Mobile services go beyond wireless, beyond Internet..beyond ‘e’..

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Abstract. Mobility is about individual and on-demand connection. It’s about getting the right information at the right time and in the right place.

For governments and businesses, mobility is about having citizens, customers, employees or a sales force empowered by technology. In the end, mobility has the power to transform the way we go beyond the Internet.

As the digital economy evolves, businesses of all kinds are searching for the Holy Grail of the mobile services market. This means mobile services that go beyond the Internet, beyond wireless -- beyond 'e.' In other words, delivering the right content and applications with the right portal and the right devices -- whether wired or wireless -- combined with a high level of security, the right interface and network and integrated with the user’s vital business processes.

Delivering mobility isn't just about wireless devices and networks. It's really about connecting people -- connecting them with one another, with their work, their homes and their play -- and supporting their experience regardless of which technology is used. So that the end result is a seamless customer experience with all the old boundaries removed.
…Converged technologies drive the creation of new, highly leveraged applications that promote the creation of new business processes, which in turn increase productivity and revenues. It’s clear that technology alone does nothing to accelerate business growth. Rather, growth occurs as new and emerging applications and business processes create competitive advantages for technology customers...
…More and more businesses and governments are extending their supply chains in all directions. Global enterprises are automating the distribution and sharing of data, information and applications in real time. This necessitates a strategic plan that assures the privacy, confidentiality, integrity and availability of their information systems, supporting infrastructures and other intellectual assets. Yet the issue of data security is only the top of the iceberg when planning comprehensive information assurance strategy…

Real-life business needs have to be met and they are - processes and communications need to be transformed, costs need to be reduced and fast and efficient entry to the mobile business marketplace need to be facilitated. If this is accomplished, the necessary four imperatives in the digital economy can be fulfilled -boundaries can be eliminated, collaborate in new ways, establish their customers' trust and continuously seek improvement.

1. Introduction: Mobility and the digital economy

The digital economy means more than electronic business. It is a new way of working in which every aspect of a business is digital. The convergence of computing,

communications and digital content opens a new era of unprecedented innovation related to the use of information. Convergence allows individuals to experience increased flexibility and personal freedom across all areas of work, home and play. As a result, people have adopted new social behaviors to take advantage of anywhere, anytime and anyway access to information. Mobile technologies are gateways to the digital economy and mobility is key to seamless digital living.

1.1 Ubiquity

One of the key attributes and the most obvious advantage in mobile communications and the wireless world is ubiquity. The mobile technologies have the ability to make ubiquity part of everyday life. Mobility delivers the anytime, anywhere, device-independent information access that characterizes ubiquity. People experience it when they gain immediate access to pervasive, digitized information while remaining virtually unaware of any part of technology's mediation.

True digital freedom is the seamless, transparent and unhindered ability for people to interact with the information they need. Ubiquity is the right for people to obtain the right information at the right time and in the right place using any device. The starting point may be allowing people to read e-mail on their mobile phones or transferring funds using some other hand-held device. But genuine ubiquitous computing and communications go much further: wearable computers that continuously monitor people's health and relay the information to doctors; pocket devices that keep people continuously plugged into information; and networks of smart devices, from cars and refrigerators to climate-control and security systems that constantly communicate with each other and adjust people's environments to ensure their comfort and safety. Mobility is the foundational technology upon which ubiquity depends.

In order for the mobile technologies to lead to seamless digital living and ubiquity, business has to overcome the key obstacles to the mobile transformation. EDS has identified the essential actions in terms of four 'imperatives' that companies must take to be successful in the new digital economy: eliminate boundaries, collaborate in new ways, establish trust and continuously seek improvement. The obstacles to mobility can only overcome by truly championing mobility and recognize and approaching these four imperatives in the digital economy.

2. Impediments to mobile transformation

What are the obstacles to ubiquity and mobility? In addition to the political, cultural and social challenges, the immediate technological limitations involve user and server application development, network connectivity, content generation and management, as well as device development and implementation. The problem with mobile devices as e.g. palm computing devices, PDAs and mobile phones is that they cannot be easily networked or exchange information between themselves and other information sources. This is due to the immaturity of current digital wireless networks, which have limited bandwidth, limited coverage and differing regional standards.

