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Multicast Packet Delivery and QoS Oriented Routing Protocol for Hybrid Wireless Networks

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ABSTRACT: The escalating intensity of wireless communication in today's environment, individuals often mandatory QOS for sharing their data between the nodes. A wireless hybrid network that join together 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 approve resource hesitation based QOS routing for MANET in a hybrid network Inherit invalid hesitation and race condition problems in MANET. To propose a Neighbor selection algorithm, in that an intermediate node assigns the highest priority to the packet with the closest deadline and forwards the packet with the highest priority first. The propose Packet Scheduling for packet routing. This algorithm assigns earlier generated packets to forwarders with higher queuing delays and scheduling feasibility, while assigns more recently generated packets to forwarders with lower queuing delays and scheduling Feasibility, so Data redundancy elimination algorithm that the transmission delay of an entire packet stream can be reduced. To propose a QoS Oriented Distributed Routing Protocol (QOD) for hybrid networks to provide QoS services in a highly dynamic scenario. The advantage of the unique features of hybrid networks. The proposed is an efficient secure distributed QOS protocol that addresses some issues specific to Hybrid wireless networks which are communication delay, cost, mobility, and link unreliability.

KEYWORDS: Neighbor selection, Packet Scheduling, QoS Oriented Distributed Routing Protocol (QOD).

I. INTRODUCTION

A 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. It is the overall performance of a computer network, particularly the performance seen by the users of the network. To quantitatively measure quality of service, several related aspects of the network service are often considered, such as error rates, bandwidth, throughput, transmission delay, availability, jitter, etc. Quality of service is particularly important for the transport of traffic with special requirements. In particular, much technology has been developed to allow computer networks to become as useful as telephone networks for audio conversations, as well as supporting new applications with even stricter service demands. QOS provide high performance in terms of overhead, transmission delay Mobile resilience and scalability. Hybrid wireless network has proved a better network structure for next generation of wireless networks and help to tackle the stringent end to end QOS requirement for different applications.

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II. LITERATURE SURVEY

A majority of QoS routing protocols are based on resource reservation, in which a source node sends probe messages to a destination to discover and reserve paths satisfying a given QoS requirement. Perkins extended the AODV routing protocol by adding information of the maximum delay and minimum available bandwidth of each neighbor in a node's routing table. Jiang proposed to reserve the resources from the nodes with higher link stability to reduce the effects of node mobility. Liao proposed an extension of the DSR routing protocol by reserving resources based on time slots. Venataramanan et al. proposed a scheduling algorithm to ensure the smallest buffer usage of the nodes in the forwarding path to base stations. These works focus on maximizing network capacity based on scheduling but fail to guarantee QoS delay performance. Some works consider providing multipath routing to increase the robustness of QoS routing. Conti proposed to use nodes' local knowledge to estimate the reliability of routing paths and select reliable routes. The works in and balance traffic load among multiple routes to increase routing reliability. Shen proposed to let a source node fetch the lost packets from its neighbors to recover the multicast traffic. Shen and Thomas proposed a unified mechanism to maximize both the QoS and security of the routing. Li proposed a centralized algorithm to optimize the QoS performance by considering cross-layer design among the physical layer, MAC layer, and network layer. QOD aims to provide QoS guaranteed routing. QOD fully takes advantage of the widely deployed APs, and novelly treats the packet routing problem as a resource scheduling problem between nodes and Access Points.

III. EXISTING SYSTEM

Reservation-based QoS routing protocols have been proposed for MANETs that create routes formed by nodes and links that reserve their resources to fulfil QoS requirements. Although these protocols can increase the QoS of the MANETs to a certain extent.

Disadvantages of existing system:

Continuously changing network topology makes conventional wireless routing protocols incapable of providing satisfactory performance in the data transaction environment.

IV. PROPOSED SYSTEM

With the improvement of the wireless network for solving the QOS issues, of hybrid networks, to propose a QoS-Oriented Distributed routing protocol (QOD). To propose protocol adopts the resource reservation based QOS routing scheme. The proposal a QOS Oriented Distributed Optimal Routing Protocol (Q-ORP) to enhance the QoS support capability of hybrid networks.

ADVANTAGES OF PROPOSED SYSTEM:

A QoS-guaranteed neighbour selection algorithm to meet the transmission delay requirement. A distributed packet scheduling algorithm to further reduce transmission delay. A mobility-based segment resizing algorithm that adaptively adjusts segment size according to node mobility in order to reduce transmission time. A traffic redundant elimination algorithm to increase the transmission throughput and a data redundancy elimination-based transmission algorithm to eliminate the redundant data to further improve the transmission QoS.

V. ARCHITECTURE

The QoS requirements mainly include end-to-end delay bound, which is essential for many applications with stringent real-time requirement. While throughput guarantee is also important, it is automatically guaranteed by bounding the transmission delay for a certain amount of packets. The source node conducts admission control to check whether there are enough resources to satisfy the requirements of QoS of the packet stream. Fig. 1 shows the network model of a hybrid network. For example, when a source node n1 wants to upload files to an Internet server through Access Points, it can choose to send packets to the Access Points directly by itself or require its neighbor nodes n2, n3, or n4 to assist the packet transmission.

