Distributed Fixed Mobile Convergence

Hilton Lee

Abstract

This report is written to illustrate an idea called *Distributed-FMC* which tried to extend the Fixed Mobile Convergence concept. The report will provide an overview on Distributed-FMC system, discuss the design and implementation of a Distributed-FMC prototype, the experiments that I have performed to examine the performance, and some of the future works and practical applications of the Distributed-FMC system.

Convergence is happening in the telecommunication industry today. Fixed Mobile Convergence allows the users to roam seamlessly and take advantage of different access networks. A Distributed-FMC system, however, will further extend this ability by allowing providers and users to distribute the traffic with different combinations of access networks according to the range, signal strength, availability, cost, user preference, and quality. By using Distributed-FMC system, the service providers and users can truly take advantage of different access technologies, including 3G, WiFi, WiMAX, at the same time.

In this project, I have implemented a Distributed-FMC system prototype. A Distributed-FMC system can be implemented in layer 2/3 or the application layer, and I have decided to implement the prototype on the application layer: A Distributed-FMC Application Server acts as a proxy server to provide the distributed service. I have implemented two types of distribution for investigation. One is a round robin distribution and the other one introduce duplicate packets for redundancy against packet loss. Although there are some difficulties that I have encountered during the implementation, I have successfully implemented the distribution on UDP/RTP traffic for streaming. During the experiments, I have demonstrated that video streaming works fine under the distribution. The performance on distribution under my test environment is acceptable, but the experiments suggested that delay and jitter will be a major concern in distribution. Thus, a more in-depth analysis in the real or simulated environment is needed.

The experiment also suggested that processing speed and memory for buffering is one of the factors in Distributed-FMC system. Moreover, since a Distributed-FMC client application is needed to recombine the distributed packets, the resources usage will also needed to be carefully measured to determine whether the performance is acceptable in a resource constrained device. On top of the processing speed and memory usage, power consumption is also another important factor that will need further investigation.

There are several practical applications on Distributed-FMC that I have suggested at the end of the report. These applications including providing better seamless handover experience, distribution for video on-demand, and managing the bandwidth on-demand. Unfortunately, because of the time constraint, I cannot demonstrate all these features that Distributed-FMC can provide in this project. However, Distributed-FMC definitely worth further investigation, and I believe it will be an important component in the next generation networking.