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You would want to cash in on market fluctuations to sell or buy shares in real time, you would want to check your bank balance and make a draft on the spot or you would simply want to pay your insurance premium, all at once while you are on the move. A mobile phone today facilitates all these and much more…

When mobile phones were launched in India some 5 years ago, they were described as rich cousins of pagers. Mobile phone was seen as nothing more than a status symbol for the highflying society of the country. If the exorbitant mobile rates was one of the primary reasons why it was considered a luxury, the apparent limited utility of this bulky gadget - acting as just a phone without a cord - was the overwhelming reason for its poor acceptance.

But five years down the line, as we enter the new millennium, the scenario has changed fore ever. Mobile penetration has grown by leaps and bounds. At the global perspective, the number of mobile phone connections in the last few years has far out beaten even the number of landlines. By 1998 the number of mobile connections annually had reached 100 million lines, a clear 42% more than the number of landlines the same year.

The main reason for this turnaround is the growing utility value of mobile phones. The array of services available on a mobile phone today has redefined the very concept of mobile telephony. In effect, well known sci-fi writer Arthur C. Clarke's prediction that the world would be inundated with communication terminal devices called Comsoles which

What will the next-generation mobile going to be like? For one, it is going to be an all encompassing device and one which will create a big bang in the communications marketplace. Here are some quickstats as to what one can expect in the near future. More than 200 million European subscribers will access information from the Internet with a mobile device by 2003. This represents more than 85 percent of all mobile phone owners. Based on statements from several vendors and operators, after 2001 no more phones will be shipped that are not Internet-enabled via a microbrowser. According to Durlacher's projections, the European market for mobile commerce or m-commerce will increase from about $323 million in 1998 to $23.6 billion by 2003. Italy will generate the most m-commerce revenue ($4.8 billion), followed by Germany ($4.1 billion) and the United Kingdom ($3.4 billion).

The advent of Internet as an all-pervasive information dissemination medium and the fear that came with it of Internet irreversibly changing the social behavioural patterns of human beings and the natural instinct of a man to be free without strings attached (quite literally), led to the emergence of mobile phone as the most sought after communication device. Mobile has come in as a perfect solution for those who feared a sedentary

localization of services and applications, the enhanced personalization of services, the increasing availability of bandwidth and the "always-on" Internet connectivity, its not hard to see why mobiles are redefining communication scape forever.

Mobile commerce

Of all the myriad services that are finding place on a mobilephone, mobile commerce seems to be the most happening thing. Advertising is expected to become the key m-commerce revenue generator ($5.4 billion) once mobile's marketing power has been fully
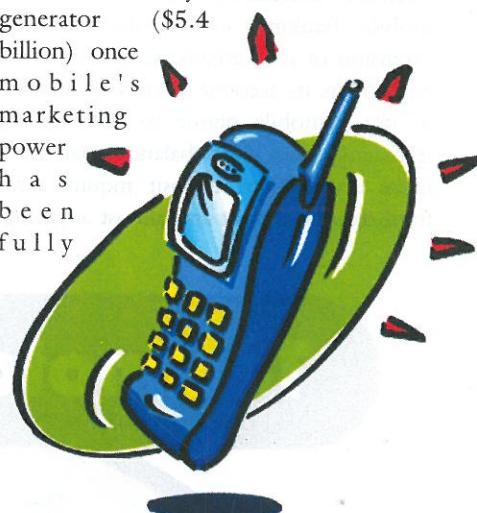
discovered. Financial services, such as mobile brokerage, mobile payment and mobile banking, will be the second-largest revenue source, with $4.9 billion. Actual mobile shopping (retailing, reservations, auctions, etc.) will be worth $3.5 billion. The rest is generated by applications such as business, customer care, entertainment and security as per Andy Bottomley, director of research for Durlacher Corp., a research-driven investment group specializing in emerging technology and media.

