Internet Banking and Arab Gulf Experience

Abstract

Banks everywhere understand that they need to stop operating as a number of solid operational units and act as single integrated enterprise not only their customers are demanding this, but also are the regulators and probably their investors. As this paper shows, the rationale for movement towards the new banking operating environment is compelling and as the NBK (National Bank of Kuwait) and NBO (National Bank of Oman) examples show it is also achievable. The opportunities now exist for banks to overcome the inflexibility and complexity of their traditional operational structure and become true on demand banks. this research only concentrates on the discussion of the requirements of the technology and security . The background of the E-bank is described first, then the need for the Internet Banking, followed by some strategies of how to address the technical and security requirements to help the E-bank to set up the business online.

المصارف الالكترونية : تجربة دول الخليج العربية (الكويت ،عمان)

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الملخص :

يدرك المصرفي ون بأنهم بحاجة الى التوقف عن معالجة عدد محدد من العمليات المصرفية بصورة منفصلة، وعمل مشروع متكامل لايعالج طلبات الزبائن فقط بل تنظيم عمليات المستثمرين والزائرين. ان الفرصة الان متاحة للمصارف للتغلب على التعقيدات وعدم المرونة في هيكلية العمليات المصرفية التقليدية ولكي تصبح اكثر شفافية للزبائن.

توضح هذه الورقة عرض الاسباب للتوجه الى العمليات المصرفية الحديثة ويستعرض تجربة بنك الكويت الوطني (NBK) وبنك عمان الوطني (NBO) كنماذج حققت الهدف.

يركز البحث على مناقشة المتطلبات التقنية والامنية ويوضح اولا مفهوم المصارف الالكترونية ومن ثم توضيح متطلبات المصارف الانترنيتية وبعض الستراتيجيات لكيفية اختيار المتطلبات التقنية والامنية لمساعدة المصارف الالكترونية لوضع اعمالها على الانترنت (on line).

Internet Banking and Arab Gulf Experience

1- Introduction

Electronic commerce is becoming a new way of doing business. It started in the financial area and is spreading to cover all aspects of commercial transactions over the world. Internet banking eliminates the labor-intensive process and thus reduces costs and time in various aspects. Internet banking is an enterprise multi-channel e-banking solution that enables banks to provide full range of banking services and content to customers with different user profiles, efficiently and reliably.

Internet banking integrates heterogeneous and independent systems (WEB, mobile and voice/fax) into a component solution based on uniform security infrastructure, common administration and shared access to bank's core financial information systems. As the Internet technology is growing, some of the Internet commerce issues, such as technology, security, legacy, taxation and privacy, need to be addressed before the bank and consumer can fully take the advantages from it.

2- Importance

Internet has come a symbol of new era in services and banking is inevitably one of the leaders in taking advantage of it. Internet is a technology that spreads faster than any other technology- the use of internet is estimated to double in every hundred days.

The aim of the search is to analyze the provision of electronic banking services and technology requirement with case study.

3- Goal

Technology has dramatically changed not only way we live and work, but also the way we communicate and do business. The financial services industry is also being revolutionaries by constant technology advancement. E-bank is considering to expanding the business to the Internet. Firstly, it will introduce its internet services for local customers, and further down road, it will target to expand to overseas.

The search aim is explaining E-bank internet bank system and it's distributed architecture with their important issues.

4- Electronic Bank

E-Bank is a simple, quick and secure way to bank, delivering a virtual banking branch right to your computer. It is a real-time solution that allows users to access accounts 24 hours a day, 7 days a week. Customers can accomplish banking tasks quickly and conveniently using the Web, Wap, e-Mail or SMS (Short Messaging Service). During the development of the e-Bank system the utmost attention was given to providing efficiency, quality and reliability using the most up-to-date technology.[1]

5- Basic characteristics of the electronic service:[2]

1- Pay bills and make loan and mortgage payments online

2-Check balance and transaction history for checking, savings, loans, money market, and mortgage accounts

3-Transfer money between accounts

4-View monthly statements online

5-User friendly interface

6-Using electronic channels Web, email, SMS

7-Save clients time and money, eliminating paper

8-Available 24 hours a day, 7 days a week

6- Launching of the Electronic banking

The term electronic banking is almost generic in it's nature and therefore its mostly used without any further explanation of definition. It should be reminded that electronic banking is not equal to the term Internet banking although the latter is undoubtedly the most widespread type of it.

