# Czech Republic Launches Europay's CLIP Purse

A national, domestic electronic purse pilot scheme was launched in Prague in the Czech Republic last month using Europay specifications and architecture.

The first transaction was conducted by Europay's Director and CEO, Louis-Noël Joly, who used the CLIP card to purchase a sandwich and refreshment from a merchant located in Prague's famous Wenceslas Square.

Three leading Czech banks - Komercni banka, Investicni a Postovni banka (IPB) and Agrobanka - will provide the infrastructure for the electronic purse service.
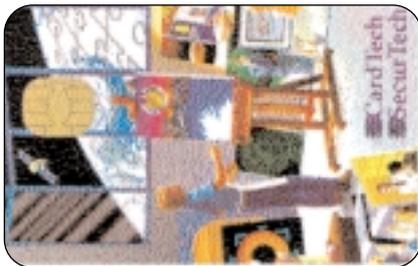
June 1997

News

Smart Card Tutorial

How to Subscribe
*If you wish to subscribe
to Smart Card News
please complete the
form on page 119*

Don't Forget!
*Our On-Line Website,
containing a Library of
Smart Cards and information
about the full range of SCN
services, can be found at
the following address:*
http://www.smartcard.co.uk

The International Smart
Card Industry Guide 1997
*If you would like your
company to be featured
in the next edition of the
Guide please send us your
details via fax, e-mail or by
using the on-line form
at our website.*

Important Announcement
*Due to office reorganisation the **SCN** telephone numbers have been updated.
You can now contact us on a new number:
+44 (0) 1273 236677, as well as **+44 (0) 1273 626677**.*

Czech Republic Launches CLIP

Continued from page 101

The first phase of the pilot involves 1,000 "purse-only" cards and 25 merchants. It is planned to issue 10,000 cards and have 100 retail outlets by the end of this year.

Retailers selling goods and services previously not suitable for settlement via plastic cards - such as newspaper kiosks, florists, snack bars, bakers and coffee bars - are involved in the project.

Cards can be reloaded with value at participating point of sale terminals, view stations and bank branch terminals. Initially, the electronic purse cards will be single currency holding up to 1,000 Czech Krone (35 ECU).

On completion of the pilot phase, the three banks will progressively introduce the CLIP service on to their Maestro and Cirrus debit cards which will be converted to chip technology. It is also envisaged that the electronic purse will be extended outside the country and that it will become multi-currency.

Contact: Craig Browne, Business Manager, Eastern Europe, Europay - **Tel: +32 2 352 5914. Fax: +32 2 352 5992. E-mail: europay@waterloo.com**

Smart Payphones for Australia

Telstra is to spend US $78 million (A$100 million) replacing its existing public payphone network with a Smart Card payphone system, starting in Adelaide in July. Most of the roll-out is scheduled for completion by the end of the year, with the remaining installations completed in the first quarter of 1998.

Peter Shore, Telstra Managing Director, Commercial & Consumer, said: "By replacing the four different styles of payphones currently deployed - some of which are 23-years-old - we can deliver a far more reliable and simpler service to our customers.

"All the new payphones will accept every Australian coin as well as the latest "smart" micro-chip Phonecard technology, which replaces the existing magnetic Phonecards used by millions of Australians since 1990."

He added: "In the future, a number of the new payphones will feature modem connection, so customers will be able to receive and send e-mail messages by plugging in their own portable computers."

The new payphones have improved features for customers with special needs, with larger screen display for easier reading of on-screen information and the same on-screen information is available in four foreign languages at the touch of a button.

Telstrams National General Manager for Payphone Services, Ms Janet Sayer, said customers would be able to buy the new phonecards from more than 17,000 retailers around the country, but, she added: "More importantly, in time customers will be able to do much more with their Phonecard, such as purchase a variety of goods and services."

Telstra Corporation is Australia's leading domestic and international telecommunications provider and a major carrier in the Asia Pacific region with annual revenues of more than US $12 billion (A$15.2 billion).

Contact: Cathy Clarke - **Tel: +1 203 532 1339. Fax: +1 203 532 1659. E-mail: cnca@ix.netcom.com Web: http://www.telstra.com.au.**

ICL / VeriFone Collaboration

ICL Retail Systems is to collaborate with VeriFone to use VeriFone's card payment solutions in ICL's platform EPOS system, GlobalSTORE. ICL will also act as a reseller of VeriFone devices, PIN Pads etc. alongside its EPOS systems. Countries initially targeted will be France, Spain, Germany and UK.

In the UK, ICL will use VeriFone devices to conform to the requirements of the ICC trials of EMV, and then expects this functionality to be enhanced progressively to conform with electronic purse schemes such as Mondex and Visa Cash.

Contacts: Ian Chandler, ICL Retail Systems - **Tel: +44 (0)1628 582000. Steve Johnson,** *VeriFone -* **Tel: +44 (0)1895 824031.**

Proton for the Middle East

Banksys, developer and operator of the Proton electronic purse in Belgium, has formed an alliance with Electronic Data Systems (EDS) in the US to bid jointly for the development of a stored value card, based on the Proton technology, for Israeli banks. Comsec, an Israeli security company, is also a member of the Banksys/EDS alliance.

In addition, Banksys says it is currently in negotiations with EDS to reach a global non-exclusive co-operation agreement for the promotion of Proton as a worldwide standard for electronic purses and for other applications involving the use of Smart Cards: access control, social security, public transport and loyalty cards.

Banksys recently founded Proton World, an international consortium of Proton licensees for the worldwide development of the technology, interoperability between user countries and the launch of new applications based on the Proton Smart Card.

A joint subsidiary established with Australian company ERG to develop the expansion of Proton in the Southeast Asian countries will be based in the Malaysian capital, Kuala-Lumpur, and Danny Vanhoutte, one of the Banksys sales managers who has practical experience of the region, will take charge of marketing management.

*Contacts: **Daniel Skala**, International Sales Manager, Banksys - **Tel: +32 2 727 6427. Fax: +32 2 727 6767. E-mail: export.division@banksys.be** Danny Vanhoutte, International Account Manager, Kuala Lumpur - **Tel: +60 3 261 8833. Fax: +60 3 261 1186. E-mail: d_vanhoutte@compuserve.com***

Smart Card and Reader Package

Oki Advanced Products and Schlumberger Electronic Transactions have announced that Oki's Value-Checker PLUS will be offered as a Smart Card reader option for Schlumberger's SafePaK network security package.

SafePaK provides public key cryptography capabilities to network operators and users, combining the Cryptoflex Smart Card, which features 1024-bit RSA key technology and 4K bytes EEPROM, and a choice of Smart Card readers for personal computers.

Value-Checker PLUS is a thin reader with a built-in keypad and display, plus a detachable adapter for PC/SC compatible serial port connection to Personal Computers. It also provides secure PIN entry and verification when connected to a PC ensuring that a user's confidential PIN is never entered on the PC.

*Contacts: **Fraser McNeilly**, Oki Advanced Products USA - **Tel: +1 508 480 8621. E-mail: digitalmoney@oki.com** Stephen Acken, Schlumberger - **Tel: +1 203 325 8772. E-mail: sacken@environics-usa.com***

IBM and CSI Marketing Agreement

IBM Corporation and Card Services International (CSI) have announced a joint marketing agreement giving IBM the rights to sell and distribute CSI-developed CardBASE2000 on a worldwide basis.

CardBASE2000 provides a technology framework which enables a card issuer/acquirer to control and monitor multi-function applications on chip cards.

It interfaces with a variety of payment products including credit, debit, purse and loyalty, all on a single Smart Card, and is compatible with EMV (Europay/MasterCard/Visa) specifications and supports both DES and RSA security environments.

