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Access Point Selection In Quality of Services For Hybrid Wireless Network

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Abstract

The rapid development of wireless networks has stimulated numerous wireless applications that have been used in wide areas such as commerce, emergency services, military, education, and entertainment. Now a day, the number of Wi-Fi capable mobile devices including laptops and handheld devices (e.g., smart phone and tablet PC) has been increasing rapidly. A Mobile Ad hoc Network (MANET) is consisting of a collection of wireless mobile nodes, which form a temporary network without relying on any existing infrastructure or centralized administration. 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. The QoS support reduces end-to-end transmission delay and enhances throughput to guarantee the seamless communication between mobile devices and wireless infrastructures. In this paper, we propose a QoS-Oriented Distributed routing protocol (QOD) to enhance the QoS support capability of hybrid networks. 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. The proposed schemes are based on we exploit the local channel occupancy of the joining Station (STA) as well as that of the Access Point (AP) in order to develop an AP selection algorithm that takes into account collisions, interference, and received signal strength. For achieving this we use NS-2 simulations to demonstrate the effectiveness of our approach.

Keywords: Hybrid wireless network, Quality of service, Access point, Station.

Introduction

Recent progresses in the network technologies have led to rapid development of new wireless networking techniques and possibilities. An example of such a new wireless network is Mobile Ad hoc Network. On the other hand, the demand for new applications with new requirements is developed. One of the most demanding applications is multimedia application. Multimedia application characterized with the requirements for voice and video conferencing, and text and images sharing. These new requirements have led to necessity of supporting real-time traffic. Real-time applications are highly sensitive to latency and other quality of service parameters such as bandwidth. Ad hoc networks have numerous practical applications such as military and emergency operations. These practical applications need the support of one to many, and many to many connections. Therefore, in such practical applications, multicast communication is a must. QoS routing, especially QoS multicast routing, is very crucial for these applications.

MANET

Ad hoc wireless networks (AWNs) are zero configuration, self organizing, and highly dynamic networks formed by a set of mobile hosts connected through wireless links. These networks can be formed on the fly, without requiring any fixed infrastructure. As these are infrastructureless networks, each node should act also as a router. Throughout this paper, the terms ‘‘mobile host’’, ‘‘node’’, and ‘‘station’’ are used interchangeably. As a router, the mobile host represents an intermediate node which forwards traffic on behalf of other nodes. If the destination node is not within the transmission range of the source node, the source node takes help of the intermediate nodes to communicate with the destination node. Tactical communication required on battlefields, among a fleet of ships, or among a group of armored vehicles are some of the military applications of these networks. Civilian applications include peer-to-peer computing and file sharing, collaborated computing in a conference hall, and search and rescue operations.

An ad hoc wireless network is a collection of wireless mobile nodes forming a temporary network. Its classical applications are in battlefield communications, disaster recovery, and search and rescue operations. More commercial applications are already being developed. In an ad hoc wireless network, connections among these mobile nodes occur via multihop wireless connections without the support from a fixed infrastructure such as a base station.

As technology advances, wireless and portable computers and devices are becoming more powerful and capable. These advances are marked by an increase in CPU speed, memory size, disk space, and a decrease in size and power consumptions. The need for these devices to continuously communicate with each other and with wired networks is becoming increasingly essential. Mobile ad hoc networks (MANETs) open the door for these devices to establish networks on the fly, i.e., formally, a MANET is a collection of mobile devices which form a communication network with no pre-existing wiring or infrastructure. They allow the applications running on these wireless devices to share data of different types and characteristics. There are many applications of MANETs, each with different characteristics of network size (geographic range and number of nodes), node mobility, and rate of topological change, communication requirements, and data characteristics.

Related Work

Surjeet et.al proposes a concept QoS Bandwidth Estimation scheme for Delay Sensitive applications in MANET. Mobile Ad Hoc Networks have attracted a great interest in case of wireless and multimedia technologies. Infrastructure less nature of MANETs makes a Quality of Services (QoS) provisioning very challenging and important research aspect. To find a QoS constrained from source to destination, we should be able to affectively determine the available resources through the route. The routing protocol is the most integral part of any type of QoS provisioning. It has to decide which route is able to fulfill the requirement of the desired QoS for specified application .The modification have proposed in the existing MANET protocol to get the information about the total path bandwidth for delay sensitive applications. In the bandwidth estimation and for route maintenance .The proposed protocol is implemented as Route discovery this kind of the QoS constrained. The application indicates that the RREQ header about the minimum required bandwidth that must be guaranteed. When the application in RREQ header for maximum permissible end-to-end delay. Different methods for estimating network utilization like MAC layer congestion window, Queue length and collision measures provide only a little or no information about when a node is actively transmitting or not. so the routing protocol can react much better to mobile topologies. Hence the Bandwidth can be satisfied for delay sensitive routing protocol.

