

A Study on Wireless Banking

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Apr, 28, 2002

Abstract

Wireless banking is a convenience we all want to take advantage of, and one that financial institutions are eager to have implemented as soon as possible. While the pressure to implement wireless-banking services is great, and its development and implementation are challenging, care needs to be taken to avoid the potential risks. Therefore, I will choose this topic to point out the most important part of wireless banking for people.

According to human's history, business is very important activity in people life. Computer development is to help people develop human's life. Therefore, combining computer business with computer networking is a very important job in this new coming generation. We will deeply view several subjects such as some technology today's wireless technologies, wireless banking in our future, WAP wireless banking application, Taiwan's wireless banking, and how to use this wireless system to make it more useful in our life. Finally, I will point out my central goal and my conclusion.

Keyword:

WSP : Wireless Session Protocol.; WTP: Wireless Transation Protocol ; GRPS: Gernal Packet Radio

Introduction

No longer in our future, the devices we use today, such as voice devices, DVD, PC desktops, cars, and appliances, will be interconnected. The controls for these devices can be centralized in a portable wireless console. From your car, you will be able to use your wireless console to select music from your PC in your home and start baking a cake in your oven. Multimedia will play an increasingly more important role in this wireless world.

Provides wireless optimizations for standard IP communications is including header reduction, IP packet compression, IP filtering, and Transmission Control Protocol (TCP) protocol optimization to address wireless network latency and constrained bandwidth for Windows and Windows CE-based clients. Also we are already learning some working in Distributed computer operated system such as RPC, RMI, Multicast, and CORBA.

Moreover, provides highly scalable caching functions on a server to reduce bandwidth costs and improve response times when processing Web addresses. I will like to call it, Web sport anywhere (WSA), I mean is Web sport everywhere. In addition, this (WSA) Edge Server dynamically monitors and load balances activity across the set of (WSA) Everyplace Suite processors that are deployed in a configuration. This is my Wireless Banking idea beginning.

Before we are into topic, we need to know about some service. There is Wireless Session Protocol (WSP), Wireless Transaction Protocol (WTP), Wireless Transport Layer Security (WTLS), Bearer services - Short Message Service (SMS), IP bearer services such as General Packet Radio Service (GRPS). When I study this topic, the most difficult is to learning those subjects.

Taiwan Wireless Banking

In recent years, Taiwan computer technology was to grow fast, such as CPU manufacturing technology and 12 inch silicon chips research. In several weeks ago, Taiwan will be open market in order for product about 12 in silicon chips. Therefore, Acer group will prepare to build facture for setting foundation of future need. In this March, Taiwan is first time to using Wireless Banking Tax payment system. It is support by Acer computing system and Panda Co Group.

Taiwan's largest mobile network operator Taiwan Mobile recently began offering mobile banking services throughout several provinces and municipalities. Collaborating initially

with three leading banks -- the Bank of Taiwan, the Industrial and Commercial Bank of Chang-Hun, and Taiwan Commercial of First Bank, Taiwan Mobile will provide these services to some half million subscribers in the initial phase. Users will be able to access their banks via mobile phone for transactions such as checking bank balances, paying phone bills, and transferring funds between accounts. Several million subscribers are expected to benefit from the service by the end of this year. Other banks are now talking with the company to cooperate in this service, according to a Taiwan Mobile official. Taiwan Mobile is also planning a range of other new services for the future, including a stock-trading application, which is scheduled to be unveiled in the coming months. Taiwan is first time to use java-compatible (Wireless Banking System) WBS cards provided by Acer Computer Group, which are capable of being upgraded as needed, Taiwan Mobile will easily be able to extend its service range, said the company official.

Wireless-Banking technology

As we know very well about Bluetooth; there is support for wireless to develop in banking service that is a global standard for wireless connectivity.[5] If this technology can fix into wireless banking system, I will like to call this technology system for wireless-Banking technology system. It is a low-cost technology that provides short-range radio links between mobile devices such PCs and mobile phones; we can use this technology fit into our wireless banking system. It enables users

to simply and easily connect a wide range of computing and telecommunications devices without the need to buy, carry, or connect cables. And also there allows users to surf the web with their laptop while their mobile phone is in their briefcase. Also, information such as recent interesting rate and paycheck data can be exchanged easily to check. However, bluetooth have some technology difficult to overcome, such as interrupts, and only for local area.

