Telemedicine Based on LMDS in the Urban/Metropolitan Area: A Romanian Case Study

Sebastian Marius Roșu
Special Telecommunications Service, Romania

Ionel Bujorel Păvăloiu
University Politehnica of Bucharest, Romania

George Dragoi
University Politehnica of Bucharest, Romania

Cristian Gabriel Apostol
Military Technical Academy, Romania

Daniel Munteanu
Valahia University of Targoviste, Romania

INTRODUCTION

Public health is a major issue that requires special attention at national level in any country. The health status of the population is largely influenced both by the medical services quality of by the intervention promptness. In recent years, the medicine field has been invaded by a wide variety of medical applications such as: laboratory robots, tele-surgery, telemedicine and tele-consultation, surgical training, rehabilitation and hospital robots, all these assisted by qualified personnel - doctors and nurses (Angeletos, 2011). Currently, many health agencies and health personnel which provides health services, share data and professional knowledge over the Internet offer (Ataç, Kurt & Yurdakul, 2013).

Telemedicine represents the exchange of medical information between geographically dispersed locations via electronic communications in order to improve the health of patients. Telemedicine is useful especially for populations living in isolated communities and remote regions and is currently applied in almost all medical fields.

Management of trauma patients requires fast, definitive and precise care as well as major resources and continuous expertise (Lafiti et al., 2007), therefore paramedics attending an accident scene can use telemedicine systems to retrieve medical history about a person and any other necessary information to provide the needed assistance in minimal time (Fong, Fong, Rapajic & Hong, 2003). The critically ill patients can be located in distant places, requiring remote reception and broadcasting of data related to their status and real-time diagnosis before they are transported in the hospitals.

The telemedicine system was successfully implemented in Romania in emergency medicine. The project of primary care improvement may be an opportunity for family medicine in both rural areas but also in urban areas. In Romania, family doctors (General Practitioner – GP) are those who provide and coordinate primary and continuous personal health care, for the individual and the family (e.g. family goes to a family doctor the first time somebody has a health problem). The insured, identified with

DOI: 10.4018/978-1-4666-9978-6.ch009
health problems that cannot be treated by a family doctor (one of the most important tasks of a family doctor is prescribing drugs in the list of cleared and recommendation based diagnostic investigations.), are directed to specialists in clinics or hospitals (Rusu & Dragoi, 2014). Implementing a telemedicine system that allows remote consultation for severe or complex conditions could save lives and it insures for certain financial savings.

The rather low level of eHealth use in Romania can be attributed to the fact that this policy field is relatively new in Romania. As of 2010 the public hospitals and all family doctors (over 12000) have a minimal IT endowment. As the country still has a tightly centralized government system, no regional eHealth strategies were considered in Romania. In the past, in the absence of agreed strategies for Romania, the issues which should have been included had an erratic trend. Several endowments of IT equipment (hospitals, family doctors) were made by individual projects, without a strategic vision. The necessity of a patient oriented health information system project, based on Electronic Personal Health Record (EPHR), was included in all drafts for eHealth strategies, but no application development has been started until now in this direction.

The main objective of the new information system proposed to be active since 1 May 2015 ought to be: the integration of the main Romanian health information systems, the inclusion of the existing solutions, and a citizen focused approach towards public health and a patient-focused approach for curative medicine. European interoperability was considered also important in this new context. Modern infrastructure has to be built based on information and communications technology, on which it can be ensured eHealth interoperability and can be developed e-health applications. In this idea, we propose in this paper a wideband LMDS based method to provide telemedicine services in urban (metropolitan) areas. E-health and telemedical services represent an alternative for the lack of high qualified medical personnel and equipment and ensure a safe backup system for the existing services.

LMDS (Local Multipoint Distribution Service) is a broadband wireless access technology that provides a point-to-multipoint microwave connection in those areas where cable or fiber-based networks are too expensive or inappropriate because of the paucity of customers or geographical conditions (Carrasco et al., 2008). Given the available bandwidth, the LMDS can support high data rate applications and a variety of simultaneous services: multi-channel television (broadcast, pay per view, video on demand), telephony, interactive multimedia services (e-commerce, tele-teaching, telemedicine, etc.).

LMDS, being a prevalent BWA (Broadband Wireless Access) deployment, is intended for fixed network deployment implying that mobility support is very limited, but the properties of LMDS make it particularly suited for telemedicine backbone support (Fong et al., 2011). By providing two-way broadband services (e.g., video, telephony, high-speed Internet access), the LMDS network allows sharing of expertise between healthcare professionals located in different centers and consulting specialists for a second opinion in cases of emergency.

The telemedicine systems use nowadays primarily the wireless communication technologies for the reliable delivery of the medical information and services. Starting from this premise, we propose in this paper a wideband LMDS based method to provide telemedicine services in urban (metropolitan) areas.

The opportunity to offer multimedia services without the need of underground optical fiber systems to create the network is an essential point for the technology, allowing large bandwidth voice and multimedia services on a less expensive infrastructure network. An LMDS system consists of four parts: the network operations center (NOC), a fiber optic network or other type of network that links together various NOCs, at least a base station placed in a tower within the reach of the fiber optic network and the user equipment which allows modulation, demodulation, signal control and interfacing operations.