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RESEARCH ARTICLE

XEN-SERVER- MOBILE OPPORTUNISTIC NETWORK USING FOR ENHANCED QOS IN WIRELESS SENSOR

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ABSTRACT: The Providing Quality of Service (QoS) support in Mobile Opportunistic Networks is a particularly active research area with a number of proposals being made to support real-time applications that are based upon the interaction between the xen-server and a QoS provisioning mechanism. This paper builds upon such ideas and presents QoS-aware Shortest Multipath Source (Q-SMS) steering protocol that have been shown to offer significant network improvement when compared to best protocol proposed schemes. Q-SMS essentially modifies the previously proposed SMS scheme to explicitly provide QoS assurance. The new proposed scheme allows nodes to obtain and then use estimation of the residual capacity to make appropriate admission control decisions. In this paper we develop a QOS-based, Robust Multipath Steering (QRMS) protocol for mobile Opportunistic networks to allot weights to individual links, depending on the metrics link quality, channel quality and end-to-end delay. In this paper, a cross layer based multipath steering (CBMS) protocol to improve QoS in mobile Opportunistic networks to allot weights to individual links, depending on the metrics link quality, channel quality and end-to-end delay is developed. This paper presents a new approach based on xen-server for supporting enhanced QoS. The objective of this multipath steering is to improve the reliability and throughput and favour load balancing. In this approach, initially multiple loop-free and link disjoint paths are computed and then a mobile steering backbone is created based on the characteristics of mobile nodes in the network.

Index Term: Q-SMS, MSB, QRMS, XEN-SERVER, CBMS

1. INTRODUCTION

Direction-finding schemes have encouraged a great deal of interest from the beginning of Mobile Opportunistic Network[1] investigate until the current time. Early work [2–4] listening carefully on finding feasible routes without considering information about the network status. In addition, without knowing the bottleneck capacity or throughput, the source may send more data than the bottleneck node on the route can accommodate. The overloaded node ultimately drops data which wastes capacity and unnecessarily consumes energy. Also, time is expended in transmitting such data. Therefore, data that eventually reaches its destination would have had to wait longer in packet queues, resulting in a significantly increased delay. Although this may be acceptable for data only applications, many real-time applications require Quality of

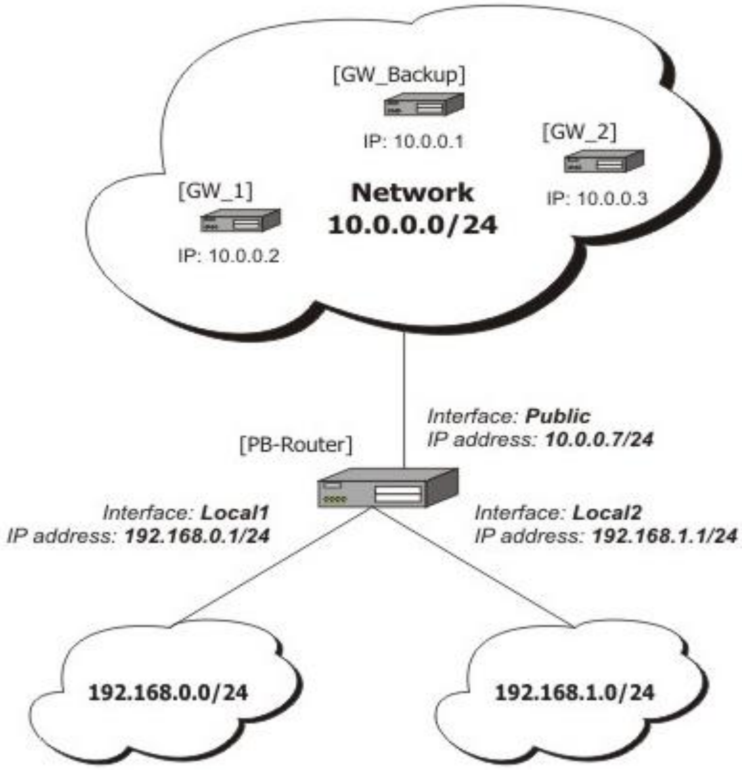
Service (QoS) support from the network. Possible QoS support can be achieved by finding a route to satisfy the application requirements. The cross-layer optimized energy-aware multipath steering protocol (EMRP) for mobile Opportunistic networks is proposed. By sharing the information among the physical layer, the MAC sub-layer and the network layer, EMRP efficiently utilizes the network resources such as the node energy and the link bandwidth. Simulation results show that the protocol prolongs the network lifetime, increases the volume of packets delivered, lowers the energy dissipation per bit of data deliveryand shortens the end-to-end delay.

