# Korean Smart Card Fare System Biggest to Date

A contactless Smart Card electronic ticketing system rolled out in Seoul, Korea, is the largest in the world to date to be actually operational although other major schemes are in development, notably, Hong Kong Mass Transit.

All 8,725 buses in Seoul have been equipped with contactless card readers and over 600,000 contactless cards were in use at the end of last month with a target figure of one million cards before the end of this year.

The success of the scheme has resulted in a request from the Mayor of Seoul City, Cho Soun, to use a ticketing system for the Subway which is compatible with the bus system and a field trial is expected to start soon.
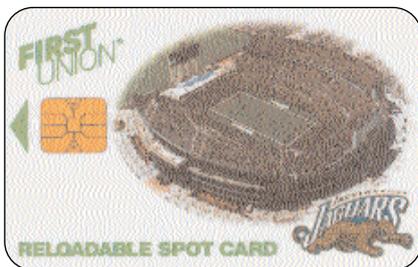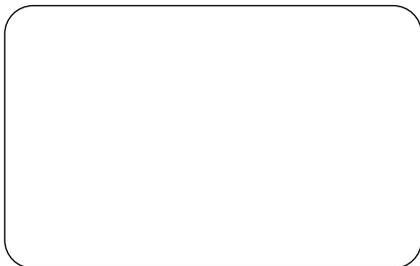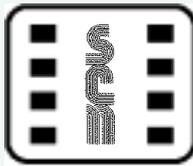
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Cards On the Cover
Saltzburg Card - *Page 146*
Korean Smart Card - *Front Cover*
First Union - *Page 144*
Zeelandkaart - *Page 146*

Smart Card News - August 1996

Contents

Next Month
Smart Card Tutorial:
Another definitive technical paper by
SCN's Dr David Everett.

Korean Smart Card Fare System

It was only last October that the Seoul Bus Union began a field trial in the Seoul and Kyunqki areas with an electronic ticketing system using contactless Smart Cards to replace the traditional payment on buses by tokens purchased from booths located near most bus stops.

The system was installed by INTEC Ltd., a Korean company which acquired the MIFARE contactless technology licence in early 1995 from Mikron of Austria, and then worked to develop a card validator with components that could be obtained locally, thus producing a Korean manufactured product. More than 500 buses were equipped with terminals accepting payment with a contactless Smart Card supplied by Gemplus, 20,000 cards were issued by the end of 1995.

Following the successful completion of the trial, the Seoul Bus Union decided to roll-out the system.INTEL installed the system, which includes a clearing house function, in all 8,725 buses in the fleet by the end of June 1996 - a remarkably short time compared with normal Smart Card system integration times.

Fares, which depend on the card type (adult, student, etc.) are deducted automatically and the cards can be purchased and recharged either at bus token distributors or in university campus stores. The cards are available in three denominations - Won 5,000, Won 10,000 and Won 20,000.

Plans call for the sales network to be expanded through subway stations, banks and post offices and to install card vending machines. To encourage the recharging and re-use of the bus cards, cardholders recharging their cards receive a five per cent bonus credit. The new system enables management to track, record and analyse trends in revenue per bus or per route, and speed boarding times as customers no longer have to fumble for coins as the card can be kept in a wallet and can be read at an operating distance of about 10 cms from the card validator on the bus.

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Travel Card Project in Helsinki

A contract has been placed for a major Smart Card-based travel card project in Helsinki for buses, trams, underground and local trains and ferries. The initial order calls for the supply of 300,000 rechargeable proximity cards (contactless cards) and 500,000 prepaid contact Smart Cards.

The Board of the Helsinki Metropolitan Area Council has chosen Olivetti SpA and the consortium lead by Olivetti's Finnish subsidiary, Olivetti Oy, as the supplier for the new electronic travel card system. Olivetti Oy will supply vending machines, computers, project management and maintenance. Buscom Oy will be responsible for the supply of ticket issuing machines, proximity readers and Smart Cards. Western Systems Oy and TT-Ticto Oy, will be responsible for the software of the system. TT-Ticto Oy may also participate in the administration of the project.

When completed the system will comprise of approximately 2,500 card readers, 1,500 ticket issuing machines, 100 inspector terminals, 35 depot systems and about 320 card charging and ticket sales system. In addition, the systems will be supplemented with automatic equipment for the sale and recharging of the cards.

Buscom Oy is well known in Finland for its fare collection systems based on contactless proximity card technology and has installed them in some 20 cities in Finland, Sweden, Norway, Denmark and Germany. Olivetti Oy has participated in the delivery of a travel card system for the handicapped in the greater Helsinki area.

The new electronic travel card scheme will be introduced into the public transport system of the greater Helsinki area in two phases. First, the equipment will be installed in the vehicles so that the sales of single tickets can be started in the summer of 1997. The travel cards will be introduced a year later in the summer of 1998.

The Council says the travel card system will become the method of payment in all public transport vehicles in greater Helsinki, including the local trains of the Finnish State Railways.

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VISA Cash Success in Atlanta

Visa says that the initial results from the pilot of VISA Cash, its chip-based stored value card, at the Summer Olympic Games in Atlanta, "clearly demonstrate the viability and future potential of the product."

Figures released show that the cards were used for over 200,000 transaction representing US $1.1 million. Over the 18-day period, this equated to over 11,000 transactions each day, with an average value of US $5.50.

The most popular use for the card was for the purchase of food and beverages as well as telephone calls and accounted for about half of the volume.

The pilot, conducted by Visa with three of its members banks - First Union, NationsBank and Wachovia - continues throughout 1996 during which time the three banks expect to issue 1.7 million cards. Over 1,500 merchants are participating, with 4,200 card acceptance terminals already installed.

Stephen Schapp, Executive Vice President, products and marketing, says "This is the best demonstration so far of the potential for VISA Cash. It clearly confirms three main points. First, and most important, consumers like it, as indicated by research results and the actual transaction figures. Second, with average transactions of US $5.50, it is opening up a brand new market for our members. And third, having put the technology through a very demanding and high profile test, we know that it works."

Problems experienced related to the number of acceptance locations, he said, adding, "With a brand new product, and a city the size of Atlanta, the coverage and the number of acceptance locations was inevitably going to be a factor.

"If people say that they cannot use the card in enough places, that is the best possible problem we can have. We plan to resolve it by increasing the level of coverage during the remainder of the pilot period."

Contact: Colin Baptie, Visa International, UK - Tel: +44 (0)171 937 8111.

Rechargeable Cards for Fans

Football fans of the Jacksonville Jaguars are being offered rechargeable stored value cards from First Union Bank in Florida to purchase food, drink, game programmes and souvenirs at a number of locations in their home stadium. Last season they had pre-paid disposable cards (*SCN November 1995*) and the success of the scheme has resulted in the issue of reloadable cards for the convenience of the fans and to simplify the process of acquiring cards.

To launch the initial scheme in 1995, the bank teamed up with systems integrator and equipment manufacturer Diebold, Smart Card fabricator Schlumberger and POS system supplier Tangent Associates.