There are some benefits for that should have more and more manufacturers adopt this technology and create devices that support it, developers will find new, previously unimaginable ways to apply its power. Imagine entering a bus and your fare is automatically paid by your mobile phone. Or you can connect with at home. This technology is one of the key technologies that can make the mobile information society possible.

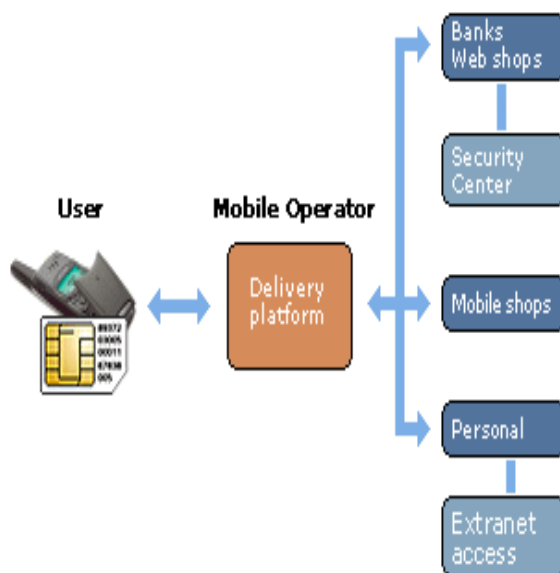
On the other mode, it is famous I-mode, which is Internet model. I know that is one of the world's most successful services offering wireless web browsing and e-mail from mobile phones. Therefore, customers can easy carry and easy online transfer banking account. Whereas until recently, mobile phones were used mostly for making and receiving announce, i-mode phones allow users also to use their handsets to send their request, access various information services, and communicate via email with banker. In Japan, i-mode is most popular among young users, 24 to 35 years of age. The heaviest users of i-mode are women in their late 20s. When using i-mode services, you do not pay for the time you are connected to a website or service, but are charged only according to the volume of data

transmitted. That means that you can stay connected to a single website for hours without paying anything, as long as no data is transmitted. Usually, the banking service is not working for long data transmitted, only for short request and short response.

In last paragraph, I am already point out about i-mode technology, invented in early years ago, is at processing in mobile Internet accessing system. It has become using in wireless banking exam success in Japan. In this I-mode technology system, which allows users to access everything from e-mail to restaurant guides to interactive games on their mobile phones, started with zero users in three years ago, I think that is starting in 1999. (I was reading this information from TIME magazine.) It now has as many as 20 million subscribers and the potential to be a leader in Internet service.

Technically, i-mode is an overlay of NTT (Networking Technical Tip) ordinary mobile voice system. While the voice system is circuit switched (that is, you need to dial-up), i-mode is packet switched. This means that I-mode is always on, in principle, provided you are in an area where the I-mode signal can reach you. If banker send announce, look at the day of pay check, view international trade results, load transmit data into their handsets, play games, do online pay tax and online stock trading. And also in your life, you can look at weather forecasts, view sports results, load music into your handset, and look for restaurants, chatting with friend, finding girlfriend/boyfriend and new friends. The i-mode technology uses cHTML, a subset of HTML, and is easier for Web site developers to learn than the wireless markup language (WML). According to the book, I-mode

Java-enabled telephones can use the currently deployed i-mode network architecture. Downloads from sites will be handled through cHTML; and the HTTP protocol, uploads, and data transfers from i-mode Java-enabled telephones also will be handled by cHTML.[1] The main subject in this paragraph is to use this I-mode in wireless banking. That is my idea from learning using I-mode in several weeks ago.



