# Mobile Wireless Internet Quality of Service Management

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**Abstract – The ubiquity of the mobile wireless Internet has led to the increasing use of real-time applications. These applications need service guarantees if they are to be accommodated on the mobile wireless Internet. This has necessitated the setting-up of Quality of Service (QoS). We intend developing a QoS scheme that would accommodate real-time applications on the mobile wireless Internet. We would propose a protocol for reserving network resources. This protocol will take into account the fact that different flows have different requirements. We shall compare our protocol with the mobile resource reservation protocol (MRSVP)**

**Keywords – Quality of service, Resource reservation**

## I. Introduction and Background

The phenomenal increase in handheld communication devices has played a major role in popularising the mobile Internet. Mobile users expect to receive similar services in a mobile wireless Internet as in the wired part [1]. This necessitates the setting-up of Quality of service (QoS) guarantees. A QoS scheme needs to provide a mechanism for a network to distribute and manage shared resources (bandwidth and buffers) over different flows. The current Internet is based on the best effort (BE) model which does not provide any guarantees to flows. Efforts aimed at finding schemes that guarantee QoS have led to the Internet Engineering Task Force (IETF) proposing two different approaches. These are the Integrated Services (IntServ) [2] and the Differentiated Services (DiffServ) [3]. IntServ QoS model adds Guaranteed service (GS) and Control-load (CL) service classes to BE model. GS is designed for real-time data traffic that needs a guaranteed minimum delay. This service class guarantees that the packets will arrive at destination within a certain delivery time and are not discarded if the flow's traffic stays within the boundary of its traffic specification [7]. CL is designed for data traffic that accepts some delays, but is sensitive to network overload and loss of packets. IntServ introduced a mechanism of resource reservation for individual flows, and this is carried out by a signalling protocol known as the Resource reservation protocol (RSVP) [10]. The main disadvantage of IntServ is that it is not scalable, because it requires per-flow state in each node. DiffServ was proposed as an improvement to IntServ. DiffServ is class-based unlike IntServ which is flow-based. DiffServ has the Expedited Forwarding (EF) [5] and the Assured Forwarding (AF) [6] classes apart from BE class. In EF the arriving packets would experience almost an empty queue, and the departure rate should equal or exceed the arrival rate. AF assumes that the minimum amount of bandwidth is initially assigned to the flow. These mechanisms were developed for the wired Internet.

Currently there is no standardised QoS protocol for a mobile wireless Internet. Talukdar et al. proposed the Mobile Resource Reservation Protocol (MRSVP) [8]. MRSVP makes advance resource reservations at multiple locations where a mobile host may possibly visit during the service life time. MRSVP has the problem of over-reserving highly limited network resources. A possible solution to this wastage of resource is to predict the next cell that a mobile host would possibly visit. One such proposal for predicting the mobility of a mobile host is the sectored-cell approach [9]. This approach predicts the exact cell that a mobile host would visit. The protocol that we shall propose will take into consideration this sectored-cell prediction scheme.

The remainder of this paper is organised as follows: section II looks at some previously conducted work in this field. Section III states our research goals. The research methodology to be used is stated in section IV. Section V concludes the paper and future work is also stated.

## II. Related Work

IETF accepted RSVP [10] as the standard protocol for resource reservation. An RSVP sender sends a Path message with a flow specification (Fspec) through intermediate routers to the receiver. The receiver, having received the path message, may then send a Reservation message (Resv) along the reverse path that has been formed by the path message to reserve network resource. Therefore RSVP supports receiver based reservation. MRSVP [8] and HMRSVP [11] are extensions of RSVP for accommodating mobile host. MRSVP makes advance resource reservations at multiple locations where a mobile host may possibly visit during the service life time. MRSVP reserves resources in the cells that have been specified in the mobile specification (MSpec) of the mobile host. A mobile host makes an active reservation from the current cell and makes passive reservations from other cells specified in its MSpec. MRSVP is not scalable because of much passive reservation of network resources. This causes wastage of highly limited network resources. Tseng et al.

proposed a Hierarchical Mobile RSVP Protocol (HMRSVP) [11]. HRSVP groups routers into clusters in a hierarchy form. This protocol makes advance resource reservation only when the handoff delay tends to be long. This is usually when a mobile host wants to leave a domain for another. HRSVP is not scalable, because it has too many control messages. The Wireless Lightweight Reservation Protocol (WLRP) [12] was proposed specifically for a wireless mobile network. WLRP introduces a mechanism of loss negotiation. This is a degree in which the application can tolerate loss of packets. WLRP also uses loss profile. The application's loss profile could be either be distributed or burst loss. The main drawback of WLRP is its dependability on an application's mobility profile (mobility specification), to reserve resources.

There is currently no suitable resource reservation strategy for the mobile wireless Internet In the above discussion we highlighted shortcomings of a few schemes.

## III. Research Goal

The primary goal of this research study is to develop a QoS resource management mechanism that will accommodate real-time services in a future mobile wireless Internet. For us to realize this research goal, we have defined the research objectives: 1) To determine how to configure resources in advance, in a mobile wireless Internet. 2) To propose a mobile wireless reservation protocol for deterministic QoS guarantee. 3) To compare our protocol's performance with similar proposed protocols.

## IV. Research Methodology

The research design approach to be undertaken when conducting our research study is as follows: Investigation, related work, modelling and simulation of proposed model.

### *A. Investigation*

We are going to conduct an investigation on the existing schemes and will propose a resource management strategy for the mobile wireless Internet.

### *B. Modelling*

We shall propose a model for effective resource reservation on a mobile wireless Internet that will provide service guarantees for real-time applications in a mobile wireless Internet.

### *C. Simulation Design*

We are going to simulate the proposed model, in order to emulate real world scenarios for our system. This will allow us to detaily study our system. We shall then compare the performance of our model with some previously proposed schemes.

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## V. CONCLUSION

In this paper we have looked at same efforts that have been made to reserve resources on the mobile wireless Internet, for QoS provisioning. We are going to develop a resource reservation protocol for the mobile wireless Internet that would take into account, the fact that the future mobile wireless Internet would have to accommodate flows of different classes.

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