Diebold is installing 25 iq EPIC terminals - Smart Card loading stations - where fans will be able to load value onto their cards. The company is also providing networking software for processing and settling all transactions after each home game.

Rafael Molano, Diebold's Director of Advanced Card Systems, says: "Using this new system makes reloading your Smart Card as easy and fast as getting cash from an ATM."

New Software for Pisces System

Landis & Gyr (UK), developer of the Pisces Smart Card electricity payment system, has announced new Windows-based management information software as part of the Pisces Controller system.

It has been specially packaged for energy providers with smaller customer bases and is supplied on 3.5 inch disks, an installation guide and operations manual.

Martin Pollock, Marketing and Technical Director, explained, "This package can operate either as a stand-alone compact customer account management sub-system or as a pilot platform for much larger systems. We already have versions in four languages to support several projects worldwide."

Contact: Martin Pollock, Landis & Gyr (UK) - Tel: +44 (0)1952 677661.

Gemplus Card Plant in China

Gemplus is to manufacture Smart Cards in China in a joint venture with the Tianjin Telephone Equipment Factory (TTEF) of the Post and Telecommunications Industrial Company. The company will be located in Tianjin, near Beijing, and will start manufacturing operations this year.

The new company, called Tianjin Gemplus Smart Card Company Limited, has been created with the support of the Ministry of Posts and Telecommunications and Telecom China. 51% is owned by Gemplus and 49% by TTEF.

Gemplus says the new company will initially focus on the phonecard market which is poised for strong growth in China with Smart Card payphone installations estimated to be around 400,000 by the year 2000.

The new factory is targeting a yearly manufacturing capacity of 100 million cards before the end of the century.

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Mars System Deal with Mondex

Mars Electronics International (MEI) has concluded an agreement with Mondex International to develop compatible payment products for vending and other unattended point of sale applications.

MEI is the world's leading supplier in this market. The agreement means that Mondex cardholders will be able to use their cards to pay for drinks and snacks from vending machines as well as car parks, train and bus tickets, or to purchase items from other U-POS (Unattended Point-Of-Sale) applications that currently accept notes and coins.

The company stresses that while it is looking forward to supporting Mondex in its worldwide ventures, it will maintain an independent position with regard to electronic cash schemes.

Nick Habgood, Marketing Manager for MEI, explained: "Many countries will require us to support two or more schemes in the same card reader. We can only do this and provide the necessary support if we maintain our independence. I am delighted to say that Mondex fully understands and supports this approach."

MEI will be implementing the Mondex application onto its recently announced Smart Card product platform which will support multiple electronic cash schemes. It will also operate in conjunction with MEI's existing range of coin and note accepting products.

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Keystone Selects German Plant

Canadian card manufacturer, Keystone Manufacturing Plastics, headquartered in Ontario, has purchased a fully automatic Smart Card production system from Meinen, Ziegel & Co. GmbH of Munich, Germany, to enhance existing advanced card manufacturing capability.

*Contacts: **Bill Edwards**, President, Keystone Manufacturing Plastics - **Tel: +1 416 293 3842. Fax: +1 416 293 5198. Fred Smith**, President, Royonix Inc. American Sales & Service Agent for Meinen, Ziegel & Co. GmbH - **Tel: +1 805 257 0303. Fax: +1 805 257 0802.***

Spain Breaks Visa Monopoly

The Association of Spanish Savings Banks have signed an agreement with Europay International which breaks the long-standing card issuance monopoly enjoyed by Visa in Spain.

The decision initially involves the issue of six million cards within two years, including the MasterCard (credit), Maestro (electronic POS debit) and Europay's CLIP (electronic purse) brands.

Europay says the agreement also includes an eventual migration of the Savings Banks' Visa credit cards to MasterCard.

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DNP Announces New Card

Dai Nippon Printing and SPOM Japan have announced the joint development of a new type of Smart Card for electronic commerce.

The card's Integrated Circuit (IC) is said to be capable of carrying out complex encryption processing. DNP comments: "The processing of credit cards and electronic money over networks requires strict authentication of the people involved in a transaction. This new card renders the task of authentication simple and accurate."

The IC card features a new type of microprocessor with a high-speed co-processor and is claimed to handle public key encryption internally. The operating system can also use the DES algorithm depending on the application.

The operating system conforms to ISO standards as well as JIS (Japan Industrial Standard) and is expected to be used throughout Japan as a multi-purpose card.. It is also expected to be used in electronic commerce trials sponsored by Japan's Ministry of International Trade and Industry. DNP says sample shipments of the new card are scheduled for October.

SPOM Japan was established in 1989 as a joint venture between Dai Nippon printing and Bull CP8 now called CP8 Transac.

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Sainsbury Reaps its Reward

Supermarket giant J Sainsbury is regaining some of its market share from main rival Tesco since it launched its Reward loyalty card. The scheme, only launched last June, already has 5.5 million cardholders and is adding 100,000 a week. The group expects to beat its target of 7 million cardholders by the end of the year.

In July, Sainsbury's market share rose to 21.1% compared with 20.6% in June. In supermarket terms this is a significant increase in turnover but the group still has a long way to go to regain its position of January 1995 - a month before Tesco launched its loyalty card.

Zeelandkaart Pilot Project

The Zeelandkaart (ZLK), a multi-function Smart Card being piloted in the Province of Zeeland in the south west of The Netherlands, now has 23,000 cards issued.

The 8K bytes EEPROM card from IBM can be used as an electronic purse and can also contain 16 telephone numbers, listing the last four numbers called. Several shops give bonuses when payment is made with the ZLK.

Cards can be reloaded in all the public telephone booths in the Netherlands (more than 18,000) and the transaction is secured by a PIN code.

Research shows that the card is used by two important groups - residents and tourists. Local people are using the ZLK mainly for public transport (210 buses), parking (185 parking machines) and at retailers and libraries (85 outlets).
There are nearly 50 specific recreational outlets, museums and restaurants more related to tourists.

The scheme is being developed in stages. It was introduced as a small pilot in the summer of 1995 in only one town and involved parking meters, one bus line and public telephones. In the second stage, which began in May this year, the pilot scheme was extended throughout the Province of Zeeland.

Plans call for a multi-functional chip card called the Chipper to be issued in a joint venture between PTT Telecom and the Postbank. The Chipper will also have possibilities for loyalty programmes, telephone-identification and secured access.

Contact: Rob Regensburg, PTT Card & Payphone Services, The Netherlands - Tel: +31 70 343 9571. Fax: +31 70 343 652.

Salzburg Tourist Card

The new pre-paid microprocessor Smart Card for tourists to the City of Salzburg (see front page) is comparatively rare as far as collectors are concerned as it costs more than a few Pounds or Dollars. Announced recently by the Austrian National Tourist Office (*SCN June 1996*), it is used to pay for nearly all holiday requirements, including 3-5 star hotel accommodation and meals in restaurants etc.