Electronic banking includes several traditional services like telephone banking, credit cards, debit cards, AMTs. The more recent additions are Internet banking, mobile banking and digital TV banking. Electronic banking is also known as electronic funds transfer (EFT) and basically is simply the use of electronic means to transfer funds directly from one focusing on Internet banking and other methods have been included mainly for purpose of comparison.[3]

Internet banking refers to systems that enable bank customers to access accounts and general information on bank products and services through a personal computer (PC) or other intelligent device.

Internet banking products and services can include whole sale products for corporate customers as well as retail and fiduciary products for consumers.

Ultimately, the products and services obtained through Internet banking may mirror products and services offered and services include:[4]

- Cash management
- Wire transfer
- Automated clearing house (ACH) transactions
- Bill presentment and payment.

Examples of retail and fiduciary products and services include:

- Balance inquiry.
- Funds transfer.
- Downloading transaction information.

- Bill presentment and payment.
- Loan applications.
- Investment activity.
- Other value-added services.

7- Issues in Internet Banking

Financial institutions, their card associations, and vendors are working to develop an Internet payment infrastructure to help make electronic commerce secure. Many in the banking industry expect significant growth in use of the Internet for the purchase of goods and services and electronic data interchange.

The banking industry also recognizes that the Internet must be secure to achieve a high level of confidence with both consumers and businesses.

Sound management of banking products and services, especially those provided cover the Internet, is fundamental to maintaining a high level of public confidence not only in the individual bank and its brand name but also in the system as a whole. Key components that will help maintain a high level of public confidence in an open network environment include:[5]

- **Security:** is an issue in Internet banking systems. Firewalls are frequently used on Internet banking system as a security measure to protect Internal system and should be considered for any system connected to an outside network.
- **Authentication**: is another issue in a Internet banking system. Transactions on The Internet or any other telecommunication network must be secure to achieve a high level of public confidence. In cyberspace, as in the physical world, customers, banks, and merchants need assurances. That they will receive the service as ordered or the merchandise as requested, and that they know the identity of the person they are dealing with.

Banks typically use symmetric (private key) encryption technology to secure massages and asymmetric (Public/private key) cryptography to authenticate parties.

- **No repudiation:** is undeniable proof participation by both the sender and receiver in a transaction. It is the reason public key encryption was developed, i.e., to authenticate electronic message and prevent denial or repudiation by the sender or receiver. Although technology has provided answer nonrepudiation, state laws are not uniform in the treatment of electronic authentication and digital signatures. The application of state laws to these activities is a new emerging area of the law.
- **Trust**: is another issue in Internet banking systems. As noted in previous discussion, public and private key cryptographic systems can be used to secure information and authenticate parties in transactions in cyberspace. At rusted third party is a necessary part of the process. That third is the certificate authority. Some people think of certificate authority like an online notary. The basic concept is that a bank or other third party uses its good name to validate parties in transactions.
- **Privacy**: is a consumer issue of increasing importance. National banks that recognize and respond to privacy issues in proactive way make this a positive attribute for the bank and benefit for its customers.
- **Availability**: is another component in maintaining a high level of public confidence in network environment. All of the previous components are of little value if the network is not available and convenient to consumers. Users of a network expect access to systems 24 hours per day, seven days a week.

8- Technical requirements

For the technical requirements of the E-bank Internet banking system, the network architecture, client side technology, server side

technology, programming tools and communication bandwidth will be covered. A distributed architecture will be adopted for the E-bank, which provides an open application framework, supports the assembly of business applications from libraries of reusable components providing end-users (E-bank staff, trading partners and customers) with applications and information. The system architecture will provide the following characteristics:

