

Chapter XIII

Metropolitan Broadband Networks:

Design and Implementation Aspects, and Business Models

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ABSTRACT

This chapter presents the design principles that cover the implementation of broadband infrastructure in the region of Western Greece, by examining all the necessary parameters that arise while implementing such a critical developmental project. The broadband infrastructure that is deployed is either based on optical fiber (on big municipalities) or on wireless systems (OFDM based and WiFi cells). Furthermore, we present as two case studies all issues of the designing of the Metropolitan Area Network of Patras, the third largest city of Greece and the Wireless Access Network of Messatida. The major target of the broadband networks is to interconnect the buildings of the public sector in the city and also deploy infrastructure (fibers or wireless systems) that will create conditions of competition in providing both access and content services to the advantage of the end consumer. The usage of the broadband infrastructure by service providers will be based on the open availability of the infrastructure in a cost-effective way. Finally, we present the main characteristics of a proposed business plan that ensures financial viability of the broadband infrastructure and guarantees the administration, growth, and exploitation of infrastructure.

INTRODUCTION

This chapter presents the design principles that cover the implementation of broadband infrastructure in the region of Western Greece, by examining all the necessary parameters and studying all the issues that arise while implementing such a critical developmental project. In particular, we present the main principles that should be followed while developing such metropolitan area networks. Regarding the design guidelines, in this chapter we cover issues such as architecture of the broadband network, topology selection, requirements of the passive and active equipment, and requirements of the fiber and ducting infrastructure. Furthermore, we present as a case study critical issues regarding the design of the metropolitan area network of Patras, the third largest city of Greece. The main target of the MAN of Patras is to interconnect the buildings of the public sector in the city. The organizations that are going to be connected in the MAN are organizations of the sectors of public administration, education, health, culture, and so forth. The usage of the broadband infrastructure by service providers will be based on the open availability of the fiber optics infrastructure in a cost-effective way. Finally, we present the main characteristics of a proposed business plan that ensures financial viability of the broadband infrastructure and guarantees the administration, growth, and exploitation of the infrastructure.

Several related projects that implement neutral broadband infrastructure in cities are running across the world. For example, Ireland, Sweden, and New Zealand run such programs, where the local authorities design and fund the major part of the projects aiming to increase the broadband penetration with benefits to the end users (UTOPIA, 2006; CityLink, 2006; Localret, 2006).

This chapter is structured as follows. We next describe broadband infrastructure in Europe and in Greece, then present the general guidelines for the design of municipal broadband networks. Following this, the methodology of work regarding the designing of the MANs is offered, and the overall architecture and topology of the MAN of Patras is briefly described. Additionally, the same sec-

tion describes the architecture of smaller wireless networks that are implemented in smaller municipalities where the optical MANs are not profitable and presents a typical case study that is Messatida municipality. A presentation follows of the main characteristics of a business plan that ensures the financial viability of broadband infrastructure. Finally some concluding remarks and planned next steps are presented.

BROADBAND STATUS IN GREECE

The importance of broadband infrastructure worldwide is confirmed by the activities of certain advanced countries in order for the appropriate broadband infrastructure to be developed and adopted so as to contribute to economic growth and to tackle any possible cases of “technological exclusion” of citizens (Firth & Mellor, 2005).

The importance of broadband networks for the development of a country may also be confirmed by the intensiveness of the activities of many countries that set as their main strategic objective the implementation of such infrastructures. In addition, the development of such networks has also been adopted in the common European policy for the implementation of the Information Society. In eEurope 2005 as well as in i2010, broadband access is an important priority of the European Union (EC, 2002; Europa, 2004).

In the current situation, the proper infrastructure in Greece is owned only by the former public telecommunications provider (OTE), while the alternative providers seem only to have plans in expanding their network infrastructure within the big cities of Greece. The business plans of the alternative telecommunications companies and network carriers do not include the expansion of their network throughout Greece, since they are afraid that non-urban areas do not appear to have any business interest. Broadband access, as defined by the “Strategic Text on Broadband Access” of the relevant task force, requires the proper broadband infrastructure and the competition between the Internet service providers. Since broadband infrastructure is now being developed, the penetra-

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