The building of financial application solutions is already underway. Take for example Postbank, a leading bank in the Netherlands recently signed a contract with Ericsson Business Consulting and Libertel to start mobile banking with mobile stock trading as the first application available. Over time, clients of the bank will be able to make mobile payments as well. With this tie up the

THE MAIN REASON FOR THIS TURNAROUND IS THE GROWING UTILITY VALUE OF MOBILE PHONES. THE ARRAY OF SERVICES AVAILABLE ON A MOBILE PHONE TODAY HAS REDEFINED THE VERY CONCEPT OF MOBILE TELEPHONY.

can retrieve any and all information in any form - be it audio, video, multimedia - has come true. Mobile phones can be likened to the comsoles of A.C.Clarke's fictional proposition on global communication systems.

population in the near future owing to rapid proliferation of Internet.

Mobile today is a ubiquitous, always reachable, highly convenient and a supremely secure device for any kind of transaction. Coupled with the increased

Ericsson R320 WAP mobile phone will have access to real-time stock information and users would be able to place their orders live on the Amsterdam Stock Exchange, whenever they want, wherever they are. This way they can manage their stock portfolio anytime and anywhere.

M-commerce in India

Not just in the Netherlands, even back home mobile phones are turning into veritable treasure houses of information on anything and everything. Just two months back, HDFC bank tied up with Orange (formerly Hutchison Max) to introduce mobile banking in Mumbai. As an extension of its Netbanking facilities, the bank offers its account holders the option to use a mobile phone to do banking transactions like check balances, pay bills, make drafts, fixed deposit inquiry new fixed deposit request and almost anything

that you do in a normal bank. With SEBI (Securities and Exchange Board of India) clearance even stock trading would be possible on the mobile in India.

There is no doubt that mobile is going to create a whole new lifestyle for people. Proof of that is how Indian banks are smarting upto the occasion. Have a look at the number of new banking products that are emerging on the Indian scene.

E-vector, developed by Ecapital helps linking up any application with any interface. The application can be anything like banking, reservation, bill payment etc., e-vector can link it upto the mobile phone. Another product is Flexcube@ which is a Internet banking solution that runs on a WAP browser. This has been developed by CITIL, Citibank's software arm. At around the same time Nucleus software, a software development firm specialising in development of banking

Technology on the Move

The astonishing pace at which technologies are being developed is one of the reasons why mobile commerce is catching on so fast. A quick look at the present, emerging and futuristic technologies.

SMS

The Short Message Service (SMS) is a single short message of up to 160 characters of text in length. Those 160 characters can comprise words or numbers or an alphanumeric combination. Non-text based short messages (for example, in binary format) are also supported. The Short Message Service is a store and forward service, in other words, short messages are not sent directly from sender to recipient, but always via an SMS Center instead. The Short Message Service features confirmation of message delivery. This means that unlike paging, users do not simply send a short message and trust

and hope that it gets delivered. Instead the sender of the short message can receive a return message back notifying them whether the short message has been delivered or not.

GPRS

The General Packet Radio Service (GPRS) is a new nonvoice value added service that allows information to be sent and received across a mobile telephone network. It supplements today's Circuit Switched Data and Short Message Service. GPRS is NOT related to GPS (the Global Positioning System), a similar acronym that is often used in mobile contexts. GPRS has several unique features

Speed

Theoretical maximum speeds of up to 171.2 kilobits per second (kbps) are achievable with GPRS using all eight timeslots at the same time. This is about three times as fast as the data transmission speeds possible over today's fixed telecommunications networks and ten times as

products has come up with bank@will which is again a mobile banking product.

Mobile Travel Commerce

With online travel being the number one category in Internet consumer spending in 1999, as much as one third of all travel expenditure is likely to be transacted via the Web by 2003 (Source: Gartner), effectively dis-intermediating many travel agents but creating opportunities for new distribution intermediaries. By then there will be an estimated 115 million mobile Internet users across the US and Europe. Already, for the first time, mobile phones have overtaken the laptop computer as the most popular technological tool taken on business trips by frequent flyers (source: OAG).

