

## Auction System in Wireless Environment

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*Abstract:* - Pervasive and mobile computing technologies promise to provide users with a quick and convenient access to a variety of commercial applications. With the proliferation of mobile devices, such as laptops, mobile phones, Personal Digital Assistants (PDA), and the fast mobile networks, mobile auctions seems to be the most compelling service. This paper proposes an auction system in wireless environment to offer flexible and adaptable auction services to all users. We present a prototype implementation of an auctioning system in wireless environment by using mobile phones based on the English auction type. We elaborate on a prototypical process how these auction methods, interaction requirements and other attributes can be incorporated in mobile phones based auction. We observed that auction systems provide more flexible and adaptable commerce services to mobile users.

*Key- Words:* - M-commerce, Auction, and WAP.

### 1 Introduction

In general, mobile commerce (m-commerce) is defined as the use of wireless terminals (cellular telephone, personal digital assistant (PDA)) and a network to conduct business transactions, exchange of information, buying/selling of services or goods, etc. M-commerce has three unique characteristics: Convenience and accessibility, Localization, broad reach and Personalization. The dynamic development of mobile commerce and the increasing integration in the Internet have opened up an entirely new research and development field. M-business reaches beyond web based commerce to include core business processes such as B2C/C2C m-transactions, B2B m-transactions, Personal life management, Mobile office and Mobile operations back-office, supply chain management, and customer relationship management. Many commercial auction services have been launched in recent years, mostly based on the English auction method.

With the advent of mobile commerce, the world has witnessed a concurrent reform in content delivery through the ability to provide content anywhere, anytime. With an increasingly mobile society where more and more people are on the move, mobile auctions seems to be the most compelling service that may revolutionize the mobile commerce landscape and make it dramatically more powerful and easier to use. Mobile auctions can be defined as [1] “a market

institution with an explicit set of rules determining resource allocation and prices on the basis of bids from the market participants”. Auctions can be classified in different ways [2], there are open auctions as well as sealed bid auctions. There are auctions where the bidding prices ascend and auctions where the prices descend.

The most commonly used auction types are the open-cry auction (also called English auction), where auction participants gather at one location, physical or virtual, at a pre-specified time and buyers can hear the bids submitted by competitor buyers and have to decide whether to bid higher or not within a limited time. In sealed bid auctions, auction participants are required to submit their bids by a specified deadline. The auctioneer keeps the bid information secret until the deadline when the bids are evaluated and the winner is declared. Sealed bid auctions can be either single round or multiple round. Dutch auctions are different. The auctioneer starts with a very high asking price. Then the price is decreased gradually until a buyer accepts the asking price.

These auction methods can be compared quantitatively and qualitatively [3] based on information anonymity (information about products or people to be revealed during and after the auction), auction rules (start and end of the auction), pricing mechanisms. Most of the problems encountered in online auctions are the same for mobile auctions among which how to deal with

unsupported bid, collision, expulsion, and withdrawal.

In addition to the advantages of online auctions [4], mobile auctions can offer the following advantages:

- **Cost effectiveness:** Since most of the people are having some sort of mobile devices.
- **Technology power:** Computers and mobile phone technologies are getting more and more powerful. There are remarkable improvements in memory, battery and central processing unit (CPU) technologies allowing more advancement at incorporating powerful application and multimedia content.
- **Ample Bandwidth-** The availability of third generation (3G) wireless technologies with greater wireless transmission speed will create widespread business or business participation.
- **Value of the Internet access:** More and more people are reenlisting the value of the Internet access for personal and professional needs. Mobile phones are the most convenient way to access the Internet than being connected to the Internet through desktop.
- **Market share:** As more and more people will be using mobile devices, the market share will be a critical factor that will make m-commerce applications for the improvement in digital economy.
- **Cellular networks:** New digital cellular networks are beginning to be more capable and efficient for most Internet and Web applications.
- **Pricing models:** Flat rate pricing for Internet has already been introduced but predictable fixed cost will make it easier for potential wireless data communication to take the plunge.
- **Standardization:** Wireless protocol standards (WAP) had promoted the need for standards for wireless access.

