

A Real-Time PDA Based Communication Appliance for Multi-users

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Abstract. PDA devices have become an accessory that a large community uses for managing their personal data. With the development of new devices with additional network and video capabilities they gain the potential to be used in more comprehensive communication scenarios too. On the example of usage for image communication we show, how new applications must not be viewed in an isolated way and need innovative approaches for both system hard- and software enhancement as well as for the integration with heterogeneous infrastructure components. The challenging task for creating so called communication appliances is not just to transfer existing desktop mechanisms to smaller and mobile computers but to consider their specifics and establish additional architectures and mechanisms that meet those best. Our paper describes the prototyping of image communication device based on an off-the-shelf PDA, design and usage experiences and potential future enhancements.

1 Introduction

In recent years communication paradigms evolve very fast and we experience a major shift from fixed and stationary systems towards nomadic and mobile communication devices. A realistic future scenario comprises nearly ubiquitous network access in large areas of the world. Moreover the rapid transition towards an open and flexible IP-based heterogeneous network infrastructure will accelerate the definition and deployment of various services spanning the range from audio to multimedia applications. Additionally we also face a change in the type of devices that are used for managing data and accessing services. Whereas computational intensive applications were traditionally bound to host systems or desktop computers, the recent generation of PDAs introduces a shift in this assignment of functions. In addition to having easy means of accessing and storing data, one of the basic motivations for using those portable devices is being able to communicate. With the recent state of technology it gets possible and desirable to use PDAs for not just managing notes, contacts and calendars but for also accessing a huge number of infrastructure based services and for even videophony-like applications. Current innovations in the area of ubiquitous and mobile computing [10],[15] are pushed from research both on the hardware system as well as the protocol and application side. The progress in technology and the availability of powerful hardware and software platforms recently enabled the development and practical deployment of a number of applications that try to use small devices [1] in a collaborative manner [2-3]. For our prototype we benefit from the

work that is currently done for providing Linux and other Open Source solutions for off-the-shelf PDAs as the iPAQ [4]. In the past we mainly find a number of applications – each packaged in a kind of a “black box” that are specialized for distinct purposes. You are e.g. using a cellular phone for audio communication whereas the addresses and phone numbers of your communication partners are stored on another device. With the emerging use of these PDAs and other innovative computer end systems the new term ‘communication appliance’ has been introduced. It describes the combination of both hard- and software components as tool for personal use. To fulfil the demand for multimedia communication, everywhere and at anytime, communication appliances have to overcome the apparently contradictory and incompatible requirements of being small and multi-purpose, power-efficient and powerful, autonomous and interacting with heterogeneous infrastructures. We will show how many of these specifics apply to and have to be solved in the area of using PDAs for image communication. Real-time image communication forms a promising technology to provide enhanced and new communication and application scenarios to a number of users.

Basically every networked computer system with appropriate audio capabilities can potentially be used to communicate with other IP-based but via gateways also conventional telephones [5]. In combination with Presence and Instant Messaging applications this holds an enormous potential for the support of seamless ubiquitous communication.

2 System Architecture and Design Considerations

Our intended scenario comprises a set of mobile users with PDAs that are connected to an infrastructure via Wireless LAN and are able to both originate and receive image messages. We use HP iPAQ PocketPC 2210 equipped with PocketPC 2003 OS supporting .NET Compact Framework. This OS is designed for managing the slow CPU and small memory effectively and supporting easy development of user-oriented GUI. In order to implement the communication system synchronized by wireless network, the Socket .NET Compact Framework gives the compatibility between heterogeneous devices, hence the smart devices such as PC, Notebook, PDA, Celuler Phone etc. can communicate each other using TCP/IP on wireless LAN environment as shown in Figure 1. SDIO Type Wireless LAN is used to be expanded through the SD expansion slot. TCP/IP-based system running on Internet infrastructure can support all kind of communication topology. Also unlike the chatting messenger program which is usually centralized server based, this system can be operated independently under various kind of synchronized working environment.

The network is synchronized as the following algorithm as shown in Figure 2.

To activate server, Server Thread is generated. Then TCP Listener is working and waiting for the access from clients

By using TCP Listener and TCP Client Class, Server and Client is set up. TCP Client activates the Server using Server Class, confirms the Client access and the generation of Server.