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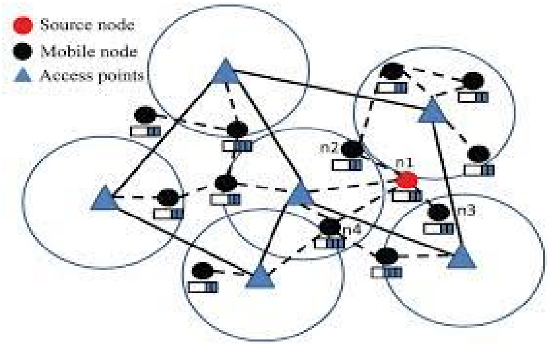

Fig 1 The network model of the hybrid networks.

VI. ALGORITHM

Neighbor selection algorithm:

In this algorithm, an intermediate node assigns the highest priority to the packet with the closest deadline and forwards the packet with the highest priority first. Queue length threshold is set to avoid queuing congestion, we set up a space utility threshold TUs for each node as a safety line to make the queue scheduling feasible. In QOD, after receiving a forward request from a source node, an intermediate node Ni with space utility less than threshold e TUs replies the source node. The replied node Ni informs the source node about its available workload rate, and the necessary information to calculate the queuing delay of the packets from the source node. The source node selects the replied neighbor nodes that can meet its QoS deadline for packet forwarding based on the calculated queuing delay.

Similar to the random early detection (RED) algorithm, in which a queue length threshold is set to avoid queuing congestion, a space utility threshold TUs is set up for each node as a safety line to make the queue scheduling feasible. Let Uas(i) denote the available space utility and Uas(i) = TUs – Us(i) . In QOD, after receiving a forward request message from a source node, an intermediate node ni with space utility less than threshold TUs replies the source node. The replied node ni informs the source node about its available workload rate Uas(i) ∗ Wi , and the necessary information to calculate the queuing delay of the packets from the source node. Based on the calculated queuing delay, the source node then selects the replied neighbour nodes that can meet its QoS deadline for packet forwarding. After the source node determines the qualified nodes that can satisfy the deadline requirement, the source node needs to distribute its packets to these qualified nodes based on their available workload rate Uas(i) ∗ Wi to make the scheduling feasible in each of the adjacent nodes. Consider the packet generating rate of the source node is Wg kb/s, the number of QoS qualified neighbours is Nq , the available workload rate of the intermediate node i is Uas(i) ∗ Wi , and the workload rate allocation from source node to immediate node i is Ai = (Sp(i))/Ta(i), where 0 < i < n. Then, the following equations is solved to get an allocation set A:

Any results that satisfy this equation $A = \begin{cases} W_g = \sum_{i=1}^{N_q} A_i \\ A_i \leq U_{as}(i) * W_i \end{cases}$ can be used by the source node.

Nearest Neighbour Finding Algorithm

Algorithm: Distance Measurement

Input: Objects positions (o1, o2)

Output: Distance (in points)

Step1: Identify object A

Step2: Identify Object B

Step3: Identify position of object1 x and y O1(x1, y1)

Step 4: Identify position of object2 x and y O1(x2, y2)

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Step5: difference between (x1-x2) and (y1-y2)
Step6: Return value

Source code for nearest neighbor algorithm

```
for {set i 0} {$i<$val(nn)} {incr i} {
        set NL($i) [list]
        set x_pos1 [$n($i) set X_]
        set y_pos1 [$n($i) set Y_]
        for {set j 0} {$j<$val(nn)} {incr j} {
                if {$j!=$i} {
                        set x_pos2 [$n($j) set X_]
                        set y_pos2 [$n($j) set Y_]
                        set x_pos [expr $x_pos1-$x_pos2]
                        set y_pos [expr $y_pos1-$y_pos2]
                        set v [expr $x_pos*$x_pos+$y_pos*$y_pos]
                        set d [expr sqrt($v)]
                        set nd($i,$j) $d
                        puts "Distance from $i to $j:$d"
                        if {$d<$communicationrange} {
                                $n($i) add-neighbor $n($j)
                        }
                }
        }
        set neighbor1 [$n($i) neighbors]
        foreach nb1 $neighbor1 {
                set now [$ns now]
                puts "The neighbor for node $i are:$nb1"
                set idv [$nb1 id]
                puts "$idv"
                lappend NL($i) $idv
        }
}
```

Distributed packet scheduling algorithm:

After qualified neighbors are known, this algorithmic program schedules packet routing. It assigns earlier generated packets to forwarders with higher queuing delays, while assigns a lot of recently generated packets to forwarders with lower queuing delays to decrease total transmission delay. In order to further reduce the stream transmission time, a distributed packet scheduling algorithm is propose for packet routing. This algorithm assigns earlier generated packets to forwarders with higher queuing delays and scheduling feasibility, while assigns more recently generated packets to forwarders with lower queuing delays and scheduling Feasibility, so that the transmission delay of an entire packet stream can be reduced.

