Abstract—According to rapid developments in information technology (IT), wireless communication and network services has substantially changing the landscape of communications. Furthermore, associate facilities of bike leisure industry are developing rapidly in recent years due to the advocacy of the government in Taiwan. Therefore, information technologies used in bike leisure industry has increased substantially. In this paper, we first introduce web services and mobile devices interact with the web services. We then proposed a web services-based system for bike positioning. Finally, we will describe the typical design and implementation scenarios and design patterns for our system which bike riders can use different devices with different platforms such as mobile phones, PCs, tablet PCs, laptops, personal digital assistants equipped with Wireless LAN, 3G network and GPS to access the web services we proposed in our system. Bike riders can use their positioning system more flexible.

Keywords—GPS; Google Maps; information pushing; mobile device

I. INTRODUCTION

Web service is a major trend in the service-oriented architecture and an interoperable solution across platforms. Wireless communication and network services have substantially changing the landscape of communications. The associate facilities of bike leisure industry are developing rapidly in recent years due to the advocacy of the government in Taiwan. Therefore, information technologies used in bike leisure industry has increased substantially. We design and implement a Web Services-based System for Bike Positioning by pushing the information received by GPS module on the mobile devices equipped by bike riders. The information will be saved in servers and the system will provide mapping services they use, database management services, and information pushing services. However, most mobile devices are often based on different OS (Operating System) due to the preference of users and the brands of mobile devices. The goal of this paper is to combine 3G network with SOAP (Simple Object Access Protocol)-based web services we designed for different OS platforms.

According to the research of Curbera (2002) [1], the interface of web services are defined and described using XML (Extensible Markup Language) and is identified by a URI (Uniform Resource Identifier) [2]. A Uniform Resource Identifier (URI) is a compact sequence of characters that identifies an abstract or physical resource [3]. Web services can be interoperable with agreement on following standards as XML, SOAP, WSDL, and UDDI (Universal Description, Discovery, and Integration) is a standard for web services to register and publish services available to users [4]. WSDL (Web Services Description Language) [5], which is an XML format for describing network services as a set of endpoints on messages containing either document-oriented or procedure-oriented information. SOA defines a base communication protocol for users to exchange XML data. There are three main characters in a web service model, describing as follows:

- **Service Provider**: a Service Provider use WSDL to describe the function, input, output interface in a service object.
- **Service Requester**: a Service Requester request for the connection from service provider by the information published by service register.
- **Service Register**: Service Register provides a place for service provider to post their services and provides a place for service requester to find the services they need.

A Web service-aware wireless device (mobile devices interact with the Web Service provider and the Web Service Register as Fig. 1.) can have numerous advantages [6] described as follows:

- It enables handset manufacturers to rapidly deploy Internet solutions build on open standards.
- It makes applications more dynamic as they can invoke different services or service implementations based on the user’s context.
- It facilities the interoperability and integrate with enterprise applications and applications running on other wireless devices.

![Figure 1. Web Service model of wireless device](null)