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Mobile Internet based M-Commerce Management Architecture & System*

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Abstract

The mobile Internet exists already in very many forms on the market. However, there are definitely still a lot of possibilities to improve the current concepts and solution, and thus a lot of room for future R&D activities. This paper is divided five parts as followings:

First of all, introduction; Secondly, the basic concept of mobile Internet is introduced, and its' development status is described simply; Thirdly, the process of coming into being M-commerce based on Internet and the existing modes of M-commerce are discussed respectively; the differences between E-commerce and M-commerce are also shown in the paper; Fourthly, an M-commerce system model is presented, the model involves its' basic elements such as hierarchical architecture, management mechanism, system decision-making, application procedure etc; Fifthly, development trend and application fields for coming the new economics times are forecasted; Finally, how to build a M-commerce management system and make applications for business via CERNET** (one of the biggest Internet platform in China) are introduced primarily in end of the paper.

1. Introduction

The booming Internet provides to people many conveniences and unlimited business chances. E-commerce has well known, for example, is one of the modern business models, nevertheless novelty mobile Internet is emitted today along with developing Internet & mobile communication technologies as well as people's imperious demands progressively. However, the mobile Internet is enlarging application fields of Internet-based E-commerce, at the same time, it opens up another way for suiting the future business. Therefore the mobile Internet-based named M-commerce (mobile commerce) is appeared slowly in the forefront of new economics times as a novel commerce mode. Nowadays "Mobile" has used widely in many fields with correlative daily life, such as mobile finance, mobile office, mobile mailbox, mobile classroom, mobile hospital, mobile bank, mobile phone, mobile computer, as well as mobile battle so many "mobiles," they are popular in kinds of social and economical fields, and more and more press close to people's daily life, their mutual "mobility" is achieved by the mobile Internet. So we can regard justly the M-commerce as a capacious stage for the future business based on developing rapidly Internet, it is not only a

novel business mode but also a landmark effecting home social development and human behavior, and it can also supply an opportunity to span some stages of economical development for the developing countries.

In the near years, E-commerce has been discussed widely despite there isn't uniform appraisal. However in the modern information society, E-commerce is an inevitable result of technique development and society progress, on the other hand it is also an innovation special for the developing countries, and its' progress is suffocated because of its' juvenility and imbalance in the global information industry. Whereas E-commerce is one of important step for the inevitable global information process, it is the means resource of new economics. In the new economics times, M-commerce will become a main mode of E-commerce, hereby it is important and necessary that understand and research M-commerce facing the coming "mobile times".

2. Mobile Internet and Its' Current Status

Mobile Internet is a large-scale and expansive application platform that be consisted of mobile communication system and Internet architecture, as well as relative advanced information technologies. The current status of M-commerce is shown by some characteristics as followings: Firstly, the M-commerce services is mushrooming to become a large-scale industry in some developed countries, but it is very imbalance over whole world, especially for developing countries such as the poor Africa country; Secondly, so far there isn't an integrated system architecture & uniform management model for M-commerce in the world; Thirdly, some factors such as techniques, management, society credit system, and so on, they can't yet ensure absolutely the reliability of some M-commerce applications, this is a very important factor that restrict farther development and enlarging application fields of M-commerce in the future. Fourthly, lack of uniform fare rules, for example, there isn't fair and reasonable model for measuring all M-commerce trades between company and company or company and customer, the existing incomplete model can't accept by all traders and customers yet.

3. Existing M-Commerce Mode

"Limited fast-moving" is an important character of existing M-commerce mode. The existing M-commerce mode is developed mainly from the original shape based

on E-commerce, as has known, E-commerce have two main modes—B2B and B2C, however, M-commerce is depend mainly on mobile Internet to make business. Nowadays, mobile communication is developing to 3G and 4G and Internet is trending to next generation Internet (NGI)[1], there are many difficult problems are faced to take in setting mobile communication system and NGI, now typical applications of M-commerce are limited in some developed countries such as American, Japan, Europe etc., nevertheless party of functions are applying in developing countries, for example, SMS (Short Message Service) ect. is becoming an industry of mobile Internet in Chinese Mobile & Internet Industry[2]. As a whole, M-commerce is provided with “fast-moving” but it’s limited application in the world.

4. M-commerce Management System

M-commerce management is a very complex procedure; it is deal with PSTN, mobile communication and other relative telecommunication management elements, as well as Internet management architecture. So it isn’t easy to make a set of uniform M-commerce management system depend on different modes. The basic element of the M-commerce management model is given in this section.

4.1 Hierarchical Architecture

Like hierarchical directory structure of computer network, M-commerce management system can divide five levels:

- Integrated level (core—No.5)
- Application level (swap—No.4)
- Transmission level (ware flow—No.3)
- Network level (information flow—No.2)
- Physical level (platform—No.1)

4.2 Management Mechanism

In M-commerce system, it is farthest to implement a self-governing. Besides some Man/Machine control units in integrated (core) level as a makeup during machine processing, other levels there aren’t any manual work control. For example, the management system firstly gets the business information from the network level under the uniform physical platform; then the information is integrated to input the wares flow data; after then the system starts dealing with the trade depend on the systemic authentication, finally all business are finished by the start (level No.1)—end (level No.5) loop of M-commerce.

