Chapter 32
Network Mobility and Mobile Applications Development

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ABSTRACT

The use of mobile devices with possible connection to the Internet is increasing tremendously. This mobility poses new challenges at various levels, including hardware, network services, and the development of applications. The user searches small and lightweight devices, easy to use, and with vast autonomy in terms of energy. She/He seeks also to connect the Internet "every time, everywhere", possibly using different access technologies. Given the interface limitations, and processing capabilities of small mobile devices, the software and the operating system used must be necessarily adapted. This chapter overviews the mobility area, provides deep insight in the field, and presents the main existing problems. Mobility and the development of mobile applications are closed related. The advances in network mobility lead to different approaches in the mobile applications development. The chapter proposes a model for developing mobile applications, based on our research.

INTRODUCTION

In the last three years, there has been an impressive increase in multimedia content demand, stimulated by the increase of user-created video and Internet Protocol Television (IPTV) adoption. Video centric applications like Live Video, Video on Demand (VoD), Video Gaming, Conferencing and Surveillance, are becoming increasingly popular among users in general, and mobile users in particular, holding laptop computers or mobile handset devices. These applications stumble on a set of limitations in current networks. Delivering

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high quality streaming and interactive multimedia content with diverse Quality of Service (QoS) requirements, over a diverse set of access technologies (wired or wireless), launches new challenges, often specific to the underlying access technology, which may change under mobility. Furthermore, supporting these applications demands application specific techniques that dynamically adapt to the state of the network and, in the case of mobility, that adapt to the new access networks.

It is crucial to multimedia applications to provision QoS in these networks and to provide real-time assessment to multimedia QoS. Multimedia applications can be classified into three key areas: communications, video on demand, and live streaming. Each of these areas requires unique end-to-end treatment in order to ensure high-quality multimedia delivery to the end user.

Mobile multimedia delivery over diverse network technologies poses many challenges. However it is creating opportunities too. Mobile multimedia is gaining momentum as a revenue-generating opportunity.

The software development environments for the mobile devices represent also a challenging issue for the mobility. It is important to identify and characterize the existing platforms to make the right development decisions in order to increase the devices autonomy.

The proposed chapter collects the most recent developments on the involved technologies (multimedia applications, QoS, multicast and IP mobility) and state how they could interact and be put together. It presents open research topics in this area. It also characterizes the existing platforms in the mobile devices and proposes, based in our research, a model for the mobile applications.

BACKGROUND

This section introduces the main concepts about mobility and mobile operating systems.

The following section presents a brief definition of concepts and related work done in the mobility area. It also makes an overview of the mobile operating systems. It finishes with some conclusions and trends.

Transmission of Multimedia Content

The importance of interactive audio and visual contents is increasing. Interest in multimedia applications is growing. But multimedia applications pose new demands to devices, to networks, and to communication protocols. When video and audio are being used, delays and jitter are not welcome. New protocols came to light in order to make possible multimedia transmission with the necessary quality. An example of such protocols is the Real Time Protocol (RTP) protocol family. RTP (Schulzrinne et al, 2003) provides end-to-end network transport functions suitable for applications transmitting real-time data, such as audio, video or simulation data, over multicast or unicast network services. The data transport is augmented by the Real-time Control Protocol (RTCP) to allow monitoring of the data delivery in a manner scalable to large multicast networks, and to provide minimal control and identification functionality. The Secure Real-time Transport Protocol (SRTP) (Baugher et al, 2004) is a profile of RTP, which can provide confidentiality, message authentication, and replay protection to the RTP traffic. The Real Time Streaming Protocol (RTSP) (Schulzrinne et al, 1998) is an application-level protocol for control over the delivery of data with real-time properties.

In computer networks, the number of applications that need parameter guarantees like bandwidth, delay, jitter, and packet loss rate, is growing. Thus, it is necessary to use QoS in order to assure those parameters.

Video and voice real-time applications are being more used each day, posing new challenges to traffic management and congestion control.