IBM will build the flexibility, security and functionality contained within CardBASE2000 into its Smart Card solutions on a worldwide basis.

The agreement strengthens the IBM Smart Card Solutions portfolio, especially in the area of implementation of the multiple proprietary-based electronic purse schemes such as Proton, Visa Cash, Mondex and CLIP.

*Contacts: **John Noakes**, Smart Card Solutions, IBM - **Tel: +44 (0)171 202 3706. Fax: +44 (0)171 261 9930. E-mail: john_noakes@uk.ibm.com. Internet: http://www.chipcard.ibm.com** Sarah Flynn, Card Services International, Ireland - **Tel: +353 1 284 3233. Fax: +353 1 284 3220. E-mail: sflynn@csi.ie***

French La Poste to use MIFARE

La Poste, the French Post Office, is to use MIFARE contactless Smart Card technology for VIGIK, its access control system for residential buildings which will give postal delivery employees easy access to a large number of buildings during their rounds, while maintaining security of the premises. MIFARE contactless Smart Cards will be issued to French postal carriers at the end of this year and they will be able to use them at every building where VIGIK compatible read/write devices are installed.

Postmen have to recharge their MIFARE "key" every day at a reloading terminal in their Post Office with the predefined schedule for that day. In contrast to mechanical and other types of keys, the VIGIK key cannot be used before and after the specified period of time.

La Poste estimates that around 500,000 buildings will be equipped and five million cards will be issued within the next five years.

The flexibility of the system enables other service providers to join the system, such as cleaning and maintenance services, newspaper carriers. Similar MIFARE "keys" - either card-sized or integrated into wristwatches, key fobs etc. - can be issued to residents. Building managers can grant specific access rights to anyone who holds a MIFARE card.

Marketing plans

La Poste plans to market the VIGIK access control system worldwide. VIGIK can be employed by any operator who requires secured access to a large number of residential and office buildings as well as easy key management. In addition to access control to buildings, the system can also be used for maintenance and repair of ATMs, payphones and vending machines, room management or time sharing.

The electronic "lock" consists of two components - a contactless MIFARE card which functions as the "key" for the person authorised to enter the building, and a square-shaped lock, the antenna, located near the entrance door.

When the card is held a few centimetres away from the antenna, a control box checks access authorisation and activates the door opening system (transaction time approximately 150 ms). To further enhance the security of the system, the cards are also electronically signed with an asymmetric public key algorithm.

A programming unit computes the authorisation for each contactless card every day using the following data: card serial number, operator identifier, starting and ending times of authorised period of use.

Signatures are computed by a cryptographic Smart Card. This card contains the secret key of the operator. The calculation's results are then transmitted to the different card loading terminals.

*Contacts: **J.P. Huon**, VIGIK Programme Director at La Poste - **Tel: +33 (0)1 41 41 63 36. Fax: +33 (0)1 41 41 64 22. Elisabeth Döerner**, Philips Semiconductors / Mikron - **Tel: +43 3124 299 760. Fax: +43 3124 299 270**.*

UK Chip Card Test

Visa International and Lloyds TSB announced last month that they had carried out the first in-house transaction using a Visa chip card. The transaction was carried out by Jim Cuddy, head of IT, Card Services at Lloyds TSB, using a Visa Delta card. The bank is to run an in-house trial in their Southend office where initially 50 chip cards will be issued to staff.

The Visa chip card, which conforms to EMV (Europay/MasterCard/Visa) specifications, will be used by Visa Member financial institutions all over the world as they migrate from magnetic stripe to Smart Cards.

It will be introduced first in the UK on both Visa debit and credit cards at a trial being co-ordinated by APACS the Association of Payment Clearing Services, starting in October when 100,000 chip cards will be issued to the public by UK financial institutions in two locations - Northampton, England, and Dunfermline, Scotland.

*Contact: **Colin Baptie**, Visa International - **Tel: +44 (0)171 937 8111. Fax: +44 (0)171 937 0877**.*

Canada Goes Mondex at CardTech

In a move which suggests that MasterCard's gamble on Mondex is paying off, nine out of Canada's ten largest deposit-taking financial institutions have now joined Mondex Canada. The news stunned delegates at CardTech SecurTech '97, held in Orlando, Florida, and disappointed representatives of Banksys who face seeing the Proton based Exact card system on trial in Kingston being swapped to Mondex.

The Bank of Montreal, Canada Trust, Le Mouvement des caisses Desjardins and National Bank of Canada announced at CardTech that they had joined Mondex Canada. The Toronto-Dominion Bank is in the process of joining. The existing members are Canadian Imperial Bank of Commerce, the Royal Bank of Canada, Credit Union Central of Canada and Hongkong Bank of Canada.

Mondex Canada plans a national roll-out starting in mid-1998 with most cards to be issued in 1999. It expects to incorporate Mondex's multicurrency capabilities in approximately two years' time. Additional applications are also under investigation; the Guelph card already incorporates an ATM access function but no date has been set for introducing multi-application functionality nationally.

Mondex will also be available to all Canadian MasterCard members who are regulated entities, including non-banks.

(It was later announced in Toronto that Scotiabank is to join Mondex Canada, giving a further boost to the Mondex impetus in Canada. Scotiabank is Canada's most international bank with 1,488 branches and offices in 48 countries on five continents.)

In the meantime, Bank of Montreal and Canada Trust plan to participate in the Guelph Mondex trial.

The Exact trial in Kingston using the Proton electronic purse technology from Banksys, is expected to continue until the roll-out when cardholders will receive replacement Mondex cards.

*Contact: **Joe Clark**, Mondex Guelph liaison, Canada - **Tel: + 1 519 822 2880, Fax: +1 416 440 0667***

Visa Cash Live on the Internet

Visa Cash was in evidence at CardTech too. Together with the Bank of America, Visa performed the world's first live stored value Smart Card transaction on the Internet. The purchase of a greeting card from online merchant CardMart Greeting demonstrated a system which Visa and Bank of America will begin testing this summer.

Several hundred employees of Bank of America and Visa will participate in the six month pilot, using reloadable Visa Cash cards and personal computers to purchase goods from participating Internet merchants. Merchants signed up so far include CardMart Greetings, Broderbund Software Inc. and Newsletter Technologies Inc. and others are expected to follow.

*Contact: **Roseann Clavelli**, Visa International, USA - **Tel: +1 415 432 3439, Fax: +1 415 432 3856***

NEC enters market

CardTech also saw Japanese semiconductor giant NEC's arrival on the Smart Card scene, stating its intention of becoming one of the top three suppliers of security microcontrollers. NEC announced it had joined forces with Bull to develop a new generation of low cost microprocessor cards.

Bull is aiming the new card, called Memphis, at the loyalty market.

"The main obstacle for distribution of quality loyalty programmes based on microprocessor Smart Cards is the cost of the card," says Eric Pradier, Vice President of Bull Personal Transaction Systems Division.

Bull is pricing Memphis to be competitive with memory cards and quotes prices of under $1.5 at high volume. The card will be available in the fourth quarter, 1997. It offers 2K bits of EEPROM, DES, four application files and token management. It is ISO 7816 compatible.

The low price was possible, says Bull, because of the continuing decrease in silicon geometries. Because of the need for security on memory cards, microprocessor cards are now decreasing in silicon

size faster than memory cards. Bull believes that where an application requires over 1K of memory, plus security, it will be cheaper to use microprocessor cards than memory cards.

Both Bull and NEC emphasize that their relationship is not exclusive. NEC has developed a full product family based on its widely used 8 bit core, the 78K0S, and Memphis uses only the lowest end chip in this family.