4.3 Decision-making and Application Procedure

Decision-making is one of key elements of M-commerce management system; it is correlative directly with the system architecture and its’ application. In the paper we use HAS (hierarchy-system-analysis) method [3] to make decision-making model of M-commerce manage-

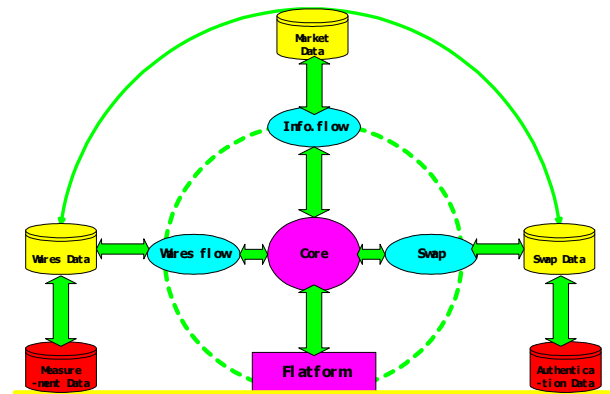


Figure of an application procedure for M-commerce

ment system. M-commerce management system although can shown simply by hierarchical architecture as 4.1, but it have many subsystems consist in each level, so we need build a large application data named core data is consist of lots of sub-databases, such as market data, ware data, swap data, authentication data, measurement data, and so on. For the length of paper, we give a figure only to express simply the application procedure of M-commerce management system as above figure.

5. Development Trend and App. in China

M-commerce farther develop lie on the future mobile communication system (e.g. 3G and 4G ect.) and NGI.

Mobile communication is very large market in the world, especially; China has seen rapid growth in mobile phone subscriptions during 1999 to 2001. Today, nearly 200 million people subscribe to mobile phone service in the country. Estimation shows that the number of mobile phone subscriber will over 230 million in China by 2003[4], thus attaining the critical mass necessary for M-commerce to bloom. NGI plan has started in the world, e.g. NGI& Internet2 in America, GÉANT in Europe, APAN in Asia-Pacific, CA*NET in Canada, IPv6&NGI in China and Japan, and so on.

M-commerce will develop rapidly through mobile Internet platform provided by the future mobile communication system and NGI. Its’ applications will more close to people’s daily life, for example, anyone can use any device to contact each other or take their any business in anywhere at anytime, people can also arrange their housework by the mobile Internet even he/she isn’t in the house. Chinese mobile carriers are optimistically predicting 300 million phone customers accessing the Internet by WAP or more advanced protocol such as 3G or 4G on hand-held devices in about two or three years [5]. Therefore mobile Internet is still an attractive new market.

Future wireless Internet terminal are expected to compose three functions: communication tool, personal wallet or credit terminal, personal secretary etc. But there are some problems that let customs look over and steps back: technology is still not mature: WAP and GPRS (3G, 4G) technology is only to march toward the first step that

mobile interconnection, transmit speed and stability are not satisfied enough, input difficulties yet no solution and there is no rich, effective applications. If we cannot solve these problems, mobile Internet could only be remaining as a concept to affect M-commerce farther develop.

Altogether, some key factors for the M-commerce development in China could then be summarized as:

- ★ With the popularization, charge rate will become more and sensitive to utilization of M-Internet.

- ★ New technologies will bring opportunities for M-commerce.

- ★ Regulation policy and business model are both key issues for the growth of M-commerce in China.

6. CERNET Introduction

CERNET [6] is one of the biggest Internet platforms in China. Nowadays, the network is consisted of 8 GigaPop center nodes, 36 MigaPop main nodes, connecting cities over 160, members over 900, users over 9 million (latent users over 320 million). There are many testbeds such as IPv6 testbed between China and Japan, 3Tnet, NSFCNET, CERNET and CERNET2, they are connecting to Internet2 and APAN ect., it will become one of the most important application platform for M-commerce in the future in China.

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** CERNET means China Education and Research Network (CERNET for short)

Autobiography

Qinghui Zeng (qhzheng@cernet.edu.cn, <http://www.edu.cn>) received the PhD degree in information & communication engineering from Huazhong University of Science & Technology, China in 2001.

He is currently a member of IEEE, IEEE-CS and CSEE. He is also a senior member of CSSE. He was awarded the top paper prize in information management engineering from National Information Center of China and second research prize in computer control and its application in electronics and information systems from CSEE, and top doctoral prize from Huazhong University of Science & Technology and the top graduate student prize from The Eastern Communication Co., LTD., He has published more than 50 papers in domestic and international journals such as IEEE, IEE, ICEE, Chinese Journal of Electronics, Computer Application, System Engineering, Decision Science & Application, High Technology Letter, Computer Engineering & Application and the proceedings of International conference on Management/Telecom/Industrial/ Engineering ect..

Dr. Zeng is currently studying in Network Research Center of Tsinghua University as an associate professor & senior engineer and working in Tsinghua University as a postdoctoral researcher of Department of Computer Science & Technology of Tsinghua University. His research interests are information & communication engineering, information management & decision-making system, mobile wireless Internet, network economics, mobile multimedia communication, intelligent information processing, hierarchical fuzzy control technology and their application.