channel variance errors, and limited bandwidth.

Compared to pure ad hoc routing protocols, routing in hybrid wireless networks is dramatically simplified when the centralized part of the network is given the control on all the routing operations. However leveraging the infrastructure can result in signaling overhead and may not provide optimal routes. A tradeoff should be found between overhead and routes optimality. The characteristics of the different hybrid wireless networks should also be considered in the routing approach, due, for example, to the different types of mobility in each network.

7. IMPLEMENTATION OF GNHSA

The proposed GNHSA algorithm is each node schedules a broadcast for a received message if the node is selected by the sender and if it has not scheduled the same message before. Clearly, each message is broadcast once at most by a node.

In the algorithm each node may only schedule a broadcast when it receives a message for the first time. In contrast, in Algorithm 1, a broadcast schedule can be set at any time. For example, a message can be dropped after the first reception but scheduled for broadcast the second time. Clearly, the main design issue in Algorithm 1 is how to select the forwarding nodes. This algorithm proves that a collision-free network, Algorithm 1 can achieve full delivery if it uses a slice-based selection algorithm to select the forwarding nodes.

ALGORITHM 1: GNHSA

Extract information from the received message M

if M has been scheduled for broadcast or does not contain node’s ID then

drop the message
else
set a differ timer
end if
When differ timer expires
Select a subset of neighbors to forward the message
Attach the list of forwarding node to the message
Schedule a broadcast

The GNHSA algorithms can be divided into two subclasses. In the first subclass, each node decides whether or not to broadcast solely based on the first received message and drops the rest of the same messages that it receives later. Algorithm 1 falls in this subclass and achieves local optimality by selecting the minimum number of forwarding nodes in the lowest computational time complexity.

In the second subclass of sender-based broadcasting algorithms, each node can decide whether or not to broadcast after each message reception. However, if a node broadcasts a message, it will drop the rest of the same messages that it receives in the future. Therefore, each message is broadcast once at most by a node using the broadcasting algorithms in both subclasses.

The first proposed broadcasting algorithm falls in this subclass of sender-based broadcasting algorithms. The proposed algorithm can reduce both the computational complexity of selecting the forwarding nodes and the maximum number of selected nodes in the worst case. Algorithm 1 shows the basic structure of the proposed sender-based broadcasting algorithm. As shown in Algorithm 1, each node schedules a broadcast for a received message if the node is selected by the sender and if it has not scheduled the same message before. Clearly, each message is broadcast once at most by a node.

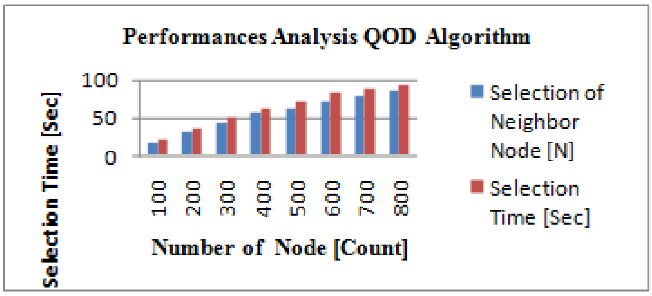
8. EXPERIMENTAL RESULT

The Table 1 represents experimental result for QOD-Algorithm and GNHSA- Algorithm model. The table contains selecting number of neighbor node count in QOD algorithm and GNHSA Algorithm model within 1000 sec time interval details as shown.

S.NO	NUMBER OF NODE (Count)	QOD-ALGORITHM		GNHSA - ALGORITHM	
		Selection of Neighbor Node [N]	Selection time [Sec]	Selection of Neighbor Node [N]	Selection time [Sec]
1	100	16	22	13	17
2	200	32	35	29	30
3	300	42	49	38	44
4	400	56	62	50	56
5	500	63	72	56	65
6	600	71	83	66	80
7	700	79	89	70	85
8	800	85	92	78	86

Table 1.Performances Analysis QoS-D-GNHSA Algorithm

The Fig. 6 represents experimental result for QOD-Algorithm and GNHSA- Algorithm model. The figure contains selecting number of neighbor node count in QOD algorithm and GNHSA Algorithm model within 1000 sec time interval details as shown



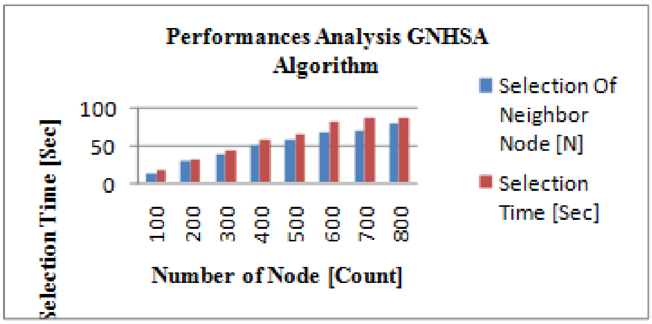


Fig. 6 Performances Analysis QoS-&-GNHSA Algorithm

The Table.2represents experimental result for QOS-&-GNHSA Algorithm mode time analysis. The table contains selection of neighbor node time analysis for QOS-&-GNHSA Algorithm model within 1000 sec time interval details as shown.

