

An Architecture for the Integration of Wireless Internet Services

Wireless Local Area Network (WLAN) standards such as IEEE 802.11b were originally developed for use within local area networks. Recently, however, WLAN has also gained large acceptance as a public Internet access technology. Locations that support public Internet access through WLAN are called hotspots. Typical hotspot locations include cafes, hotels, conference centers and airports (from the Mondru AB whitepaper on the HotSpot Air Interface). By the end of 2003 there were approximately 40,000 hotspots world wide. The projection is that by the year 2007 the number of hotspots will increase to 180,000 (according to In-Stat/MDR).

A basic hotspot consists of the following components: one or many access points, an access point controller application, a radius server to handle authentication and an internet connection. With this set-up any venture owner can provide its users with wireless internet access. However, at this point in time, this service is limited to authenticating users against a text file.

This project aims at studying the possibilities of broadening the spectrum of services that hotspot owners can provide. Developed at Mondru AB, this project has the main goal of determining the viability of a system architecture capable of the following interrelated goals:

- Integrating an existing access point controller application (chillispot) and a radius server (freeradius) to do user authentication and accounting against a database.
- Providing hotspot owners with management features by integrating a web server application to the set-up.
- Allowing security features like authentication using one-time passwords over SMS by integrating an SMS server (kannel).
- Providing hotspot owners with the possibility to have pre-paid as well as post-paid users. Post-paid users are registered in the system and billed on a timely basis, and post-paid users have access to the service with pre-paid cards. This pre-paid cards are generated by the system for the hotspot owner to sell to his users.
- Flexibility. The architecture would need to be flexible enough to easily accept the integration of new services in the future.
- Scalability. The architecture should provide for future development that would allow the system to be used in an environment larger than that used to develop the prototype.

The final architecture design consists of one access point controller application, one radius server, a web server, one SMS server and a shared database. The main development effort was devoted to the web server. All the other components were configured to cooperate with the web server in providing hotspot owners with new, innovative functionalities.

Development was carried out in a modular fashion, where similar functionalities were bundled together in the implementation. This allows for the final prototype to be flexible when new requirements arise, as new modules can be incorporated with ease, requiring only minor changes on the existing modules.

One of the requirements for a commercial product is high availability, which the current architecture of this prototype does not guarantee. However it was designed in a way such that higher levels of availability could be obtained by adding redundancy in a few places.

Finally, load analyses indicated that the existing procedures will continue to be efficient only for a maximum number of users. When this number is reached, they will have to be fine-tuned so that they execute faster rates.