2. RELATED WORK

One of the basic characteristics of a mobile Opportunistic network is the multi-hop connection, in which mobile nodes cooperate to relay traffic to the distant destination node that would otherwise be out of direct communication range. Therefore, nodes in MANET serve not only as hosts, but also as routers. The multi-hop connection can also increase network capacity and decrease the energy consumption for transmission. However, due to the frequently changing network topology and limited resources of energy and wireless bandwidth, steering in MANET is an extremely challenging task. Basically, the steering protocol which chooses the best route between the source and destination nodes to fulfill the multi-hop transmission is called single path steering. In cases of highly dynamic network topology and strictly limited resources, however, single path steering is not the best solution. Multipath steering protocols are then introduced, which provides redundant and alternative routes to assure successful data packet transmission and, at the same time, reduce the key relay nodes' power consumption, alleviating the network partitioning problem caused by the energy exhaustion of these nodes. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Another key issue in MANET protocol design is cross layer optimization. Based on the OSI 7-layer model, traditional network protocol design explicitly defines and strictly restricts the information exchanged between layers. However, this prevents efficient protocol design in MANET. For example, under the layering restriction, MANET steering protocols are unable to retrieve energy and location information from the underlying data link layer and physical layer and, thus, unable to calculate good routes based on such information.

Cross layer design and Cross layer optimization:

We will use the term "cross layer design" and "cross layer optimization" interchangeably hereafter to refer to protocol design and optimization based on the inter-layer exchange of information beyond the OSI-layer structure definition. Based on the rationale of multipath steering and cross-layer design, we introduce the Energy-aware Multipath Steering Protocol (EMRP) for MANET. EMRP is a multipath steering protocol which uses information from the physical layer and the MAC layer in choosing routes, focusing on the energy efficiency and the overall network performance. Simulation results show that EMRP outperforms the traditional single path steering protocol in providing longer network lifetime and lower energy consumption per bit of information delivered. In addition, as in other multipath steering protocols, it reduces the end-to-end delay and improves the volume of packets delivered.



3. RATE MONOTONIC ALGORITHM (RMA)

We had already pointed out that RMA is an important event-driven scheduling algorithm. This is a static priority algorithm and is extensively used in practical applications. RMA assigns priorities to tasks based on their rates of occurrence. The lower the occurrence rate of a task, the lower is the priority assigned to it. A task having the highest occurrence rate (lowest period) is accorded the highest priority. RMA has been proved to be the optimal static priority real-time task scheduling algorithm. The interested reader may see [12] for a proof. In RMA, the priority of a task is directly proportional to its rate (or, inversely proportional to its period). That is, the priority of any task T_i is computed as: ***priority***, where p_i is the period of the task T_i and k is a constant. Using this simple expression, plots of priority values of tasks under RMA for tasks of different periods can be easily obtained.

3.1. QoS-aware SMS (Q-SMS) Steering Scheme

A novel and practical QoS steering scheme referred to as the QoS-aware Shortest Multipath Source (Q-SMS) steering scheme is proposed. The proposed scheme modifies and extends the route discovery and maintenance of SMS [23] to provide QoS assurance. The QoS extension allows nodes to use their estimation of the residual capacity to make better admission control decisions. The Q-SMS steering scheme achieves high good put, low delays and overheads in the presence of mobility and traffic load and enables natural integration with the local residual capacity estimation. This section describes the residual capacity estimation, route discovery with admission control, QoS route reply phase, QoS route maintenance phase and path selection of the proposed scheme.

4. ROUTE DISCOVERY WITH ADMISSION CONTROL

Q-SMS is an on-demand QoS-aware steering scheme that utilizes a cross-layer design. Therefore, the steering scheme depends on the application requirements. Q-SMS finds a route to the destination by flooding the network with a QoS route request (QRREQ). Q-SMS extends RREQ packet format of SMS with the capacity constraint. The capacity constraint consists of the required capacity (C_{req}) and minimum available capacity (C_{min}) representing maximum

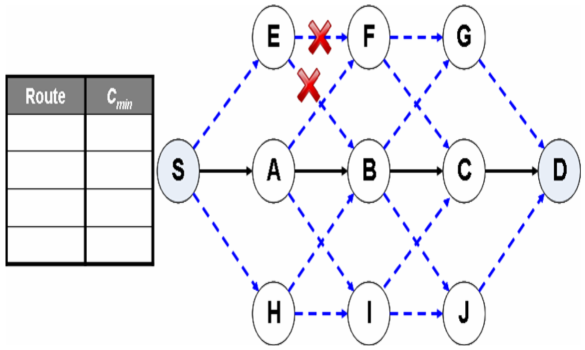


Figure . Admission control in RREQ propagation

Figure 1 shows an example of Q-SMS route discovery with admission control, where S is the source node and D is the destination node. S initiates the route discovery phase by sending QRREQ packet to the neighbors with reverse shortest hop count [23] and capacity constraints. In this example, node A has sufficient capacity on its QoS portion of allocated capacity, so it forwards QRREQ to neighboring nodes. However, node E does not have enough capacity in the QoS portion, so it does not forward QRREQ to D through B and F even though it can reach D. In this fashion if QRREQ reaches the destination by satisfying the reverse shortest hop count and the capacity constraint, then the destination replies with a QRREP packet back to source node using the reverse path identified within the QRREQ packet.