Berdy Medical Record Card

Berdy Medical Systems, Inc., of Rochelle Park, New Jersey, USA, are the manufacturers of a Smart Card-based medical record card system which enables patients to carry their medical history wherever they go.

The Berdy SmartCard, an 8K bytes EEPROM microprocessor card, helps doctors to provide faster care in emergencies, eliminates unnecessary tests and form filling as all the essential information is stored in the card. Current fee for the card is US $49.95.

The patient decides what information will be stored on the card and who will have access to the information. Healthcare professionals can read and print out information stored on the card using Berdy's Patient Chart Reader, or read and write medical information to it using a computer system supplied by Berdy and running on their SmartClinic software.

The card can hold the following information:

* A summary of the medical record information caregivers need in an emergency, an overview of current and chronic problems, allergies, current medications, blood type and family physician contact information.

* Basic personal data such as address, phone number, date of birth, marital status, occupation, employer, next of kin with relationship and phone number.

* An extensive profile of past illnesses, medications, procedures plus recent physical examination and family medical history.

* Insurance information for the payment of the patient's healthcare services.

The company says that the card is especially valuable to people who see a doctor more than once a year, who see more than one doctor, have chronic medical problems, take several medications, may need care in an emergency room, people who travel and young children so that their medical information is accessible when in the care of a baby-sitter.

Berdy began its marketing campaign in the New York metropolitan area in March 1994 focussing on direct sales to the consumer with an advertising campaign on cable television and giving its basic card reader system to more than two dozen hospital emergency departments.

The Berdy card is available from Universal HealthCare Distributors, 4613 Parkbreeze Court, Orlando, Florida 32808, USA. *Tel: +1 407 292 0744. Fax: +1 407 292 0726.*

Smart Ski Slope Management

An artificial ski slope built on a slag heap at Nœux-les-Mînes in northern France includes a Smart Card management system.

Skiers using the 320-metre slope can use their Smart Card for entry to the changing rooms and to rent ski equipment. They pay for the time actually spent on the ski slope by inserting their card in a TPScam 4000 terminal at the entrance and again when they exit, the charge being automatically debited from their card.

The IDS FUNCHIP leisure system installed by IDS (Innovatron Data Systems) and its local partner IBOS, also manages employee access control.

Contacts: Geneviève Puig, Communication Manager, IDS - Tel: +33 1 46 25 82 87. Fax: +33 1 46 25 82 71. Alain Renuy, Mayor, Nœux-les-Mînes - Tel: +33 21 26 35 55.

DANMØNT on Inter-City Trains

Danish Railways (DSB) have installed payphones in their new inter-city trains with the DANMØNT stored value card as the only means of payment.

The payphones operate on the GSM cellular mobile network covering Denmark so there is no longer an excuse for not informing the boss that you will late for work.

Contact: Henning N Jensen, Managing Director, DANMØNT - Tel: +45 43 44 99 99. Fax: +45 43 44 90 30.

First ImagineCard Alliance Demo

The ImagineCard Alliance of Informix Software, Inc., Gemplus and Hewlett-Packard Co. gave the first live demonstration of their advanced Smart Card technology at Informix's Worldwide User Conference in Chicago last month.

A multi-application Smart Card, implemented to meet specific conference logistics and requirements, contained an electronic purse function, conference evaluation, logical and physical access and registration, with customer accessibility and card-owner controlled authentication.

The demonstration ran on the following products provided by the Alliance partners:

*   Informix OnLine Dynamic Server and middleware, Gemplus PCOS Smart Cards and GCR 400 and 500 card readers.

*   HP9000 servers, HP Pentiums PCs running Microsoft Windows '95 and HP200LX palm-tops with built-in Gemplus GPR4000 PCMCIA Smart card readers.

*   HP, Informix and Gemplus applications softwares, middlewares and management systems.

The ImagineCard Alliance was announced in October last year to jointly develop technology which will initially target two rapidly growing markets - electronic commerce and corporate Intranet - to enable companies to deliver new applications and functionality to individuals, improving convenience, security and service.

Plans call for the Alliance to deliver its first phase by December, 1996 with two key features:

1   Strong authentication that protects personal information and transactions

2   Digital signature to prove data integrity, ensuring non-repudiation of electronic transactions.

According to the Alliance, these features will enable consumers to strongly authenticate themselves for applications such as on-line purchases and electronic banking via the Internet. Additionally, with the corporate security features, companies will empower their employees to access, distribute and share confidential information on-line via Intranets and private networks. It will also provide physical access to buildings, secure areas and other corporate facilities.

Support from leading edge companies

This latest announcement from the Alliance was remarkable for the strong support and confidence expressed by executives of leading edge companies.

Dr Tsuruho, Executive Vice President of Research and Development at NTT Data Corporation, Japan's largest information systems provider, said: "We believe the Alliance's vision will deliver the key benefits required by our customers: convenience, security and end-to-end user transactions over global networks."

BT's Director of Card Services. Geoff Finch, said, "Our commitment to the ImagineCard Alliance's vision demonstrates our confidence in their product development strategy. Together our partnership will bring us into new markets, help us achieve our future growth objectives and extend our range of services to our customers globally."

Dudley Nigg, Executive Vice President, Direct Distribution group at Wells Fargo Bank, commented: "As a bank, security and strong user authentication are absolutely vital to deploy electronic commerce solutions. We intend to extend our range of services to our customers using the best-in-class products offered by the Alliance because of the solution that can be delivered now and in the near future."

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SCN Report on Electronic Purses

A *Smart Card News* Special Report, *A Comparative Review of Electronic Purses*, is being sent free to all our subscribers worldwide. The 48-page survey, which gives details of the major electronic purse schemes in operation around the world, is believed to be the first and most comprehensive of its kind in this area. Additional copies may be obtained at the non-subscriber price of £25.

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Night Club Loyalty Card

Night Clubs in the UK are the latest venues to discover the benefits of Smart Card technology with a system from Smart Card International. The card can be used as a loyalty and discount card and also as a cash purse.

The system was tested first at the Ivory Club, which has about 1,000 members, in Taunton, Somerset, last March. The 2K bits memory card from Gemplus is used with Gemplus card readers and Sharp cash registers upgraded to include Smart Card Manager software. This enables transactions to be carried out at the point of sale in around two seconds.

Cardholders are rewarded with loyalty points for purchases made in the club. The card is also an identity card and allows fast access to the club. Staff find the system easy to use, reducing queues at the bar and improving throughput and cash security.

A similar system has been installed at Kudos, a London gay club. The owners wanted to reward their customers, some of whom have been regulars since it opened at the end of 1992, with a loyalty discount card which gives points when food or drink is purchased at the club.

Currently, the system is being installed in one of the largest clubs in London with a membership exceeding 2,500. (The club does not want to be named until the system is operational and offered to its members). A number of other clubs are in the process of confirming orders.

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Gemplus Appointments

Gemplus has announced four appointments to its management team. Remi-Antoine Conti (47), takes over the management of the Quality programmes for all products and services marketed by the Group and responsibility for the Security and Environmental Protection activities. He graduated from the ENSAM engineering school in 1973 and from the IAE business school in 1975. He joins Gemplus from the SGS-Thomson Group

where he was Quality Director.