Wireless technology promises anywhere, anytime Internet access. But wireless electronic business will not move beyond anywhere or anytime in the near future if inconsistent security, immature standards, patchy service and other shortcomings are not addressed. Therefore, many companies have a relative lack of interest for mobile technologies.

2.1 Security

In the transition from e-commerce to the digital economy the major roadblock, lack of trust, must be removed. Until we earn trust for the information industry's ability to safeguard personal information and protect Internet users against crime, a robust digital economy will remain a goal far away. Given this, security is the top concern for the mobile world.

Security is vital to protect content as well as infrastructure. Seamless digital living will expect and demand absolute security. As digital living increases there will be an increasing demand particularly in three fields: identification: the assurance that somebody is checking to make sure users are who they say they are; authentication/data integrity: verification that data has not been tampered with or altered; and privacy: the assurance that no one is going to read data except the person for whom it is intended. Combating cyber crimes will require major efforts from industry and governments in the future.

The information assurance risks are many. However, the wireless technologies have advantages over a cabled infrastructure with regard to information assurance. During a physical disaster, e.g. a hurricane, the wireless communications system is more likely to survive than a cabled network. Therefore, using wireless greatly enhances network availability and information assurance compared to cable. Some companies may wish to have both technologies, one being used as a backup of the other.

The emerging mobile computing opportunities for telecoms and IT providers and the success of e-business companies, measured in thousands and millions of "hits", could be their downfall. Their survival depends in large measure on maintaining rapid contact with their customers in spite of viruses and denial-of-service attacks or even underestimated shopper traffic. Dependable infrastructure has to stay up and be open for business around the clock.

2.2 Stability and standards

The stability of wireless technology and the disparity of standards worldwide is another big concern in the mobile world. Until the mobile technologies are completely reliable and proven and there are set standards, most companies will not devote resources to wireless. The insecurity is to big for going for one type of system today and in two years see a different standard come out.

Among the biggest technology drawbacks to a wireless web are that screens on mobile devices are too small to support current web pages and content.

2.3 Cost

Changing to wireless Internet would facilitate the work for the employees. However, the cost for changing to wireless is a prohibiting factor for many business and industries. The mobile devices used in a company's distribution center cost significantly more than the handheld mobile units.

Before changing to wireless Internet many companies first need to develop a wireless "mindset" that also includes designing web content suitable for wireless users.

2.4 Bandwidth

Among the obstacles facing wireless web users are bandwidth limitations. Wireless bandwidth is too narrow to support multimedia applications. The number of people logging on from wireless devices is expected to grow significantly. The flip side is that the wireless

industry should not underestimate the complexity of delivering web services in a highly trafficked infrastructure.

As long as the bandwidth limitation exist, companies have to make sure they can support a flexible infrastructure and can handle the inevitable fluctuations the currently exist in the web traffic.

3. Mobile services beyond 'e'..

The hurdles to reach the wireless world have been listed. How can companies overcome these obstacles and how can mobility be championed? Every company regardless of size, needs to cost-effectively control mobile technology.

Mobile capabilities have to be highly flexible and scalable because no two companies operate in the same way and no two users' needs are the same. Solutions need to cover the entire spectrum of capabilities, including business needs assessment and consultation, portal design and content selection, network integration and operations, customer care and support - and everything in between. Both software and hardware decisions have to be tailored to meet each company's specific needs.

Powerful mobile services must extend beyond 'e' – beyond simply allowing people to make wireless phone calls and otherwise wirelessly connect with each other. Rather, the model encompasses the components necessary to make a mobile strategy successful over the long term: applications (commerce, information, communication), devices (smart cards, wearables, PDAs), infrastructure, security, customer relationship management, connectivity (WANs, LANs, MANs), enterprise applications (enterprise systems, healthcare, knowledge management) and content (personal, intellectual capital).