Guanglin zhang et.al proposes a concept Capacity of hybrid wireless networks with directional antenna and delay constraint. In this paper, the hybrid wireless network consists of a randomly distributed nodes equipped with the directional antenna and regularly placed base stations connected by optical links. We investigated that the ad hoc mode throughput capacity when each node is equipped with directional antenna under a maximum-hop resources allocation. That is, a source node transmits to its destination only with the help of base station connected by optical links. Source node n transmits to its destination only with the help of normal nodes within L hops. The transmission will be carried out in the infrastructure mode, with the help of base stations. The throughput capacity when each node is equipped with the directional antenna under an maximum hop, the number of base stations m, and the bandwidth W bits/sec of the network is split into three parts for ad hoc mode and for uplink in the infrastructure mode. All the nodes use a common transmits power level. They show that the per node throughput capacity in random ad hoc network which have been increases to zero. The main reason to improve the throughput capacity is that using the directional antenna of generic antenna patterns, they show the scalability in throughput capacity. A total number of a bandwidth be an available bandwidth which can be carried over a multiple sub-channels which for infrastructure mode transmissions into uplink and downlink parts, according to the direction of the transmissions relative to the base station. The throughput capacity by increasing the maximum-hops and decreasing the directional antenna beam width if the number of base stations and maximum-hops are both small, the directional antenna cannot provide throughput capacity improvement.

Promkotwong et.al explains the concept of QoS Aware Multicast Routing Protocol (QMRP). QoS multicast routing protocols are pivotal in enabling new receivers to join a multicast group. QMRP achieves a scalability by significantly reducing the communication overhead of constructing a multicast tree. This is achieved by switching between single-path routing and multiple-path routing according to the current network conditions. Maximum Branching Level(MBL) Maximum Branching Degree(MBD) provide the high QoS performance such as Overhead, Transmission delay, Mobility-resilience, Scalability Single hop reduce the overhead, link failure .By monitoring the Energy level, solve the energy harvesting problem. Improve the QOS level by modifying the multi hop as single hop. The network with control packets consumes the limited network bandwidth especially for non-participating nodes. On-demand maintenance reduces the control overhead by starting from a node that the link failure occurs loop free with the medium access control.

Proposed System Architecture

The following figure shows the system architecture of the proposed concept.

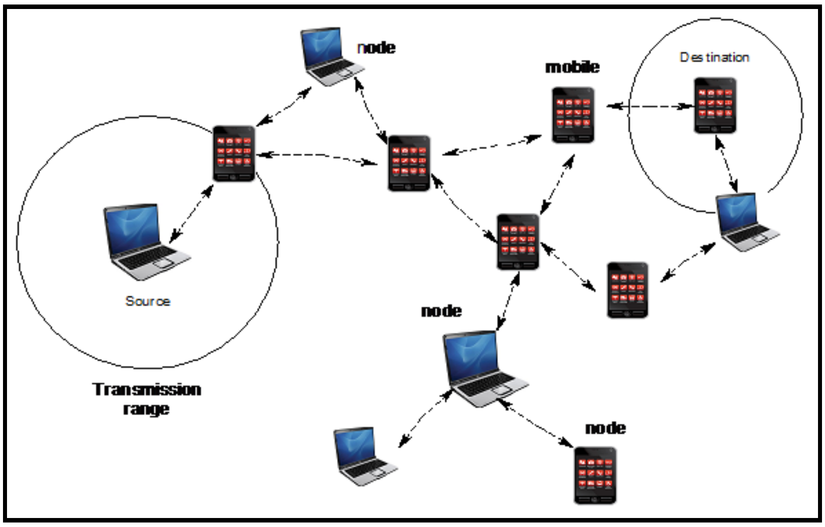


Figure 1: Proposed System Architecture

Initially nodes are created. All the nodes are mobile node. The mode of transmission is wireless transmission. The way of data transmission is set either half duplex or full or single. The starting time and the ending time of the data transmission is set.