Jean-Marc Giry (36), takes over the Communications Division. He graduated from the HEC business school in 1981 and gained a Master's Degree in computer science from the Universite de Paris-Dauphine in 1982. Prior to joining Gemplus he was employed by the French subsidiary of the American Oracle software company where he set up the Marketing and Communication Division.

Sami Baghdadi (41), takes over the Personalisation and Services Division. He holds an engineering degree from the Ecole Nationale de l'Aviation Civile and a Master's Degree in economics. Previously he was responsible for the management of Nokia car Electronics in Sweden.

Dale Clements (36) takes over the management of the Banking and Retail Business Division. He has an MBA in management from the Cranfield Institute and joins Gemplus from American Express where he was Director of pan-European product development for Amex Travel (including Business Travel and Amex Corporate Card).

San Francisco Student Card

The University of San Francisco (USF), with Bank of America, are to offer students and staff a multi-function card serving as an ID card and providing a wide range of campus services. It will be used for access to the health and recreation center, buildings such as libraries and residence rooms, debit card purchases at on-campus stores and other services.

Students who choose to open an account with Bank of America will be able to use their USF ID card as a Versatel card providing ATM access.

French VITALE Card Scheme

The French National Health Insurance Scheme (CNAM) is said to be planning to issue 12 million VITALE social security Smart Cards next year to streamline the administration and reimbursement procedures by replacing medical claim forms which should lead to substantial savings in the social security budget.

Uganda Card Fights Crime
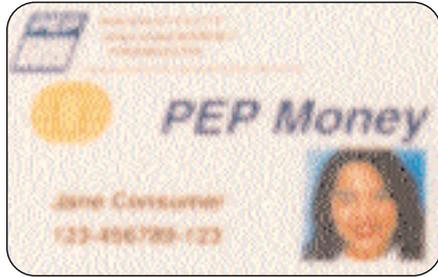
Safety and security as well as improved efficiency has motivated the International Credit Bank in Kampala, Uganda, central Africa to introduce a Smart Card electronic cash system, called SmartMoney, for its customers.

Consumers and merchants carry a great deal of cash through the streets of the capital Kampala and other cities, making them prey for thieves. It is especially dangerous for merchants, who at the close of business each day, take thousands of Uganda shillings to the banks to deposit. Many merchants have been attacked and robbed and some have been murdered. It is commonplace for the wealthy to be accompanied by armed bodyguards.

A solution has come from Productivity Enhancement Products (PEP), a small engineering and product development company in Laguna Hills, California. The US company has recently completed the installation of Uganda's first Smart Card cash transaction system. PEP has supplied TB100 cards with DES encryption from Micro Card Technologies Inc., the US subsidiary of CP8 Transac in France. Some 2,000 cards have been issued and the bank expects to add about 250 per month until it expands into neighbouring cities.


Bank official Henry Kinalwa, says: "The bank is initiating a massive effort to educate the citizens about the system with a marketing campaign aimed at consumers, merchants, students and government departments." He added: "With fraud a major problem in Uganda, the Uganda Revenue Authority is looking very closely at utilising the system."

Gary Beadle, Project Director, explained that the system's hardware consists of a standalone, unit ruggedly built to withstand a hostile environment. It is battery operated to be independent from the country's unreliable power source and telephones. There is a calculator-sized unit for the bank or merchant combining a keyboard, LCD and receipt printer, and a smaller keyboard and display for use by the consumer.

He added that to overcome the inherent distrust of non-cash systems among the population, a number of security features were built into the system, including data encryption and key management techniques to prevent counterfeiting or forgery.

"We spent a lot of time seeing if the system could be defeated," said Beadle. "Basically, it is based on the Traveller's Check concept." Money deposited in the bank is placed electronically on the card. To make a purchase, the card is inserted into the merchant's system and money is transferred from the card to merchant's system automatically. To access the system, the merchant and the customer both enter secret PINs. At the bank, the merchants insert their cards into the system and the money is deposited into their accounts and receipts are printed.

***Contact: Dan Beadle**, President, PEP, or **Gary Beadle**, Project Director - **Tel: +1 714 348 1011**. Home page: http://www.*
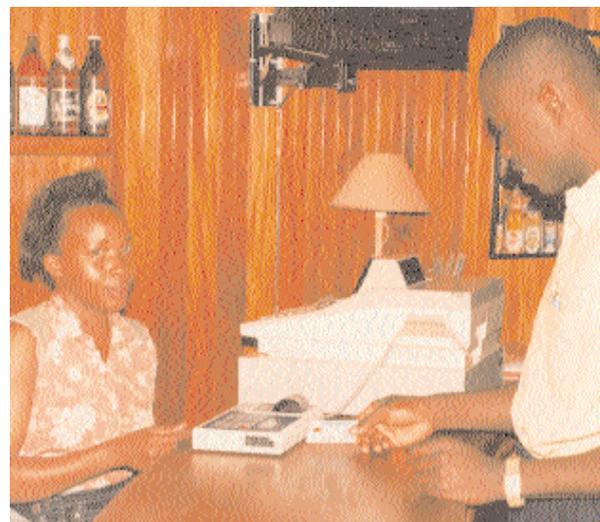
Edah Supermarket Card

The Edah supermarket in Culemborg (population 16,000) in The Netherlands is piloting a Smart Card customer loyalty scheme which will eventually replace the 1.4 million bar-code cards (800,000 described as active) distributed nationally.

The new chip card with 256 bytes of memory is fabricated by Dutch company Datanet. It is issued free to customers who obtain it in the store by filling in a form. Currently, 4,000 chip cards have been issued.

Customer benefits are immediate. Every cardholder is entitled to a reduction of 5 per cent on the purchase of any private label goods, and every week there is one special offer for cardholders. There are also joint promotions with various companies, for example, Vendex International offers a 10 per cent discount to cardholders who book at a leisure complex.

Chip card holders collect points on the card for the amount spent and for special product offers. These points can be redeemed to buy anything

from electrical goods to perfume or redeemed for cash at 50 per cent of nominal value. Later this year and early in 1997, Edah will be testing a multi-application vendor card in co-operation with C&A, Esso and Hema (a department store). The functions on the card will include electronic purse, telephone card, use on public transport and loyalty.

PCC Card Systems in Holland supplied the bar-code card and Edah says they will have a role to play in the future with the development of the multi-vendor chip card.

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Personal Readers from Nagase

Nagase and Co, the authorised dealers for Toshiba Smart Card Products within Europe, have announced two types of personal Smart card readers manufactured by Toshiba Corporation, Japan.