S. No	NUMBER OF NODE (Count)	QOD-ALGORITHM [sec]	GNHSA - ALGORITHM [sec]
1	100	22	17
2	200	35	30
3	300	49	44
4	400	62	56
5	500	72	65
6	600	83	80
7	700	89	85
8	800	92	86
9	100	22	17
10	200	35	30

Table. 2 Neighbor Node Selection- Time Analyses

The Fig. 7 represents experimental result for QOS-&-GNHSA Algorithm mode time analysis. The figure contains selection of neighbor node time analysis for QOS--GNHSA Algorithm model within 1000 sec time interval details as shown.

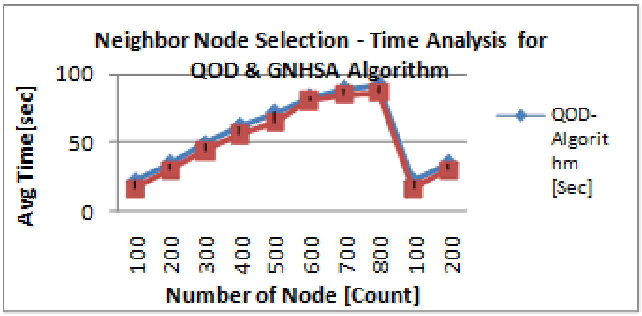


Fig 5.2 Neighbor Node Selection- Time Analyses

9. CONCLUSION

This study makes five contributions. QoS-guaranteed neighbor selection algorithm. The algorithm selects qualified neighbors and employs deadline-driven scheduling mechanism to guarantee QoS routing- Distributed packet scheduling algorithm. After qualified neighbors are identified, this algorithm schedules packet routing. It assigns earlier generated packets to forward with higher queuing delays, while assigns more recently generated packets to forward with lower queuing delays to reduce total transmission delay.

Mobility-based segment resizing algorithm is a source node adaptively resizes each packet in its packet stream for each neighbor node according to the neighbor's mobility in order to increase the scheduling feasibility of the packets from the source node. Soft-deadline based forwarding scheduling algorithm. In this algorithm, an intermediate node first forwards the packet with the least time allowed to wait before being forwarded out to achieve fairness in packet forwarding. Data redundancy elimination based transmission. Due to the broadcasting feature of the wireless networks, the APs and mobile nodes can overhear and cache packets. This algorithm eliminates the redundant data to improve the QoS of the packet transmission.

REFERENCE

[1]. H. Luo, R. Ramjeey, P. Sinhaz, L. Liy, and S. Lu, "UCAN: A Unified Cell and Ad-Hoc Network Architecture," Proc. ACM MobiCom, 2003

[2]. S. Radhakrishnan, N.S.V Rao, G. Racherla, C.N. Sekharan, S.G. Batsell, DST––A routing protocol for adhoc networks using distributed spanning trees, in: IEEE Wireless Communications and Networking Conference, New Orleans, 1999

[3]. N. Nikaein, H. Laboid, C. Bonnet, Distributed dynamic routing algorithm (ddr) for mobile ad hoc networks, in: Proceedings of the MobiHOC 2000: First Annual Workshop on Mobile Ad Hoc Networking and Computing, 2000

[4]. V. Bharghavan, A. Demers, S. Shenker, and L. Zhang, "MACAW: A media access protocol for wireless LANs," in Proceedings, 1994 SIGCOMM Conference, (London, UK), pp. 212-225, 1994. http://www.homerf.org/.

[5]. C. Qiao, H. Wu, and O. Tonguz, "Load balancing via relay in next generation wireless systems," in Proceeding of IEEE Mobile Ad Hoc Networking & Computing, pp.149-150, 2000

[6].G. Chakrabarti and S. Kulkarni, "Load Balancing and Resource Reservation in Mobile Ad Hoc Networks," Ad Hoc Networks, vol. 4, pp. 186-203, 2006

[7]. J. Broch, D. A. Maltz, D. B. Johnson, Y. C. Hu, and J. Jetcheva. A performance comparison of multi-hop wireless ad hoc network routing protocols. Proceedings of the 4th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'98), Dallas, Texas, USA, October 1998.