

Efficient Technologies for Access Control and Asset Management

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Abstract

Technological advances in the field of Electronic commerce (or e-commerce) and access control have been overwhelming in the present years, conceding the freedom to consumers for accessing and using these services when and where they wish, at times and places that are convenient to them. E-commerce and access control encompasses all business conducted by means of telecommunications and computer technologies and have made computer networks an integral part of the economic infrastructure. The widespread use of standard desktop PCs, laptops, mobile phones, credit cards, ATM cards, smart cards and different identification technologies for E-commerce and access control need to offer superior privacy and security in the technological environment.

Keyword: *iButton, E-commerce, access control, asset management, embedded system*

1. INTRODUCTION

The Internet and E-commerce have grown much more rapidly than anyone guessed, spawning potentially new ways of communication, collaboration and coordination among consumers, businesses and trading partners. The physical currency i.e. paper money and metal coins has evolved into present day form of plastic, like credit cards, debit cards, smart cards, to avoid counterfeiting and fraud. In this digital era, consumer devices for E-commerce access are getting smarter day by day offering features to users they never imagined. These are used for carrying out countless financial transactions, fund transfers, buying and selling of products or services over the Internet through a process of electrical money transactions, known as E-Money. Electronic money can provide many benefits such as convenience and privacy, increased efficiency of transactions, lower transaction fees.

In simple terms E-commerce is money stored as, and transmitted in Electrical form. However, the term may refer to more than just money stored and transmitted in Electrical form. It also includes the entire online process of developing, marketing, selling, delivering, servicing and paying for products and services.

The technologies used for E-commerce access can be roughly categorized into consumer devices and

communication infrastructure. The range of consumer devices include standard desktop PCs, laptops, mobile phones, credit cards, ATM cards, smart cards, etc. The communication infrastructure necessary for wired and wireless environment include various communication protocols, markup languages that may vary with different devices and operating systems. This paper describes different technologies and issues related to the consumer devices. It also presents the enduring trend of E-commerce in India.

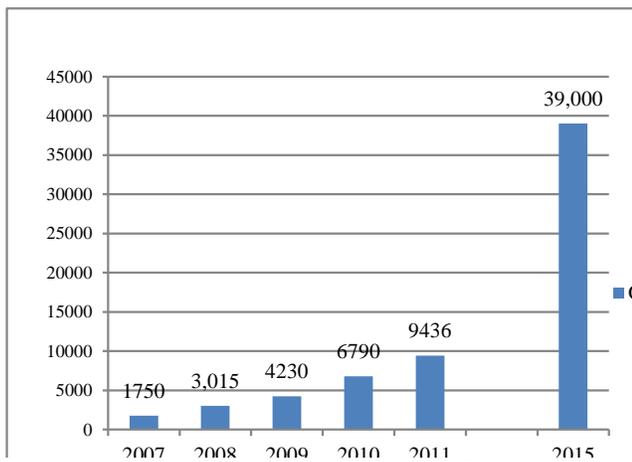
2. E-COMMERCE IN INDIA

For developing countries like India, e-commerce offers considerable opportunity. E-commerce in India is booming due to increased Internet penetration and more secured e-commerce services. At present, about 8-10 million people in India transact online, which is about 11 per cent of the 80 million Internet users in the country, which represents a penetration of 7 per cent of the population and 17 per cent of the urban population. Overall e-commerce industry is poised to experience a high growth in the next couple of years. India's E-commerce market is growing at an average rate of 70 per cent annually and has grown over 500 per cent since 2007. The current estimate of US\$ 9.43 billion for year 2011 is way ahead of the market size in the year 2007 at \$1.75 billion. [Internet and Mobile Association of India]. It is forecast to reach a whopping \$US 39 million by the end of 2015. The following chart depicts the expected and recorded growth of E-commerce in India in the last couple of years. Other factors contributing the rapid growth of e-commerce in India is its population. Indian middle class of 288 million people is equal to the entire U.S. consumer base makes India a real attractive market for e-commerce.

The number of unique users transacting on travel sites (only) are estimated to be around 6-7 million and for non-travel ecommerce sites is around 2-3 million today, The online travel industry which presently is the largest contributor to the e-commerce market which constitutes about 81per cent of the total market share has grown to INR 37, 890 crores by December 2011 and estimated to grow at 22 per cent to reach Rs 54,800 crores by 2015. Online travel revenues are dominated by ticket bookings, with air and train bookings accounting for close to 90 per cent of the segment's revenues. Bus travel, hotels and tour

packages have been slower to evolve but are now growing rapidly. While 57 per cent of the online travel revenue came from air travel, train and hotel packages contributes 37 per cent and five per cent, respectively and remaining one per cent is from bus bookings. Online train ticket bookings is around Rs 8,000 crore (USD 1.8 billion) in 2010-11, accounting for around 32 per cent of the overall ticket bookings. Another area that has shown significant growth is the financial services market that has grown to INR 2650 crores by end of December 2011.