The GMCF believes that the mobile Internet will be of real benefit to travellers as travel services become available anytime, anyplace. In addition to booking and amending travel plans on the move, travellers will be able to obtain personalised alerts and information about travel delays, relevant local attractions, events, special promotions and even preferred restaurants. This new mobility dimension will result in a surge of traveller-related mobile transactions of all descriptions. Transactions made using mobile phones are forecast to generate as much as $14 billion per annum in four

Mobile Commerce: Projections for the future

There is a significant market opportunity, particularly in the business sector, for the provision of mobile Internet services, applications and products over the short to medium term (3 years).

In SA's view, by 2002, the mobile data market will predominantly be serviced by mobile Internet services and applications.

> IN ADDITION TO BOOKING AND AMENDING TRAVEL PLANS ON THE MOVE, TRAVELLERS WILL BE ABLE TO OBTAIN PERSONALISED ALERTS AND INFORMATION ABOUT TRAVEL DELAYS, RELEVANT LOCAL ATTRACTIONS, EVENTS, SPECIAL PROMOTIONS AND EVEN PREFERRED RESTAURANTS.

years time, or 7% of all consumer e-commerce, marking a fundamental change in consumer behaviour.

In the fixed wire environment, the Internet acted as a catalyst for the development of the data market. Similarly, the opportunity

fast as current Circuit Switched Data services on GSM networks.

Immediacy

GPRS facilitates instant connections whereby information can be sent or received immediately as the need arises. No dial-up modem connection is necessary. This is why GPRS users are sometimes referred to be as being "always connected". Immediacy is one of the advantages of GPRS (and SMS) when compared to Circuit Switched Data. High immediacy is a very important feature for time critical applications such as remote credit card authorization where it would be unacceptable to keep the customer waiting for even thirty extra seconds.

Third Generation

The mobile communications industry has evolved in three stages. Three generations of mobile phones have emerged so far, each successive generation more reliable and flexible than the last. In analog systems one could easily use analogue cellular to make voice calls, and typically only in any one country. Digital mobile phone systems added fax, data and messaging capabilities as well as voice telephone service in many countries.

Multimedia services add high speed data transfer to mobile devices, allowing new video, audio and other applications through mobile phones - allowing music and television and the Internet to be accessed through a mobile terminal.

With each new generation of technology, the services which can de deployed on them becomes more and more wide ranging and truly limited only by imagination. We are reaching that stage with 3G.

During the first and second generations different regions of the world pursued different mobile phone standards, but are converging to a common standard for mobile multimedia called Third Generation (3G) that is based on
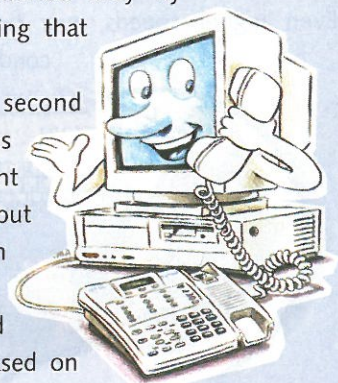
for mobile data will be realised as Internet applications migrate to the mobile environment. However, using voice services as an entry platform, and establishing good distribution channels are two essential pre-requisites for mobile data (including mobile Internet) to become a mainstream service.

The key market drivers of mobile Internet will be high growth and adoption of the Internet and cellular services across the US and Europe. In the US and increasingly in Europe the Internet is being accepted and used as a standard business tool. Users of fixed wire based Internet services and corporate networks will increasingly expect access to and use of similar services while away from the desk.

What is Mobile Commerce?

Mobile commerce applications involve using a mobile phone to carry out financial transactions- this usually means making a payment for goods or transferring funds electronically.