After qualified neighbors are identified, this algorithm schedules packet routing. It assigns earlier generated packets to forwarders with higher queuing delays.The queuing time $T_w^{(x)}$ of a packet with priority x estimated by :

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

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where x denotes a packet with the xth priority in the queue, and TI→D (j) and Ta (j) respectively denote the transmission delay and arrival interval of a packet with the jth priority. is the number of packets arriving during the packet's queuing time Tw (x) , which are sent out from the queue before this data packet. After receiving the reply messages from neighbouring nodes along with the scheduling information of all flows in their queues, the source node computes the queuing time Tw of its packets in each intermediate node and then chooses the intermediate node ni that meets the condition Tw(i) < TQoS − TS→I − TI→D. After scheduling data packets to qualified intermediate nodes based on equation (3), the previously generated packet from source node is transmitted to a node with longer queuing delay but still within the deadline bound. Taking advantage of the different values of Tw in different neighbouring nodes, the entire traffic stream transmission time can be decreased by making the queuing of previously generated packets and the generation of new packets be conducted in parallel.

Source code for Distributed packet scheduling algorithm:

```
for {set des 0} {$des<$val(nn)} {incr des} {
for {set j 0} {$j<$val(nn)} {incr j} {
        if {$des!=$j} {
        lappend route($j,$des) $j
        for {set i 0} {$i<$val(nn)} {incr i} {
                set flg($i) 0
        }
        set s $j
        set flag 0
        set RN $s
        puts "Route from $j to $des"
        while {$RN!=$des} {
        puts "RN:$RN"
        foreach rn $NL($RN) {
        if {$rn==$des} {
                set flag 1
        }
        }
        if {$flag==1} {
                set RN1 $des
} else {
        set x_pos1 [$n($des) set X_]
        set y_pos1 [$n($des) set Y_]
                set dL [list]
                if {$mindis==$dis($des,$ni)} {
                set RN1 $ni
                set flg($ni) 1
                puts "Node:$RN1"
                }
        }
}
```

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VII. RESULT ANALYSIS

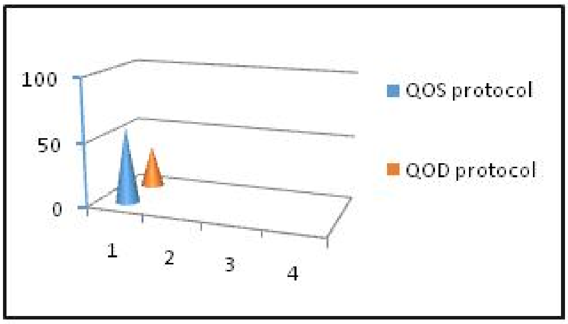

Fig 2: Packet Delivery ratio comparison

The packet delivery ratio of the QoS oriented Distributed Routing protocol is higher than the existing QoS protocol.

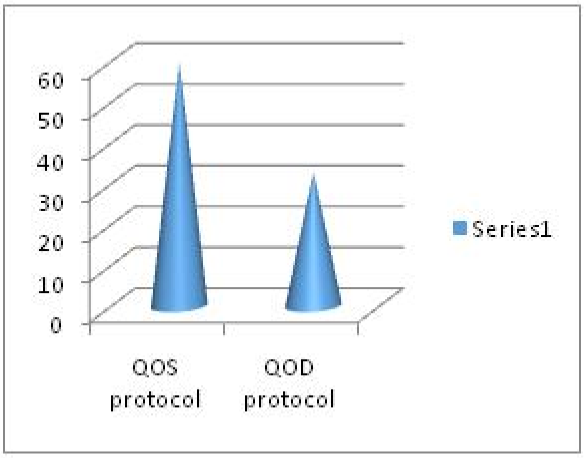

Fig 3: Bandwidth comparison of proposed and existing.

VIII. CONCLUSION AND FUTURE WORK

Hybrid wireless networks that integrate MANETs and infrastructure wireless networks have proven to be a better network structure for the next generation networks. It little effort has been devoted to supporting QoS routing in hybrid networks. Direct adoption of the QoS routing techniques in MANETs into hybrid networks inherits their drawbacks. It propose a QoS Oriented Distributed Routing Protocol (QOD) for hybrid networks to provide QoS services in a highly dynamic scenario. Taking advantage of the unique features of hybrid networks, i.e., anycast transmission and short transmission hops, QOD transforms the packet routing problem to a packet scheduling problem. In QOD, a source node directly transmits packets to an Access Point if the direct transmission can guarantee the QoS of the traffic. Otherwise, the source node schedules the packets to a number of qualified neighbor nodes. Specifically, QOD incorporates five algorithms. The QoS-guaranteed neighbor selection algorithm chooses qualified neighbors for packet forwarding. The distributed packet scheduling algorithm schedules the packet transmission to further reduce the packet transmission time. The mobility-based packet resizing algorithm resizes packets and assigns smaller packets to nodes with faster mobility to guarantee the routing QoS in a highly mobile environment. The traffic redundant elimination-based transmission algorithm can further increase the transmission throughput.Experimental results show that QOD can achieve high mobility-resilience, scalability, and contention reduction.

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