A basic paradigm shift has occurred as corporate information systems move from a cost centre model to a strategic business asset. Converged technologies and the network that incorporate these technologies are no longer used simply for sending and sharing files and printers. The network infrastructure becomes a highly leveraged business accelerator while technologies further converge to support the IP-based intelligent network services. In this context, information assurance programs become even more important. These programs must include initial risk assessments, business continuity strategies, change management and continued monitoring and validation of current business policies and objectives.

3.1 The Digital Economy's Imperatives

The mobility factor gives that the digital economy is not business as usual. The imperatives for success and making enterprises work in the mobile digital economy are:

- Eliminate boundaries
- Collaborate in new ways
- Establish trust
- Continuously seek improvement

Success in the mobile world is only possible if approaching and realizing the significance of these imperatives.

3.1.1. Eliminate Boundaries

Distinctions have to be eliminated between the old and new digital economy. Early telephone technology began eroding the boundaries of space and time, which is also what mobile technologies are doing today. This development is good as eliminating boundaries

is fundamental to consumers and businesses in the digital economy. Mobility must be championed to eliminate boundaries. In order for companies to eliminate boundaries and gain the digital sense, comprehensive solutions are needed that bypasses the accustomed boundaries of time, location (spatial or geographical) and interface (device).

Digital freedom for companies can be achieved by connecting enterprises and individuals without regard to location, time or technology. The most difficult issues challenging businesses trying to adopt to a mobile strategy include: device independence and integration, linkage to businesses databases and systems, security and privacy issues, billing and micropayments, reliable and seamless service and data-flow management and integration.

This wireless approach will break through the last barrier between corporate enterprise data and the mobile work force. The result is a solid technology platform to bring seamless mobile corporate data offerings to market. It creates a new standard for communication between corporations and their mobile workers which extends the reach of corporate knowledge centres to any device anywhere.

3.1.2 Collaborate in New Ways

It is becoming standard business practice to collaborate. Even established businesses have to partner with suppliers, customers and competitors. Enterprises are abandoning old economy practices that inhibit collaboration and the sharing of knowledge. Firms are incorporating their customers, suppliers and partners into their value chains, creating digitally linked communities. That means consumers are more involved in the creation and development of their own products and that the trading of goods and services through virtual communities becomes so easy that the customer receives not only better prices, but better quality products and more varieties. Increased collaboration also means added responsibility.

The converging technologies together in addition to the new collaborative relationships add up in intelligent networks. Intelligent network infrastructure that are self-defending and self-healing and remove potential security bottlenecks need to be created.

3.1.3. Establish trust

To be able to create trust is to be successful in the digital world. Privacy for individuals as well as for companies is vital in this process. Organizations worldwide must be offensive to defend their digital assets and industry and governments have to work together to ensure the standards that are developed protect privacy and reflect integrity and respect for the individual. Internet and the new technologies present new ways for committing old crimes, but it also makes new crimes possible because the use of Internet as e.g. data access and interference.

To prevent the consequences of the insecurity of the mobile world some first steps would be to place security systems and passwords in the access stream. Encryption of communications and transaction traffic is strongly advised. Information assurance should be the marriage of security and business continuity for the long term.

The wireless world generates advantages to the criminal and companies have to be prepared to repel attacks. It is easier to “jam” wireless communications versus a cabled infrastructure, thus causing a denial-of-service. Networks might need to be constantly monitored to respond automatically to jamming, thus disabling the offensive signals. Given this, a strong set of information assurance components is vital for the wireless world: capacity planning, risk assessment and vulnerability checks.

Public Key Infrastructure (PKI) based architectures, a system that provides a higher level of security than is available today, will be the primary defense against illegal activities in the digital economy. The emerging digital economy must offer consumers a business environment they can trust, one that is invisible to them and makes the process safe and secure. The key to meeting these expectations is a PKI.

3.1.4. Continuously Seek Improvement

The digital economy is a dynamic, real-time economy where speed must be a core business value. Once information is digitized, people have the freedom to perform their jobs anywhere, anytime, anyway.

The infrastructure necessary for true mobile office automation has been created using voice-over IP technology. Network providing infrastructure and management support of wireless and conventional platforms to converge voice, video and data into one transparent network need to be created.