The following operations can be made for selecting access point:

(a) Neighbor node selection
QoS-guaranteed neighbor selection algorithm selects qualified neighbors and employs deadline-driven scheduling mechanism to guarantee QoS routing. Since short delay is the major real-time QoS requirement for traffic transmission, traffic scheduling in intermediate nodes. 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.

(b) Distributing packets
After qualified neighbors are identified, in order to further reduce the stream transmission time, a distributed packet scheduling algorithm is proposed for packet routing.

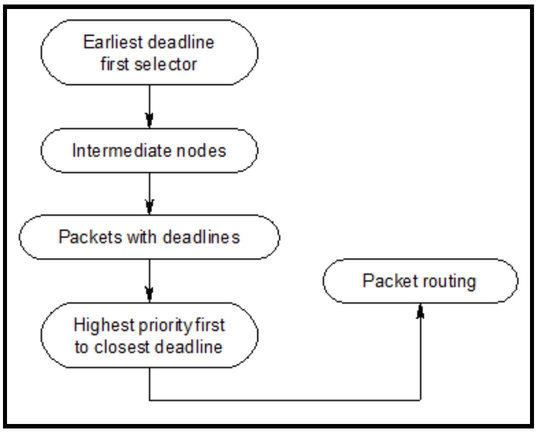


Figure 3: Steps for Distributing Packets

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. Here, the QOD incorporates the EDF, in which an intermediate node assigns the highest priority to the packet with the closest deadline and forwards the packet with the highest priority first. An intermediate node can determine the priorities of its packets based on their deadlines.

(c) Segment Resizing
In a highly dynamic mobile wireless network, the transmission link between two nodes is frequently broken down. The delay generated in the packet retransmission degrades the QoS of the transmission of a packet flow. On the other hand, a node in a highly dynamic network has higher probability to meet different mobile nodes and APs, which is beneficial to resource scheduling. The space utility of an intermediate node that is used for forwarding a packet. That is, reducing packet size can increase the scheduling feasibility of an intermediate node and reduces packet dropping

probability. However, we cannot make the size of the packet too small because it generates more packets to be transmitted, producing higher packet overhead. Based on this rationale and taking advantage of the benefits of node mobility, we propose a mobility-based packet resizing algorithm for QOD in this section. The basic idea is that the larger size packets are assigned to lower mobility intermediate nodes and smaller size packets are assigned to higher mobility intermediate nodes, which increases the QoS-guaranteed packet transmissions.

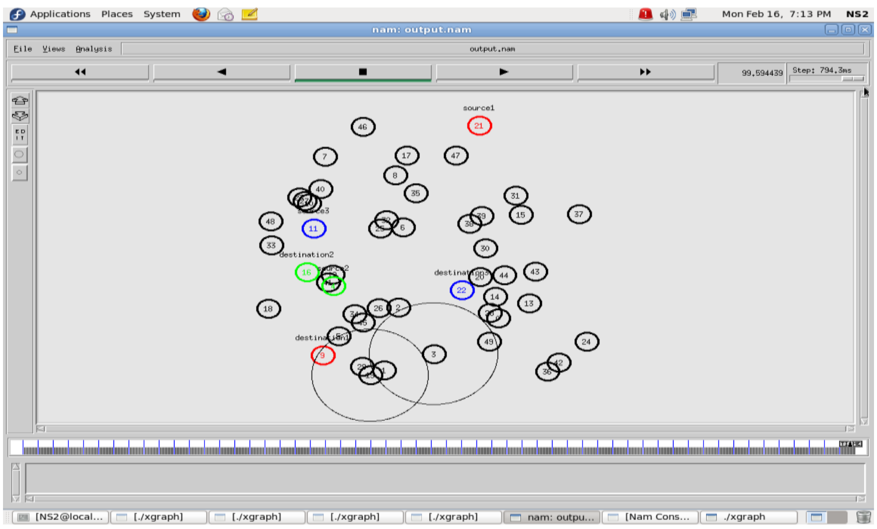
(d) Efficient Forwarding

Recall that in the EDF algorithm, an intermediate node forwards the packets in the order from the packets with the closest deadlines to the packets with the farthest deadlines. If an intermediate node has no problem to meet all packets' deadlines in forwarding, that is, the packets are scheduling feasible, the EDF algorithm works satisfactorily. However, when an intermediate node has too many packets to forward out and the deadlines of some packets must be missed, EDF forwards out the packets with the closest deadlines but may delay the packets with the farthest deadlines. Here, In order to achieve fairness in the packet forwarding scheduling for soft-deadline driven applications, a forwarding node can use the least slack first (LSF) scheduling algorithm. With the LSF algorithm, an intermediate node periodically calculates the slack time of each of its packets, and forwards the packet with the least slack time. If all packets have the same slack time value, one packet is randomly chosen to be sent out.

