



Chapter V

**Wireless Personal and
Local Area Networks**

Thomas G. Zimmerman
IBM Almaden Research Center, USA

ABSTRACT

Wireless communication is a technical and business revolution. Mobile phones are a common site in most cities around the world. Wireless personal and local area networks provide digital connectivity among mobile computing devices, including desktop, laptops and personal digital assistants (PDA). This chapter focuses on the competing standards that are vying for dominance in the booming wireless market. To prepare the reader, a broad review of wireless technology is provided. The various organizations that support the competition standards are outlined. The chapter concludes with some predictions, anticipating the outcomes of a very volatile marketplace.

INTRODUCTION

Wireless Personal Area Network (WPAN) refers to short-range wireless communication, typically less than 10 meters. This small area corresponds to a person's immediate environment, their personal operating space. Any device that physically interacts with a person will typically be within this area. This includes devices worn, carried by, or in close proximity to a person.

Wireless Local Area Network (WLAN) refers to modest-range wireless communication, typically less than 300 meters. This area corresponds to an office, home, small building, or factory floor. The devices can be stationary or mobile, for information processing, monitoring, or entertainment.

In this chapter we will first familiarize ourselves with the terms and concepts of wireless technology. Since networks imply inter-device communication, we will spend most of the chapter discussing wireless standards and interoperability, the ability of devices to talk to each other. Device interoperability is a daunting yet necessary task to make devices and applications useful, convenient, and ubiquitous. We will survey some of the industry associations and standard groups that do this difficult work. Finally we will make some predictions of which standards will dominate the marketplace.

BACKGROUND

Information is transmitted on a medium. The properties of various media for wireless communication are summarized in Table 1.

We shall briefly review the development of wireless networks on these media.

Zimmerman (1996) and Gershenfeld use the human body as a “wet wire” to send data through the body, creating a WPAN with a 2 meter range. A modulating electric field induces a small current in the human body, representing data. The body, however, also acts as a shield. Placing a hand on the transmitter blocks any electric field from leaving the device.

Richley and Butcher (1995) demonstrate a WPAN using magnetic fields. A magnetic field is unimpeded by the human body and can achieve a 6 meters range. However, the antennas to achieve this range are large in size.

Table 1. Wireless Communication Media

Medium	Range (m)	Data (kbps)	Advantages	Problems	Application
Electric	2	20	Low cost International	Blocked by conductors	ID badges
Magnetic	6	200	Low cost International	Antenna size	Control Messaging
Optical InfraRed	30	1,000	Very low cost International	Directional Power	Control IRDA
RF UHF	30	100	Low cost Good range	Regulations	Control Messaging
RF ISM	400	11,000+	International High data rate	Cost Power	Networking

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