WAP is an open, global specification that empowers users of digital mobile phones, pagers, personal digital assistants and other wireless devices to securely access and interacts with Internet/intranet/extranet content, applications and services. Wireless Application Protocol is the de facto worldwide standard for providing Internet communications and advanced services on digital mobile phones, pagers, personal digital assistants

and other wireless devices. WAP is a protocol stack for wireless communication networks, specified by the WAP forum. The WAP forum is currently part of the Open Mobile Alliance [5]. WAP is essentially a wireless equivalent to the Internet protocol stack (TCP/IP). A big advantage of WAP is that it is bearer independent. The most common bearer is currently GSM, but also a PDA or a third generation mobile phone can be used.

WAP is a good solution for mobile users due to the following reasons:

- 1) Small screens, Limited device memory, Less powerful CPUs, Limited bandwidth availability, Unreliable connections, High latency.
- 2) WAP has its own security model that works on lines very similar to Web security. Hashing algorithms, digital certificates, and public key cryptography provide the critical security required for any real transactions using WAP.
- 3) WAP development is pretty simplistic. WML and WMLScript provide for almost everything that a mobile Internet application would need. The learning curve for WML or WMLScript isn't very steep; most programmers can pick it up rather quickly.
- 4) WAP is widely accepted. Major players in the wireless market (like Nokia, Motorola, and Ericsson) are all very active participants in the WAP process.
- 5) WAP is standard independent. So even a switch to a GPRS network wouldn't really make a difference when browsing. Only better data transfer speeds would contribute to a better browsing experience.

Implementation of a system supporting auctioning and reverse auctioning of tourism products and services over mobile devices considering aspects such as the characteristics of the tourism industry, as well as the limitations and unique attributes of the mobile communication channel is presented in [6]. Nomad is the mobile agent system integrated with eAuction House, where mobile agents travel to the eAuctionHouse site and participate in auctions on the user's behalf. Users can create agents using Java or can automatically generate agents from Nomad's template agent library [7]. Shill bidding in multi-round online English auctions is presented in [8].

An architecture model for multi-agent systems that was developed in the European project LEAP (Lightweight Extensible Agent Platform) for mobile business process is presented in [9]. A prototype implementing an efficient multimedia

middleware approach towards ubiquitous value-added services using an auction house as a sample application is given in [10]. A distributed auction system using a large-scale adhoc network as its sole communication platform is explained in [11].

To the best of our knowledge, there are no auction systems with mobile phone as a commercial product or research prototypes. This paper proposes a prototypical auction system with mobile phones. The implementation of this prototype system uses modern information system technologies like J2ME and J2EE [12]. J2ME wireless tool kit is used to implementing the front end for the cellular devices, which will be communicating with the Internet web site implemented in J2EE.

The rest of this paper is organized as follows. In section 2 we explain about J2ME and J2EE. The proposed auction system is explained in section 3. Section 4 deals with the proposed system functionality. We conclude with a short summary and an outlook on future work in section 5.

## 2 J2ME and J2EE

To meet the demand for information appliances in the rapidly developing consumer and embedded markets, Sun has extended the scope of Java technology with the introduction of Java™ 2 Platform, Micro Edition (J2ME™)[13] [14]. A user having a J2ME enabled mobile device will be able to download applications from a network and run them on his/her mobile device. J2ME is optimized to run on memory-constrained devices like cellular phones and PDAs, is the technology that can help the carriers maximize their opportunities in this fast growing marketplace.

Among the major benefits of Java technology that J2ME brings to the wireless world are:

- The ability for carriers to utilize a wide range of manufacturers with the ability to run the same content. Portability of code from one device to another.
- Safe and secure network delivery, even over the Internet.
- A full runtime environment allows more interactive applications that don't have to utilize extensive network bandwidth.
- Off-line operation. Since services written in Java technology can run on a mobile phone, this allows users to interact with the service while in power network coverage or to save network cost by being in offline mode.

Java™ 2 Platform, Enterprise Edition (J2EE™) [15] [16] is an open, standard-based, development and deployment platform for building n-tier, web-based and server-centric, and component-based enterprise applications. From developers perspective J2EE provides a standard framework of building server components. From platform vendors' perspective, provides platforms to run any applications.

## 3 Proposed Auction System Model Using English Auction Type

Mobile phone based auction system facilitates auction activities on behalf of human users. We have developed a prototype using the J2ME wireless tool kit [17] to implement the front end for cellular devices, which will be communicating with Internet web site implemented in J2EE. Fig. 1 is an overview of our proposed system model. Auction servers comprise of services/products to be auctioned. A user can configure mobile phone to initiate bidding on an auctioned item as a buyer.