Finger 1 [7]

Third-Generation Technology

When I was born in 1970, first generation in mobile technology started. At that time, only 8 bits personal computer just starts (PC) it. Then the second generation, which I think to begin in the 1990s (or around 1990 my college life) and it is still being used today, such as cellular digital packet data (CDPD), code-division multiple access (CDMA) and Global System for Mobile communications (GSM). The third

generation of wireless will come soon. I will assume it is expected to reach maturity between 2003 and 2005. Third Generation is expected to deliver enhanced voice and data and possibly video that we can access our banking account in anywhere. We just need bring our handset, and computer machine will recognize the customer's voice and video view. And also its bandwidth can be as high as 2Mbps and it will operate at 2GHz. It is good enough for wireless banking system processing document and image transfer. Together, these form the foundation for advanced mobile Internet services, including personalized data processing, signature recognize, finger print recognize, and unified messaging, encompassing high-speed data, superior quality customer's voice and video, and location-based services. Wideband Code Division Multiple Access (WCDMA) provides[2] a highly effective use of radio spectrums at 2 megabytes per second, which is a much higher data rate than other radio technologies today. The higher bandwidth that WCDMA provides can deliver the full potential of 3G. For example, WCDMA allows simultaneous access to several voice, video, and data services.

As I know EDGE (Enhanced Data GSM Environment), a faster version of the (Global System for Mobile) GSM and (Code Division Multiple Access) CDMA wireless service, is designed to deliver data at rates up to 384 Kbps and enable the delivery of multimedia and other broadband applications to mobile phone and computer users. The EDGE standard is built on the existing GSM standard, using the same (Time-Division Multiple access) TDMA frame structure and existing cell arrangements. We can notes

that its base stations can be updated with software. And also I believe that project to be available in this year 2002.

CDMA2000 or TDMA2000 is an effective third generation standard for the delivery of high-bandwidth data and high-capacity voice services. For example, huge customer data could be solving. It will not have any problem to transfer customer data. The evolution of the cdma2000 standard will enable mobile systems to offer data throughputs of 2 megabytes per second and beyond. The higher bandwidth that cdma2000 provides may deliver the full potential of third generation technology. For example, cdma2000 allows simultaneous access to several customers voice, video, and data services for wireless banking system. cdma2000 may be implemented in the existing frequency bands of CDMA and TDMA at 800 to 1900 megahertz,[2] as well as in a new spectrum at 2 gigahertz in Japan.

To meet the needs of customers, third generation e-business must access information anywhere at any time through any device on any network. The global Internet economy, built around desktop PCs, is expanding to incorporate a galaxy of smaller, simpler devices, including mobile phones, smartphones, handheld companions carried by mobile workers, in-vehicle information systems in cars, mobile banking accessing, stock trade processing, and more. Pervasive computing is comprised of these devices. Incorporating these devices into your network and enabling your business applications for them expands an enterprise into pervasive e-business.

General Packet Radio Service Technology

General Packet Radio Service (GPRS) technology enhances the present Global System for Mobile (GSM) communication and Time Division Multiple Access (TDMA) networks that introduce packet data transmission[2], which enables always on mobility. This means that the user can choose to be permanently logged on to banking account, customer request accessing, and other services, but not have to pay for these services unless sending or receiving information. When Enhanced Data rates for Global Evolution (EDGE) is added to GPRS, these data rates can increase up to 384 kilobytes per second.

Adding new packet data nodes and upgrading existing nodes to provide a routing path for packet data between the mobile terminal and a gateway node will implement GPRS. The gateway node provides interworking with external packet data networks for access to the Internet and intranets. The advantages are faster data speeds and continuously connected mobility, almost instantaneous connection set-up, and connection to a plethora of data sources around the world, through support for multiple protocols, including Internet Protocol (IP). Uses include wireless banking; wireless gaming, account transfer, paycheck notice, interest rate issue, sports betting, stock trade business, horse racing, quiz, yellow pages, mall search, Microsoft Chat, e-mail, and file transfer protocol (FTP).



