

# Chapter XLIII

## Broadband Diffusion and its Driving Forces

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### ABSTRACT

*In the light of the emerging consensus on the potential impact of broadband technology on economic growth and development, this chapter analyzes the cross-country differences in growth of broadband technology by examining the key demand and supply factors driving diffusion in the observed countries. In addition, utilizing empirical evidence and country case analyses, the chapter offers tentative policy suggestions for accelerating broadband diffusion under alternative circumstances.*

### INTRODUCTION

Existing literature on endogenous growth theory<sup>2</sup> suggests that efficient transfer of knowledge and information, because of its ability to produce spillover effects, holds the key to high economic growth performance across the world. Extending this conclusion further, modern literature on information and communications technology argues that in today's information age, access to information infrastructure services is not only a necessity for socio-economic development but also the absence of such access could become a major constraint for achieving potential development goals.<sup>3</sup> In the context of this argument, broadband (BB) technology offers a major step forward towards worldwide access to information and its associated spillover

growth benefits.<sup>4</sup> It is expected that modern BB technology, because of its unique advantage over narrowband technology, will play a significant role in the 21<sup>st</sup> century information transmission process by becoming the primary vehicle for accessing information on a worldwide scale.

Over the past few decades, different components of telecommunications infrastructure have evolved dramatically. Rapid technological progress has occurred in both wired and wireless networks. In wired network, technological development caused the transition from copper and coaxial transmission systems to fiber optic, and signaling and encoding systems have changed from analog to digital. Further, digital technology has allowed for the introduction of packet transmission technology and facilitated the deployment of IP-based infra-

structures. Simultaneously, rapid technological progress in the area of radio based telecommunications systems has increased the demand for mobile telecommunications around the world. In recent years, most of the countries with advanced telecommunications systems are paying special attention to building a network that facilitates broadband access to the Internet. The development of high capacity Internet backbone together with the World Wide Web has significantly changed the way business, individuals, and government function. A new wave of broadband (high speed) accessibility of the Internet has the potential to revolutionize multimedia data transmission processes by integrating networks of data, voice, and video in one unified communications network. This technology will not only increase the efficiency of all activities that can be performed using communication, it will also encourage innovation of many new applications and services.

With the understanding that deployment of BB network is a key element for increased social and economic development, communication companies and policy makers are debating the best ways to develop and market BB services. In the context of these developments, this chapter focuses on analyzing the current state of BB diffusion rate in various countries across the world while paying close attention to the supply and demand related factors driving such diffusion in the world. In addition, the chapter investigates the possible role of public policy in accelerating BB technology diffusion through its influence on both demand and supply factors.

The layout of the chapter is as follows. The section that follows introduces the characteristics of broadband access technology and its associated benefits in general. Country-specific differences in performance of broadband access technology are then analyzed while taking account of the underlying structures of demand and supply. Together with outlining a new empirical model, existing approaches to demand and supply estimates of broadband services are summarized. Complementary country case analyses are then presented. Summary and conclusions are provided in the last section.

## **BROADBAND ACCESS AND ITS BENEFITS**

Broadband technology and its use in offering integrated network services are altogether a new phenomenon in information and communications technology. Much hope is being raised in the literature regarding its potential to effect dramatic changes in information transmission process. The dynamics of its ongoing evolution, however, kept researchers from providing a definition of BB technology in precise terms. In operational terms, BB now refers to a set of electronic communications technological solutions. The primary features that distinguish this technology from other competitive transmission technologies include its relatively high bandwidth, always on functionality,<sup>5</sup> and capability for high-speed information transmission in both directions—downstream from the Internet to the users and upstream, from users to the Internet. An integrated view of these features, however, does not suggest a specific speed or a specific service. In fact, there is no universally accepted standard regarding the speed of transmission that characterizes “broadband.” Instead, a myriad of speed transmission standards have been proposed in the literature. The U.S. Federal Communications Commission (FCC) identifies a bandwidth of 200 Kbit/s for downstream transmission as the cut off point for BB service and allows for its shift upward over time as technology changes.<sup>6</sup> International Telecommunications Union (ITU, 2003a), on the other hand, defines BB as a transmission capacity with speed faster than the primary rate of ISDN, indicating that of 1.5 to 2 Mbit/s. Finally, National Research Council (NRC, 2002) proposes keeping its specification altogether open allowing it to evolve with the technological dynamics of transmission mechanism and changing consumer needs of transmission speed.

Empirical observation on BB services around the world indicates that these services can be accessed through a number of different network technologies. These access technologies differ between themselves by their corresponding cost of development and functionality. The commonly known access technology networks of digital

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