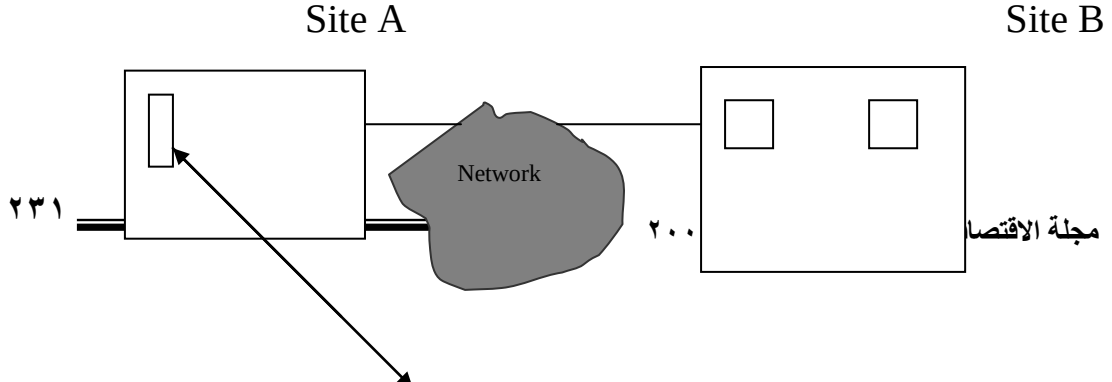
- Responsively - whenever they require it
- Distributed - wherever they require it
- Aligned with business needs - how they require it

In order to maximize the return on E-bank's investment in its information technology and to cope with global information system, E-bank needs a technology architecture that will ensure linkage to key business strategies.[6]

8-1 Overview of E-bank Distributed Architecture

In a distributed data base system, the database is stored on several computers, The computers in a distributed systems communicate with one another through various communication media, such as high-speed networks or telephone lines. They do not share main memory or disks. The computers in distributed systems may vary in size and function, ranging from work stations up to mainframe systems.

The computers in a distributed system are referred to by a number of different names, such as sites or nodes, depending on the context in which they are mentioned. The general structure of distributed system is show in Figure 1.[7]



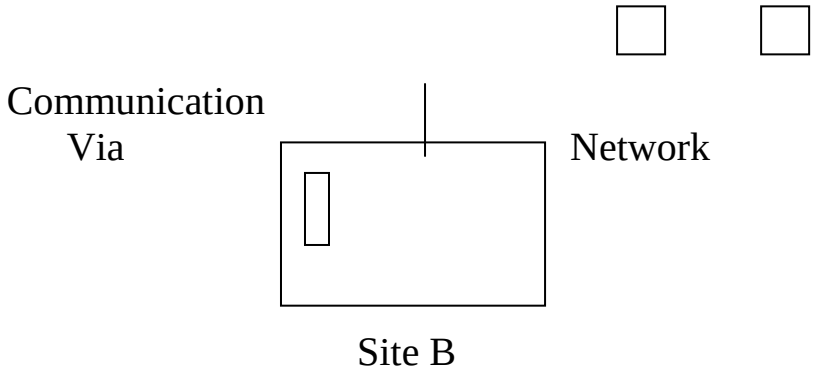
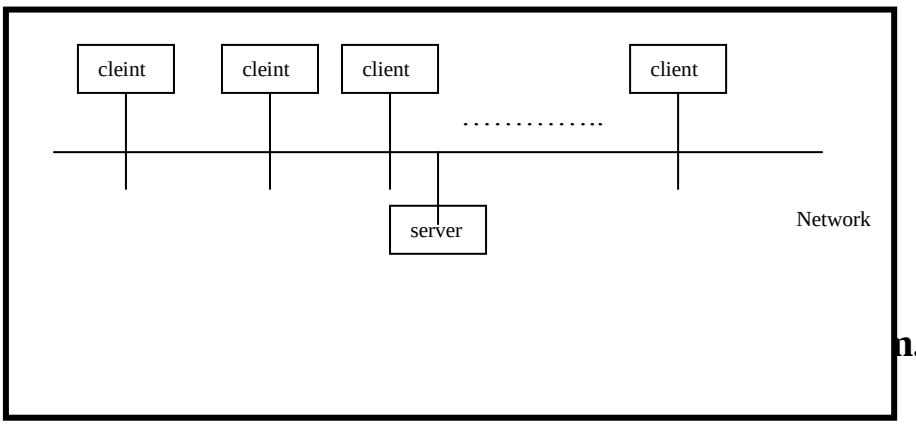


Figure (1) Distributed system

The secret to understanding the Internet is that the Net is populated by two types of computer programs: servers and clients. Servers are programs that provide resources. Clients are programs that allow you use to access those resources. The client / server system show in show in figure 2

The Web consists of a great many web servers scattered all around the Net. These web servers can respond to requests for information organized into "pages". A web page can contain text, pictures, or even sounds. To accesses web page, you use a web client that calls upon the appropriate web server to send you the page. Your client then displays the page for you on your screen. If necessary, your client will call upon an auxiliary program to show you picture , or to play a sound.[8]



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8-2 Client Applications

Client in E-bank can be distributed from (E-bank staff, trading partners and customers) with applications and information. Internet banking client applications are developed using the advanced web technologies such as HTML, Java and CGI.