4.1 Performance Metrics

We measure up to our QRMR protocol with the AOMDV [6] protocol**.** We evaluate mainly the performance according to the following metrics, by varying the nodes as 35, 60, 85 and 200.

Organize overhead: The control overhead is defined as the total number of steering control packets normalized by the total number of received data packets.

Average end-to-end delay: The end-to-end-delay is averaged over all surviving data packets from the sources to the destinations.

Average Packet Delivery Ratio: It is the ratio of the No. of packets received successfully and the total no. of packets sent.

Figure 1: Nodes Vs Delay

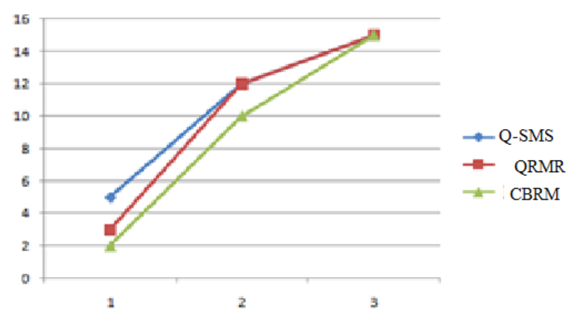


Figure 2: Nodes Vs Delay ratio

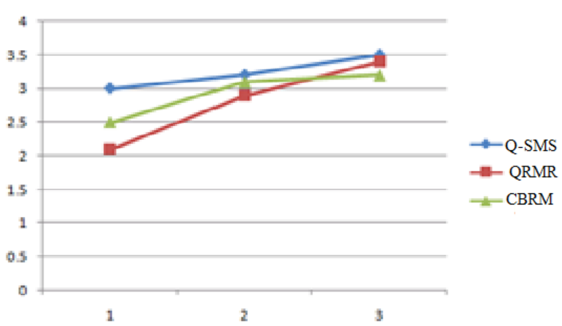


Figure 3: Nodes Vs Overhead

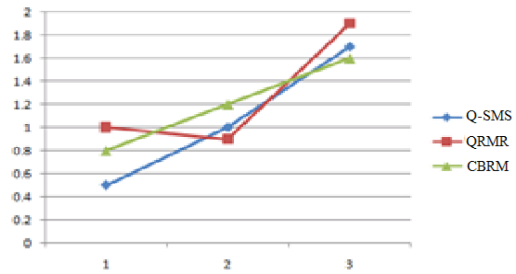


Figure 4: Speed Vs Delay

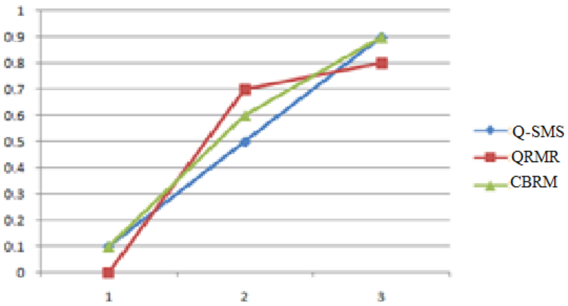


Figure 5: Speed Vs Delay ratio

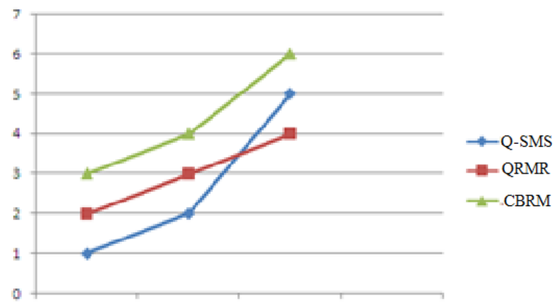
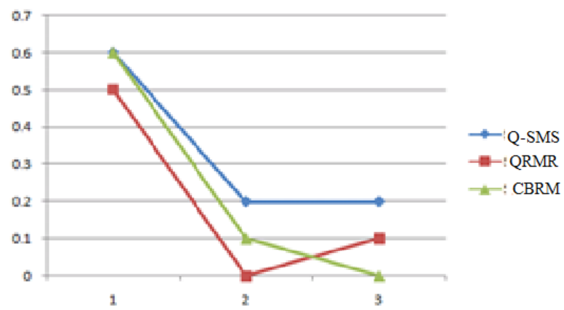


Figure 6: Speed Vs Overhead



5. CONCLUSION

In this paper, an energy-aware xen-server for mobile Opportunistic networks is proposed. As a cross-layer design, QRMR utilizes the information from the physical and the Q-SMS protocol to select better routes. Mobile Opportunistic networks require a complex management to efficiently exploit the networks resources also covering the heavily demanded QoS constraints in current multimedia applications. This paper presents a cross-layer design that tries to combine the functionality of the Steering layer with Medium Access Control (MAC) information and physical layer parameters to provide the steering algorithm with the more accurate information about the environment. Simulations results indicate that Q-SMS Protocol network lifetime and achieve lower energy dissipation per bit of data delivery, higher volume of packets delivered and lower end-to-end delay.

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