Type A is a full insertion model which has 10 keys to input PIN code and a calculator function. Type B is a compact half insertion model which can be fitted to a key ring. Both types can read ISO 7816 standard compatible Smart Card with T=O, T=1 and T=14 transmission protocols. Two coin type lithium batteries can give approximately three year operation life and are replaceable for both models. The main use of the new readers is expected to be in electronic purse applications. There are also additional functions such as reading loyalty points or checking the balance of telephone cards depending on customers' requirements.
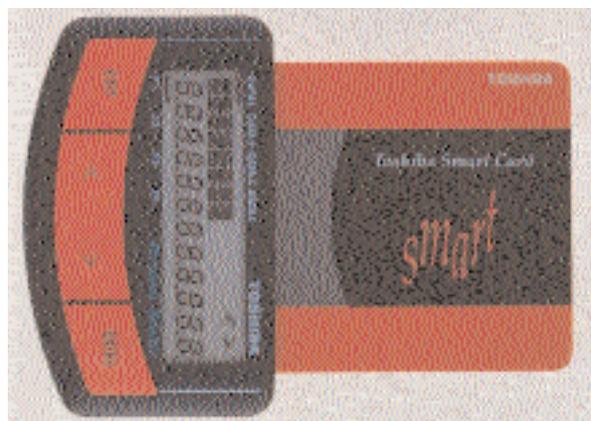
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Birth and Development of Mondex

An interview with
Tim Jones
Director, Mondex International
and
Managing Director, NatWest UK

By Anna Ronay

Tim Jones, co-inventor of Mondex, graduated from Cambridge University in 1976 and began his career working for Shell UK Oil and Lucas CAV. Immediately after University Tim played guitar and sang lead vocals with Brighton rock band 'The Deckchairs'. When one of his fellow band members decided to get a 'proper' job Tim followed suit, joining the NatWest Operational Research Group in 1983. He became involved in EftPos UK and the early days of Switch. In 1988 he was appointed Senior Executive, Card Strategy Group with the task of guiding NatWest through the turbulent period of Visa/Mastercard duality, the breakup of the Joint Credit Card Company and the internationalisation of the SWITCH debit card. In 1990 he was appointed a Director of Eurocheque International and Chairman of the UK Cheque Card community. This was the same year Mondex was invented. In July 1996 Mondex went International and although Tim still has an important Mondex role he was also appointed Managing Director of Electronic Markets at NatWest UK. Aged 41, he is married with three children and lives on the South Coast of England at Hove in East Sussex.'

The concept 'Mondex' was created on 2 March 1990. The birth of Mondex was, however, the end for a project titled Red Switch. The close down meeting on 2 March, insisted upon by Graham Higgins, Senior Executive and resisted by Tim Jones, was the turning point for the pair. The result of that meeting was Mondex.

The history to this meeting begins in the 1980s with the introduction of the debit card. Tim Jones explained that the debit card made him realise there were to be significant winners and losers within the market and he decided to actively seek the next breakthrough form of payment. Despite clear intentions the breakthrough for Tim became slightly side-tracked. In May 1989 an investigation began into the possibilities offered by both stored value cards and Smart Cards. By June 1989 stored value cards had been rejected following the recommendations of a group of MBA students at Loughborough, commissioned to investigate the two options. The names involved at this stage were NatWest, BT, Coopers and Lybrand and the Metropolitan Police.

The possibility of a smart debit card was then investigated for the next nine months. The conclusion was that the time was not yet right for Smart debit cards. The close down meeting in March 1990 was, according to Tim Jones, the point at which the 'right' questions began to be asked. He identified the key question as, 'Is there a missing product?' Tim explained that research into stored value cards led to one of the most important and unique features of Mondex being recognised. The cost of an accounted stored value product is similar to that of a debit programme, however income opportunities simply do not match costs. This led him to question both these costs and the need to account for every transaction. He concluded that the need to trust data resulted in the accountability of every transaction.

The next breakthrough was the link he made between the security of EftPos UK, a consortium of banks he was involved with in the 80s and the 'problem' of accounting for costs. Tim Jones identifies the most important aspect of Mondex as transferability, which is also a key feature of money.

Tim Jones admitted that companies such as Visa and MasterCard were potentially competitors, or collaborators with Mondex, adding that it was too early to say how the relationship would develop. When questioned about the rumours concerning Mondex and MasterCard he confirmed that Mondex was in negotiation with various corporations, although he refused to comment further.

When it was suggested that the launch of Mondex in Swindon has been a slow process, he argued that 40,000 customers had been targeted, and 24 - 25% attracted in a year. He described this as an outstanding achievement and declared himself 'delighted'. He said that the product was obeying all the fundamentals of marketing and people

were reacting as expected. He suggested that there was sufficient evidence to expect Mondex to become a product of the same scale as debit/credit cards and he therefore expected the maturity cycle to be similar; between five and fifteen years.

Asked about national roll-out he explained that there were a number of dimensions to consider, the most important being the need to wait for a retailer roll-out of IC card infrastructure. Tim recognises that Mondex is part of a broader business issue and must now wait for retailers to invest in the system. Tim expects a deep acceptance of Mondex throughout the UK retailing base by the year 2005, with hundreds of millions of Mondex cards in use.

Another avenue for Mondex to explore is its role on the Internet. Tim Jones said he had a clear understanding of what Mondex's role on the Internet would be and added that it would be developed through the global founders with global technology. He anticipates that consumers on the Internet will demand choice, just as they do in physical retailing. He described Mondex's job as to be 'Cash on the Net'. Potentially this could turn any net-connected PC into a cash dispenser in the home. Tim said that at the moment Mondex was currently developing software only implementation to put Mondex on the Net. He claimed it will be possible to 'seamlessly upgrade the product', although he acknowledged it would never be as totally private as cash. He said Mondex will be on the Net by 1997, but could not give a date.

Another development possibility for Mondex is the recognised role for contactless cards. Tim Jones explained that a sleeve could be developed for the present Mondex card that would implement the contactless technology. Referring back to the Internet, he explained that for heavy duty Mondex purses in high volume sites they will be looking to type approve larger more sophisticated silicon chips. These chips would be able to do millions of transactions as opposed to the hundreds of thousands Smart Card chips are capable of today.

When asked about the possibility of future consortium plans Tim Jones explained that he sees Mondex as a business function to sit on multifunctional cards, therefore, if projects such as Shell loyalty cards were successful it would make sense to combine functions. On this level Mondex would be involved, but would not be a consortium unless there was a good reason, as new schemes could be embedded within the existing Mondex model.

When it was suggested that Mondex currently had a low profile within Europe, he responded by saying Mondex had a high profile in the European banking sector and they were talking to a number of major financial institutions. He seemed confident that Mondex would play a significant role in Europe.

The future for Mondex also holds the possibility of projects in Japan and China. Tim Jones could reveal that Mondex was currently in negotiation with the Industrial Bank of Japan, although conclusions were yet to be reached. In China the rights to Mondex have been acquired as part of a deal with the Shanghai and Hong Kong banking system.

On a personal level Tim Jones sees his greatest personal achievement during the Mondex project as having been able to harness the skills and enthusiasm of many people and effectively turn an idea into a technical and global product. He described the leadership role as one of delegation and motivation and the project as achieved by a team who shared one vision. The most difficult part of the project was persuading bankers, who are traditionally conservative, to back a novel and exciting proposition with serious money and corporate support.

