

Centralized Management System for Mobile Communications with Pocket PCs

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Abstract—Pocket PCs are mobile computing devices largely used for mobile communications. Often Pocket PCs are long time used and modifications of the connection parameters to different networks are necessary. There is also need for installing different software packages. The mentioned operations can be manually done, by each user, this being a difficult and error prone solution or automatically, from a centralized location. This paper presents a centralized management system for mobile communications with Pocket PCs. It is useful for remotely setting connection parameters (dial-up phone numbers, SMSC numbers, DNS servers addresses etc.) and loading software packets to all or part of the Pocket PCs from a group leading to important saved times and the possibility to offer customized programs and graphical elements.

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The next section presents other similar works, the third section describes the created system and the last section outlines the conclusions.

I. INTRODUCTION

An accentuated spread of the mobile communications takes place in our days. More and more mobile devices are found in different domains: pagers, mobile phones, Pocket PCs etc.

Pocket PC, [1], is a mobile computer included in the category of Personal Digital Assistant (PDA). It accomplishes all the functions of an organizer (address list, calendar, meeting list etc.) plus other more complex applications such as: text editor, data base, mathematical operations, clock, data transfer with a PC etc. A Pocket PC has a RISC processor, an EPROM or Flash program memory, a RAM memory, a TFT or LCD display, with the usual dimension of 55x77 mm, Compact Flash, PCMCIA and Secure Digital card interfaces and several communication ports: serial, USB, IrDA, Bluetooth etc., each of them being useful for networking the Pocket PC.

They run an operating system such as Windows CE or Palm OS. There are many software applications running on PCs for Pocket PCs. Windows CE, [2], is an operating system used by a lot of embedded systems, including Pocket PCs. It offers to the application developers Win32 APIs, ActiveX controls, interfaces for message queues and other facilities as COM (Component Object Model), ATL (Active Template Library) and MFC (Microsoft Foundation Classes). The embedded system can be easily connected to PC through ActiveSync, using serial cable, network cable or infrared connection. The operating system offers support for multimedia (including DirectX), communication (TCP/IP, SNMP, TAPI) and security.

There are many situations in which Pocket PCs are long time used and modifications of the connection parameters to different networks are necessary. There is also need for

II. STATE OF THE ART AND RELATED WORK

The mechanisms for centralized configuration of the systems and for remotely installing the applications are different for desktop PCs and for mobile devices.

For the centralized management of the PCs the Windows 2000 offers Group Policies. It helps the administrators to control the access of the users to different settings and applications through their affiliation to a group and not through individual settings of each user and compute.

For the mobile phones, OTA (Over The Air) Provisioning through WAP (Wireless Access Protocol) is a tool for configuring and remotely centralized installation of applications. Through OTA the administrators of the mobile telephony networks can control the parameters of the services and the software existent on the mobile phones. The Internet and the WAP standard are used for controlling the mobile phones. The first OTA configuration services were based on SMSs. Special SMSs were used, not shown to the user, interpreted by software existing on the mobile phone. The OTA configuration through WAP supposes the sending of a SMS Push through which a WAP page is specified and the phone will download it. The page may include setting elements and software packets which will be downloaded through WTP (Wireless Transfer Protocol). At the new mobile phone models the OTA configuration can be done through MMS (Multimedia Messaging Service) too. This service is offered to the users for sending images and sounds but can be used for sending also programs through SMIL (Synchronized Multimedia Integration Language). By using this language configuration parameters

and software packets can be sent to a mobile device. The notification will be done with the same SMS Push mechanism as in the OTA Provisioning through WAP. In this case too, the configuration of a valid connection, including an Access Point Number, a Gateway Address, a MMS port number etc. is needed.