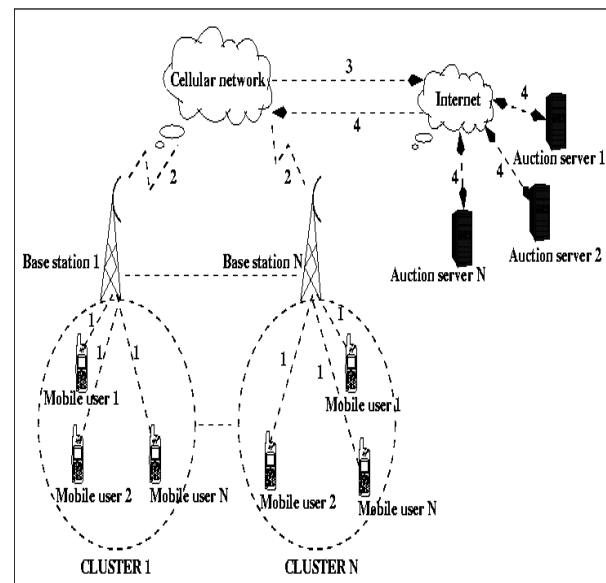


Fig. 1 Mobile phone based auction system model.

In the mobile phone based auction system, a user can configure by providing auction related information, such as the type of items they are interested in, maximum value for that item, and bidding strategies. The proposed mobile phone based auction system operates as follows:

1. User searches the required auction web services in the Internet through GPRS (General Packet Radio Services) enabled mobile phones.

2. User request goes through the base station and Internet to the auction server.
3. Connection is established between auction server and mobile phones.
4. User communicates with auction server through the mobile phone.

#### 4. System Functionality

In this section, we will demonstrate the basic elements of system functionality through a scenario that is presented in the screen of a WAP enabled mobile phone. Here the discussion is limited on the front-end system functionality as experienced from the user point of view.

**Step 1:** The user selects to view the auctions that are available in the auction server from the menu through 'auctions' link. (refer fig. 2)

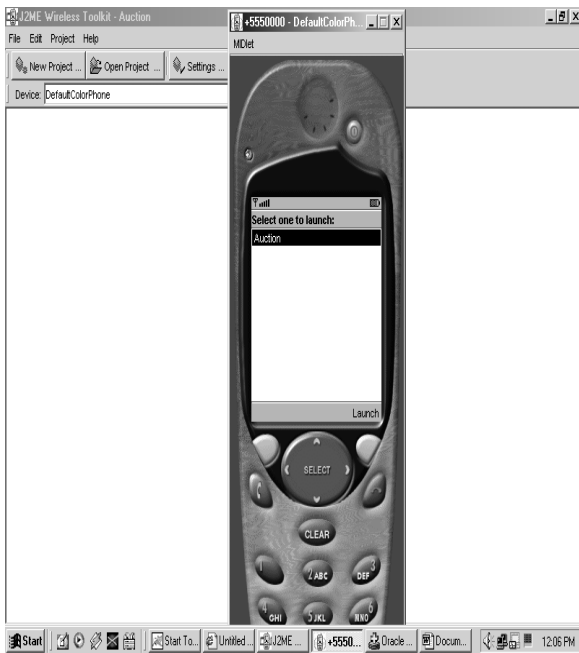


Fig. 2 Selection of auction link.

**Step 2:** To select 'Start Bidding' link, user must 'Login' with a user name and password as registered at the auction server (refer fig. 3 and 4). If the user is not authenticated through login, interface in mobile phone will not proceed further and hence the auction server will not allow the user to operate bidding.



Fig. 3 Login to auction server.

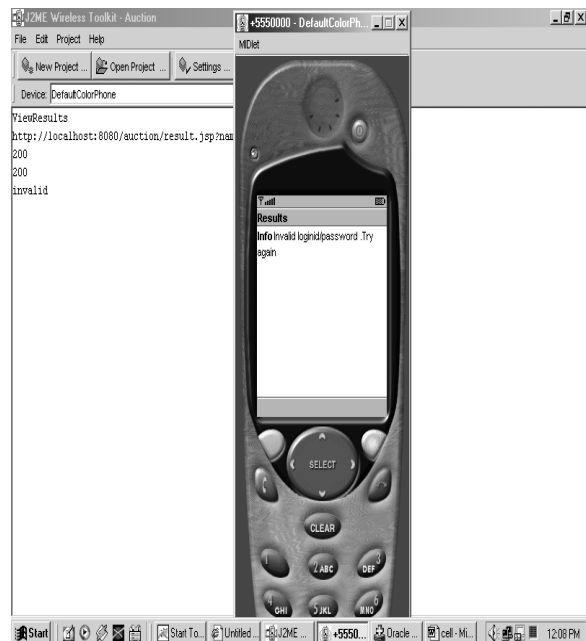


Fig. 4 Invalid login message.