Contact: Dominique Mercier-Chevalier, Bull Personal Transaction Systems, France - Tel: +33 (0)1 39 66 46 17. Jean-Franois Chouteau, NEC Electronics, France - Tel: +33 (0)1 30 67 58 00

Philips launches 16 bit processor

NEC was not the only semiconductor manufacturer making announcements at CardTech. In a move away from the industry "standard" of 8 bit controllers, Philips Semiconductors announced its 16 bit SMARTXA family of controllers for use in protected downloadable multi-applications.

The chips use firewalls to ensure the protection of multiple applications in an open environment and are designed for use with interpreters.

Philips claims that SMARTXA chips result in 30 fold performance increases compared to an 8 bit controller solution under the same conditions. Existing Philips 8 bit systems can be directly upgraded.

Contact: Philips Semiconductors. Web site: http://www.semiconductors.philips.com

GemVision - a vision of today?

In a controversial move, Gemplus launched a range of multi-application Smart Cards for the banking market called GemVision.

The first card in the range, a 1K card which can incorporate credit or debit, stored value and loyalty applications, will be available this month. Further cards in the range with additional functionality, including Gemplus's software for implementing add-on applications like secure access or biometrics,

will be available in November 1997. Gemplus has been working with Visa on the range, and it is currently undergoing Visa certification.

Gemplus described GemVision as a major breakthrough, permitting banks to leverage the full power of the Smart Card for the first time, in order to develop the package of applications that best meets the banking industry's needs.

However, unlike Mondex's MULTOS, GemVision does not use interpreter technology and does not allow loading in the field, although applications running on the card may be activated after the card is issued. The cards do not yet run Java but can be updated to include the Java card API, once Gemplus views it as accepted in the marketplace.

Some industry commentators questioned Gemplus's strategy in launching a range of multi-application cards based on today's technology rather than using the latest interpreter based techniques. One source suggested that the move possibly reflects Gemplus's opinion of the current viability of Java Card.

According to Sonia Reed, Director, Financial Transaction Business Division, North America, Gemplus, GemVision is an investment technology, developed in response to market demand from banks who want to investigate multi-applications today.

Contact: Flavie Gil, Gemplus, France - Tel: +33 (0)4 42 36 56 83, Fax: +33 (0)4 42 32 51 17.

Schlumberger Java Licenses

Nonetheless, rivals Schlumberger announced licensees for their Java Card implementation. SGS-Thomson and Texas Instruments have licensed Solo, Schlumberger's Java virtual machine and Motorola and Hitachi have announced their intentions to do the same.

The result, says Schlumberger, will be the early availability of Java based Smart Card chips adhering to the Java Card API specification for Smart Card manufacturers.

Contact: Jerome Traisnel, Schlumberger, France - Tel: +33 (0)1 47 46 58 32, Fax: +33 (0)1 47 46 68 26

Airport biometrics

One of CardTech's strongest features is the wealth of biometric applications displayed. One highlight was the agreement between TL Technology Research, a Malaysian airport security systems company and Visionics Corporation, an American face recognition company. The agreement gives TLTR an exclusive licence to use Visionics's FaceIt face recognition system for the world's first biometrics and Smart Card based airline passenger and baggage security system.

The system will use face recognition technology to ensure that only true passengers can enter airport departure lounges and subsequently board planes and that only luggage from passengers who board is loaded.

During the boarding process, a video camera captures biometric data from the passenger's face which is stored on smart chips embedded in the boarding cards and luggage tag. IRIS Technologies, a Malaysian Smart Card manufacturer, will supply the smart chips and the overall system will be part of the IRIS Integrated Passenger Baggage Security System. The first installation will be in operation at Langkawi International Airport in Malaysia in July 1997.

*Contact: Dr Alan Samuels, Visionics, USA - **Tel: +1 212 327 7421***

Market review

Siemens presented its regular overview of the Smart Card market. It predicts that the market for smart card ICs will grow by approximately 50% over the next four years, with market volume reaching $2.8 billion by 2001.

With annual growth rates of approximately 35%, the Smart Card IC market has consistently outstripped the semiconductor industry as a whole, whose average growth rate is 15%, says Siemens, and this is set to improve yet further.

Siemens believes that the strongest overall market segment will be the electronic purse with over 35% of the total Smart Card IC market. This will be followed by telecommunications (17%), healthcare (13%) and transportation (13%). Currently the most rapidly growing segment is healthcare (92% a year) followed by transportation (90% a year).

Security controller ICs (including cryptocontrollers) are expected to show a compound annual growth rate of roughly 63% over the next four years and will constitute 89% of the overall market by 2001. Contactless Smart Card ICs should show a CAGR of 67% through the end of the decade, resulting in a 15% overall market share.

By the end of the decade, Europe will have lost its traditional lead in the Smart Card market and will account for approximately one third of the market, as will America and Asia Pacific. Much of the Asia Pacific market will be for security memory ICs, with the demand lying mainly with phone card and public transportation applications.

*Contact: Tamara Polahar, Siemens, USA - **Tel: +1 408 777 4959, Fax: +1 408 777 4988.***

Industry growth and planning

The growing use of Smart Cards was one of CardTech's strongest messages. Commenting on the 24% increase in attendance from last year to a record 6,875, conference organiser Ben Miller said: "We were especially encouraged by the sizable growth in the number of user organizations attending the conference for the first time. It shows that the people who will be adopting advanced card and security technology in the years to come are getting very serious in their planning."

*Contact: Ben Miller, CardTech SecurTech, USA - **Tel: +1 301 654 0551, Fax: +1 301 654 0287.***

Proton-World Goes Java

Banksys is to participate in the programme JavaCard 2.0 API (Application Programme Interface) developed by JavaSoft, a subsidiary of Sun.

Major companies which have decided to adopt the same standard include Citibank and First Union National Bank, Gemplus, Giesecke and Devrient, Schlumberger, Motorola, Verifone, Hitachi, Bull, Toshiba and Visa amongst others.

*Contact: Youri Tolmatchov, Banksys. **Tel: +32 2 727 6666. Fax: +32 2 727 2727.***

New AFC for Moscow Metro

Moscow Metro, which handles some three million passengers per day, is to install an automated fare collection (AFC) system later this year which will be capable of handling both contactless Smart Cards and magnetic stripe cards.

The new revenue collection system is required to improve fare collection, reduce fraud and handle the increasing volume of passenger journeys.

ERG Limited's subsidiary, AES Prodata, has been awarded the A$8.4 million contract to supply V3000 combined magnetic and contactless Smart Card readers, barriers, on-station computers, a data collection infrastructure management system and a card personalisation and issuing system.

Initially, 153 Metro stations will be equipped with two modified gates in each hall (240 entrance halls). The number of gates fitted with the new automated fare collection system will eventually increase to eight per hall. The V3000 units will be installed on the existing turnstiles, with magnetic stripe tickets being used for single, multi-ride tickets and monthly passes. Metro staff will be the first to use the contactless Smart Cards.

It is planned to introduce point of sale equipment at Metro stations to dispense magnetic tickets and add value to Smart Cards.

Contact: Sarah Manners, Manager Corporate Communications, ERG - Tel: +61 8 9273 1100. Fax: +61 8 9273 1208.

SET Version 1.0 Published

MasterCard and Visa have published SET 1.0, (Secure Electronic Transaction) the open industry protocol that details how payment card transactions on the Internet and other open networks will be secured using encryption and digital identification. Participants in the development included GTE, IBM, Microsoft, Netscape Communications Corp., RSA Data Security, SAIC, SPYRUS, Terisa Systems and VeriSign.