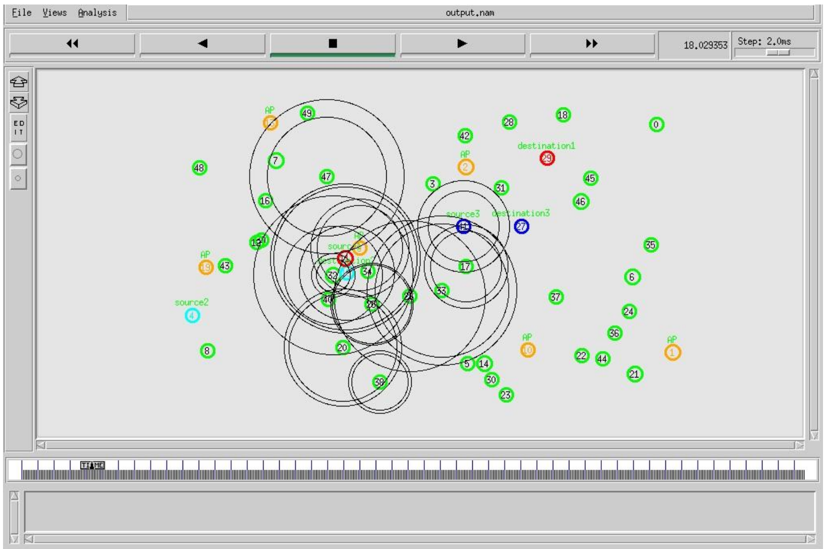
Experimental Results

The proposed concept has implemented using Network Simulator tool (NS2). The following figure shows the screenshot for above said concept.

The following figure shows the Screen shot for finding adjacency node.