8-2-1 Thin Clients

Thin clients are best for static reports that require little database access. The thin client communicates via Hypertext Transfer Protocol (HTTP) to a Web server. The Web server's main purpose is to serve documents or files, which may contain very sophisticated graphics that are files themselves. Common getaway interface (CGI) is used to accept parameters, execute a program, and return the results. For the browser to display results, they must be formatted with Hypertext Markup Language (HTML)..[9]

8-2-1 Fat Clients

to each operating system. As application require more functionality and higher graphic and response interfaces for the desktop the thin client becomes fatter HTML, although capable of presenting highly graphic materials, does not have the interactive capabilities such as pull-down menus and list boxes, that today's business users expect. In striving to be portable, HTML sacrificed some of the interactive capability that proprietary

Plug-ins provides the functionality. Plug-in technologies execute on the desktop while the user is in the brewers and provide more interactivity than HTML. In what is known as the "download once, run many times" method, the excitable code for the plug-in resides on the server and downloads to the client when necessary.

However, plug-in do have drawbacks. For example, they must be download "just-in-time" when needed. Both brewers and clients

suffer from their proprietary nature. As result, it is expected that plug-in will probably by pep laced by java and ActiveX programs.[10]

8-2-3- Common Gateway Interface (**CGI**)

CGI is the *de facto* standard for interfacing Web servers with external applications, and possibly currently the most commonly used method for interfacing Web applications to data resources. The concept of CGI originated from the initial Web development for providing a generic interface between a Web server and user-defined server applications. The main advantages of CGI are its simplicity, language independence, Web server independence, and its wide acceptance.[11]

8-2-4 Nature of HTML

HTML is a collection of markings which, when embedded within text, describe how that text should displayed, as, such, HTML is properly called a markup language.

AMARKUP LANGUAGE is formal set of specifications used to define information which can be added to the content of document as an aid to processing it.

The best way to think about HTML is to consider it a set of specifications (each with its own type of markup tag), which can be used to define the elements of a hypertext document .The purpose of the HTML is to specify how the text should be processed. The purpose of browser is to act as a presentation engine, to interpret the HTML and to display the text in an appropriate manner.[12]

8-2-5 Java

Java is the first major programming to be shaped by the World Wide Web (the Web). Java allows you to do traditional programming. Java also has many special features and libraries that allow you conveniently to write programs that can use Web's resources**.** These include extensive support for graphical user interfaces, the ability to

embed a Java program in Web document, easy communication with other computers around world, and the ability to write programs that run in parallel or no several computers at same time.

Java programs, called *applets*, can be written to automatically load and execute by following a link in the Web. This ability to embed Java programs in HTML documents is a primary factor in success of Java. With Java applets, Web documents are no longer static text, images, or video segments. Web documents can provide all interaction of any program.

Client- server computing is an essential new element in computers that manage communications and computations. The server typically a fast computer with a very large amount of hard disk storage, gives out information to clients that request it. The network support in Java makes implementing client-server programming solution easy.[13]

8-3 - Middleware

Middleware has basic categories. Each category is based on the services provided to applications as well as the interface it provides to users. These categories are file transfer services, transaction management services, Transaction – server system.

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8-3-1 - File Transfer Protocol (FTP)

The Internet standards include a more powerful and widely used file transfer protocol, called the *file transfer protocol* (FTP). FTP defines procedures for the transfer of files between machines.

FTP is rather unusual in that it maintains two logic connections between machines. One connection is used for the login between the machines and uses the Telnet protocol. The other connection is used for data transfer.[14]

8-3-2- Transaction management service (TP)

TP monitors initially in response to a need to support a large number of remote terminals from single computer. The term TP monitor initially stood for teleprocessing monitor, these systems have

since evolved to provide the core support for meaning, commercial TP monitors include the IMS system and CICS.[15]

8-3-3- Transaction – server system

Transaction–server systems, also called query-server systems, provide an interface to which clients can send requests to perform an action, in response to which they execute the action and send back results to the client. Users may specify request in SQL,or through an application program interface, using a remote-procedure-call mechanism.

