CHAPTER I

INTRODUCTION

1.1 Introduction and Problem Review

The increasing of wireless communication and the Internet usages lead to a new emerging technology, wireless Internet. The wireless Internet is characterized by wireless communication and Internet technologies with the providing of the Internet services such as voice, data, and multimedia to wireless terminals. The infrastructure of this architecture can be separated into two parts [1, 2, 3, 4]; wireless network and wireline network. The wireless terminals connect to wireless networks, and an Internet application server connects to wireline network. Both parts are attached together through the Internet system.

Internet traffic characteristic of wireless Internet's users is similar to wireline Internet's users. The only different between wireless and wireline Internet is resource availability. Wireless Internet has less resource than wireline Internet; such as lower bandwidth, high packet loss rate, intermittent connection and high variation of resources, so that only small size of contents are served. This problem leads to an urgency need in better Internet applications.

For the wireline network, which is the core for both wireless Internet and wireline Internet, currently provides service in the best effort manner; First-In-First-Out (FIFO). Inconsistency and unbalance of network flow in the wireless Internet network are critical because these affect the services efficiency and the users' satisfaction.

Furthermore, Internet application servers must serve requests from many wireless terminals simultaneously. Each terminal's request works independently. Bottleneck problem occurs when they compete for limited server's resources. Different clients, different requested applications, and diverse environments lead to different requirements that the server must be served. An QoS application is required to address the above problems under the wireless terminals' constraints such as processing capabilities, network capacities and power limitations [2, 5, 6].

Currently, QoS concept also plays a key role in business competitions, as communication technologies become no difference. Service providers can use the QoS concept as a tool to improve and guarantee quality of service to customers, while customers can also use quality of service as a key factor to choose the most satisfied service provider. QoS problems are occurred when there are gaps in the QoS cycle [7]. These gaps can be classified as follows: 1) alignment gap, a gap when a service provider translates a customer requirement into the Service License Agreement (SLA), 2) execution gap, a gap in the service provider's internal processes because of management and/or technical limitations, 3) perception gap, a gap when a service provider sends a product/service to the customer, and 4) value gap, a gap between customer's expectations and perceptive products/services. The QoS management is proposed to manage communication services in order to control and ensure customer's expectation are met, and also get feedback from customers. The QoS management functions of each service provider may be different, depending on the system designer; however every system has its aim to guarantee QoS in order to achieve customer satisfaction.

It is the fact that application developers can access and control only their applications on the Internet Service Provider (ISP) whereas they cannot force ISP's and other Internet nodes' resources. In order to assist the application developers to have more control on their quality of service to customers, the QoS management functions are ap-

plied to the application level. The QoS management functions are such as mapping the customer requirements and network parameters, monitoring bandwidth, managing network resources, maintaining customer's feedback and so on. These functions can reduce the QoS gaps between customers and service providers. Therefore, it is a significant importance to provide an application-level QoS management.

Among the environment variation of wireless Internet system, adaptive application-level scheme that can adapt to the resources variation is required such as the adaptive buffering, the adaptive transmission mechanisms, and the adaptive scheduling policies. Software agent technique can be used as a powerful tool to support the application-level QoS management's activities by its characteristics, for instances, autonomous, reactiveness, proactiveness, cooperation, and adaptation.

Therefore this research.will propose an adaptive application-level quality of service management approach in wireless Internet network using an agent-based technique to meet the customer satisfaction.

1.2 Research Objectives

- To find out a new QoS model that can better manage limitation of wireless Internet and unbalance of network flow. The adaptation technique is concerned.
- To find out a new policy to improve incoming request scheduling which is the initial step/function in the QoS model.

1.3 Scopes of the Study

In this dissertation, we focus on two main topics:

- proposing a new conceptual adaptive QoS model for end-to-end Internet applications. A feature adaptation is explained as a case study of the model.
- considering web server as an application server because the most of the Internet service is world wide web. Optimization technique is applied to scheduling incoming request, in order to improve QoS to a wide range of users. Validation and verification of the proposed technique comparing to the traditional scheduling policies are expressed.

1.4 Research Plans

1. Study concepts of related technologies such as wireless Internet, quality of service, adaptive application, incoming request scheduling, and software agent.
2. Define problem of the study.
3. Design system architecture.
4. Define a generic model for an adaptive QoS management application according to 3.
5. Define an adaptive application framework according to 4, focus on incoming web request scheduling.
6. Implement an incoming web request scheduling test-bed system.
7. Test and compare the invented scheduling policy which expects to provide an optimal solution among its conflicting objectives and constraints.

1.5 Research Advantages

- Both wireless and wireline network are considered in the new conceptual adaptive QoS model, so the limitations and barriers of both sides are managed.
- The QoS management functions are added on to the new QoS model, which can reduce the QoS gaps between customers and service providers and also adapt to the different requirement from the users.
- There is an additional adaptive step in the proposed QoS model to renegotiate for more required resources.
- An alternative multicriteria based policy has been proposed to better scheduling the incoming request, instead of using traditional single criterion policy.