Mobile Commerce Agents in WAP-Based Services

Mihhail Matskin and Amund Tveit
Norwegian University of Science and Technology

With the increasing number of e-commerce services for mobile devices, there are challenges in making these services more personalized and to take into account the severely constrained bandwidth and restricted user interface these devices currently provide. In this paper we consider an agent-based platform for support of mobile commerce using wireless (WAP-based) devices. Agents represent mobile device customers in the network by implementing highly personalized customer profiles. The platform allows customization and adaptation of mobile commerce services as well as pro-active processing and notification of important events. Information to the customers is delivered both via WML-decks and SMS messages. Usage of the platform is illustrated by examples of valued customer membership services and subscription services support. Some details of a prototype platform implementation are briefly considered.

INTRODUCTION

The increasing number of mobile portable devices in use creates a great opportunity for development of a wide spectrum of mobile e-commerce services. The main advantage of these services is their high availability. Customers with a mobile device can enjoy these e-commerce services regardless of time or location. However, mobile devices, such as cellular phones and PDAs, are constrained by severe restrictions that might complicate practical use of e-commerce services. These restrictions are related to the limitations of wireless data networks when compared to wired networks (less bandwidth, more latency, lower connection stability, less predictability and less standardized protocols) and to the limitations of mobile handsets when compared to personal computers (small screen size, complicated text input, little memory, slow CPU and more constrained energy supply).

Additional problems with wide application of mobile e-commerce services are related to higher cost of wireless communications (compared with wired communications) and users of mobile devices not having sufficient experience of Internet or PC usage. To overcome the above restrictions and problems, we require simplicity and expressiveness in the mobile commerce services.

It is possible that some of the limitations will be relaxed in the future through improved hardware or telecommunication networks technology (Tarasewich & Warkentin, 2000), but, at the moment, all of them should be taken into consideration when implementing mobile services.

As a basic way of relaxing the above-mentioned problems and limitations, we see the following solutions:
- the connection time to the network service should be minimized,
- the precision of delivered information should be high in order to avoid exposing a large amount of useless information to be read on a small screen.

These solutions assume that as much work as possible should be done off-line without the mobile device being directly connected to the network.

Our approach towards reaching this goal is to provide a mobile device user with a personal software assistant that represents the customer’s profile and interests in his e-commerce activities. In order to implement such an assistant, we deploy the agent technology. The personal software assistant is implemented as a software agent. This agent operates in the Internet environment, and the users employ WAP-enabled mobile devices to communicate with their personal software assistant agents to take advantage of e-commerce services.

The rest of the paper is organized as follows. First, we describe some details of e-commerce services we would like to implement, as well as basic problems associated with their implementation. Then, we briefly consider the basic concepts of agent technology and WAP as enabling technologies. Next, we propose a solution for mobile e-commerce services utilizing software agents and WAP-based communication. Then, we give some additional details of a generic platform and a
TWO EXAMPLES OF MOBILE E-COMMERCE SERVICES

As our examples of mobile e-commerce services, we consider valued customer membership service support and subscription-based services.

The purpose of valued customer membership service is to provide members with special offers and with information about available products and services. Usually the service is applied by a shop or a chain of shops to provide membership benefits to their registered customers. Basically the service uses information about registered members to support mailing catalogues or booklets with particular offers. The main problem with such a service is its very low degree of personalization. The same offers and catalogues are usually sent to all members without consideration of their particular interests. This may cause customers to miss out on interesting offers as a result of them being hidden amidst a huge amount of non-relevant information. It is also possible that customers simply ignore non-personalized catalogues and offers. In order to achieve better personalization of services, more information about customers’ interests and preferences should be included in the membership database, however, this may contradict with privacy requirements (W3C, 2000). Even if the customers agree to disclose their preferences to the membership service, this can hardly be done in a flexible manner especially with huge centralized databases that assume a standard set of attributes for all customers.

Advertisements and information are usually sent to customers by regular mail. Usage of mobile portable devices for receiving these advertisements is not efficient when the limitations mentioned in the Introduction are taken into account. Nevertheless, getting the latest knowledge of good offers for some required products could be very valuable when booklets and catalogues are not readily available.

Our second example of an e-commerce service is support of a subscription service for mobile device customers. This is a well-developed service supported by many providers. In particular, we consider a stock market quotes notification service. The main problems with this service are similar to the above-mentioned problems with customers’ membership services. Customers wish to be notified about changes in quotes of selected stocks. In order to get such notification, they need to disclose their stock preferences to a service provider. This is not often desirable because the customers may wish to preserve their privacy about stock preferences. It is quite usual that customers’ quote notification preferences change over time. In this case, personalization is often poor because of the restricted ability of dynamic service customization imposed by the limitations of mobile devices.