Transaction –server architecture follows the functional division between the front-end and back-end. Due to the greater processing requirement of graphical user-interface code, and increasing power of personal computers, front-end functionality is supported on personal computers. The personal computers act as *client* of the server systems, which store large volumes of data and support the back-end functionality. Client ship transactions to the server systems where those transactions are executed, and results are shipped back to clients that are in charge of displaying the data.

Standards such as Open Database Connectivity (ODBC), have been developed for interfacing of clients with servers.

The general structure of client-server system is depicted in Figure 2.[16]

9- Security requirements

While security is an important factor in any business, it is perhaps even more so in the financial sector given the huge amounts of money at stake. It is, however, comforting to now that along with the dynamic advancement of technology in the banking sector safety is taken as serious issue with equally impressive supporting safety features.

9-1 Security for the transaction

9-1-1 Encryption

Data encryption is what makes transactions over the Internet possible. The Internet is built on public lines. Without encryption any one could sniff anyone else's transmissions and use them however they wanted. Encryption is the heart of e-commerce world.[17]

- Just a Bit(40-Bit, 56Bit, 128-Bit,and 512-Bit Security)

All encryption is performed by applying keys to the individual values of a message and thus scrambling them in what (hopefully) appears a random fashion. The larger the number of bits, the more potentially secure.

- **PK**

Pk stands for public key encryption and is the backbone of most encryption mechanisms in common use today. Before PK, key blocks had to serve double duty. They had to encrypt and decrypt a message. The obvious difficulty with this approach was hat if someone got to hold the public key block, she could spoof pretty much anything she wanted.

Public key encryption solves this problem by having too keys-one public and one private. The public key is used to encrypt the message, and private key is used to decrypt the message. When someone wants to send an encrypted message to another person, the first person obtains the second's public key and encrypts the message. This is then sent to the second. He uses his private key to decrypt the message. The private key can't be computed from public key, so the entire transaction is secure.

-SSL

SSL (Secure Socket Library) uses public key technology to manage an encrypted session between a server and a client. Its primary use today is in providing relatively secure communications with Web servers. The technology and libraries to use public available multiple locations on Web.

9-2-Username and password

Usernames and passwords are typically the gatway to the systems. Because everyone knows this. Follow these simple rules for using usernames and passwords:[18]

- Use uncommon or nonsensical names.
- Make it meaningless to other.
- Use long password.
- Change your password often.
- Don't write your password down.
- Don't tell anyone.

9-3- Virus Protection

Antivirus software is thought of as a client application, but organizations are beginning to realize that scanning is required at multiple points on a network to prevent data from being destroyed-end to save staff from having to clean machines that become infected. Organizations are scanning for viruses at the firewall, on E-mail servers and at the desktop. Desk-top virus scanners are still the only protection from viruses brought in on floppy disks.[19]

9-4- IT Audit for Internet Banking Environment

While The integration of security technologies into applications starts at the ground level, the creation of enforceable security procedures must start at the top and include the human element.

Evaluate what needs to be secure and what doesn't. And use fast hardware to host firewall and tunneling servers.

Authenticate users. Keep mailing lists current.

Audit trails are must. Review audit trails often to assess use or misuse of network. Train personnel on what to look for.

Contrary to popular belief, everything does not have to be available to everyone. Set up resources so that are available only to specific groups of individuals on need-to-know basis.

Manually monitor the system in real time (or use software to do so). Have a backup plan to move the intranet to a secure location in the event that there is a security breach. Make sure that the users who

need the intranet can still get to the information regardless of the breach. [20]

10- Case study

10-1-National Bank of Kuwait,NBK [21,22,23]

Since its foundation in 1952 as the first national bank and the first joint stock company in the Gulf Region
It is by far the largest and most dominant financial institution in Kuwait. Among Arab banks, NBK has the most extensive regional and international network which includes branches, subsidiaries and representative offices in New York, London, , Paris, Geneva, Beirut, Jordan, Bahrain, Qatar , Singapore ,China , Iraq and Saudi Arabia .NBK also has other ambitious plans for expansion in the near future to cover Dubai and other regions .

