

Chapter XVII

Third Generation (3G) Cellular Networks in Telemedicine: Technological Overview, Applications, and Limitations

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ABSTRACT

The evolutions in the field of telecommunications technologies, with the robustness and the fidelity these new systems provide, have significantly contributed in the advancement and development in the field of medicine, and they have also brought forth the need for their utilisation in the healthcare sector. Thus, telemedicine and e-Health have clearly started to become an important issue for implementation, operational deployment of services and a promising market for industry. Recognizing this trend, its importance in the lives of citizens all around the globe and its contribution in the daily healthcare delivery by all actors involved in the procedure, the authors of this chapter attempt to familiarize the readers with the impact that high broadband wireless networks have upon telemedicine services and with the way they facilitate the secure transmission of vital information stemming from bandwidth demanding applications in real time. After providing the readers with an overview of telemedical services and commenting on how they can offer added value to existing healthcare services, they provide an analysis of the wireless infrastructure that has facilitated telemedical services over the years, and point out the significant role that the third generation telecommunications systems can play in the field. After that, follows an analysis

of the range of new applications that can be supported by the 3G telecommunications infrastructure, and the related research that has taken place in the European level regarding the utilization of 3G networks for telemedical applications. However, 3G networks are not a panacea; for this reason the limitations of this infrastructure is also stressed out. The authors conclude by discussing whether 3G networks can prove to be an attractive solution for telemedical services to healthcare providers.

INTRODUCTION

The evolutions in the field of telecommunications technologies, with the robustness and the fidelity these new systems provide, have significantly contributed in the advancement and development in the field of medicine; they have also brought forth the need for their utilisation in the healthcare sector, a sector that is information intensive and knowledge demanding. Thus, e-Health solutions are of crucial importance (Olsson & Lymberis & Whitehouse, 2004, p.312); telemedicine and e-Health have clearly started to become an important issue for implementation, operational deployment of services and a promising market for industry (Wooton, 1999) (“EU2004a”, 2004). As had been forecasted a decade ago, healthcare institutions make extensive use of computer networks, mass storage devices, and sophisticated workstations at which humans and machines interact, assisted by advanced information processing tools and techniques of knowledge engineering, to achieve integration of multimodality multimedia, diagnostic data and expert medical knowledge (Orphanoudakis & Kaldoudi & Tsiknakis, 1996, 210). However, telemedicine is not a brand new service. On the contrary, telemedicine has been described from as early as as 1906, when W.Einthoven described the possibility of transmitting cardiogram information via telephone lines. This description became a reality in 1910 when S.G. Brown did actually transmit hearing sounds in London. In addition, a few years later, and more specifically

in 1920, wireless communications were utilized in order to provide medical advice support in boats from the Norwegian hospital Haukeland.

Since 2004, the term eHealth aroused, defined by Eysenbach as: “eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterises not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally and worldwide by using information and communication technology” (Eysenbach, 2001, e20), (Pagliari et al, 2005, e9). The term eHealth is supposed to be an overall term, or even better an “umbrella” term, including all aspects of Health Telematics.

Telemedicine is one of the areas canopied under the umbrella-term – eHealth. The term ‘telemedicine’ derives from the Greek ‘tele’ meaning ‘at a distance’ and the present word ‘medicine’ which itself derives from the Latin ‘mederi’ meaning ‘healing’. However, even though this service has been attributed many terms, there is not actually a standardized definition of it. On the contrary, various organizations have come up with different definitions of the term telemedicine. Thus for example, the World Health Organisation defines telemedicine as the delivery of healthcare services, where distance is a critical factor, by healthcare professionals using information and

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