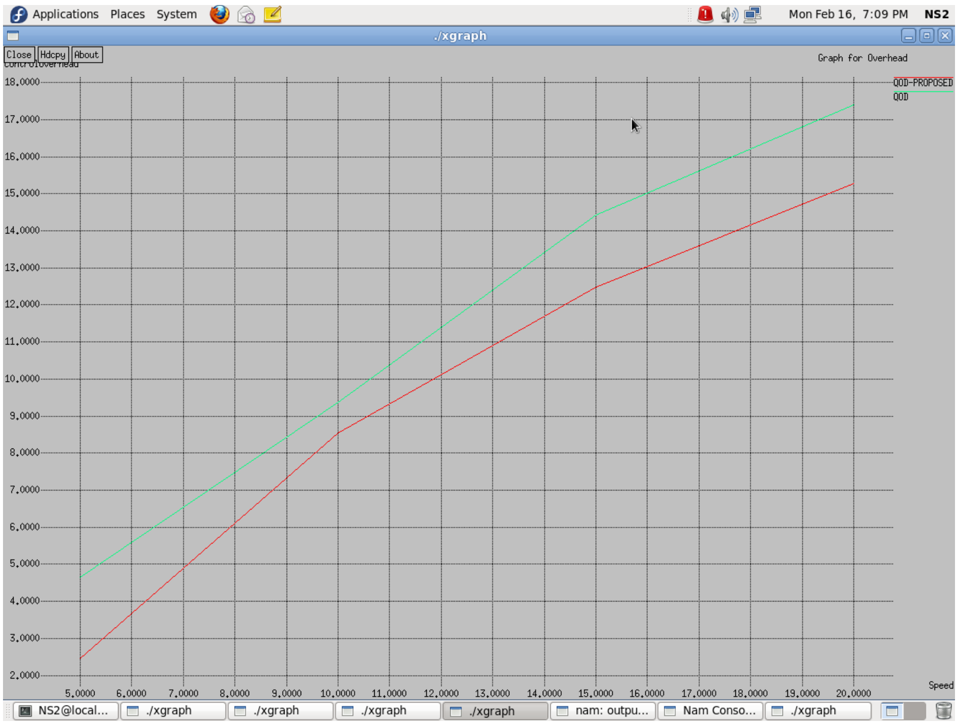


Screenshot 1: Selecting Neighbor Node

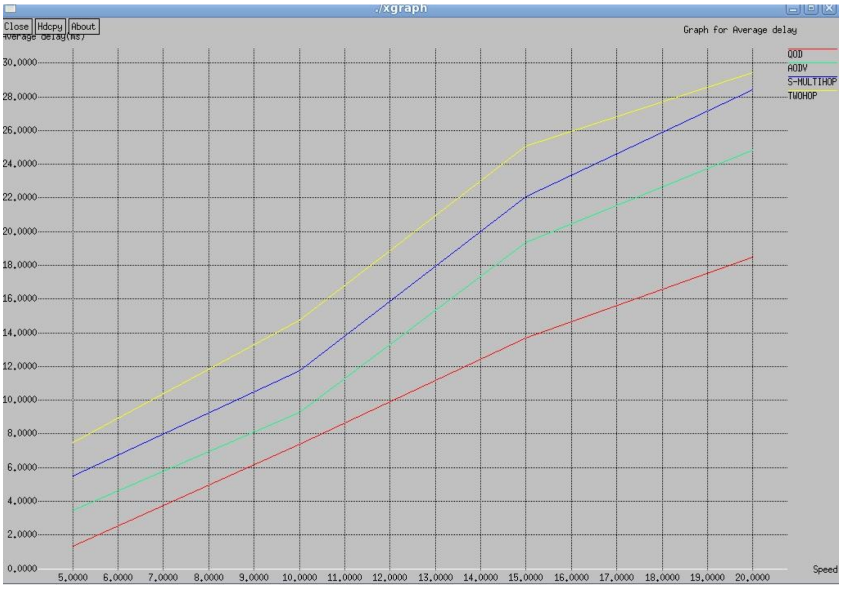


Screenshot 2: Accessing Destination Node

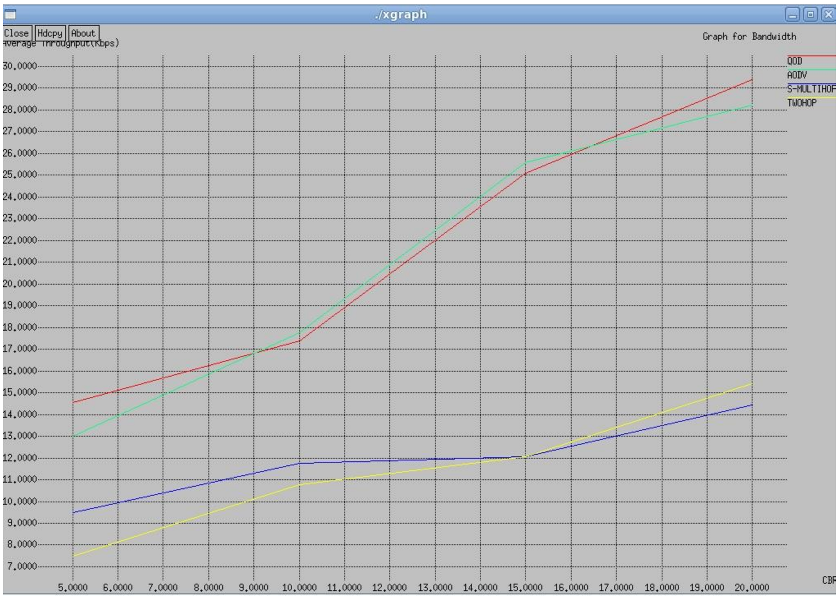
The following screen shot shows the performance metric of our proposed system.



Screenshot 3: Graph for overhead



Screenshot 4: Graph For Average Delay



Screenshot 5: Graph for Bandwidth

Conclusion

Hybrid wireless networks that integrate MANETs and infrastructure wireless networks have proven to be a better network structure for the next generation networks. However, 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. In this paper, we propose a QoS oriented distributed routing protocol (QOD) for hybrid networks to provide QoS services in a highly dynamic scenario. Our proposed concept is implemented and performance metric chart is analyzed using NS2.

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