NBK(AL-Watani) has been providing online services since 1997. Today it is probably the most advanced and functionally rich offering in the region, and compares well with the offerings from leading banks in the US and Europe.

NBK have concentrated on the consumer banking market, although it will soon be launching Internet services for it's corporate clients to replace the aging PC based application that bank have had for several years.

10-1-1 NBK (Watani Online) services

Watani Online (WOL) offers a safe, secure and convenient online banking experience.

- Check account balances.

- View and pay credit card bills.
- Transfer funds locally and internationally.
- Pay bills including school fees online.
- Renew Quality net subscription online.
- Settle Kuwait Clearing Company payments.
- Apply for Internet shopping card and other online services.
- Open **new accounts online** in KD or foreign currencies.
- **Transfer funds** from credit card to account instantly.
- Transfers and beneficiary creation.

10-1-2 NBK Security Commitment

p NBK is committed to online security. In this respect, the bank has placed a number of security measures in line with international best practice to make Watani Online a safe and secure online banking service.

10-1-2-1 Encryption and firewalls

Encryption prevents unauthorized users from accessing account information on Watani Online. NBK uses the highest level, 128-bit SSL (Secure Socket Layer) encryption to protect Al-Watani Online information.

10-1-2-2 Automatic time outs

Watani Online uses a default timeout mechanism of ten minutes. After this time, the system automatically "logs off" you off and ends your session. You will then need to relog in to access Watani Online.

10-1-2-3 ePIN and additional security

Additional security on Watani Online includes:

- **ePIN:** The ePIN is an electronic Personal Identification Number which provides access to third arty transfers in and out of Kuwait. The ePin can be requested online and must be picked up from the branch where the customer will have to authenticate him/herself.

- **Random ID verification on beneficiary creation:** Customers are required to input system generated random digits from their ID in order to create a new beneficiary to conduct a transfer.
- **SMS Notification:** Customers' receive immediate SMS alerts on transfers and beneficiary creation

10-1-3 Threats

10-1-3-1 Phishing

Phishing refers to fraudsters attempts to 'fish' for the personal details by using fake emails and claiming to be from NBK and so forth.

In these emails, the customer is requested to provide their personal or financial information. Customers are led to believe the request is from NBK or a real company when in fact it is an attempt to collect customer information for the purpose of committing fraud. Once the fraudsters have collected financial information via phishing, they can abuse this information and steal funds from those accounts.

They then recruit innocent individuals by placing different ads on the Internet. These recruits are known as 'mules'. The bank accounts of the mules will be used to accept money transfers from and the mules will be asked to withdraw the money from their accounts and forward it, minus their commission, to the fraudsters. The fraudsters may be able to stay anonymous but there is a trail to the phishing mules which can be followed by the authorities.

Be very careful about job offers which involves the acceptance and release of funds to a bank account in return for commission. Mules recruited by phishing fraudsters are money laundering and are likely to face criminal prosecution.

If you receive an email requesting you to re-register or re-enter sensitive details, delete it immediately and contact NBK on 801801.

10-1-3-2 Viruses and worms

A computer virus is software that attaches itself to another program to survive and reproduce and can only run if the infected program is running. This can tie up resources such as disk space and memory, causing problems on any computer.

An email virus is the latest type of virus which is transported through email messages and usually attaches itself to all contacts on the victims email address book.

A worm is similar to a virus and infiltrates security holes on your PC. Once a security hole is found, the worm will attempt to replicate itself from computer to computer.

10-1-3-3 **Trojans**

A Trojan is a harmful program that can infect your computer. Some Trojans will claim to clean your computer of viruses but instead introduce viruses that make your computer vulnerable to attacks by hackers. Some tips on how to avoid Trojans are:

The user can increase her chances of ensuring her computer is free from worms and viruses by:

- Never open unknown emails or attachments
- Install software from trusted sources only
- Scan your computer on a regular basis
- Use a firewall to monitor traffic to and from your computer while you are connected to the Internet
- Install anti virus softward and keep it updated

10-2- National Bank of Oman(NBO) [24,25]

NBO the first Omani bank to launch on online banking service for it's customers through its NetB@nk product .

