Demand Inquiring Service: A Network Service Based on Application Demands and Network Condition

Kustarto Widoyo, Terumasa Aoki, and Hiroshi Yasuda

Department of Interdisciplinary Course on Advanced Science and Technology, Graduate School of Engineering, The University of Tokyo
RCAST Building 45th, 4-6-1 Komaba, Meguro-Ku Tokyo 153-8904, Japan
{tarto,aoki,yasuda}@mpeg.rcast.u-tokyo.ac.jp

Abstract. This paper presents a network service, which enables receive individual application demands and considers network condition information in order to achieve the best performance of network resources management and network information advisory service to the applications. The complications of the Internet, the increase of the users and the varieties of applications have made the condition of the network and the execution results unpredictable. All of these elements make the network service difficult to accomplish the real target. Here, we proposed the Demand Inquiring Service, a network service providing information and advisory services to the applications and at the same time managing the utility of network resources. The goals of Demand Inquiring Service are to function as automatic traffic engineering and to provide transparency about network condition to users and applications. Demand Inquiring Service provides services of storing, computing, forwarding the packets and giving higher user-friendly to users and applications.

1 Introduction

In general, from the first research and development of Internet, which is more than 25 years ago, network is just another sharing resource that needs to be used and managed. From the application perspective, the network is just a “black box”. Application does not know what is happening inside the box and only knows the input-output of the box. As mentioned in [7], the beginning of the Internet was constructed with the concept of End-to-End system. The inner nodes such as routers, bridges have functions not more than storing and forwarding packets.

With the growth of the Internet, the numbers of users and the kinds of applications have made the utilization of the sharing resources of the network become higher and complex. Moreover, some applications need services that can be best supported or enhanced using information that is only available inside the network [11]. In other words, if network timely use of the information is available to the application, such as...
time and place of congestion, hot-spot points in the network, location of loss packets, etc, it will significantly enhance the service seen by the application. Conversely, if applications can give information that is needed by the network, it can optimize the service performance of the network.

With the above reason, here we propose a service system that emerges the network information and application information into one service system, which we call Demand Inquiring Service (DIS). DIS has an aim to make users or applications freely request their demands into the network and then for the network to give services as users or applications need, *adaptively and interactively*. We do not just make the network to be intelligent as in Intelligent Network but using active network technology [2][3][4][5] enables an environment for the users or applications to actively participate in when, what and how to do the requests. Furthermore, network can manage its resources to make good performance in its services. Our work tries to propose the mechanism and environment, which enables users to become active elements of the network, and the network becomes friendlier in providing services to users. Here network do not just store and forward the packets but store, compute, forward and give hospitality to the users/applications.

The rest of the paper is structured as follows. In section 2, we describe definition of network services discussed in this paper. The next section, the concepts of the DIS are presented. Section 4 describes the structure, the parts of the DIS, the correlation between them and relation with other protocols. In section 5, we discuss about application of DIS and the simulation result. Finally, section 6 concludes this paper and presents the issues of further research.

2 Network Services

In this section, we first defined what we said with network services. Network service is activities, which network provide to the users or applications concerning with the data/packet communication between the users or applications. Sometime it is transparent and sometimes it is not from the point of view of users. From the point of view of the user, some services are transparent and others are not. Recently, the trends are not only how to provide good services, but also how to control the quality of services.

Since there is much kind of users with variety of applications, in the future, network must become more adaptable to cater the wide range of user demands. There is a need to reconcile the perspectives of the telecommunication and computing communities in new dynamically programmable network architectures that support fast service creation and resource management through a combination of network aware applications and application aware networks [6]. The programmable networks enable the network to provide services to specific users as they themselves have arranged.

From the point of view of the network, there are some service models and mechanisms, which have proposed by Internet Engineering Task Force (IETF). Notably among them, there are the integrated services/Resource Reservation Protocol (RSVP) model, the differentiated services (DS) model, multi protocol label switching