**Step 3:** The user selects the 'choose' menu which comprises of two sub menus, 'view results' and 'start bidding'. A user wanting to view the previous auction results, selects the 'View results'. A user wanting to bid selects the 'Start bidding' link. (refer fig. 5)

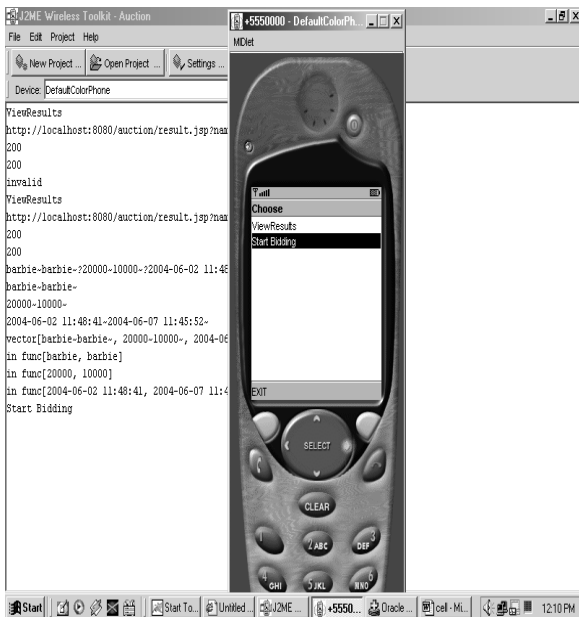


Fig. 5 Selection of start bidding or view results.

**Step 4:** If the user is authenticated for a particular product, user has to bid price by looking at the auction minimum price. The screen will display the minimum bid, minimum bid time (to submit a new bid) and an input box for the user to enter his bid. The user selects the 'Bid Price' option to enter his bid price. (refer fig. 6)



Fig. 6 Display of user bid prices.

**Step 5:** The user selects the 'OK' option when he has finished editing the input box of bid price. (refer fig. 7)



Fig. 7 User selects OK option.

**Step 6:** The interface in the mobile phone shows the confirmation of the bid. (refer fig. 8)

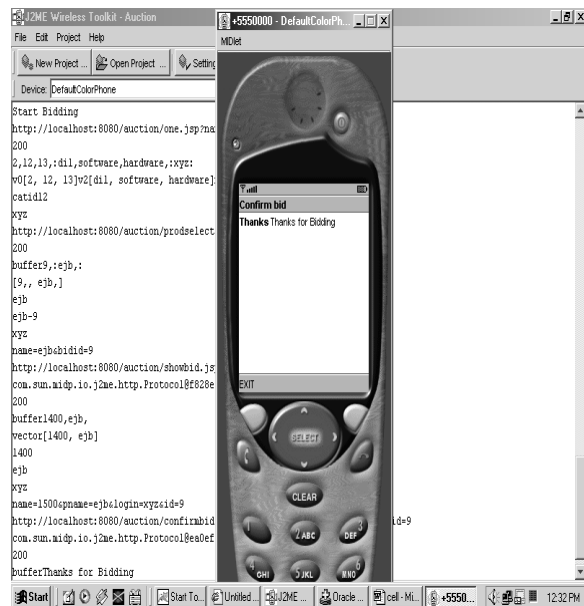


Fig. 8 Confirmation of bid price.

Using the above simple seven-step process, users can easily participate in auctions with only a limited interaction with the system. After the users have submitted a bid in the given time, they must wait until the end of the auction, when they will be notified by a simple SMS about the auction outcome. Again the users have to bid after looking at the auction outcomes.