Transferring money between accounts and paying for purchases are electronic commerce applications. An emerging application, electronic commerce has been

> ## MOBILE COMMERCE APPLICATIONS INVOLVE USING A MOBILE PHONE TO CARRY OUT FINANCIAL TRANSACTIONS- THIS USUALLY MEANS MAKING A PAYMENT FOR GOODS OR TRANSFERRING FUNDS ELECTRONICALLY.

facilitated by developments in other areas in the mobile world- such as dual slot phones and other smarter terminals and more standardized protocols, which allow greater interactivity and therefore more sophisticated services.

For example, at CeBIT 99 in March 1999, a partnership between Nokia, Yellow Computing, Dr. Materna and

Sielaff showed the concept of ordering and paying for a Coca-Cola using the Short Message Service. Nokia supplied the 9000 Communicator and serial cable, Yellow Computing the 9000 client software, Dr. Materna the SMS Center and billing link and Sielaff the vending machine itself. Customers originated a short message with the content "COKE" or "FANTA" or "SPRITE". This message was addressed to the Communicator that had an RS232 serial cable interface to the Sielaff vending machine. The drink was delivered along with a short message

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CDMA technology. Europe pursued NMT and TACS for analog and GSM for digital, North America pursued AMPS for analog and a mix of TDMA, CDMA and GSM for digital. 3G will bring these incompatible standards together.

Enhanced Data rates for GSM Evolution (EDGE)

Enhanced Data Rates for GSM Evolution (EDGE) is another high-speed mobile data standard. It allows data transmission speeds of 384 kbps to be achieved when all eight timeslots are used. In fact, EDGE was formerly called GSM384. This means a bit rate of 48 kbps per timeslot. Even higher speeds may be available in good radio conditions.

EDGE was developed (by Ericsson initially) for mobile network operators who fail to win Universal Mobile Telephone System

(UMTS) spectrum. EDGE gives incumbent GSM operators the opportunity to offer data services at speeds that are near to those available on UMTS networks.

EDGE also provides an evolutionary migration path from GPRS to UMTS by implementing now the changes in modulation that will be necessary for implementing UMTS later. The idea behind EDGE is to eke out even higher data rates on the current 200 kHz GSM carrier by changing the type of modulation used.

Bluetooth

Bluetooth is an alliance between mobile communications and mobile computing companies to develop a short-range communications standard allowing wireless data communications at ranges of about 10 meters.

Bluetooth will encompass both a standard communications interface and a low-cost computer chip. It is a cross between the DECT (Digital European Cordless Telephone) and iRDA (infra Red Data Association) technologies. Bluetooth was conceived by Ericsson, but founded by Nokia, Ericsson, IBM, Intel and Toshiba. The Bluetooth Interest Group has since been joined by hundreds

saying "Please take your ice cold Coca-Cola" or "Your choice is sold out" sent back to the mobile phone. The billing record was sent to mobile network for charging on the customer's normal mobile bill- a cash-free transaction!

Challenges

There are several issues relating to the development of mobile commerce applications:

Delivering mobile commerce applications necessitates dealing with issues such as security, integration with the retail and banking hardware and systems, non-standardized mobile infrastructure and competing ecommerce standards. Additionally, there is a lack of standards relating to the mobile phone to network interface, the interfaces between host and mobile platforms and between different mobile platforms.

As such, the scalability of ecommerce is questionable- initiatives that link wireless and IT systems tend to be custom developments on a project by project basis. There are also questions about the appropriateness of using a mobile phone as the interface to ecommerce applications. The man machine interface on mobile phones is currently sub-optimal and difficult for mass market users to manipulate- a smart card on its own could be a better platform for non-cash payment. However, this area of electronic commerce applications is expected to contribute to grow significantly in the future, as mobile phone penetration delivers a critical mass of potential customers for such services. Indeed, it is in countries such as Scandinavia where mobile penetration is highest that e-commerce applications are being pioneered.

WAP - The hot technology

The Wireless Application Protocol (WAP) is a hot topic that has been widely hyped in the mobile industry and outside of it. WAP is simply a protocol- a standardized way that a mobile phone talks to a server installed in the mobile phone network.

