Chapter XII
Enhancing the Multimedia Tour Guide Experience:
Transmission Tailoring Based on Content, Location, and Device Type

Tacha Serif
Brunel University, UK

Gheorghita Ghinea
Brunel University, UK

ABSTRACT

This chapter describes an investigation exploring user experiences of accessing streamed multimedia content, when that content is tailored according to perceptual, device and location characteristics. It builds upon the findings of our user perception evaluations by harnessing the results together to create pre-defined profiles based on QoP requirements, device type, and location for context-aware multimedia content streaming, and, in so doing, enhance the concept of context to include perceptual requirements. In the light of the findings, we propose that multimedia transmission to mobile and wireless devices should be made based on pre-defined profiles, which contains a combination of static (perceptual, device type, CPU speed, and display specifications) and dynamic information (streamed content type location of the device/user, context of the device/user). Furthermore, we believe that using profiling technology mobile service providers can effectively manage local network traffic and cut down their bandwidth costs considerably.

INTRODUCTION

As computing environments become mobile and information access on the move commonplace, computing research has extended to cover contextual information such as a user's location, situation, and circumstances. Although multimedia has been previously tailored according to user location (Abowd, Atkeson, Hong, Long, & Pinkerton, 1996; Burigat & Chittaro, 2005) and device (Buyukkokten, Garcia-Molina, Paepcke, & Winograd, 2000; Fox et al., 1998; Freire, Kumar, & Lieuwen, 2001), such tailoring until now has ignored perceptual quality considerations, even though, as we have shown in previous work (Ghinea & Thomas, 2005) bandwidth--scarce resource in a ubiquitous computing environment--could be more efficiently utilized this way. Nonetheless, to the best of our knowledge, no research has explored user multimedia perception and experiences when supported by a GPS (global positioning system) based, location aware, mobile guide--the focus of our study, described in this chapter.

CONTEXT AWARE COMPUTING

Advances in computing hardware and software technologies are key factors behind the proliferation of mobile computing. However, the initial ideas on mobile technologies and devices came from Weiser, according to whose vision the most profound technologies are the ones that weave themselves into the fabric of everyday life until they are undistinguishable from it (1991). Weiser in his articles identifies two crucially important issues, namely location and communication, which are necessary to initiate the "disappearance" of wired computing and create the conditions necessary for the birth and growth of location and context-aware computing (Want et al., 1995; Weiser, 1991, 1993, 1998).

Following the introduction to the concept of context-aware computing and its definition, some example studies will now be reviewed. One of the earliest was ParcTab (Want et al., 1995), which was implemented at the Xerox PARC Research Labs based on the vision of Mark Weiser. The main objectives of this project were:

- To design a mobile hardware device, the PARCTAB, that enables personal communication
- To design an architecture that supports mobile computing
- To construct context-sensitive applications that exploit this architecture
- To test the entire system in an office community.

As part of this prototype application, devices such as a palmtop computer, an electronic notepad, and an electronic whiteboard were used. The result of this work was a digital office facilitated with some intelligent electronic gadgets. All the devices in use as part of this project were connected to the local area network using infrared (IR) connections, which also enabled the location management of the users. Knowing the location of the user, the relevant communications (e.g., emails and phone calls) were then routed accordingly to the user's physical location or computer terminal.

The active badge project conducted at Olivetti Research Laboratories in Cambridge, UK, in the late 90s significantly affected context-aware computing through the implementation of the first indoor positioning system (Want, Hopper, Falcao, & Gibbons, 1992). The system was initially implemented as a substitute for the pager system that was used to locate members of staff and assist receptionists with their switchboard operations and is facilitated with wearable badges, sized 55x55x7mm and weighing 40grams, to produce a unique code for approximately a tenth of a second every 15 seconds. These transmissions are then picked up by receivers, which are scattered around the host building. The received signal is