# Chapter XXXVII
# The Diffusion of WiMax Technology: Hurdles and Opportunities

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## ABSTRACT

*A fundamental goal of the wireless industry is to economically offer ubiquitous broadband access to a large number of people in diverse geographical settings. WiMax technology has the potential to be a leading cost-effective technology in the wireless industry, providing opportunities to mobile service providers who lack a Third Generation (3G) license or related infrastructure. WiMax benefits from widespread industry backing and established standards. This chapter will focus on the potential of WiMax technology to deliver personal broadband and fixed Internet capabilities. The chapter applies the diffusion of the Global Internet framework to analyze the current state of WiMax deployments along with the difficulties in developing a WiMax network and building a subscribers base.*

## INTRODUCTION

Over the last decade mobile voice has evolved from a niche technology to a must have service, with users adopting this innovation into all aspects of their daily lives. In conjunction with the widespread adoption of mobile phones, a broadband revolution is also happening around the globe due to the proliferation of technologies such as Digital Subscriber Line (DSL), cable modem, and broadband wireless services. The next major evolution in communications will see the convergence of both mobile and broadband technologies to create a phenomenon called Personal Broadband (PB) or Mobile Broadband Internet (MBI). Personal Broadband can be viewed as a fusion of the two perpetual markets of mobile voice and broadband, aiming to serve four types of customers: those

migrating from mobile voice services and seeking higher speeds for multimedia applications, fixed users who want mobility, WiFi users seeking additional range, and new users who will adopt the new generation of services and applications generated by personal broadband technologies. There are currently three competing technologies capable of broadcasting wireless data at broadband speeds to achieve Personal Broadband. The first is the evolution of the traditional cellular network to provide increasing data bandwidth from a few bits per second with wireless application protocol (WAP) or enhanced data rates for GSM evolution (EDGE) enabled handsets, to a few hundred kilobits per second with evolution-data optimized (EVDO) or high-speed downlink packet access (HSDPA), to the promise of millions of bits per second with the eventual Long-Term Evolution of the 3G standard (3G LTE). Another approach being pursued involves using WiFi to create a mesh network. A wireless mesh network is a network created through the connection of wireless access points installed at each network user's locale. Another interesting approach involves the use of Worldwide Interoperability for Microwave Access (WiMax) technology, WiMax which began as a fixed broadband access technology, and has recently added features to enable mobility. WiMax can deliver capacity similar to the 3G LTE but is being deployed in networks now, while the 3G LTE is not expected to be available for at least two years. This chapter will focus on the potential of WiMax technology to deliver personal broadband and fixed Internet capabilities using the diffusion of the Global Internet framework to analyze the current state of WiMax deployments along with the difficulties in developing a WiMax network and building a subscribers base. The framework employed is beneficial to the discussion because it allows for an analysis along multiple dimensions which incorporate various perspectives such as political, technological, social, economic, and historical factors that have shaped the evolution WiMax phenomenon. WiMax is a standards-based technology that facilitates the delivery of wireless broadband access as an alternative to wired broadband like cable and DSL. WiMax stands for 'World Interoperability for Microwave Access, and is a wireless network infrastructure based on the IEEE 802.16 standard. WiMax provides fixed, nomadic, portable and mobile wireless broadband connectivity without the need for direct line-of-sight with a base station.

This chapter is structured as follows: The first section provides a background discussion on the diffusion of the Internet models along with a discussion on the global diffusion of the Internet framework employed to examine WiMax diffusion; this is followed by an overview of WiMax connectivity infrastructure. The next section describes the market segmentation. This is followed by a discussion on potential hurdles for deploying a WiMax network. Prior to the conclusion, a section discussing the future trend of personal broadband is presented.

## BACKGROUND: GLOBAL DIFFUSION OF THE INTERNET THEORY

There are a multiplicity of technology diffusion frameworks, Some frameworks have been adapted to be more specific to the area being discussed such as Internet diffusion in developing nations (Wolcott, Peter et al., 2001), Innovation diffusion in large organizations or specific sectors (Wainwright, David W & Waring, Teresa S, 2007) or to explain mobile data usage (Gruber, H. & Verboven, F., 2001) Mobile data adoption (Fife, Elizabeth & Pereira, Francis, 2005), telecommunication diffusion (Antonelli, Cristiano, 1989). It is beyond the scope of this chapter to provide a detailed review of innovation diffusion research, examples of studies that provide comprehensive reviews are Anand, J. et al. (2006) or McMaster, T & Wastell, D. (2005). There are also interesting studies (Baskerville, R. & Pries-Heje, J., 2001; Kautz, K. & Larsen,