APPLICATION RESEARCH OF WIRELESS EQUIPMENTS IN PLM

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Abstract: The approach of the extend to wireless terminal equipments from enterprise's PLM system was investigated , using Peer-to-Peer technique which is based on java, putting stress on solving the technical framework and key technologies of wireless equipments in application to PLM system, giving its apply form and integration model in PLM system. The results shows that, the WPLM system that using the technical framework meets enterprise's need of cooperation design, extends enterprise's cooperation working environment to wireless field, carves out a new space for PLM.

Key words: JXME (Java2 mobile edition); Peer-to-Peer; WPLM (Wireless Product Lifecycle Management)

1. THE PRESENT SITUATION

1.1 The general situation of PLM

The PLM is under the environment of Web, based on the product dada integration within whole life cycle, investigating product's management and cooperation from product layout, design, manufacture to distribution and so on within its life cycle, aiming at reduce the time which products come into the market and lower the cost, providing integrated product's cooperation and manufacture system which sustain product rapid design and optimal scheduling of manufacturing for enterprises. It is a strategically thought way[1].

Thanks to the fast development of advanced wireless technique and wireless equipments presently, it provides possibilities of adding wireless accessing functions for PLM system.

Please use the following format when citing this chapter:
Zhou, ChuanHong, Shi, Yong, Wang, Qiang, 2006, in International Federation for Information Processing (IFIP), Volume 207, Knowledge Enterprise: Intelligent Strategies In Product Design, Manufacturing, and Management, eds. K. Wang, Kovacs G., Wozny M., Fang M., (Boston: Springer), pp. 625-630.

1.2 The general situation of wireless equipments

Applying wireless equipments to PLM system , the significance lies in no matter whether the employee is using wireless local area network in factory area or the employee in other places can all accessing electronic product data and enterprise information in time and conveniently, it contributes to the improvement of employee's work efficiency and enterprise's information degree. Besides, as the wireless network technology become more and more mature and popular, its price is far lower than traditional wire network, .it has more advantages to enlarge PLM technology's extent.

2. WIRELESS EQUIPMENTS' TECHNOLOGY FRAMEWORK AND KEY TECHNOLOGIES IN APPLICATION OF PLM SYSTEM

2.1 Technology framework

The system structure of applying wireless equipments to PLM system is shown as Fig. 1:

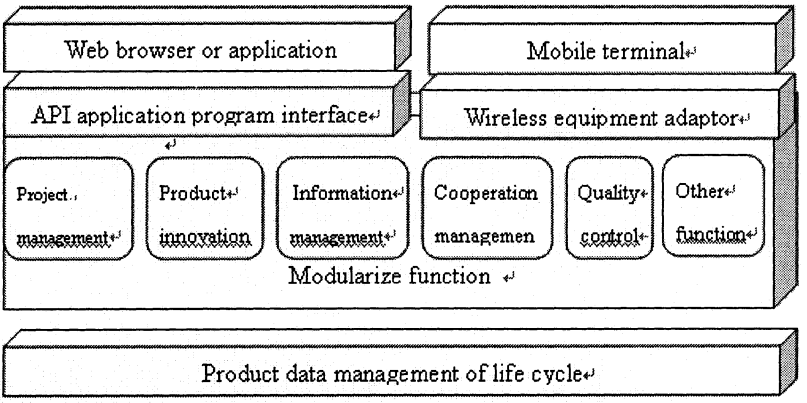

Figure 1 the system structure of wireless equipments in PLM system

Based on traditional PLM system, the PLM system which accessed to wireless local area network has added wireless equipment adapter and increased mobile terminal at client.

According to the description of whole system structure above, the following physical structure of wireless equipments in PLM system is put forward.

Accessing way can make those customers using mobile terminal such as PDA, mobile telephones, pocket computers accessed into wire power grids under mobile environment, so as to achieve WPLM (Wireless Product Lifecycle Management) system operation environment.

2.2 Key technologies

In hardware aspect, present wireless network equipments mostly use 802.11 protocol, compared with other protocols, it has some advantages such as high data transmission efficiency, far transmission distance, performance stabilization, According to Palm's practical application environment, selecting appropriate wireless equipments is the key of successfully making PLM system wireless.

In software aspect, the software applying to mobile terminal mainly adopts JXME used for mobile equipments——the J2ME platform based on JXTA technology.

J2ME is developed for those equipments using limited energy, limited network connection (often wireless connection) and limited Graphics User Interface faculties. There are great differences between hardware platforms which sustain J2ME, Among them there are more high- tech equipments, for instance: TV STB,IPTV and so on; there are also low-tech equipments, such as: mobile telephone, pager, PDA and so on. J2ME aimed at hardware's qualifications such as data processing capability, memory capability, network connection capability decided CLDC (Connected Limited Device Configuration),CDC(Connected Device Configuration)configuration and MIDP（Mobile Information Device Profile） description.