The importance of establishing trust has been expressed above. However, no service runs on automatic pilot. The most effective approach is to take a holistic/life-cycle approach of the difficulties and complexities that are built in the protection of companies' information systems assets. Assuming that protecting information is a simple matter is detrimental for an organization. A comprehensive life-cycle strategy accommodating the full range of information systems security needs and that ranges from assessment to implementation, from validation to monitoring and management is necessary to address the critical business and infrastructure requirements.

However, cycling just once through the life-cycle model is not enough. Change is happening at a rapid rate in the organization in the technology and in the economy. Constant monitoring of an organization's network, applications and people from an operational and business perspective is critical.

4. Conclusions

The new technologies in the digital economy will provide entirely new ways of doing business in many sectors. For example in the health sector will wearable devices continuously assure people's health; in the field of just-in-time training and productivity will enterprises bring just-in-time instructions to students or knowledge and expertise to field employees; and mobile financial services will enable currency buyers to pay for goods and services through a key fob or smart card containing user-identity data.

Today's mobile technologies are impressive, although they are merely the first products of mobility, precursors of what lies ahead. What is considered as state of the art in mobility today is just a transformational step.

To meet the challenges of the digital economy EDS has introduced EDS Mobile Services and wireless solutions, which offers comprehensive solutions that bypass location, time and interface. By an end-to-end perspective where the traditional distinction between wired and wireless disappears, the model encompasses the necessary elements to make a mobile strategy successful over the long term: applications, infrastructure, security, customer relationship management and more. The comprehensive approach taken recognizes the holistic life-cycle approach and help companies eliminate boundaries, collaborate in new ways, establish their customers' trust and continuously seek improvement. The fundamental principle of the life-cycle model requires that security measures are implemented by the intent of providing long-term, continuous protection. The logic is simple – even if an organization's infrastructure is secure today, it will not be

tomorrow. The critical challenge is to keep the IT configurations current and to do it on a continuing basis.

EDS Information Assurance technologies secure trust and privacy, and do not only involve a new way of looking at security but also new ways of doing security. The technologies involve aggressive and proactive approaches to protect and defend critical data and systems. Together with Information Assurance technologies, EDS Intelligent Network Foundation (INF) delivers real-time mechanisms for protecting companies' critical assets. INF eliminates boundaries that traditional networks face as it simplifies communications by combining multiple networks into one converged architecture that unifies a company's voice, video, data traffic on both wired and wireless platforms. It enables them to move all this communications off phone lines and to Internet Protocol Networks. Ubiquity is reached by plugging into a traditional wired network or via a wireless connection whenever one wants anywhere in the world.

Advances in broadband capabilities, as e.g. the implementation of 3G wireless technologies, are removing current wireless-network limitations. Within the next decade, wireless bandwidth will reach the capacity of wired bandwidth today, enabling wireless devices to access information once reserved for wired devices alone.

Future generations of wireless technology will not only bring the Internet to individuals, they will deliver individuals to the Internet in more transparent ways. As such the Holy Grail in wireless technology applications is simplicity. The easier it is to place a call to order theatre tickets or order from a catalogue, the more valuable the application itself will be. If a consumer not is able to execute an order on a wireless device easier than she can when using her computer, she will not go wireless.

The fact that the user community on the wireless telephony network is growing faster than the Internet user community, together with the secure infrastructure provided by telephony networks means that the future of role Internet may change. Perhaps the Internet was just the distraction that carriers needed to provide them time to develop the next generation of telephony e-commerce services.

However, mobility is not about the technology and it is not only about being wireless. The customer will choose the channel of communication and mobility is about the customer having the same experience anywhere he is. The ultimate goal is ubiquity, which would require no more logging on and logging off.

Establishing and maintaining effective policies that address the security, integrity, availability, confidentiality and privacy of critical information system assets is crucial to business survival. Privacy, PKI and security are all vital for mobile technologies and the mobile world. These policies are all part of the broader information assurance, where trust is key and which is a fundamental part of the digital economy's four imperatives.