Last month, following the successful incorporation of Mondex International Ltd, Tim Jones became Managing Director of Electronic Markets within NatWest UK. When asked about his new position he explained there were a number of dimensions to the job. He will continue on the board of Mondex International Ltd. as a representative for the Inventors and will also be responsible for interest in Mondex franchises outside the UK. He described his role at NatWest as an advisory one, identifying both opportunities and threats on the horizon. Of particular interest is the search for the new pieces of infrastructure of the 21st century. He clarified that as Mondex is the expression of an asset in digital form there must be others that can be expressed digitally. He mentioned re-insurance and airline tickets but would not expand as he said he was in the earliest stages of exploring the possibilities. He smiled: 'You will have to wait and see.'

Zero Fraud with Holiday Card

Not many businesses, where transactions normally include cash, can claim to be fraud-free, but that is the boast of the four-star Turunc Hotel in Marmaris, Turkey, where a Smart Card system for holidaymakers was introduced some three years ago (*SCN December 1994*).

Holidaymakers are using the card within the hotel for every type of expenditure at the various bars, restaurants, gym, water sport facilities and transportation from and to the hotel.

About 500 cards are issued each week and the average sum of money loaded onto the card per week is £50 with average transactions per card per day six.

The hotel says that customers respond positively to the scheme because the card is easy to carry everywhere, stores all transactions and provides detailed reports when required and is easily reloadable. Any balance remaining on the card on departure is refundable.

Benefits for management are that it has cut the flow of real cash eliminating fraud opportunities which may benefit waiters and other staff and provides a more precise control of stocks. In addition it is not necessary to count the cash regularly on the collections points as a report from the related point of sale device is enough.

The system

The system consists of three main parts: the Smart Card enabled points of sale, the McCorquodale cards and a central computer with a MelCard reader. The Bentas Hotel application software is reloaded and configured for a particular point of sale, giving the selling point ID, the waiter's ID and the price look-up table of the items available. One of the points of sale is at the reception desk where the Smart Cards are issued to the guests.

To protect the investment in the card itself, the guest is charged the value of the empty card which is kept by the hotel if the guest does not return the card on checking-out.

In the issuing process, the card is loaded with the guest's personal details - name, room number etc. - and the prepaid value. The prepaid amount can be increased by simply going to the reception desk and paying the amount desired.

It is hoped to expand the system to other hotels and holiday villages for the 1997 holiday season.

Contact: Brian Todd, *Sales Manager, Dione Developments, UK.* ***Tel: +44 (0) 1494 429600***

UK Voluntary ID Card

The UK is to have a voluntary national Identity Card based on the new photocard driving licence being brought in next year.

Home Secretary Michael Howard says the new card will reduce fraud and help in the fight against crime.

The government hopes that by combining the identity card with the new driving licence it will become acceptable to the public. It will be priced at a relatively low amount estimated between £10 and £15 - less than the present £21 cost of a driving licence to increase public interest.

The plastic credit card-sized document will not be a Smart Card - partly for cost reasons and partly because of the acrimonious debate on what personal information might be held on the card., for example, criminal records.

Three types of card will be issued:

* a combined driving licence and identity card
* a driving licence for those who do not want to carry an identity card and for foreign nationals
* identity card without a driving licence for non-drivers.

The new photocard driving licence will be marked "Identity Card" and indicate that the holder is a British national. It will also be recognised as a driving licence throughout the European Union.

New licences are to be phased in from February 1997 with new applicants receiving it first. The programme to replace the 35 million licences in the UK will also start next year.

Electronic Bills of Lading

The Bill of Lading is a vital document in international trade, acting as a receipt for goods, evidence of a contract for shipment and title to the goods. It is also one of the key documents necessary for documentary credit or collection.

Project Bolero, with a budget of nearly ECU 4.5 million from the European Commission Infosec Program (DGXIII) and funding from commercial partners, has developed a concept making it possible for the first time to replicate the negotiable Bill of Lading electronically by using sophisticated electronic security measures.

Pilot trials starting in April 1994 involved eight trading chains from Europe to the United States and Hong Kong with a total of 26 users.

The potential users of a Bolero system - exporters, importers, shipping companies, freight forwarders and banks - have been key players in the development of the pilot solution. Contributions have also been made by insurance companies, inspection agencies and chambers of commerce.

Users have now formed the Bolero User Association which is intended to be a permanent platform for the development of Bolero and will carry the concept forward to a full commercial pilot and then to commercial implementation.

John Reeve, Director, Project Bolero and a Partner with Touche Ross Management Consultants, explained that the feasibility of Bills of Lading in electronic form brought obvious benefits to international trade as processing of transactions will be easier and faster, leading to reduced transactions costs and less delay in providing credit or releasing goods to their buyer.

"The ability of both issuing and advising banks to see the documents simultaneously should reduce disputes and defaults," he said. "It is an unhappy fact that fraud relating to Bills of Lading is prevalent. It is all too easy to copy or forge paper documents, but the high security provided by Bolero makes this virtually impossible.

"The benefits to importers and exporters will be increased by linking the Bolero system through to their EDI systems, and banks can similarly link their payment systems to enable a high degree of 'straight-through processing.'"

Explaining how Bolero works, he said there are four central components and a user terminal linked by an X.400 message system over X.25 networks. The main unit is the Central Registry and, for the pilot, this was based in the UK and contained entries for all documents held on Bolero, particularly Bills of Lading.

The second unit is the Certification Authority which was based in Sweden. This recognises authorised users and issues certificates that authenticate a message so that only valid messages from authorised users are accepted. It also protects messages from alteration.

There was a Registration Authority, also in Sweden, that registers new users and confirms their type buyer/seller, agent, carrier or bank. Users can only carry out functions appropriate for their type. The Registration Authority loads the Smart Cards that are used at user terminals to identify users and load their secret authentication keys.

The last central component is an X.500 Directory Service that holds a directory of users, their addresses and public keys.

The user PC holds the software that communicates with the central systems and has the business functionality to input shipping documents and make enquiries about details held on the register.

In creating a new Bill of lading, the carrier logs on to his Bolero PC, composes the Bill of Lading and signs it with his secret key (held in the Smart Card). This is then sent to the Registry as a signed message. The Registry checks the signature using the user's public key (from the Directory) and creates a new Bill of Lading record signed with its (the Registry's) secret key to prevent alterations. Other users can then inspect the entry and can, if required, obtain a certified copy signed with the Registry's secret key. The RSA algorithm is used for authentication, although another algorithm, such as DSA, could be used.

__The Bolero User Association Limited__ is located at 1 Gainsford Street, London, SE1 2NE, UK - __Tel: +44 (0)171 378 1171. Fax: +44 (0)171 403 9820. John Reeve__, Touche Ross & Co - __Tel: +44 (0)171 303 6243. Fax: +44 (0)171 353 3419.__

Smart Card Diary

Cards Australia '96 Conference & Exhibition, Sydney Convention & Exhibition Centre, Sydney, Australia, 20-22 August.