## 5 Conclusions

Services advocated by mobile auctions are highly interactive and even go further, exploiting the fact that the mobile phone is a bi-directional channel enabling one-to-one marketing. In this paper we presented a prototype mobile phone based auction system with ubiquitous access benefiting from modern information system technology. The implementation was done using J2ME wireless tool kit for developing front end for the cellular devices which will be communicate with the internet website implemented in J2EE. Auction system that is put forward in the paper can solve problems such as auction service location, cooperation among the competitors and the synchronization of the auction process.

The proposed system performance analysis, unsupported bids, time synchronization for bids, collisions and withdrawal of the bids are considered for our future work. However, to assess the potential for market success of the proposed system, the developments and business model advocated by the mobile auction mechanism will need to be empirically tested in the field.

### References:

- [1] Per Baltzer Overgaard, "Notes on auctions and Bidding"  
[www.econ.au.dk/vip\\_htm/povergaard/pbohome/webpapers/mdauctionnotes.pdf](http://www.econ.au.dk/vip_htm/povergaard/pbohome/webpapers/mdauctionnotes.pdf)
- [2] M. Kumar and S.I. Feldman, "Internet Auctions", Proc. Of 3rd USENIX Workshop on Electronic Commerce, Boston, Massachusetts, 1998, pp 49-60.
- [3] G.E. Kersten, S.J. Noronha and J. Teich, "Are All E-Commerce Negotiations Auctions?" Proc.of COOP 2000 4<sup>th</sup> International Conference on the Design of Cooperative Systems, Sophia Antipolis, France, May 2000.
- [4] F. Muller-Veerse, "Mobile Commerce Report", Durchlacher Cooperation 1999.
- [5] Wireless Application Protocol  
[www.iec.org/online/tutorials/acrobat/wap.pdf](http://www.iec.org/online/tutorials/acrobat/wap.pdf)
- [6] A. Tsamakos, P. Kourouthanassis, and G.M.Giaglis, "Auctioning tourism products over mobile devices", proc.1<sup>st</sup> International Conference on Mobile Commerce, Athens, July 2002.
- [7] Tuomas Sandholm and Qianbo Huai, "Nomad: Mobile Agent System for an Internet-Based Auction House", IEEE Internet Computing, pp. 80-86, March-April 2000.
- [8] Wenli Wang, Zoltan Hidvegi, Andrew B. Whinston, "Shill Bidding in Multi-round Online Auctions", Proc.35<sup>th</sup> Annual Hawaii International Conference on System Sciences (HICSS-35).Big Island,Hawaii,2002.
- [9] Michael Berger, Makram Bouzid, Mark Buckland et. al, "An Approach to Agent-Based Service Composition and Its Application to Mobile Business Processes", IEEE Transactions on mobile computing, Vol. 2, No. 3, pp. 197-206, July- September 2003.
- [10] MatthiasWagner, Wolf-Tilo Balke, Werner Kiebling, "An XML-Based multimedia middleware for mobile online auctions", Proc. International Conference on Enterprise Information Systems (ICEIS), pp. 934-944, 2001.
- [11] Hannes Frey, Johannes K. Lehnert, Peter Sturm, " UbiBay: An auction system for mobile multihop adhoc networks" , Proc.Workshop on Adhoc Communications and Collaboration in ubiquitous Computing Environments (AdHocCCUCE'02).2002.
- [12] Nam-Je Park\*, You-Jin Song, " M-Commerce Security Platform based on WTLS and J2ME", Proc. IEEE International Symposium on Industrial Electronics(ISIE), Pusan, Korea, pp. 1775-1780, June 2001.
- [13] J2ME: Step by step  
[www.digilife.be/quickreferences/PT/J2ME%20Step%20by%20step.pdf](http://www.digilife.be/quickreferences/PT/J2ME%20Step%20by%20step.pdf)
- [14] Urs Steiner,"J2ME"Introduction, Configarions and Profiles".  
[www.ifi.unizh.ch/~riedl/lectures/Java2001J2me.pdf](http://www.ifi.unizh.ch/~riedl/lectures/Java2001J2me.pdf)
- [15] Java Platform, Enterprise Edition  
[java.sun.com/javaee/downloads/index.jsp](http://java.sun.com/javaee/downloads/index.jsp)
- [16] Java™ 2 Platform, Enterprise Edition Technical Overview (J2EE Overview).  
<http://java.sun.com/j2ee/white.html>
- [17][http://java.sun.com/products/sjwtoolkit/download-2\\_2.html](http://java.sun.com/products/sjwtoolkit/download-2_2.html)