

# Improving Accuracy of WiFi Positioning System by Using Geographical Information System (GIS)

Tussanai Parthornratt and Kittiphan Techakittiroj

Faculty of Engineering, Assumption University  
Bangkok, Thailand

## Abstract

*WiFi positioning system with knowledge of GIS can achieve higher accuracy in terms of distance error comparing with the one without it. Positioning algorithm expectedly gets rid of unlikely crossing area in the region while selecting others. Minimization of crossing area determination with constraint of geographical information is a key contribution. Proper placement of access points in service area is another issue of concern yielding the same consequence as optimal coordinate fitting.*

*Learning process for determining environment characteristics is essential to enable accurate calculation on distance from measured signal strength. Variation of obstructions in one environment can mainly reflect inconsistent profile, especially for indoor environment.*

**Keywords:** *Wireless positioning, WiFi, GIS, constrained optimization.*

## Introduction

The proliferation of WLAN starts from being widely known as so-called “WiFi”, which is one of the Institute of Electrical and Electronics Engineers or IEEE standards for WLAN. WiFi stands for “Wireless Fidelity” and it is truly a freedom to make a connection to Internet without hassle of old-fashioned network cable. WiFi or 802.11b is one of 802.11 specifications family and it is also the first dominating standard in the market. Nowadays new wireless networking devices are adopting the new standard of IEEE 802.11g, which offers higher data speed, namely driving from 11 Mbps to 54 Mbps, while sharing common operating frequency of 2.4 GHz.

This innovative technology is evolving technically and practically in couple of years leading WLAN to be a common sight at universities, airports, coffee shops, offices and organizations. That service point or access point is often referred to as “wireless hotspot” or “hotspot” in short.

Incentives for developing and standardizing WLAN are definitely mobility and flexibility. This phenomenon stimulates

the creation of supportive features for new-age laptops. However, anything has pros, it will also have cons. This issue is largely discussed and activating research group to concern about.

## Related works and Background

Recently, direction of research in WLAN field largely varies from pure theory to real-life applications. Pure theory is a factory of innovative ideas activating manufacturer to commercialize after those ideas are proven and standardized. For real-life application, one of the issues currently in concern of wireless security is wireless positioning application. Vulnerability of encryption algorithm of both WEP and WPA is globally realized. Therefore another development for wireless security turns to be positioning technique.

Many past researches contributed creative and innovative concept of indoor positioning system with various platform and architecture. Some of them were that of high accuracy, but were not practical and cost effective. Structural investment or dedicated platform for merely a positioning facility is initially a main interest.