JXTA technique apply itself to create a universal platform, set up special service and application of peer-to-peer and distribution in simple and effective ways, making developers avoiding the necessity of considering how to solve the technique problems of P2P computing excessively, then they can absorbed in how to achieve and perfect high level application of extendable, better interoperability and usability[2]. JXTA makes use of some protocols, each protocol can achieve and integrated into P2P service and application easily, thus between different P2P systems ,it is easy to communicate with each other, work cooperatively and provide service for the opposite. JXTA was designed to which independent of program languages such as C or JAVA, platforms[4] such as WINDOWS or UNIX and network platforms such as TCP/IP and Bluetooth. Furthermore, JXTA was designed to which could be realized on any digital equipment, including sensor, mobile telephone, PDA, network router, desktop computer, server and memory equipment[3].The network structure of JXME is shown as Fig. 2:

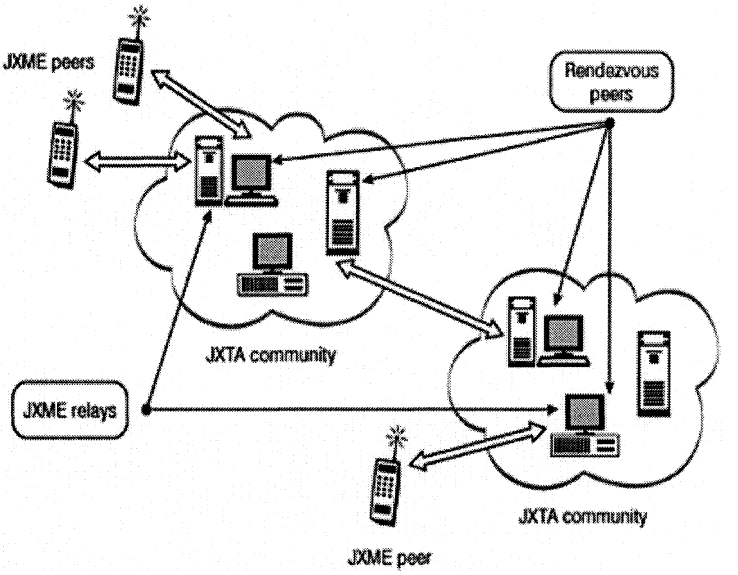

Figure 2 JXME's network structure

By using JXME technique to achieve mutual transfer of mobile peer information, the load of wireless network can be reduced greatly, the access speed of data can be improved, and accordingly guarantee is provided for the abroad application of wireless network equipments.

3. THE APPLICATION MODE AND ISSUES REQUIRED TO BE SOLVED OF WIRELESS EQUIPMENTS IN PLM SYSTEM

3.1 Application forms

The wireless equipments in PLM system are mainly digital terminal (mobile telephone, PDA, pocket computer etc.), wireless network interconnection equipments (wireless access point, wireless network card, wireless network bridge and wireless router etc.), these equipments have many application styles.

1) Flow's examine and approve

In WAN or LAN, by accessing operation interface of PLM system based on web, using mobile terminal such as PDA, mobile telephone to process flow's examine and approve timely and accurately, personnel's work efficiency can be increased, the workflow can be processed successfully.

2) Close integration with PLM's manufacture

PLM's effect run through product's every step from layout, design, manufacture, distribution to discard. Among them, wireless equipments in application to manufacture step is of realistic significance. In manufacture environment, via mobile terminal it could access upstream product design data real time, for example, design BOM, product change information, the problems occurred in production can be changed and solved in time. At the same time, in bigger workshop, every machine's work information can be seen rapidly by using wireless equipments.

3) Close integration with PLM's product distribution and the after sales support

Applying wireless equipments to PLM system can provide product's correlative information and technical supports for customers at any time and anywhere, reflecting customers' requirements to product design department through mobile terminal, thus it can rapidly response customers' requirements, increase customers' satisfaction. In the same way it's also helpful to serve staff to improve work, shorten serve turnover time, and make enterprises increase its after-sales service income.

3.2 Problems to be solved

1) The security problem of wireless LAN

JXTA Version 1.0 provides the following security primitive:

A simple bank supporting Hashfunction（such as MD5）,symmetric encrypt algorithms（such as RC4）and asymmetric encrypt algorithms（such as RSA）; a distinguish framework; a simple entry strategy based on password; a simple access control mechanism, this is based on peer group, the member of a group automatically authorized accessing other member's share data; security transmission strategy based on SSL/TLS[5].

2) The conversion of photograph format

The photograph of mobile terminal such as PDA, mobile telephone mostly adopts BMP, JPG and GIF formats. As for PLM system based on web, the transmission of Common JPG and GIF photographs haven't much problems, but for three-dimension CAD photographs of special formats ,it still require to change them into BMP,JPG and GIF formats that can be received by PDA, mobile telephone at server end through photograph format transmission.

3) Data compression:

As for mobile terminal requiring mass access to all kinds of product data, the present transfer rate of wireless network data is difficult to meet the requirement. So better data compression technique requires to be developed to meet the increasing data visiting quantity.

4. EXAMPLE OF FLOW'S EXAMINE AND APPROVE

In the example of flow's examine and approve, we can create and start a new flow from mobile terminal such as PDA, mobile telephone and so on or general computer, besides, task flow can be successfully processed by decisions such as permit, veto, unsettled etc. between different mobile terminal even fixed terminal , consequently increase personnel's work efficiency.

For example, starting flow's revise, examine and approve of some part in computer, when the personnel who hold mobile equipment received the examine and approve task, he will make out decision such as permit, veto, unsettled, consequently ensure flow could be processed immediately and successfully.

5. REFERENCES

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