Graph 1 also highlights other areas like digital downloads and e-tailing (mass merchants, niche, and deals) which are predicted to grow to 12 billion to the total e-commerce market by 2015.



Graph 1: Growth of E-commerce over the years (Figures in USD millions)

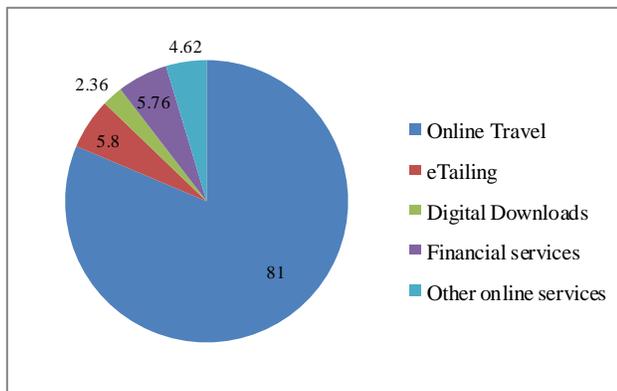


Chart 2: E-commerce Market share, 2011

3. TECHNOLOGIES

3.1. Personal Computers and Laptops

Over the past few decades we have been using PC and laptops for e-commerce and banking. In the past 15 years,

the desktop computer has been hacked in every possible way. Most of these devices run on the traditional operating system that is vulnerable to viruses created by criminal hackers. Unfortunately, as the population of netizens in India grows, the number of cyber crimes is growing at an alarming rate. The cyber crimes/ cases registered under the IT act were around 966 in year 2010 as compared to 420 crimes/ cases in year 2009 representing a growth of 128.4 per cent in just one year.

Figure represents of the actual cases that were raised in India under the Information Technology Act:

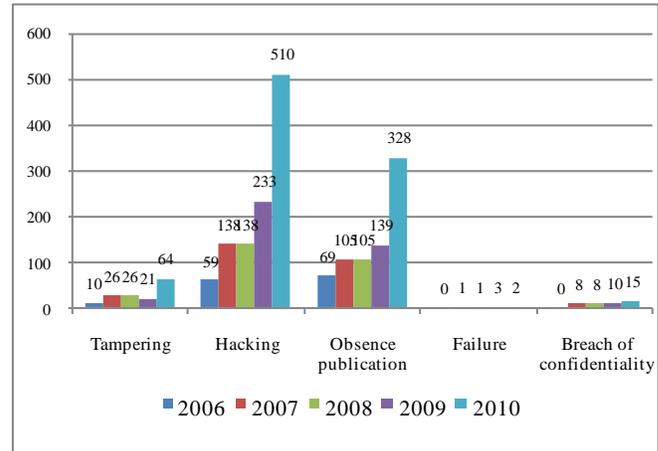


Chart 3: Cyber crimes in India, 2010.

To deal with these set of security issues, protocols such as SSL and S-HTTP are developed by Netscape. Secure Sockets Layer (SSL) protocol is used for transmitting private documents via the Internet. SSL uses a cryptographic system that uses two keys to encrypt data – a public key known to everyone and a private or secret key known only to the recipient of the message. Both Netscape Navigator and Internet Explorer support SSL and many Web sites use the protocol to obtain confidential user information, such as credit card numbers. By convention, URLs that require an SSL connection start with https: instead of http.

Another protocol for transmitting data securely over the World Wide Web is Secure HTTP (S-HTTP). Whereas SSL creates a secure connection between a client and a server, over which any amount of data can be sent securely, S-HTTP is designed to transmit individual messages securely. SSL and S-HTTP, therefore, can be seen as complementary rather than competing technologies. Both protocols have been approved by the Internet Engineering Task Force (IETF) as a standard.

To enhance security over web CAPTCHA is also used. A CAPTCHA (Completely Automated Public Turing Test

to Tell Computers and Humans Apart) is a program that can generate and grade tests that humans can pass but current computer programs cannot. CAPTCHAs have several applications for practical security, including;

- Preventing Comment Spam in Blogs
- Protecting Website Registration.
- Online Polls.
- Preventing Dictionary Attacks.
- Search Engine Bots.
- Worms and Spam.

3.2. Mobile Phones

We are witnessing a revolution taking place in India, where the e-commerce shift goes in favor of smart phones and tablets. The Indian consumer has matured and is no longer hesitant of shopping online. Nearly 67 percent of e-commerce happens on mobile devices and as many as 40 % of all Google searches in India are done using mobile phones. Till now PCs and laptops were used for browsing and looking for the best deals. But with information about most products readily available, most online purchase decisions are made quickly just on a touch of your mobile phone app.

Mobile banking on the other hand is relatively new – the operating systems vary, viruses and other malware are not as prevalent and the technologies in handsets themselves vary greatly among manufacturers. Developers have carefully revisited both operating systems and applications software on a variety of platforms. Operating systems such as Microsoft’s Pocket PC, Palm’s Palm OS, Google’s Android OS, Apple’s iOS and Blackberry OS have been developed for handheld devices are proven to be more secure and reliable.