Finger 2 [7]

Our future Wireless Banking

Today's banking and trading institutions realize that they must move quickly to capitalize on new business opportunities in wireless banking and trading. Resistance to implementation of wireless banking can lead to major losses at the business and market-share levels. Wireless services soon will be a necessity for the end-user. Although many technological barriers need to be overcome, it is imperative to embrace the change. Wireless banking and trading is only an extension of the product offerings for the financial institutions. It is not an extension of Web technology, as is often perceived. Online banking and online trading works from standard TCP/IP (Transmission Control Protocol/Internet Protocol) connection to the Internet using a PC, while wireless applications present a much greater challenge that we can see today which wireless banking lacks leadership in enforcing one standard. Even we have difficult economic condition today that

we still can find a good way to keep going in our future. CS is right track to going on your future. I was finding several network standards in last week, personal digital assistant (PDA) standards[1], browsing standards and protocol standards, etc. In the wireless world, airwaves are the only vehicle to send and receive data. Depending on the physical location inside or outside of a building, near or far from a tower, in a small town or a metropolitan area quality is highly variable.

Non-repudiation is one of the most contested issues in wireless banking and trading. The user needs to have proof that the transaction has been executed and confirmed. Wireless banking is revolutionizing the make-up of every financial and banking institution. It is radically transforming the services, needs and expectations of societies across continents, regardless of culture. In the next 24 months (or I can say about two years) and beyond, massive changes will occur in the way that people interact with banks and trading institutions regarding their business and personal finances. The revolution is driven by the client (end-user) demanding to have the information available conveniently anytime, anywhere. Immediate access is expected and required. Change at the institutional level is not an easy task. Adaptability and flexibility are needed when dealing with a variety of legacy systems, connectivity issues, protocol challenges and a constant explosion on the market of new devices. Large institutions are handicapped by their size and have to become aggressive to keep up with the rapid times. Today, business-to-business, business-to-consumer, business-to-government and business-to-enterprise are recognized to be vertical online

markets. Wireless is going to subdivide these markets and new services will emerge targeting new user groups. Data managers and system developers are expected to offer more effective and efficient methods in data delivery anytime, anywhere using any device, regardless of platform, protocol, browser, service provider or financial institution, etc.

Future Finance

The number of people accessing personal account information online will grow from few people from last generation to grow up to huge people in next generation. Given the numbers, banks and other financial providers must realize the opportunity inherent within Internet and wireless capabilities.

According to the Time magazine, approximately 100 million people in the US will have wireless, non-PC Web access by 2003 against many millions that will have landline access from PCs. This deduces that non-PC access will grow to very high percentage of the wireless PC access market within the next several years.

Wireless Banking Executive

Person-to-person and person-to-anyone (or any thing) will follow a major role in the financial world. The social life is changing every day. There will be an abundance of money transfers. When I was high school student, I never hear about that money transfers but now a user can make a payment, have it automatically deducted from the appropriate account and deposited into the recipient account with an e-mail (or handin electric customer request such

handin program in our department) acknowledgement. Then we can see that wireless banking and trading advantages are increasing daily due to a rapid advancement in technology, rapid growth in wireless coverage, cost reduction in networking and improvement in hand-held devices as well as bandwidth efficiency. In recent year, far more can be accomplished in wireless services, where it was not cost-justifiable a year ago. Then service will be better and better, the cost will cheaper and cheaper. With that in my mind (or for my thinking), wireless service providers (WSPs), corporations and financial institutions can rely on the growth and take advantage of these opportunities. Today, who is the winner? The winners in today's wireless world are those that keep up with the change, cope with the challenges and utilize the products and services that are offered. Getting more as new as data information, you will be winner. Why online gambling and porn web site could all over the world? It is because service change to customer's need. In same thing, financial institutions must drive to enhance the systems delivery to create layers of an open system environment. Those that will use standard protocols will expand and thrive. Successful wireless implementation is delivered when the end-user (or customer) can interact with the data easily, securely and independent of a network operator or hand-held device. Why windows can dominate end-user market? It is because user friendly.