Contact: Paul Lewis, Visa International Asia-Pacific - Tel: +65 437 5509. Fax: +65 437 5567.

E-Pass Goes Live

Production of the e-pass wallet PC has "taken a leap forward" following the signing of a non-exclusive agreement between E-pass International Ltd of London, IRIS Technologies and TL Technology Research of Malaysia. The agreement was signed in the presence of the Prime Minister of Malaysia.

The agreement means that IRIS and TLTR will design, develop and manufacture a prototype of e-pass at new technologically advanced facilities in the Multimedia Super Corridor (MSC) which Malaysia hopes will become its version of California's Silicon Valley.

The e-pass system will be produced using the latest high performance FRAM technology. Xanadu's e-pass International will act as consultants, will receive a percentage of all e-pass licence fees and a royalty for each e-pass made.

E-pass is a "credit-card sized computer" which can hold a virtually limitless range of functions available via buttons and a display screen (*see SCN March 1997*).

Contact: Ron Holland, Xanadu - Tel: +44 (0) 171 404 6050.

Closed Systems Alliance

A group of Smart Card technology vendors have formed an alliance to produce and market multi-application platforms for university and college campuses, stadiums, resorts, and other "closed" sites across the US.

The alliance consists of CyberMark LLC, Debitek Inc, Gemplus Corp, Product Technologies Inc, VeriFone Inc, V-ONE Corp and 3G International.

The companies believe that the closed-system market represents immediate business opportunities, and at the same time will be important for understanding Smart Card usage patterns as open systems evolve in the US.

St Andrews Town Card
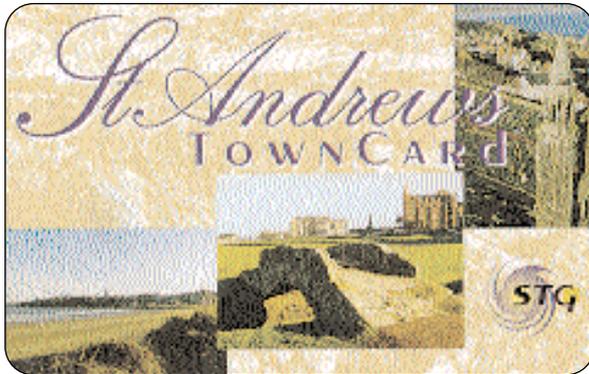
St Andrews in Scotland has introduced a Smart Card system for residents and visitors. The aim of the scheme is to raise the commercial profile of retail outlets in the town by encouraging cardholders to shop there.

The cards currently have four applications. Two important features are the electronic purse and loyalty functions. Each retailer taking part in the scheme is free to award points as they choose. For example, certain restaurants in the town are giving a bottle of wine in exchange for points.

The second feature of the card is a lottery function which is expected to start running this summer. Each week cardholders will be able to enter the draw for £1 (spending is set at a maximum of £5). Half of the money funds the lottery prizes; the remaining half is given to a the town card charity. The town card charity will have three main areas of donation - civic, education and health.

Randal McLister of Scotcomms stressed that the intention was for the system to provide a town-based beneficiary. Visitors are encouraged to donate unused points to charity at the end of their stay. The systems operator, Scotcomms, gives 1p for every point donated.

The cards have a possible twelve functions built into them. Already there are plans to add pre-payment for taxis, a dining club and a school meals system amongst others. Randal explained that gaps had been left deliberately to allow the scheme to grow.

When asked how cardholders had responded to the card Randal replied that the response had been "mixed".

Reaction seemed, at this stage, to depend on social background. For example, the 6,500 students at the University understood the function and future of the cards. Locals however, regard them primarily as loyalty cards with a forthcoming lottery feature.

The cards are also regarded as collectable souvenirs by a significant proportion of the one and a quarter million tourists that visit St Andrews each year.

The cards are manufactured by Gemplus. Dione are supplying the CPT 500 card reader terminals. During phase one of the project 8,500 cards will be issued. Over the next four years between 30,000 - 50,000 cards are expected to be issued depending on the impact of the tourist season.

*Contact: **Randal McLister**, Senior Partner, Scotcomms Partnership. **Tel: +44 (0)1334 476504. Fax: +44 (0)1334 479201.***

Canadian Parks Project

Parks Canada and Canadian Heritage are launching a Smart Card pilot at Banff Upper Hot Springs in Banff National Park on 16 June.

Canada's national park system began at Banff in the 1860s. Parks Canada is managed through the Deputy Prime Minister's office.

The cards will be used as an electronic purse to pay for admission to the mineral pools, for towel rental and spa services. The card will also be accepted in gift shops, restaurants and cafes.

Denominations on the card will be 50, 100 and 150 Canadian dollars.

One side of the card was made available for advertising. Banff enjoys some 4,000,000 visitors each year and this promotion opportunity was taken up by the Royal Canadian Mounted Police, World Police and Fire Games.

Stargenix Corporation is supplying 20,000 cards which will be available at retail outlets, hotels and 1997 world police / fire games venues. The cards are manufactured by Keystone Plastics and the chips are supplied by Siemens. The card reader terminals are the 'Systex' brand.

Dr Christopher Goeltner, Siemens' Director of Smart Card ICs North America, representatives from Walt Disney Corporation, the President of the Mounted Police Federation and mounties in full uniform will attend the opening.

If the pilot is successful Parks Canada intends to use Smart Cards at the majority of Canada's national parks.

Contact: Michael Freedman, Stargenix Corporation. **Tel: +1 403 262 5223. Fax: +1 403 264 4498.**

Clean and Smart from Emmarc

Cards and card readers can fail at any time due to microscopic debris and contamination according to the company Emmarc who have introduced a product called Kleenkard described as "a breakthrough in cleaning card technology."

The user simply removes the cleaning card from the sachet which contains Universal HCF 2001 fluid. The cleaning card is then inserted into, or swiped through, the reader which removes any debris and contamination in a few seconds. The card should be disposed of after use.

According to recent investigations undertaken by Emmarc errors made when reading cards can cause financial loss and can result in organisations replacing cards and readers before it is necessary.

Kleenkards are suitable for both Smart Card and magnetic stripe card readers. Clive Jenkins of Emmarc says a single standard Kleening sachet costs approximately 50p.

Contact: Clive Jenkins, Director, Emmarc. **Tel: +44 (0)1462 422277. Fax: +44 (0)1462 422277.** *E-mail: Emmarc@compuserve.com*

Advantage Card To Roll-Out

Boots the Chemist has confirmed that its Smart Card loyalty scheme has been a success. It plans to roll-out the Advantage card nationally later this year but has refused to say when. The announcement confirms industry rumour (*see SCN March 1997*). The cards had been trialed in Plymouth and Norwich since September.

The roll-out announcement came as Boots announced pre-tax profits up from £507.7m to £571.1m after exceptional gains of £34.9m. The increase was fuelled by a 10.8 % increase in trading profits at Boots the Chemist to £426.5m.

Contact: Francis Thomas, Boots. **Tel: +44 (0)115 968 7029.**

Siemens New Microcontrollers

Siemens Semiconductors has announced a new high-end family of microcontrollers for Smart Card Integrated Circuits. Called the Triple Es (Enhanced performance, Enhanced on-chip security and Enhanced memory capacity), the microcontrollers feature a new CPU which offers an advanced instruction set optimised for Smart Card applications while maintaining full compatibility with all existing Smart Card ICs.

Siemens says the core achieves very high speed operation and exceeds standard 8051 performance by a factor of six. The controllers also require less power than their predecessors, making them ideal for contactless operations.