Reference [3] presents a Mobile Instant Messaging system, designed for mobile devices. It deals with the problem of configuring the mobile devices taking into account their mobility. Reference [4] describes the architecture of a universal manager that manages all mobile and non mobile devices from an enterprise. In reference [5] the problems of the implications and the requirements when TCP traffics are carried over UMTS that is characterized by moderate bandwidth bearers with relatively high link error, are approached. The implementation of the OTA service provisioning models in 3G environments is focused. The paper from reference [6] examines the characteristics of the mobile system and tries to clarify the constraints that are imposed on existing mobile services. It also investigates the enabling technologies and the improvements they brought. Reference [7] describes the implementation of Split Smart Messages (SSM), a middleware architecture similar to mobile agents that exploits dual connectivity on Smart Phones. Services can be executed, discovered and migrated on top of the SSM middleware.

Unlike the above mentioned achievements, this paper presents a centralized management system for mobile communications with Pocket PCs. It is useful for remotely setting connection parameters (dial-up phone numbers, SMSC numbers, DNS servers addresses etc.) and loading software packets to all or part of the Pocket PCs from a group.

III. THE CENTRALIZED MANAGEMENT SYSTEM (CMS)

The CMS has the following goals: the remotely configuration of the Pocket PCs, especially of their data communication parameters and the remotely installation of software packets, in CAB (Cabinet File) format.

The management of the devices is done centralized through a PHP program which allows the definition of profiles, the add of users in the defined profiles and the configuration of the connection parameters of the profiles and the add of the software packets which will be installed on the devices belonging to the profiles. The data introduced by an administrator in this program are memorized in a MySQL data base found on a web server. The data from the server are sent to the target devices by sending e-mail messages. In such a message a part of the URL address is sent in which either a HTML page is found, through which a user can send its options about the offered software packets or a XML document is found which describes the parameters to be set on the device and/or the URL addresses of the application packets which will be downloaded from the Internet and installed on the device.

On the Pocket PCs a number of applications will exist for receiving the messages sent by the administrator, for displaying

the selection page of the optional programs, for processing the XML document and for downloading and installing the required software packets. For these operations the system uses the connection services to Internet offered by the Windows CE 3.0 operating system existing on the Pocket PCs.

A. The system's architecture

The system is made by several executable modules installed on the mobile device and by a web application manipulating a central data base. The modules of the application and their interaction are shown in Fig. 1.

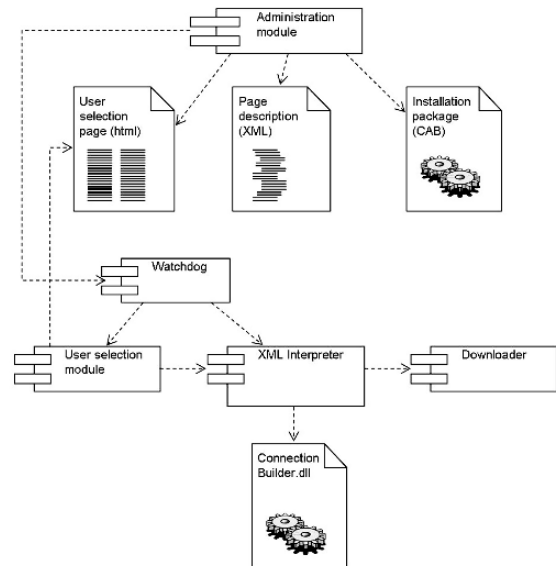


Fig. 1 The system's architecture

The Administration module is a PHP program through which an administrator can define groups (profiles) of users (Pocket PCs), can add users to the defined groups and can associate parameters to the profiles for different data connection settings (connections CSD/GPRS, WAP/Web/MMS, number of SMSC central etc.) and software packets required to be installed on the devices from a profile. The information introduced by the administrator and the associations between the profiles and the groups of parameters are memorized in a MySQL data base. When the administrator asks to the system to made the required modifications the Administration module announces the devices from the profile by sending them email messages, generates the HTML page for the selection of optional packets and, at the client's request, generates dynamically the XML document through which the required changes are described and the locations of the programs to be installed are specified.

All the modules, excepting the Administration module, are written in C++, using the SDK (Software Development Kit)