

Chapter X

A Generic Framework for Bluetooth Promoted Multimedia on Demand (BlueProMoD)

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ABSTRACT

In recent years many technologies have converged to integrated solutions and one of the hottest topics has been the deployment of wireless personal area networks (WPANs). In this article we present a generic architecture scheme that allows voice and other real-time traffic to be carried over longer distances. The proposed scheme is a novel framework that combines a wired backbone network including Bluetooth access points (APs) with the mobile Bluetooth-enabled devices of the end users. This scheme is called Bluetooth Promoted Multimedia on Demand (BlueProMoD). BlueProMoD is a hybrid network and provides free-of-charge communication among customers, multimedia advertisements, as well as location-based and other value-added services.

INTRODUCTION

The concept of personal area network (PAN) is relatively new. A PAN, basically, is a network that supports the interoperation of devices in personal space (Elliott & Phillips, 2003). In this sense, it is a network solution that enhances our personal environment, either work or private, by networking a variety of personal and wearable devices within the space surrounding a person and providing the communication capabilities within that space and with the outside world (Prasad & Munoz, 2003). A wireless PAN (WPAN) is the natural evolution of this concept, where all participating devices communicate wirelessly. Furthermore, a WPAN is a network that moves with a person, linking all the devices carried by the person with each other, as well as any devices that are met along the way.

Since a WPAN has by definition a limited range, compatible devices that are encountered along its path can either link to it or leave it when they go out of its range in a flexible and secure way.

The limited range of a WPAN offers additional advantages such as low-emitted power (thus reducing potential health risks), lower power consumption (hence longer battery life), and lower probability of interference from other WPANs as well as the possibility of location-based services (LBSs). Nevertheless, the core of a WPAN is the wireless technology employed. Nowadays there are many such technologies to choose from. Each one offers specific advantages and disadvantages, which should be taken into consideration before deciding on the most suitable for a particular service or environment.

Of all current wireless technologies Bluetooth is the most promising and employed for many real-life applications. Applications using Bluetooth have become important in hot spots such as at hotels, shopping malls, railway stations, airports, and so forth. Bluetooth is a well-established communications standard for short distance wireless connections. A wide range of peripherals such as printers, personal computers, keyboards, mouse, fax machines, and any other digital device can be part of a Bluetooth network.

Bluetooth has many advantages: (1) low cost, (2) considerable degree of interference-free operation, (3) speed, (4) appropriate range, (5) low power, (6) connectivity, (7) provision for both synchronous and asynchronous links, and (8) wide availability in mobile phones, PDAs, and other devices. Bluetooth is usage-scenario driven, in the sense that its design points were optimized to satisfy established market needs (Bisdikian, 2005). Such usage scenarios are headset to mobile phone connectivity (hands free); mobile device to computer synchronization; digital camera to printer connection for printing; and so forth. More sophisticated applications in diverse areas have been investigated such as hotel services (electronic door locks, check-in/out) in Starwood Hotels

and portable patient monitoring in hospitals so that recovering patients are not confined to their rooms (Dursch, Yen, & Shih, 2004). Another interesting application of Bluetooth technology took place at the CeBIT 2001: Guiding services for finding the shortest path to a particular exhibitor in the hall as well as additional exhibitor information services were implemented (Kraemer & Schwander, 2003).

The core of Bluetooth technology is based on the IEEE 802.11 standard and it is a wireless system for short-range communication. This standard defines the protocol for two types of networks; client/server and ad-hoc networks. Bluetooth supports both point-to-point and point-to-multipoint connections. Both Bluetooth and most of IEEE 802.11x share the same 2.4 GHz industrial, scientific and medical, license-free frequency band. Compared with other systems operating in the same frequency band, the Bluetooth radio typically hops faster and uses shorter packets.

In this article we propose a generic architecture scheme that allows voice and other real-time traffic to be carried over longer distances, while simultaneously showing how the providing organization can experience sufficient revenues in order to finance and maintain the necessary infrastructure. The proposed scheme is a novel framework that combines a wired backbone network including Bluetooth access points (APs) with the mobile Bluetooth-enabled devices of the users. The end result is a hybrid network offering free voice and other communication in return for short, specifically targeted multimedia advertisements and tracking information on behalf of the stores or branches operating at a large shopping center or complex. Location-based and other services are also envisaged as a natural side effect. An additional advantage is that the user perceives such capabilities as part of the services offered by his/her respective WPAN.

This article is structured as follows. In the following section we give a detailed overview of the most important technical characteristics of

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