

# Path Planning in Budget-Based QoS Management for All-IP Core Networks

## Abstract

The advance in information technology and impact of telecommunications liberalization cause a revolution in communication world. It attempt to merge circuit-switching and packet-switching network into one standalone perform. All-IP is one of those candidates. But All-IP also inherits the characteristics of packet-switching network, the problem of transmission quality. So, we need some management system of quality on All-IP network to achieve the ambition of converged network. In this thesis, we propose BBQ management system. BBQ offers a highly adaptive management architecture and some management tools for operators. Those tools can be used in different underly network layer and can be tuned by different network policy.

We propose the path planning as routing approach in BBQ architecture. Path-planning is doing path calculation for the traffic may happen in future using the historic traffic statistic. In run-time, admission control component will assign a planned path that satisfy the requirements of admitted traffic. In this method, absolute transmission quality is guaranteed to admitted traffic. And pre-planning can reduce heavy calculation overhead in run-time. In this thesis, we design a path-planning algorithm, the GPPA algorithm, which takes pre-defined profit as its maximize objective under bandwidth and quality constraints. Through an performance evaluation using simulation method, we demonstrate that the path-planning might outperform the traditional OSPF algorithm.

# 預算法全 IP 核心網路服務品質管理之路徑規劃

## 摘要

面對通訊與資訊科技的大幅進步、網際網路的蓬勃發展、以及電信自由化帶來的激烈競爭，通訊網路正在進行一個巨大的變革，企圖將原有 Circuit Switching 與 Packet Switching 網路整合成一個單一整合型網路—All-IP 網路以支援所有的應用服務。All-IP 網路受限於封包交換網路原有的特性，有服務品質問題(QoS)有待克服，因此有必要在 All-IP 網路上提供服務品質管理機制以實現整合型網路的目標。而要提供適當的 QoS 管理，其成功之關鍵主要在於是否能提供一個簡單易行之架構。本論文先提出 BBQ(Budget-Based QoS)採用以預算為基礎之服務品質管理，BBQ 提供一個高適用性的管理架構和相關的管理工具，可適用於不同的下層網路架構和不同營運目標的網管政策。

而在本文中提出以路徑規劃(Path Planning)的方式作為此架構的路由方法。路徑規劃係以過去的歷史訊務資料為基礎，為未來可能進入網路中的訊務規劃出一組具有品質要求的路徑，而在系統運作時，只需根據訊務的需求，指定一條符合其品質要求的路徑即可。此方法不但可以給予進入網路的訊務絕對的服務品質保證，而且事前的運算可以免除在系統運作時大量的計算負擔。在本論文中，我們設計了一套路徑規劃的演算法，來驗證我們的方法之效能。而經過反覆的模擬測試，發現本路徑規劃方法的確較傳統 OSPF 演算法擁有較佳的網路效能，且可以提供進入網路的訊務較佳的服務品質保證。