Three-day trade exhibition and a multi-streamed conference organised by the Asia Pacific Smart Card Forum and AIC Exhibitions to cover Smart Cards, Stored Value Cards and electronic purse, co-branded/loyalty cards and procurement cards. Erika Morton, AIC Exhibitions, Australia - Tel: +61 2 210 5704. Fax: +61 2 223 9216.

ESCAT 1996 (European Smart Card Application & Technology), Hotel Kalastajatorppa, Helsinki, Finland, 4-6 September.

Smart Card applications and user experiences explained by experts from seven countries. Congrex, Finland - Tel: +358 0 752 3611. Fax: +358 0 752 0899. Email: JohaniSaari@tbx.telebox.fi

Smart Cards for the Airline Industry: Practical Uses and Future Development, The Café Royal, London, 16/17 September.

The airline industry is looking at the potential for the use of Smart Card technology to complement the growing number of "ticketless travel" schemes with possibilities for use in immigration, customs & excise, loyalty schemes and as an electronic purse. International Conference Group - Tel: +44 (0)181 743 8787. Fax: +44 (0)181 740 1717.

CardTech/SecurTech Government '96, Hyatt Regency Crystal City, Arlington. Virginia, USA.

Geared towards executives and managers working in federal, state and local government agencies, the seminar includes six self-contained sessions with over 30 speakers focussing on technologies and major application areas within government. The exhibition features more than 60 booths displaying the latest in card, biometric and security technologies. Ben Miller, Conference Chair or Kelly E Kilga, Marketing Manager - Tel: +1 301 881 3383 or Web site at http://www.ctst.com

ICMA 6th Annual Card Manufacturing Expo, Bermuda, 21-25 October.

The annual gathering of the International Card Manufacturers Association which has taken "The Globalisation of the Plastic Card Industry" as this year's conference theme. Lynn McCullough, ICMA - Tel: +1 609 799 4900. Fax: +1 609 799 7032.

CarteS '96, CNIT, La Defense, Paris, France, 29-31 October.

International forum for plastic card technologies and applications with a major conference and exhibition. CEP Exposium / Cartes - Tel: +33 1 49 68 52 87. Fax: +33 1 47 37 75 09.

CardTech/SecurTech West '96, Convention Center, San Jose, California, USA, 10/11 December.

The third West conference will showcase over 80 exhibit booths. The focus of the show will be secured Internet commerce, multi-media applications, encryption issues, transportation and digital cellular programs currently in progress. Kelly E Kilga, Marketing Manager - Tel: +1 301 881 3383 or Web site at http://www.ctst.com

Asia Card Technology '97, Singapore International Convention and Exhibition Centre, Suntec City, Singapore, 23-25 April, 1997.

International exhibition, conference and technical workshops on business applications and technological developments for the Smart Card and associated industries in Asia organised by Reed Exhibition Companies. Ms Serina Tan - Tel: +65 434 3693. Fax: +65 338 2112.

**CardTech/SecurTech '97**, Orlando, Florida, USA, 19-22 May.

Now established as the biggest Smart Card conference and showcase in the world, the 1966 conference attracted a record 5,543 attendees. Conference and exhibition details later. Ben Miller, Conference Chair or Kelly E Kilga, Marketing Manager - Tel: +1 301 3383 or Web site at http://www.ctst.com

Electronic Commerce and Payment Mechanisms Part 6

Account Payment Systems

There are a number of products appearing in this class of payment structure. Concern has been raised over the status of the organisations managing the accounts. It is generally agreed that such organisations should be banks. We will describe here some of the products being produced by organisations with a banking status. This class of payment is suitable for micro payments.
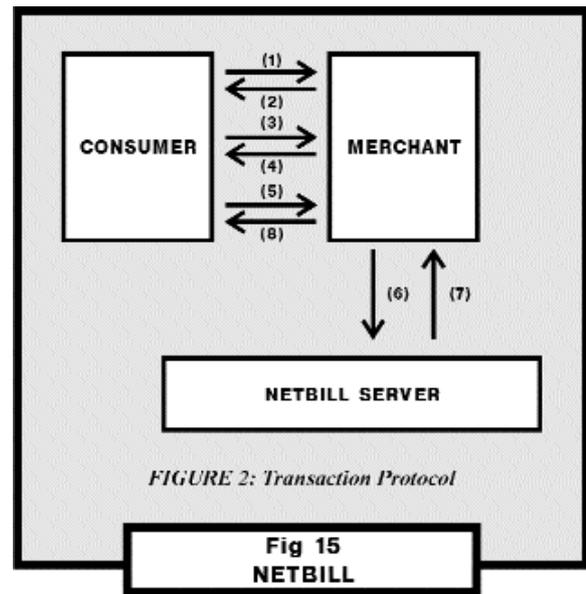
NetBill
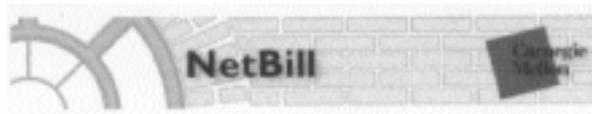
The NetBill project consists of teams from Carnegie Mellon University (CMU), Visa and Mellon bank. This partnership has been formed to develop and conduct a pre commercial trail of NetBill which is a prototype on-line payment system that will enable merchants and customers on computer networks to buy, sell, bill and pay for information, goods and services in a convenient cost effective manner.

This system is focused on micro payments so that transaction costs can be reduced to about 1 cent for a 10 cent item.

In the NetBill system an account server (the NetBill Server) maintains accounts for both customers and merchants, linked to conventional financial institutions. These NetBill accounts are debited and credited according to the relevant transactions. Funds in the customers account are replenished by conventional payment methods (e.g credit cards). NetBill credits the service provider bank accounts accordingly.

The NetBill transaction protocol is described in *figure 15*.

FIGURE 2: Transaction Protocol

**Fig 15
NETBILL**

Before a customer begins a typical NetBill transaction, she will usually contact a server to locate information or a service of interest. For example, the customer may request a table of contents of a journal showing available articles and a list price associated with each article. The transaction begins when the customer requests a formal price quote for a product. This price may be different than the standard list price because, for example the customer may be part of a site license group and thus be entitled to a marginal price of zero. Alternatively the customer may be entitled to some form of volume discount, or perhaps there is a surcharge during peak hours.

Requesting the price quote is easy. As we discuss below, in a WWW browser application built by NetBill a customer requests quote by simply clicking on a displayed article reference.

The customer' client application then indicates to the checkbook library that it would like a price quote from a particular merchant for a specified product. The checkbook library sends an authenticated request for a quote to the till library which forwards it to the merchants application.

The merchant must invoke an algorithm to determine a price for the authenticated user. He returns the digitally signed price quote through the till, to the checkbook and on to the customers application. The customers application must then make a purchase decision. The application can present the price quote to the customer or it can approve the decision. The application can present the price

quote to the customer or it can approve the purchase without prompting the customer. For example the customer may specify that her client software accept any price below some threshold amount, this relieves her of the burden of assenting to every low-value price quote via a dialogue box.

