Chapter 1.13
Dark Optical Fiber Models for Broadband Networked Cities

Ioannis Chochliouros  
OTE S.A., General Directorate for Technology, Greece

Anastasia S. Spiliopoulou  
OTE S.A., General Directorate for Regulatory Affairs, Greece

George K. Lalopoulos  
Hellenic Telecommunications Organization S.A. (OTE), Greece

Stergios P. Chochliouros  
Independent Consultant, Greece

INTRODUCTION: THE BROADBAND PERSPECTIVE

The world economy is currently moving in transition from the industrial age to a new set of rules, that of the so-called “Information Society,” which is rapidly taking shape in different multiple aspects of the everyday life. In fact, the exponential growth of the Internet, the penetration of mobile communications, the rapid emergence of electronic commerce, the restructuring of various forms of businesses in all sectors of the economic activity, the contribution of digital industries to growth and employment, and so forth, are among the current features of the new global reality, and they are all considered significant dynamic factors for further evolution and development (Commission of the European Communities, 2005).

Changes are usually underpinned by technological progress and globalization, while the combination of worldwide competition and digital technologies is having a crucial sweeping effect. Digital technologies facilitate transmission and storing of information, while they offer multiple access facilities, in most cases without implying subsequent extra costs. As digital information may be easily transformed into economic and social value, this can offer huge opportunities for the development of new products-offerings, services, or applications. Thus, information becomes the “key-resource” and the prime “engine” of the new e-economy (Crandall, Jackson, & Singer, 2003).

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Companies in different sectors have already started to adapt to the new economic situation in order to become e-businesses (Commission of the European Communities, 2001c). In addition, the full competitiveness of the state in the current high-tech digitally converging environment is strongly related to the existence of modern digital infrastructures of high capacity and of high performance, rationally deployed and properly priced, capable of providing easy, cost-effective, secure, and uninterrupted access to the international “digital web” of knowledge and commerce without imposing any artificial barriers and/or restrictions (Wallsten, 2005).

Broadband development is nowadays an essential strategic priority (Chochliouros & Spiliopoulou, 2005), not only for the European Union (EU) but for the global environment. More specifically, broadband can be considered an “absolutely necessary prerequisite” in order to materialize all potential benefits from information society facilities and so to improve living standards (Commission of the European Communities, 2001b). The availability, access, and ultimate use of broadband in both business and residential settings are critical issues. Both businesses and consumers can derive increased benefits from the availability of broadband connection to the Internet, as the technology speeds up some applications and creates entirely new possibilities (Hu & Prieger, 2007).

To appropriate further productivity gains, it should be necessary to exploit advances offered by the relevant sophisticated technologies, including high-speed connections and multiple Internet uses (Commission of the European Communities, 2002). However, to obtain such benefits, it should be necessary to develop modern, cooperative, and complementary network facilities and suitable underlying infrastructures. Among the various alternatives, optical access networks (OANs) can be considered, for a variety of explicit reasons, as a very reliable and effective solution, particularly in urban areas (Green, 2006).

The development of innovative communications technologies, the digital convergence of media and content, the exploitation and the penetration of Internet, and the emergence of the digital economy are main drivers of the networked society, while significant economic activities are organized in networks (including development and upgrading), especially within urban cities (Commission of the European Communities, 2003, 2006). In fact, cities remain the first “interface” for citizens and enterprises with the administration and the main providers of public services.

In recent years there have been significant advances in the speed and the capacity of Internet-based backbone networks, including those of fiber nature (Agrawal, 2002). In this context, there is a strong challenge for the fast exploitation of the so called “dark fiber” infrastructure, mainly as a means for realizing access networks. Such networks are able to offer a quite remarkable increase both in bandwidth and quality of service for new and innovative multimedia applications, also including “triple play” services (Lovink, 2002).

**NETWORKED CITIES: TOWARDS A GLOBAL AND SUSTAINABLE INFORMATION SOCIETY**

Information Society applications radically transform the entire image of our modern era. In particular, a great variety of innovative electronic communications and applications provide enormous facilities both to residential and corporate users (Commission of the European Communities, 2001a), while cities and regions represent major “structural” modules. Local authorities are key players in the new reality, as they are the first level of contact between the citizens and the public administrations and/or services. Simultaneously, because of the new information geography and global economy trends, they also act as major “nodes” in a set of inter-related networks, where new economic processes, investment, and knowl-