It is amazing how in just six months, it has become imperative for all Information Technology companies in Nordic countries and beyond to have a WAP division. Many many advertising agencies and "dot.coms" have announced WAP services.

of companies including One2One; a UK mobile network operator, Motorola, Qualcomm, Compaq, Dell, 3Com Palm, VLSI, Xircom, Psion Dacom and Lucent. Bluetooth does NOT involve mobile network transactions- its spectrum is freely available to use in the unlicensed spectrum area (at 2.45 gigahertz). Data transmission speeds using Bluetooth are expected to be between 720 kbps and one megabit per second (Mbps).

Bluetooth will facilitate wireless Local Area Networks in which networks of different handheld computing terminals and mobile terminals can communicate and exchange data, even on the move and when there is no line-of-sight between those terminals. Bluetooth will mean that if users have several (Bluetooth-enabled) portable terminals, they can nonetheless use them with all the advantages of an integrated smart phone, without having to re-enter data or find the most recent versions on different terminals.

Packet Switching

GPRS involves overlaying a packet based air interface on the existing circuit switched GSM network. This gives the user an option to use a packet-based data service. To supplement a circuit switched network architecture with packet switching is quite a major upgrade. However, as we shall see later, the GPRS standard is delivered in a very elegant manner- with network operators needing only to add a couple of new infrastructure nodes and making a software upgrade to some existing network elements.

With GPRS, the information is split into separate but related "packets" before being transmitted and reassembled at the receiving end. Packet switching is similar to a jigsaw puzzle- the image that the puzzle represents is divided into pieces at the manufacturing factory and put into a plastic bag.

During transportation of the now boxed jigsaw from the factory to the end user, the pieces get jumbled up. When the recipient empties the bag with all the pieces, they are reassembled to form the original image. All the pieces are all related and fit together, but the way they are transported and assembled varies. The Internet itself is another example of a packet data network, the most famous of many such network types.

WAP is hot for several reasons

☞ It provides a standardized way of linking the Internet to mobile phones, thereby linking two of the hottest industries anywhere.

☞ Its founder members include the major wireless vendors of Nokia, Ericsson and Motorola, plus a newcomer Phone.com.

☞ The WAP Forum has over 200 member companies.

☞ Mobile information services, a key application for WAP, have not been as successful as many network operators expected. WAP is seen as a way to rectify this situation.

WAP also has its detractors and controversies

☞ It is very difficult to configure WAP phones for new WAP services, with 20 or so different parameters needing to be entered to gain access to a WAP service. This is described in details for the Nokia 7110 and Motorola L series in this new edition of "Data on WAP".

☞ There are few mobile phones that support WAP and widespread WAP support in handsets is unlikely for a long time. Commercial quantities of WAP phones are not expected until towards the end of Quarter 1 2000.

☞ WAP is a protocol that runs on top of an underlying bearer. None of the existing GSM bearers for WAP- the Short Message Service (SMS), Unstructured Supplementary Services Data (USSD) and Circuit Switched Data (CSD) are optimized for WAP.

☞ The WAP standard is incomplete, with key elements such as Push (proactive sending of information to mobile devices) and wireless telephony (updating address reports and the like) not yet standardized (they will be standardized in WAP 1.2, due for standardization in late 1999 and first implementation in Spring 2000).

☞ There are many WAP Gateway vendors out there competing against each other with largely the same standardized product. This has led to consolidation such as the pending acquisition of APiON by Phone.com.

☞ Other protocols such as SIM Application Toolkit and Mobile Station Application Execution Environment (MexE) are respectively already widely supported or designed to supercede WAP.

☞ WAP services are expected to be expensive to use since the tendency is to be on-line for a long Circuit Switched Data (CSD) call as features such as interactivity and selection of more information are used by the end user. Without specific tariff initiatives, there are likely to be some surprised WAP users when they see their mobile phone bill for the first time after starting using WAP.