The service was lunched in February 2001 and offered to all of NBO's retail customers. From a cost respective, NetB@nk was introduced as a low cost solution conceived and implemented by NBO's in house IT team.

10-2-1- NBO services:

The features of NetB@nk include:

- Account Enquiry,
- Transaction History Enquiry,
- Fixed Deposit Enquiry,
- Personal Loan Enquiry,
- Account Nick naming ,
- Financial transactions such as Account Transfer,
- Credit card due payments,
- Utility Payments (such as Electricity, Water, Telephone, GSM, School Fees etc.).

Customers can also download their account transactions in various industry standard formals such as WINDOWS EXCEL, Text and PDF formats.

10-2-2 security of transactions

For security of transactions through Internet, the highest available encryption technology (128-bit encryption) certified by Version, has been used. The network is fully equipped with intrusion detection systems and firewalls. Another security feature also makes alphanumeric passwords obligatory and forces users to change their passwords on a regular basis.

10-2-3 NBO products

Another unique product is ' NBOMony', which is a live Internet financial portal that enables investment banking customers to gain access to information on the Muscat Security Market (MSM), such as quotes, offers, bids and volumes for stocks. It also provides information on bond yields, mutual funds and market analysis services. A watch list function enables users to select data on specific firms, and the portfolio function tracks the performance of an individual investor's stocks against the MSM benchmark.

10-2-4-Card Services

NBO offers a number of cards, including its ATM card, Visa and MasterCard credit cards, to customers.

The bank has scored many firsts in the credit card business. It received the *best e-commerce initiative award* from MasterCard International for the launch of its Web Shopper Card, a credit card designed exclusively for Internet use. NBO was the first bank to launch such a card in the Middle East. It is also the first and the only bank in the Sultanate to make available the *full credit limit as cash advance*. NBO is the first bank in Oman to offer *credit cards without salary assignment.*

10-2-5 ATMs

NBO has an extensive network of 78 ATMs in the Sultanate. Of these, 47 are located at the bank's service centers and 31 are at convenient locations that are visited frequently by NBO and other banks' customers.

Through its link to the Oman Switch (formerly Shamel and Al Watani) network, NBO offers its customers access to more than 300 ATMs in Oman, and more than 761 ATMs in the UAE Switch. NBO customers can also use the Visa and MasterCard networks which include more than 600,000 ATMs to withdraw cash using Visa and MasterCard credit and debit cards. The NBO ATM networks in Oman, Egypt and the UAE, totaling 1,230, are linked to provide NBO has an extensive network of 78 ATMs in the Sultanate. Of these, 47 are located at the bank's service centers and 31 are at convenient locations that are visited frequently by NBO and other banks' customers.

Through its link to the Oman Switch (formerly Shamel and Al transparent access to customer accounts. With such a high level of connectivity, NBO customers have the ability to operate their account in a seamless manner wherever they are.

11- conclusion

Internet banking users will increase as Internet penetration spreads, multi device access becomes reality as wireless and other technologies mature, the teenage ' techie ' population becomes bankable and the intenret becomes easier and easier to use.

Products and services will be presented to clients based on their preferences and their web site activity when they are online. The Internet then becomes a focussed interactive marketing channel.

Internet banking offer flexible feature configuration policy. The bank may choose deployment of any combination of channels and features.

the search has discussed how to use the new internet technology to address the technical, security and legacy issues on the Internet. E-bank Internet banking system is based on a distributed architecture that relied on multi-tirer client/server architecture - GUI front-end applications, Middleware, web server and database. The CGI, HTML and Java have been used to implement the front-end application to the end users. Microsoft Internet Information Server and Windows NT are recommended as the solutions of the suitable Middleware, Web server and database for the E-bank Internet banking system.

The implementation of the firewalls and proxies provides the high level security to the system - protect the system from unauthorized access. The use of different security techniques, such as encryption and Secure Socker Layer protocol, to facilitate monetary transfers and ensure that messages are not corrupted accidentally or deliberately by third parties, also ensure the data and the transmission of sensitivity information is protected properly. In addition, built-in electronic checks and constant virus check will ensure the networks are secure from external or internal accidental or deliberate damage. Importantly, the implementation of proper IT policy and the establishment of an IT Audit are also used to ensure E-bank online system will gain proper and thorough security in the operations of the networks.

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