Assuming that the customer's application accepts the price quote. The checkbook then sends a digitally signed purchase request to the merchants till. The till then requests the information goods from the merchants application and sends them to the customers checkbook encrypted in a one-time key and computes a cryptographic checksum (such as MD5) on the encrypted message. As the checkbook receives the bits, it writes them to stable storage. When the transfer is complete, the checkbook computes its own cryptographic checksum on the encrypted goods and returns to the till a digitally signed message specifying the product identifier, the accepted price, the cryptographic checksum and a timeout stamp. This information is referred to as the Electronic Payment Order (EPO). Note that at this point the customer can not decrypt the goods neither has the customer been charged.

Upon receipt of the EPO the till checks its checksum against the one computed by the checkbook . If they do not match then the goods can either be retransmitted or the transaction aborted at this point. This step provides very high assurance that the encrypted goods were received without error.

If checksums match the merchants application creates a digitally signed invoice consisting of price quote, checksum and the decryption key for the goods. The application sends both the EPO and the invoice to the NetBill server.

The NetBill server verifies that the product identifiers, price and checksums are all in agreement. If the customer has the necessary funds or credit in her account, the NetBill server debits the customers account and credits the merchants account, logs the transaction and saves a copy of the decryption key. The NetBill server then returns to the merchant a digitally signed message containing an approval, or an error code indicating why the transaction failed. The merchants application forwards the NetBill servers reply and (if appropriate) the decryption key to the checkbook.

RSA signatures are used for the customer and merchants signature whilst DSA is used for the NetBill signature using SHA for the hash function. NetBill uses the Kerberos authentication protocol originally developed by MIT. This protocol is based on Needham Schroeder's trusted third party protocol.
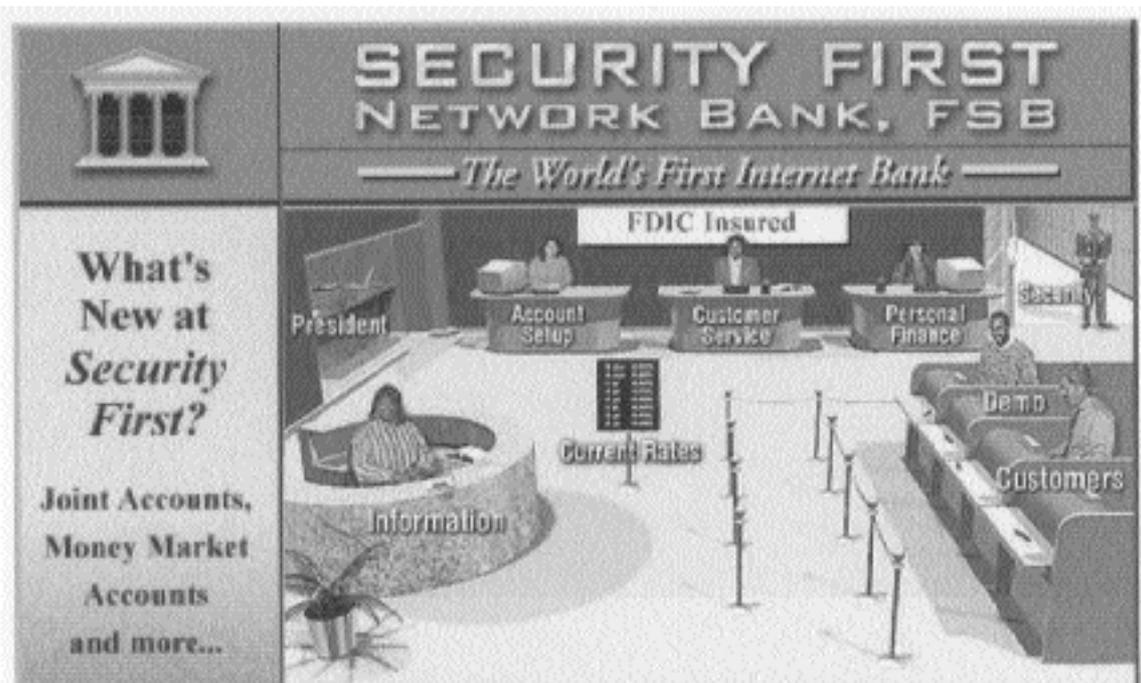
Security First Network Bank

Security First Network Bank is the first banking organisation approved by the US Government regulators to make its financial services available on the Internet. This allows customers with accounts to use their WWW browsers to transfer funds, schedule payments, write electronic cheques and reconcile statements. In fact 24 hour banking, 365 days a year.

Three banks, Wachovia Corp., Huntingdon Bancshares and Cardinal Bancshares joined forces to create the Security First Network Bank.

The Security First Network Bank is based on the use of products from two companies, Five Paces Inc. which provides a 'Virtual Bank Manager' (VBM) Package and Secureware Inc. which provides the secure web platform for the VBM.

Customers communicate with the bank using their WWW browser using Netscape's SSL (Secure Socket Layer) protocol. This protocol provides Authentication, Data Integrity and Confidentiality Services. The SSL approach is based on similar concepts to the SET protocol described earlier. The RSA algorithm is used to establish a secret symmetric session key which then enciphers the relevant data. The symmetric algorithm used today is RC4 (Note the SSL specification allows for different algorithms).

This is where there has been a lot of discussion in the media. Exports controls abound and the export version of SSL using RC4 (128 bit key) makes 88 bits public to give an effective secret key of 40 bits. This has of course been attacked (successfully) making security the subject of much debate in the media and particular on the net. Netscape have also experienced some other implementation problems in the derivation of random numbers used to generate the keys. Moving past these teething problems the security architecture certainly with the use of Smart Cards would be adequate and no doubt will become widely used albeit with some modifications to the actual implementation.

Dr David Everett

SCN Library of Cards on the Web

Smart Card News, widely regarded as the leading international newsletter on Smart Card technology, continues to set the pace with the establishment of a Web site on the Internet.

SCN was the first newsletter in the industry to be produced in full colour from its launch in September 1992 and continues to lead with its ongoing tutorial on Smart Card technology and spe-cial reports together with the *International Smart Card Industry Guide* and training workshops.

Continuing its pioneering position, *SCN* is setting up a unique Library of Cards on their Web site. Twice a month, four Smart Cards will be added to the site with a brief description of the card, the country of origin, how many cards have been issued and by whom. The cards will cover a wide range of applications such as finance (including electronic purses), healthcare, loyalty, utilities, transport, entertainment and leisure. Over the coming months the Library will develop into a valuable reference resource so far not available anywhere else. Once connected to the Welcome Page, users can access information on SCN's range of products and services, view the front page of the latest edition of *Smart Card News* and access the Library of Cards.

The Internet address for *Smart Card News* is:
http://www.demon.co.uk/scn

*Contact: **Patsy Everett**, Managing Director, Smart Card News Ltd. - **Tel: +44 (0)1273 626677. Fax: + (0)1273 624433.***