Concept of Wireless Banking

There are two-way to paging devices, such as RIM and Palm OS. Smart phones and Wireless Application

Protocol (WAP) phones could use into this system. Operating systems is a software program that manages the basic operations of a computer system that I was leaning in this semester. Windows CE this is a light version of Windows, developed by Microsoft. Most of people well know about Windows, the reason is that it is user-friendly. [2]It is installed on many of the PDA devices; Palm OS this is developed by 3COM's proprietary platform. It is the most popular operating system (OS) on the handset due to the large market share that the Palm Pilot owns today. And also it is very low cost and well knows using software. It supports some Java applications(I think,I am not sure); Linux this is very promising for growth. It has an open source base, is Java friendly, very efficient and it can be installed on many PDA devices and on smart phones; and EPOC The Symbian consortium drove the development of this C++ OS mostly for smart-phone devices used by Ericsson and Nokia. However, most of handset is using windows service to support its edition. But EPOC is one of the major OSs in this market. Each one of these handset devices will require certain ways of communicating they require their own gateways to communicate to the application servers. Moreover, various sizes of screens create different data and screen layouts. Different keyboards (or type-set) generate different navigational options and different keys. The challenge is for the application server to sort out these devices and sending the data in the correct format to each handset device.

Mark-up Language

Wireless application is where the flow of data is controlled, rules are set

and configuration files are executed. That mean is fixing for using right language to apply for wireless application. The application software should be an open system that is easy to connect to and talk to other systems. One of the most common methods of communicating with back-end systems (or in-door system) is using extensible Mark-up Language application programming interface (XML API) as the data delivery tool. Consider writing this paper, I was taking some learning in last semester such as Mark-up language. XML is used to extract and deliver data. Extensible Stylesheet Language (XSL) can perform the transformations, using the Document Type Definition (DTD) files to execute the functions agreed on in the integration and design stage. Different hand-held devices have different screen templates. The application server should track the user's sign-in by the device being used in order for data to be presented correctly. The device-specific screen templates can be XML documents that conform to DTD files and are used only to define the layout of the screens.

Transcoding is the process of formatting the content (data) according to the hand-held device request using XML, XSL and DTD file.[4] This method will enable the end-user to access data, regardless of the device type. In addition, once a request from a hand-held device is initiated, the application server will intercept the request to identify the device type and capture the content. Using several logical processes, the application server engine will process the data into an XML document, which can be communicated with the back-end system(or insider system) via the API connection. The result of the requested data will be transformed

(processed) using XSL and reformatted for the hand-held device that made the request initially. This process can become complex quickly, depending on the number of hand-held devices that are supported and the type of services offered by the financial institute. Therefore, products like IBM's WebSphere can be valuable tools to build a robust financial system in a short time.

Banking Data Management

For data management, we need to consider about User login and data controlling. The application server can use common device characteristics to display the data, which can help in development productivity. User IDs and hand-held- device Ids (or handset Id) are stored in the database at the application server level. The application server will access the database once a login request is received. The middleware database is used to prepare and format the data for the device that is requesting the login. And login Id or User Id should match key Id in database. Before User login, the application server will also compare the registered device ID to the user ID for additional security verification. The application server communicates with the gateway server for the specific device that initiates the request. Then, the gateway will push the information to the hand-held device according to the connectivity platforms, such as short message service (SMS), Mobitex. The application server must accommodate for the different hand-held platforms, such as thin client devices (IP-based devices), two-way paging, SMS short message service and smart phones. It must deliver the formatted data for that

specific device data accordingly, end-to-end in a reliable and secure manner.

Future Banking System

Push technology is when the application server is in more control over the hand-held device. The application server will make decisions for the basic content and push data to the hand-held device without waiting for the client's request. In both methods, authentication must take place first. First authentication must take place in order to push data to the hand-held device without waiting for the client's request. The gateway transfers the hand-held's request to the application server (it call middleware). The application server will know the device type by its identifier. The information will be sent to the back-end system of the financial institute, using the API(application programming interface) between the application server and the back-end system. The application server will receive the information from the back-end system to report it to the hand-held unit. At this time, the data will be formatted into appropriate screens for the device that requested the data. It will find out client part to send back request. The data will be passed back to the wireless server provider gateway and back to the hand-held device.

In second part of future banking discussion, I will like to point out that the wireless application server must be able to work with any of the networks that are offered by the wireless application providers. It should be easy to install, configure, user friend and add new services to it and to integrate it with other servers and back-end systems. The most important step is integration. It is a successful implementation of the

wireless project. The API of the existing financial institute's system must be reliable and secure. The client application must be easy to install and customer and to add new hand-held devices to it.