Flagship of the Triple E line is the SLE 66CX160S which has a surface size of just 20mm² and offers memory capacities of 32K bytes ROM, 16K bytes EEPROM with around 2K bytes of on-board RAM. The device contains features such as a noise generator used to create random numbers.

Security is enhanced by the ACE (Advanced Crypto Engine) which executes an RSA signature. The co-processor handles RSA calculations with key lengths exceeding 2048 bits. The device will be available in volume quantities by the end of 1997.

Memory chip for Visa

Siemens is also developing a memory chip for Visa for use in pre-paid applications due for delivery during this year.

Called the SLE4463, the new chip is designed specifically for use in disposable Visa Cash cards and is backward compatible with the SLE 4404 already in use in Visa Cash projects.

In another development, Visa is working with Siemens to develop a Smart Card for the UK trial of Visa Cash using Siemens' SLE 44CR80S crypto-controller chip. The trial, starting towards the end of this year, will involve up to 70,000 cards.

*Contact: **David Close**, Marketing, Siemens - **Tel: +44 (0)1344 396313. Fax: +44 (0)1344 396721. E-mail: closed@plcbrk.siemens.co.uk***

Award for Geld Karte Project

Zentral Kreditausschuss (ZKA) has won the Smart Card Industry Association (SCIA)1997 Outstanding Smart Card Application Award for its leadership in the German Geld Karte electronic purse project.

The Award recognises user organisations which implement innovative Smart Card programmes in a well-managed manner.

Geld Karte combines the electronic purse with the European debit card system. It is used at retail outlets, taxis and parking and has the ability to add new applications such as public transport ticketing.

The Geld Karte project is supported by German banks and credit institutions and is co-ordinated through the central banking agency, ZKA. In the last quarter of 1996, about 25 million Smart Cards were issued to German bank customers, with another 30 million expected to be issued during 1997.

Other nominees for the Award were the Seoul Bus Union bus ticketing system, the Holland StudentChipCard, Shell Oil UK loyalty card and the Jacksonville Jaguars stadium card.

*Contact: **Alison Donald**, SCIA - **Tel: +1 609 799 5654. Fax: +1 609 799 7032**.*

DOT terminal to accept Mondex

UK-based DOT Matrix, developer of network-orientated computers, signed a licensing agreement with Mondex International to include Mondex as a payment vehicle on the DOT terminal. The new device, shipping next month, will offer an in-built secure payment system with Mondex capability as well as supporting all other ISO 7816 Smart Cards.

The DOT terminal will be deployed in a number of applications including corporate network computing, home shopping and banking, EPOS, a Web television box and as a low cost data entry terminal.

*Contact: **Gerry Hopkinson**, Head of Corporate Affairs, Mondex International - **Tel: +44 (0)171 557 5016. Fax: +44 (0)171 557 5036**.*

New SIM Card Chip from Motorola

Motorola has announced the immediate availability of a new chip designed for GSM digital mobile telephone SIM (Subscriber Identity Module) cards.

Called the MSC0402, the new 8K bytes EEPROM chip supports the latest industry communications protocol, called SIM Card Application Toolkit which enables network operators to download new features directly to users' cards over the GSM network.

Operators will be able to offer consumers easier access to the latest services such as paging or directory services and some are already planning to use this kind of chip technology to offer services such as electronic purse. This would allow users to pay for their calls as they make them or even download cash directly from their bank accounts.

"The vision of the mobile phone as a portable ATM is not far away," says Motorola.

Contact: Kathleen Reid, Motorola - Tel: +44 (0)1355 565447.

Smart Cards for US Army Recruits

The US Department of Treasury is funding a Visa Cash stored value card pilot scheme at Fort Leonard Wood, Missouri, which involves over 28,000 recruits being issued with First Union Corporation Smart Cards to pay for their personal items such as toiletries and haircuts during their eight weeks of basic training on the post.

This is the first government pilot of Visa Cash and the programme will examine the use of stored value as a prototype for future military operations and for the possibility for eliminating cash in military facilities by automating services.

The Smart Cards are being supplied by Schlumberger and will be used with Omni 395 card-accepting terminals from VeriFone. All cards will be personalised with the soldier's name and contain a signature panel on the back for identification purposes. At the end of basic training any unused portion of the card will be credited to the soldiers' military payroll account.

SET Pilot Launched in Taiwan

Thirteen Visa member financial institutions, representing more than 90 per cent of the Taiwanese payment card issuing and acquiring market, launched the first phase of a national Secure Electronic Transaction (SET) pilot this month.

In addition to the large participation by Taiwan's banks, the pilot is also unique in that SET is being conducted on Chinese-language software developed by Taiwan's Industrial Technology Research Institute, Systex Technologies and IBM.

In the first phase, 240 Visa cardholders will be able to make purchases from nine merchants, while by the end of the year, more than 10,000 Visa cardholders will be conducting secure electronic transactions at 30 merchant locations.

The SET digital certificates issued to cardholders and merchants are being produced by VeriSign, Visa's certificate authority partner, while the payment gateways are provided by ITRI and IBM for the five acquiring banks - Bank of America, China Trust Commercial Bank, Citibank, National Credit Card Center and Standard Chartered.

Other banks participating as issuers are Shanghai Commercial & Saving Bank, United World Chinese Commercial Bank, International Commercial Bank of China, Taipei Business Bank, Grand Commercial Bank, Land Bank of Taiwan, Taishin International Bank and Union Bank of Taiwan.

Merchants include book retailers, travel services, music stores, a manufacturer-direct computer retailer, department stores, cyber shopping malls with speciality retailers and mail order type catalogue retailers.

In addition to the SET pilot in Taiwan, Visa has announced another three in the Asia-Pacific region, in Japan, Singapore and Korea. Visa is also piloting SET in several projects in Europe, including the largest trial which involves 38 Visa members in 16 European countries, a pan-European effort reflecting the fact that electronic commerce is not confined by geographical or time differences.

Contact: Jeff Perlman, Visa International Asia-Pacific - Tel: +65 437 5513. Fax: +65 437 5567.

Hilton Tests Smart Cards

Hilton Hotels Corporation have joined with American Express and IBM in pilot tests of a multi-application Smart Card which will enhance the check-in and check-out process for guests.

The tests began last month at the O'Hare Hilton in Chicago and will roll-out to another seven Hilton hotels in key business destinations by mid-June.

Several thousand frequent travellers are being issued with either an American Express Corporate Card, Hilton Optima Card or Hilton Honours Diamond VIP Card, all of which will contain IBM's multifunction computer chip.

Travellers can bypass reception and check-in by inserting their card in a special kiosk in the lobby. The kiosk displays the traveller's reservation, selects a room based on the customer's preferences, issues a key and provides printed room directions and information. At the end of the stay, the traveller can check-out by inserting the card into the kiosk to review and confirm the bill and print a receipt.

Right:
Hilton Hotels' multi-application Smart Card [Hilton Hotels Association, American Express, IBM]

The chip in the card contains the customer's personalised travel profile, including name, address, card number, Hilton guest reward programme number and hotel stay preferences. Participants have the option to store a number of other airline and car rental loyalty programme numbers - a number of American Express Corporate cardholders are also taking part in an electronic ticketing test with American Airlines (*SCN November 1996*).

Contacts: John Noakes**, Smart Card Solutions, IBM - **Tel: +44 (0)171 202 3706. Fax: +44 (0)171 261 9930. E-mail: john_noakes@uk.ibm.com. Internet: http://www.chipcard.ibm.com

Chip Card Standards for China

Peoples' Bank of China, the Chinese central bank, has signed a Memorandum of Understanding with Visa International for the joint development of China's chip card standards, paving the way for the development of a chip-based payment system in China.