The mobile carriers’ networks are more difficult to hack than your home or local coffee shop’s wireless network. Mobile carrier services like 3G have a much higher level of encryption and are not open like broadband internet. Meaning you cannot just jump on someone’s 3G connection in most cases.

With mobile banking there is the added benefit of additional layers of authentication, in which the account holder authorizes various transactions via text message or call backs with an additional code, making mobile banking even more secure.

3.3. The Credit Cards and Debit Cards

The Credit Cards and Debit cards are the most important trade instruments that facilitate e-commerce payment transactions. Electronic payments involve money transfers into other accounts as well as direct debits for payment of

utility bills, insurance premium, and so on. They also include direct credits into your account for dividends, etc., and payments made through debit and credit cards each time these are swiped at stores. Overall, 59 percent of transactions are carried out in cash, while only 41 per cent are done through electronic means. Within electronic payments, while credit and debit cards from 53 per cent of transactions by number. The card based payment systems cover credit/ debit and prepaid cards. With more than 250 million cards (debit, credit) issued in the country, a spurt in the usage of these cards across various delivery channels like Automated Teller Machines (ATMs), Points of Sale (POS), e-commerce, m-commerce, Interactive Voice Response (IVR), etc. has been observed. On an average, 400 million transactions valuing over a `1,000 billion are being processed during a month using these cards.

Credit Cards and Debit cards use a form of magnetic strip that holds identification number that links itself to a bank account. However, for payments across the Internet, consumers must type in their credit card number onto a web page to buy an item. This has potential problems as hackers can try to intercept the transaction or hack into web shops database to retrieve these numbers. Cloning of Credit Cards and Debit cards is also a security threat to its user.

Because of these problems, consumers are very reluctant to use credit cards to buy items across the Internet and retail shops, in the off chance that someone would steal their credit card number and personal details for malicious use.

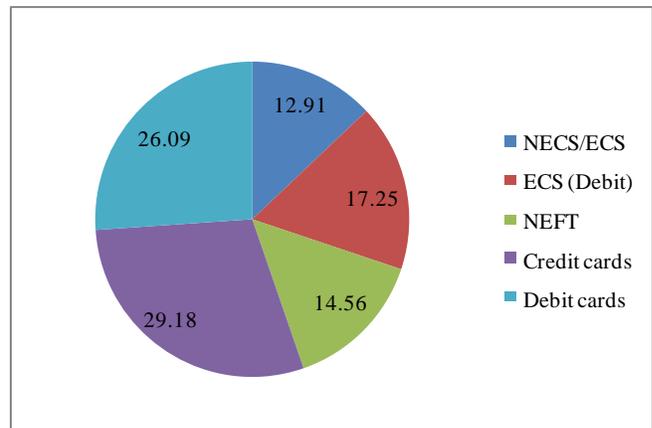


Chart 4: Retail Electronic Payment in India, 2011.

3.4. iButton Technology

iButton, a computer chip enclosed in a 16mm thick stainless steel, can serve as an e-commerce device. iButton

solution for an application is advantageous over many complementary technologies like Bar codes, RFID tags, magnetic stripe and smart cards. Unlike bar codes and magnetic stripe cards, most of the iButtons can be read AND be written to. Hence, up-to-date information can travel with a person or object anywhere they go. In addition, the communication rate and product breadth of iButtons goes well beyond the simple memory products typically available with RFID. As for durability, the thin plastic of smart cards is no match for the strength of the stainless-steel-clad iButton.

iButton has a unique 64-bit address provides a simple, secure way of identifying a person or asset. It becomes your personalized token and acts like a small change purse for one or multiple applications. Unlike paper cash, iButton is electronically authenticated using a complex, non-reversible mathematical algorithm plus 64-bit secret to ensure that the data/ eCash stored in it doesn't get altered or even the entire device gets duplicated or emulated. iButton can serve as an electronic key to meet all application needs such as eCash, access control, guard tour monitors, maintenance and inspection data management, device and software authorization, and temperature data logging. iButton technology has emerged in India on a very smaller extent but widely used in other countries for different application as mentioned above. The security aspect of iButton is greatly enhanced by the use of java based cryptographic techniques, ISO/IEC 10118-3 standard Secure Hash Algorithm 1 (SHA-1). The integrated 512-bit SHA-1 engine can be activated to compute 160-bit message authentication codes (MACs) based on information stored in the iButton.

4. CONCLUSION

Technologies used for E-commerce access will keep on changing according to user specific needs. The non-cash retail payment modes in India face significant challenges and needs a unique and innovative payment solution – one that is simple to adopt and is capable of significantly bringing down the barriers for uptake of non-cash retail payment in India. There is no doubt Mobile phone, that has touched the highest number of lives in India to date reaching out a penetration that stands at 600 million+ and growing at a CAGR of 60%, will become or rather is one the prominent technologies for ecommerce access. Another technology that can bring out fruitful results is the iButton. It posses the capability of replacing credit cards, debit cards, smart cards, etc, while carry out secure eCash transactions at events we encounter in our everyday life.

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