The application server must be an open system, using a standard protocol, which makes it easier to add or change services or devices and apply any necessary customizations or user friendly such as windows. And screen scrapping is not recommended as a final solution. As I know that is not a stable solution, and due to the maintenance that is required to keep updating the macro reader when fields are changed in the source document (website). This method can leave more room for error. Screen scrapping is, however, quick to implement, which can be a good tool for data presentation in the proof-of-concept stage.

The explosion of the wireless application industry in this several years or so has resulted in a common misconception that the wireless world is simply an extension to the Internet. While some wireless-enabling companies do use Web-scrapping (or screen-scrapping) a technique that captures screen content and transfers it to a wireless device this technique tends to produce poor performance (I think) and unreliable wireless service. It is because it is more manual labor and maintenance-intensive. The most effective way to build a wireless application system is to connect into the back-end system, regardless of type.

Security in Wireless Banking

Security is one of the most important issues in wireless banking. We were learning security in chapter 7. Why

we need security? The need to protect the integrity privacy of information and other resources belonging to individuals and organizations is pervasive[3]. In this concept, security is very important part for wireless banking, no matter in technology or business view. A recent study on wireless banking security uncovered the main challenge that is facing both wireless banking innovators and online banking establishments. Most of people are worried about online security transactions, including credit card purchases. More than high percentage of people expressed concern about revealing personal information online, such as social security numbers. Over 90% of proprietary cryptography has been broken[3]. Cell phone systems have been hacked. Wireless banking and trading are more vulnerable to attacks by hackers than many other wireless services. When data is flowing across a vulnerable environment, many of the available OSs for phones and hand-held devices offer little or no security. Most security violations occur within the institution or with the service providers. Customizing wireless security is extremely difficult, especially when computing power on the hand-held devices is limited. Double-key-secure (or double password) authentication or more digital of password is one of the protection methods that are used to verify access across different systems. At least eight digital passwords in security pin number. It is as more as digital in password can make more long time to be broken. Double key secure is where the user will authenticate two systems, the application server at the hosting service provider and the financial institution. The transaction will be granted access only when both locations agree. Secure network

architecture is achieved when all interaction points and data paths traveled are implemented using double secure keys (or double password). It has been proven that this method of security can drastically reduce violations and system hacking internally and externally, because all three parties must agree. One of the more common securities used is public key infrastructure (PKI), an encryption used for PDAs and smart-phone security. PKI consists of two keys a public key and a private key used to authenticate the user and encrypt the data. In addition, the financial institution should utilize the system to monitor access logs and flag questionable connections that can be done on the application server. Encryption is a trade-off between speed and security. A good rule of thumb is to encrypt on a 32-bit central processing unit (CPU) at the rate of 10 CPU clock cycles per byte. [5]The most compact software should be used. It should run under 5,000 bytes of memory. Encryption can vary from one device to another, depending on the platform and the OS. For additional protection, authentication can be implemented through user ID and password.

Challenge in Wireless Banking

Wireless banking implementation is demanding. There are constantly changing standards for gateways, security methods, screens, OSs and browsers. There are also variable computing powers on the hand-held devices and different bandwidth requirements. Wireless banking can be risky, lengthy and complicated to develop. Main system must be designed to connect to the existing back-end system. The application server must be

able to accommodate all protocols and devices. The end-user can use any device. The application server must be able to communicate with all gateways, such as WAP, GSM and two-way paging, etc. Transcoding tested templates can make the developer's life much easier. The end result is a robust solution. Consulting companies promise a lot, but only a few can deliver. Since wireless banking is still at its evolutionary stage, companies must keep up to date with new technological advances, products and development tools to help ease the transition. The wireless network must be device and network-independent. Most hand-held devices have their own standards to deliver data across the data channels. The end-user should be able to easily customize screens, alerts, notifications and messaging request services. The system should be able to notify users, regardless of the device type. Scalability is a major issue. Selecting the right platform to run the application server will dictate the available tools. The wireless banking system must be an open system that can easily and reliably be integrated with new gateways to the back-end system. This is a challenge that banking institutions should not undertake on their own.