Domestic banks in China have already issued 700,000 chip cards, and China's Golden Card project is designed to provide a modern electronic cashless payment system and has a target of 200 million payment cards by the Year 2000.

Chen Jing, Vice President of the People's Bank of China, said: "The chip card is the most advanced financial product in the world. It is also a key component of China's Golden Card Project.

"China's bank chip card standards will aim to set up regulations and standards for the development of the chip card industry in China and to lay technical foundations for the interoperability of chip cards across industries and regions as well as for the sharing of the infrastructure."

Contact: Paul Lewis**, Visa International Asia-Pacific - **Tel: +65 437 5509. Fax: +65 437 5567.

Mondex for Latin America

Credomatic International Corporation, the major issuer, acquirer and processing agent of credit and debit cards in Central America, has announced franchise rights for Mondex electronic cash in seven countries - Costa Rica, Guatemala, Nicaragua, Panama, Honduras, El Salvador and Belize.

The deal gives San Jose, Costa Rica-based Credomatic, exclusive rights to commercially develop Mondex in the seven countries which collectively represent a marketplace of over 30 million people. The first commercial development of Mondex in the region will be a pilot in Costa Rica in the near future.

Contacts: Tim Stewart**, Executive Vice President Americas Region, Mondex International - **Tel: +1 201 660 4101. Juan Carlos Páez.** Smart Card Project Manager, Credomatic International Corporation - **Tel: +506 258 6954.

Contactless Ticketing for Paris

French Railways (SNCF) is launching the biggest contactless ticketing experiment ever attempted in France. The six month trial will start at the end of this year and involve a suburban railway service, three bus lines and several thousand passengers in the Ile de France region.

Ascom Monétel is to supply 14 validation terminals, eight information terminals and some 50 adaptation machines, gate controllers, etc.

Passengers will be able to use the information terminals to choose their destination, check the amount of credit remaining on their cards, reload the cards and consult the card travel history. Validation terminals will debit the cost of trips made from the cards.

The SNCF experiment is financed by the Paris Transport Union and the results will be used to define the outline of the future contactless ticketing system for the Paris region, to be run jointly by SNCF and RATP, the Paris Public Transport Authority.

Claude Garoyan, *Communication Manager, Ascom Monétel* - ***Tel: +33 (0)4 75 81 41 14. Fax: +33 (0)4 75 81 41 00.***

Retail Banking in Eastern Europe

A survey by Retail Banking Research, covering the Czech and Slovak Republics, Hungary, Poland and Russia, shows that the banking industry in Eastern Europe has changed dramatically in less than a decade.

The survey also reports dozens of Smart Card schemes being up and running in Russia with over 400,000 electronic purse cards which can be used at some 6,000 EFTPOS terminals. In the other four countries over 8,000 EFTPOS terminals are now installed.

The report: *Eastern Europe: Banking Automation and Payment Systems*, costs £3,750 from Retail Banking Research, 15 Hanover Square, London W1R 9AJ, England - ***Tel: +44 (0)171 495 8871. Fax: +44 (0)171 493 0539.***

Other News

Gemplus Corporation and IDMATICS have announced a partnership to develop a chip-based identity card by integrating Gemplus' contactless Smart Card technology into IDMATICS high security document management and production systems and could include official documents such as healthcare cards, passports and drivers licenses.

DataCard Corporation has introduced hardware and software upgrades for its 9000 and 7000 Series systems to allow financial institutions and service bureaux to personalise, enable and customise Mondex cash cards. ***Contact: Mark Iverson***, *DataCard Corporation* - ***Tel: +1 612 988 1763. E-mail: mark_iverson@datacard.com***

Omron has introduced a new hybrid card acceptor designed to operate with both Smart Cards and magnetic stripe cards. Selling at under £30 it is suited to OEM applications in retail banking, electronic purse and stored value card systems. ***Contact: Guy Boxall***, *Omron Europe* - ***Tel: +44 (0)181 450 4646. Fax: +44 (0)181 450 8087.***

Ascom Nordic is to deliver 10,000 GNT507 payphones to Malaysia, all with multi-payment capacity (coins and pre-paid chip cards) and four PMS 150 supervision systems. The contract was awarded by Citifon, one of three private Malaysian operators. Ascom is supplying the electronics and high-precision mechanical components making up the heart of the payphones. Final assembly, installation and commission will be carried out by a local company, sub-contracted to Citifon. ***Contact: Claude Garoyan,*** *Communication Manager, Ascom Monétel* - ***Tel: +33 (0)4 75 81 41 14. Fax: +33 (0)4 75 81 41 00.***

Gemplus has announced its latest SIM (Subscriber Identity Module) Smart Card for mobile phones. Called the GemX16 SIM card, it has 16K bytes of EEPROM, allowing the use of spare memory to load more features and offer more services. Singapore Telecom Mobile will be the first cellular phone operator to adopt this technology. ***Contact: Flavie Gil***, *Gemplus, France* - ***Tel: +33 (0)4 42 36 56 83***

Integrated Circuit Card Standards and Specifications - Part 9 :

A Security Primer

We have often questioned the use of Smart Cards and the necessary justification of the business case. It is clear that only when you require a secure portable carrier of data is there any case to be made for using the Smart Card. In every other case there are far cheaper technological solutions. In this months discussion we are going to look at the security services that can be offered by a Smart Card and how such services are necessary in the emerging field of electronic commerce. In particular we must pay attention to both physical and logical security.

Lets start our discussion by having a look at cryptography. Today cryptographic algorithms apply some mathematical transformation of the input data to produce a cipher. Sometimes, in the case of a one way function, this process cannot be reversed and the algorithm only acts in this single direction. In *figure 1* we can consider the classical model..
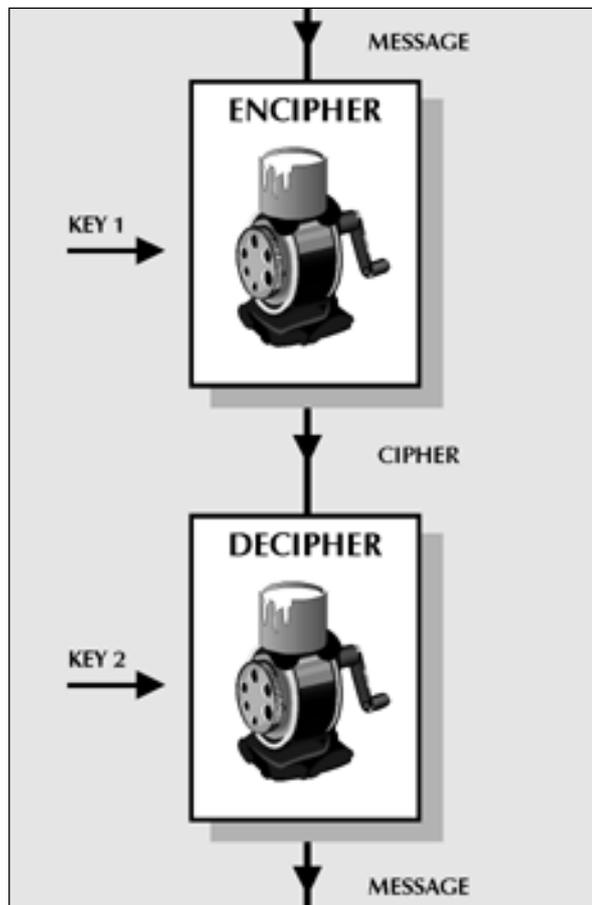
In modern cryptography the algorithm is usually public in that it is published and well known. Algorithms such as DES (Data Encryption Standard) and RSA (after the inventors Rivest, Shamir and Adleman) are referred to in almost any book on security. In this case the strength of the cryptographic process is entirely dependant on keeping the key secret. In a military environment the algorithm is usually kept secret (or heavily restricted) on the grounds that any information is useful to an opponent. In some cases the algorithm is kept secret on commercial grounds in that the inventors do not want to make their IPR (Intellectual Property Rights) freely available for all to copy or use. The use of patents may not be the best way to control the relevant commercial value. Regardless of the approach adopted the keys are fundamental to the overall process.

