

Chapter 6

Urban Telecommunications Network: Technology Convergence and Urban Infrastructure

Tan Yigitcanlar

Queensland University of Technology, Australia

Hoon Jung Han

Griffith University, Australia

ABSTRACT

Rapidly developing information and telecommunication technologies and their platforms in the late 20th Century helped improve urban infrastructure management and influenced quality of life. Telecommunication technologies make it possible for people to deliver text, audio and video material using wired, wireless or fiber-optic networks. Technologies convergence amongst these digital devices continues to create new ways in which the information and telecommunication technologies are used. The 21st Century is an era where information has converged, in which people are able to access a variety of services, including internet and location based services, through multi-functional devices such as mobile phones. This chapter discusses the recent developments in telecommunication networks and trends in convergence technologies, their implications for urban infrastructure planning, and for the quality of life of urban residents.

INTRODUCTION

As Warf (1998, p. 255) states ‘telecommunication is one of the few topics in geography that richly illustrates the plasticity of space, the ways it can be stretched, deformed, or compressed according to changing economic and political imperatives’. Over the past few decades, telecommunications

networks have become an important infrastructure player, but they are not as readily apparent as other core physical infrastructure such as highways, roads, and water and power grids. Although the invisible telecommunications infrastructure often follow the same routes of highways and railroads, current communications – whether voice, video, or data – are ultimately dependent on the existence of telecommunications infrastructure (Hackler, 2003a).

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Information and communication technologies (ICTs) form the basis of telecommunications infrastructure. In the information and knowledge era already upon us, ICTs play an increasingly important role in the planning, provision and management of urban physical infrastructure. Moreover, it is evident that ICT networks, as urban telecommunication networks, are becoming the major urban infrastructure management systems with the rapid development and wide-spread usage of internet. In a recent study, Lee et al. (2008) point out some challenges to applying digital convergence technologies in urban infrastructure. This is particularly true in 'Ubiquitous' or 'Augmented' cities where any citizen can access any infrastructure and services via any electronic device, regardless of time and location. This idea of advanced and easy accessibility to amenity and services has been reflected in many science fiction movies such as 'Matrix' and 'Minority Report'. However, although there are some small scale practices of the use of convergence technologies for urban infrastructure, its comprehensive, real world applications are yet to be developed.

As an integral part of the urban telecommunication networks, electronic or digital devices such as mobile phones, handheld computers and PCs become the key gadgets of our daily lives. In order to improve their functionality and increase product sales, these digital technologies have been subject to continuous and rapid upgrades. One of the most significant advancements in the field is ICT convergence where people access needed urban amenity and services through a single device, the so called 'black box' (Jenkins, 2006). This technology convergence has been well explored by urban planners, media companies, broadcasters, and information technology enterprises. The trend is found not only in electronic devices but also in business management arenas such as call centers where several help desks develop comprehensive customer care services.

Convergence of telecommunication technologies and internet services play a significant role

in networking the functions of a city. Early work by Gottman (1983) developed a popular notion of 'transactional city'. In this study, he anticipates that the modern telecommunication technologies such as fiber optics, global positioning systems and wireless networks accelerate the complexity of spatial transformation known as spatial de-concentration, fragmentation and gentrification (Baum et al., 2006; Chhetri et al., 2009). Accessibility to the internet and the quality of the network service also became a critical need for infrastructure development, analysis, planning, and design. In the US, information-related investments in urban infrastructure have become an increasingly vital component of national economic activity. In 1995 the annual spending on information systems (more than \$60 billion) by far exceeded the total public sector spending on transportation (Wieman, 1998).

ICT networks are rapidly evolving and in the near future will likely transform into a network supported by convergence technologies. Wieman (1998) points out how localized high-tech economic activity, supported by the early examples of technology convergence, boosts the demand for urban transportation systems. In his recent study, Han (2008) investigated the evolution of the ICT development in the Republic of Korea, which is rapidly becoming more ubiquitous and embedded in the physical urban environment and supporting urban infrastructure. He discusses how technology convergence supports rather than diminishes the quality of life in urban spaces. Personal mobile phones, for instance, are integrated with segments of urban services including public transport, e-government and e-learning. For example, technology convergence improves the access to urban services and utilities by providing mobile phones with new technologies such as SMS, G3, MP3, GPS navigation, digital camera, smart card, and e-payment.

Telecommunication and infrastructure networks are rapidly moving from systems based on wired technology to those that are wireless and

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