Application Vendor

The vendor is the important of wireless banking because vendor could control service marketing. And also vendor could effect customers satisfy. The chosen vendor must have developed and installed a wireless financial system and have a wide range of experience. The following are useful indicators. A trusted name and the longevity of the

vendor are important. The vendor must have tested and used the product in a specifically related field. For example, wireless trading is more demanding than wireless banking.

Wireless trading is time-sensitive. Stocks, options, mutual funds and bonds are different services, requiring different tools to process orders. The system must be able to deliver the data flawlessly and quickly to any hand-held device. Wireless trading requires research capabilities. Wireless trading is more active, delivering user alerts, for technology such as watch lists, quotes, charts, reports, notifications, summaries and portfolio statuses. Wireless trading could be using external systems to gather data. The point is to be specific when dealing with application vendors; not all financial services are the same. The testing and quality assurance stage must take place as early as possible to certify the systems. The application or applications must integrate fully to the back-end system or systems themselves, regardless of device type or platform. Management of all users' definitions, events, requests, updates, changes and requirements must be tested thoroughly. Application servers must include monitoring tools and protocol management of all requests. The vendor must have widely available resources and experienced programmers, systems architects and project managers. Additional manpower must be available immediately if needed. References and physical site visits are key to comprehending the consulting, development and hosting environment. The consulting company will be an extension of a business. This is the life link between the company's system and its customers that are using the services. Back-up and catastrophe planning must

be in place. The wireless application system must be network and device-independent. The application should be fully configurable with customizable screens, using standard APIs[5]. The wireless application server must be an open, modular architecture to provide the user with the maximum flexibility and extensibility to make the development and deployment easier. Development tools to enable changes to be made, services added or applications deployed are crucial. Java can transcode, encapsulate the application logic, access XML documents and XSLT (extensible Stylesheet Language Transformation) and define the presentation.



Finger 3 [7]

Successful Implementation

No matter how my paper writing about, successful implementation is the final goal. In fact, wireless users will not be able to multitask using the hand-held devices. Therefore, easier navigation will play a major role in the success of the project. It is crucial to test all users' functionality thoroughly, no matter how tight the schedule is for implementation. Depending on the type of network that is to be implemented, the number of mark-up languages and hand-held devices to

be supported, testing can be cumbersome and complex. It is sensible to use multiple software development tools to test for the real-world users. The financial institution should make use of the following steps for implementation and testing.

Conclusion

Finally, I will like to conclude my topic in this paragraph. Most of people should react to the new world economy quickly and offer what their clients are looking for. I think, there is a great future for wireless banking and it is aggressive in terms of requirements, demands and support. It is great for financial business, but people must be cautious in implementation and execution in order to deliver a reliable service. So far, many variables of wireless media are not under control. As I know, coverage is a big hindrance. Legacy systems with different topologies and different platforms make things more difficult. There will be more streamline markets demanding new ways of conducting transactions. The future of wireless banking and trading has promising magnitudes of growth. In this several weeks, I was reading some resource, I will expects that many millions more people in the US will become wireless subscribers in coming years, increasing the total number to more one hundred million. In addition, the percentage of subscribers with Internet-ready wireless handsets will quadruple during this year. Despite millions of new users, the wireless market can expect some real challenges in the near future. Wireless banking is sensitive to security and it is essential to find the right balance between speed and encryption. In deed, consistent

availability and reliability of the services are key to a successful implementation and the survival of the financial institution. In my idea, geographical coverage is imperative to successful implementation. It must be clearly defined and understood. The confirmation of transactions is key to show the level of commitment and accuracy to customers. Wireless banking is greatly dependent on the efficiency of the bandwidth. The more efficient the bandwidth, the faster the content is downloaded. End-users' requirements are driving a demand for faster transmission and higher bandwidth capacity. In order to offer an enterprise a wireless solution, major industry consortiums must break all political barriers and agree to a global format of communication. The consortiums must arrive at a solution that can access all platforms across all networks, regardless of device type, much like the Internet. The financial institutions would like to extend their services to the wireless world, but they lack the resources and the expertise to implement and deliver to their customers in a timely manner.

Acknowledge

Frank Wu, Bachelor of Computer Engineering in Wichita State University

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