If we refer to *figure 1* we can see that the encipherment algorithm operates using key 1 on the input data to produce a cipher. The decipherment process uses key 2 in order to recover the original message from the input cipher.

When key 1 equals key 2 then this is referred to as a Symmetric Algorithm of which DES is a typical example. When key 1 does not equal key 2 then we are referring to an asymmetric algorithm. RSA is probably the best known example of an asymmetric algorithm.

Symmetric cryptography is probably the easiest to understand because it is intuitive. The idea of processing the data with a key and then reversing this operation with the same key all seems to make sense. Lets look at what this means in practice (*figure 2, opposite*).

The transmitter, using an algorithm such as DES, enciphers the message using his secret key. Clearly if the key is not kept secret then any eavesdropper on the network could decode the message. The resultant cipher is transmitted across the network where the intended receiver uses the same algorithm (in this case DES) and the same secret key to decipher the message. What is readily apparent here is that both parties must keep that key secret. If either one of them is careless in looking after the key then the security link is broken. The other point to notice is that if you find an enciphered message on the network you cannot tell just by looking at the cipher which party was responsible for its generation. Since both parties have the same algorithm and the same key, either could have generated the message. This is a very important consideration in a commercial environment and is particularly critical in electronic commerce where it is usually necessary to authenticate the source of a message.

In the case of asymmetric algorithms the situation is very different. These algorithms are often referred to as public key cryptography because of the way they are used. Lets see how this works in practice:

In this example the transmitter uses an asymmetric algorithm such as RSA and with the receivers public key generates a cipher from the input message. This cypher is then transmitted across the network to the receiver. By using his secret key the receiver is able to receive the original message. Clearly the public and secret key of the receiver are mathematically related but the strength of the process relies on the difficulty of computing the secret key just from a knowledge of the public key. We note the use of the word "Difficulty" in practice few things are impossible but we can make it sufficiently difficult that the computation of the secret key is not economically viable. In practice this is largely determined by the length of the key which is why this receives so much attention in the media. Lets make a few observations:

A The receiver doesn't know who sent the message (assuming the public key was truly made public)

B Although the transmitter doesn't care about keeping the receivers public key secret he does care about its authenticity. If he used an eavesdroppers public key his message would be revealed.

Lets take *figure 3, below* and reverse the process (*figure 4, overleaf*):

In this case the transmitter uses his secret key to obtain a transformation of the input message. This cipher is then sent across the network to the receiver who recovers the original message using the transmitters public key. Lets make some more observations,

C The receiver knows that the message could only have come from a particular transmitter because nobody else has his secret key (assuming he looks after it)

D Anybody with access to the transmitters public key can read the message

E The receiver needs to be assured to the genuineness of the transmitters public key in order to be sure that the message really did originate with that particular transmitter.
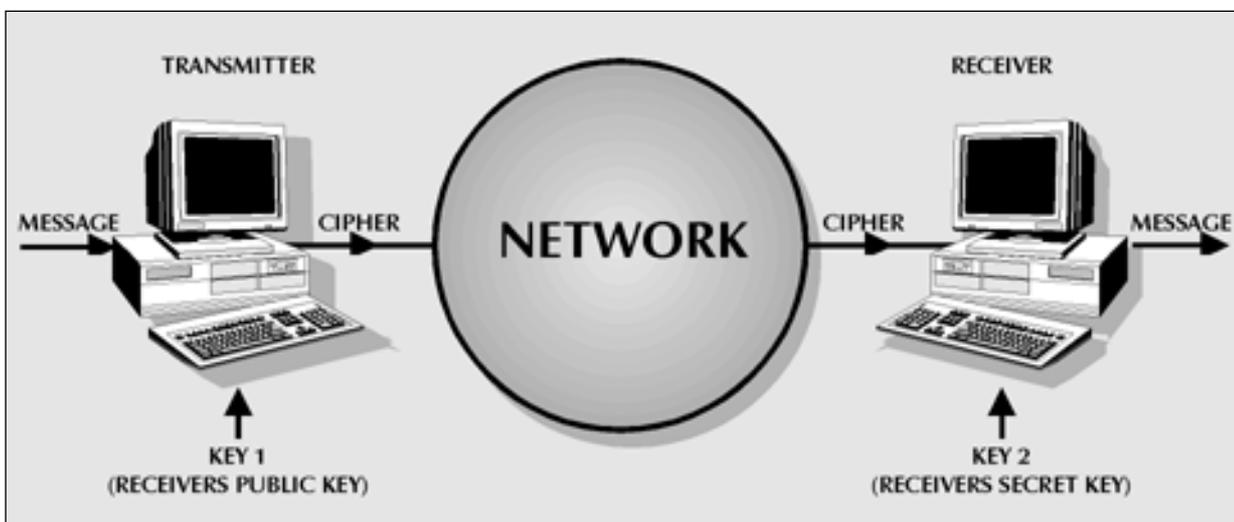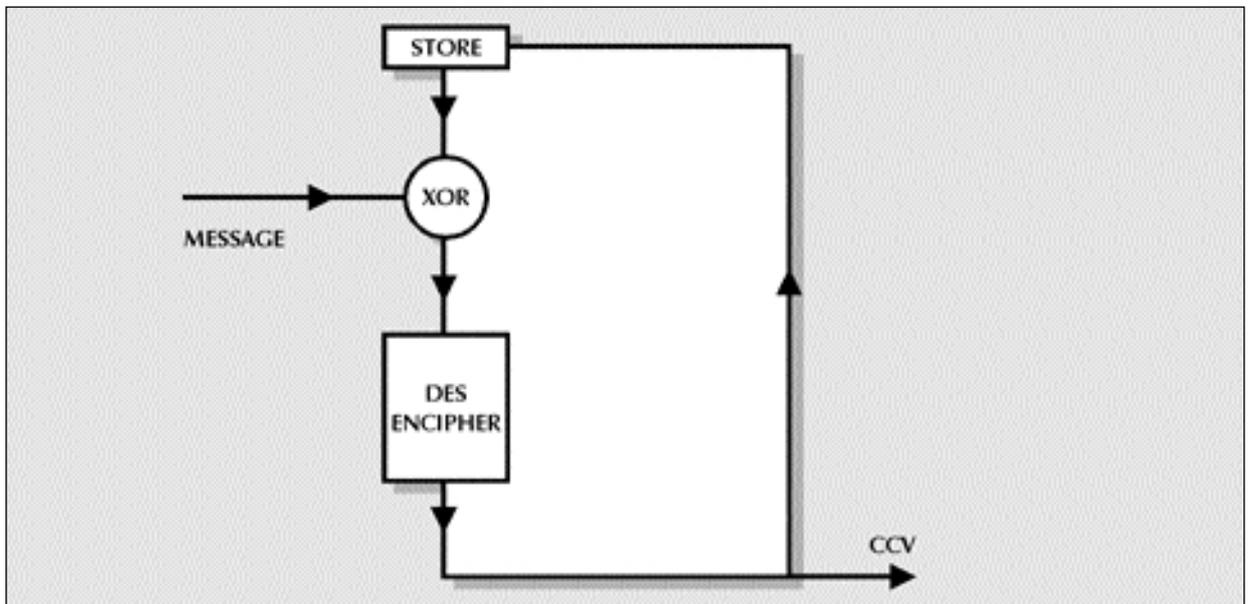
Smart Card Tutorial
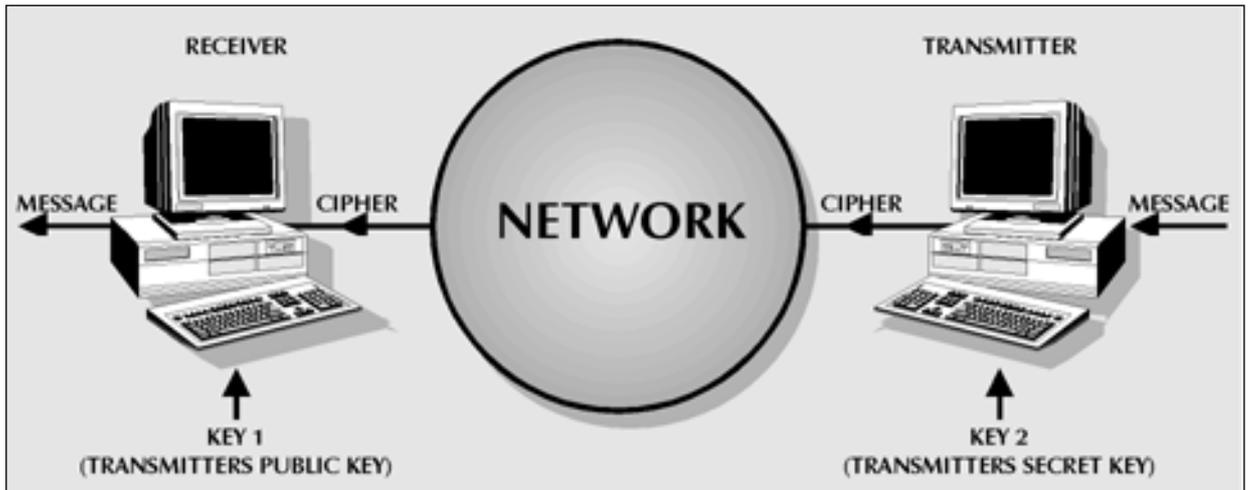
This cipher, produced with the transmitters secret key, is usually referred to as a digital signature. However the process that we have described so far is actually incomplete since the checking of a digital signature requires an element of redundancy. In simple terms we could send the complete message in plain-text as well as the digital signature. The redundancy is then observed by checking the decoded signature data against the plain-text message data. Imagine for a minute that the message data is a random number then the receiver has no way of knowing if this is the true random number without being sent additional information, in this case a total copy of the false cipher block. It is only by comparing the decoded signature with the plain text data that the receiver can be assured of the authenticity of the data. This same process therefore achieves three properties:

