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整合多媒體伺服器、代理伺服器與無線行動用戶的即時多媒體 SMIL 預載與排程架構

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摘要

在無線網路的應用上，由於透過無線網路傳輸會受到許多不同於傳統有線網路因素的影響，如無線訊號容易受到衰減與干擾，行動用戶(Mobile Host)接收到的訊號強度會隨著與基地台(Base Station)的距離及障礙物的阻礙而變化，造成資料錯誤率隨著改變，因而造成行動用戶收到的正確資料量可能不足以繼續維持即時(real-time)多媒體播放時的服務品質(Quality of Service---QoS)需求。本計畫研究的目標在於提供資源有限的行動用戶透過無線網路上的基地台，連接到有線網路上的多媒體伺服器，即時取得 W3C（World Wide Web Consortium）定義的即時多媒體展示 SMIL(Synchronized Multimedia Integrated Language)簡報所需的多媒體資料。為了同時滿足多個行動用戶端即時展示 SMIL 簡報，位於有線與無線網路邊界上的基地台必須提供代理伺服器(Proxy Server)的功能。當行動用戶向多媒體伺服器發出即時媒體需求時，透過中間的 Proxy Server 一邊向遠端的媒體伺服器發出需求後，預先下載(prefetch)需要的媒體片段資料暫存至

Proxy Server 的 cache 內，另一邊則根據所有服務的行動用戶所回饋的資訊(如接收到的資料量、網路延遲、buffer 使用情況等)，利用 Scheduling 排程演算法分配所需的頻寬，分別將資料下傳到各用戶端的 buffer 內，以滿足各用戶端即時播放 SMIL 簡報 QoS 的需求，並降低預載至行動用戶所需的 buffer 大小，減少 Client 端系統資源的浪費。本計畫將設計整個網路環境的架構， 特別是 Proxy Server 所需的 prefetching 與 scheduling 演算法，依據當時有線及無線網路的情況分別掌控兩邊的網路的流量， 讓每個用戶端使用最少的 buffer，維持連續不斷的播放服務品質。

關鍵字：無線網路;服務品質;SMIL;即時;排程;預載;代理伺服器

An Integrated Prefetching and Scheduling Architecture for Real-Time Multimedia SMIL Presentations among Media Servers, Proxy Servers and Mobile Clients

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Abstract

Applications in wireless networks will be influenced by several factors those are relatively different in the traditional wired networks, such as the signal attenuation and interference between the base station and the mobile host. The received signal power and error rate by the mobile host are varied with its suffered interference and distance to the base station, so the playback quality of service (QoS) of the real-time multimedia presentation would degrade because the amount of corrected received data may not be sufficient. The project goals are as follow. Through the base station in the wireless network, the resource-limited mobile hosts request the multimedia data of the W3C (World Wide Web Consortium) proposed real-time SMIL (Synchronized Multimedia Integrated Language) presentation in the multimedia servers located in the wired networks. For satisfying the SMIL QoS requirements of all mobile hosts, the base station must be equipped with capabilities of the proxy server to cache the multimedia data bypassed to the mobile hosts. The proxy server controls the prefetching process of the multimedia data from the multimedia servers, and at the same time schedules the cached data transmission to buffers of all mobile hosts. Under these controls, the SMIL QoS requirements are guaranteed and the consumption of client buffer is reduced. In this project, the network architecture, and especially the prefetching and scheduling algorithms of the proxy server, will be proposed to control the real-time multimedia flows between both sides of wired and wireless networks to minimize the buffer consumption of the mobile host.

Key words：Wireless Network; QoS; SMIL;Real-time;

Scheduling;Prefetching; Proxy Server