1   The integrity (correctness) of the data
2   The authenticity of the source
3   Non-repudiation in that the transmitter cannot subsequently deny the operation

We should note here that the symmetric algorithm cannot achieve these same properties because the transmitter and receiver must share the same secret key. Clearly non-repudiation is not possible because either party could have generated the message. Source authentication is however achieved between corresponding parties. Data integrity can be assured by developing a cryptographic check value (CCV) which is sent with the message. The CCV is sometimes referred to as a message authentication code. This can be implemented as shown in *figure 5*. The cryptographic check value was widely used to protect the integrity of financial messages where the property of non-repudiation between correspondent banks was not a priority.   Today with electronic commerce the situation has totally changed and this latter property is has become a fundamental requirement.

David Everett
Next week - Security continued.

Smart Card Diary

Ground Handling, Forum Hotel, London, 3-4th July 1997.

Attempts to harness the latest technology and management techniques to ensure ground handling operations have a direct impact on bottom line. Includes section on using Smart Cards and electronic ticketing to gain competitive advantage.

Contact: Antonia Gillum Webb, ICM. Tel: +44 (0) 171 499 0900. Fax: +44 (0) 171 436 5741.

Smart Card Technology in Transport, The Hyde Park Hotel, London, UK, 14-15 July 1997.

Aims to analyse the pros and cons of implementing Smart Cards, discuss latest software developments and evaluate key benefits of implementing electronic ticketing. Also post-conference workshop 16 July. Tel: 0500 821057.

Cards Australia '97, World Congress Centre, Melbourne, Australia, 26-28 August 1997.

The exhibition will cover banking, telecommunications, transport, welfare, healthcare and entertainment and feature Smart Cards, contactless cards, security access and biometrics.

Contact: Susan Reid, Exhibition Manager at AIC Exhibitions - Tel: +61 2 9210 5700.

Loose Chippings

- The British Government is to drop plans for a national identity scheme. The Smart Card industry had hoped for a Home Office review of plans rejected by the Conservatives.

- Au-System is opening a sales office in Beijing to support the growing Sim card applications business. The new office will strengthen Au-System's presence in the Asia-Pacific region, complementing the Hong Kong office that opened in 1996.

- The People's Bank of China (PBOC) and Visa International have signed a Memorandum of Understanding (MOU) to announce that the two parties will jointly develop China's "Bank IC Card Standards". The standards will be comprised of three parts; application, terminal and IC Card specifications.

Queen Visits Siemens

Her Majesty the Queen, accompanied by His Royal Highness, The Duke of Edinburgh officially opened Siemens' North Tyneside Semiconductor Plant last month.

The £1.1 billion plant is claimed by the Government to be the largest inward investment ever into the United Kingdom. Siemens hopes the plant will play a significant role in positioning the company among the world's leading semiconductor manufacturers.

Dr Henrich Von Pierer, President and Chief Executive Officer of Siemens AG said the new plant demonstrates Siemens' commitment to the United Kingdom, to Europe and to an exciting and promising industry.

Siemens announced that it will now produce 1,700 eight inch wafers for the market - four months ahead of schedule. By July the plant will reach initial target capacity. The plant currently employs 650 people and hopes to extend that to 1,000 employees by 1998.

Siemens Semiconductors currently ranks second in the list of European semiconductor manufacturers.

Contact: Laura Hotham, Corporate Communications, Siemens. Tel: +44 (0)1344 396396. Fax: +44 (0)1344 396693.

SCN Gives Away Malt Whisky

Smart Card News ran a highly successful stand at Retail Solutions this year. Visitors and delegates alike were drawn by the challenge of completing a game of skill and the prospect of winning a bottle of malt whisky.

The game was developed by *SCN's* sister company Microexpert, who specialises in website design and consultancy. Each hour's winner had completed the game in the quickest time. The game proved to be so popular that it is currently featured on the *SCN* website found at http://www.smartcard.co.uk

The picture below shows Albert Andoh, *SCN's* Marketing Manager presenting one of the winners, Terence Warmbier, Managing Director of US³ with his whisky.

US³ announced the formation of a new company at the show having joined forces with WOW ! Control Technology BV, a Dutch company involved in intelligent control systems. The new company is to be called Amazing Controls! Inc. Terence said the SCN game was "not easy to say the least."

The overall show has also been judged a great success. Almost 11,000 visitors visited the NEC in Birmingham. Retail Solutions attracted approximately 7,570 visitors and Retail '97 around 3,411.

A total of 440 companies exhibited, making the event the UK's largest retail show. Exhibitors displayed a range of new ideas in all aspects of retail technology. The Smart Card village is now in it's second year. Next year's event will be held 19-21 May 1998, Hall 5 of the NEC Birmingham.