

Swedish Bank Launches Electronic Purse Trial

Sweden has launched its first trial of an electronic purse system in the town of Lund and plans to issue 3,000 Smart Cards which can be used in over 100 participating outlets.

A one-year pilot, which follows the success of a limited test staged earlier this year, is being sponsored by Sparbanken, Sweden's national savings bank, in conjunction with POINT AB, a VeriFone International partner and Sweden's leading transaction automation supplier. If the pilot is successful, a nationwide roll-out is planned

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Smart Card News

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Next Month

Smart Card Tutorial - Part 3
From There to Here -
The Making of a Chip continued.

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Swedish Electronic Purse Pilot

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The bank is offering a choice of card programs. Card holders can select a program where value is loaded on to the card through an electronic transfer from their Sparbanken account, or a program where value is loaded through a cash transaction which opens participation to non-bank customers as well as to temporary users.

Sparbanken Finans AB, the local savings bank in Lund, has contributed local expertise in selecting both target card holders as well as participating merchants which include kiosks, tobacco shops, cafeterias, bars, grocery stores, fast food outlets, cinemas and Pressbyran, Sweden's largest convenience store chain.

Gemplus has supplied its 1K bytes EEPROM PCOS Smart Card for the project. Hand-held SC 450 Smart Card reader-writer terminals from VeriFone are used to process transactions while VeriFone's TRANZ 380 Transaction Automation system communicates with the scheme's central management system.

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Motorola Protects Test Circuits

Motorola has developed a new manufacturing process to add a further layer of security to its Smart Card chips. It has developed a process which allows the test circuitry, built on to the microchips, to be physically removed once quality testing is complete. This is achieved through an innovative precision "sawing" technique designed to foil any attempts to use the test circuits as a possible "back door" route into the microchip's contents once in use.

Waqar Quereshi, Worldwide Marketing Manager for Smart Cards, describes the technique as being "like destroying all trace of the bridge once you have crossed the river."

Motorola has applied for industry patents on the process and will offer it across a range of Smart Card products as required. The technology is being

introduced now at its specialised Smart Card production lines in East Kilbride and South Queensferry, Scotland, and will first appear in Motorola's M68HC05SC4X family of microchips to be launched in the first quarter of 1996.

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College Access Control System

An access control system from Landis & Gyr SMART of France, using a general purpose Smart Card, has been installed by the Swiss Confederation and Federal Construction Office in the Ecole Polytechnique Fédéral, an engineering college in Lausanne in Switzerland.

The college has 4,500 students and 3,000 administrative staff, scientists, researchers, etc. who daily use more than 20 buildings, lecture halls and laboratories spread over 100 hectares.

The college wanted to control access, particularly in sensitive areas, as well as to offer other applications such as a credit card and an electronic purse for use in the five on-site restaurants and at 50 self-service photocopiers. These functions are to be added later.

Ten thousand 2K bytes EEPROM MPCOS Smart Cards fabricated by Gemplus have been delivered for use in the system which includes several servers in a UNIX software environment, an ORACLE database managing access rights and users' characteristics, 35 management stations (in a Windows environment) protected by Smart Card terminals, an Ethernet terminal connecting all the college buildings, 29 terminal concentrators and 300 access control doors connected by an on-site bus to the concentrators.

Contact: Etienne Dureau, Landis & Gyr SMART - Tel: +33 75 82 32 00. Fax: +33 75 56 01 69.

VeriFone Appoints New MD

Bernard Delahaye has been appointed Managing Director at VeriFone and will be responsible for managing the VeriFone International Partners programme in Europe, the Middle East and Africa. He will work out of VeriFone's UK office.

New French SGS-Thomson Plant

SGS-Thomson Microelectronics has announced that it is to build a new high volume integrated circuit production plant at Rousset, in the Bouches du Rhone region of south east France, to handle new generation products.

The new facility, called Rousset 2000, will produce 8" (200mm) wafers with a planned weekly throughput of 5,000 wafers, and handle advanced generations of ULSI (Ultra Large Scale Integration) products using 0.5 micron, 0.35 micron and even smaller scale technologies.

The company says the product range will mostly comprise future micro-controllers, EEPROM-type non-volatile memory chips, new generation bank and telephone Smart Card chips and multi-function technology-driven products.

SGS-Thomson already has facilities at Crolles (France), Phoenix (Arizona, USA) and Catania (Italy). Work on the new US \$800 million plant will start during the first quarter of 1996 with chip production starting at the beginning of 1998.

£160m Japanese plant expansion

Shin-Etsu Handotai Europe (SEH-E) is investing £160 million in a significant expansion of its plant in Scotland to increase its production of silicon wafers for making semiconductors used by manufacturers in the production of integrated circuits. It is currently completing a £23 million expansion at its Livingston plant near Edinburgh.

A subsidiary of the Tokyo-based Shin-Etsu Handotai Company, SEH-E was established in 1984. Its manufacturing activities essentially involve slicing ingots of silicon crystal which are supplied by other parts of the group, lapping and polishing the faces of the wafers and applying various cleaning processes resulting in an ultra flat, highly finished product.

The new plant will be built adjacent to the present one which produces industry standard 6" diameter wafers, to manufacture 8" (200mm) wafers for which there is a growing demand. It is planned that the new 14,000 square meters facility will also produce 8" epitaxial wafers which involves growing another semiconductor layer on the wafers.

Industry trend

The trend amongst semiconductor manufacturers is to use larger diameter wafers giving a greater yield per wafer and consequently lower costs. *SCN* understands that plans include the production of 10" wafers by the end of the decade and then 12" wafers.

Recently Siemens of Germany announced that it would build a £1.1bn plant at Newcastle-upon-Tyne in the north east of England (*SCN August 1995*). Then Fujitsu of Japan announced a £816 million expansion of its semiconductor plant in County Durham, England.

This was followed by Motorola's announcement that it will increase its production capacity tenfold by the year 2000 - or 10 million Smart Card microchips per week (*SCN November 1995*).

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Schlumberger/Serif Joint Venture

Schlumberger Electronic Transactions of France, and the Cowells card division of Serif plc, a leading UK manufacturer of plastic cards, have entered a joint venture called Cowells Schlumberger to offer design and manufacturing services for all major Smart and magnetic stripe card application areas, as well as plain plastic cards.

Jean Paul Bize, Schlumberger's VP Electronic Transactions, says Schlumberger gains an in-depth understanding of the market forces in the UK, plus a second manufacturing plant in Europe to meet fast-growing demand.

"With the addition of Cowells' resources," he said, "our annual worldwide card manufacturing capacity now expands to 400 million."

The new company will operate from the existing Cowells site at Ipswich in Suffolk, England.

Contact: Bertrand Dussauge, Schlumberger Electronic Transactions, France - Tel: +33 1 47 46 62 47. Fax: +33 1 47 46 68 66.

CP8 Contact / Contactless Card

A microprocessor card which supports both contactless and contact communications is being developed by CP8 Transac, a division of Groupe Bull of France.

According to Adrian Cannon, General Manager of CP8 Transac in the UK, samples of the new card will be available in the second quarter of next year with production starting in the last quarter of 1996.

Speaking at the 11th European Payments '95 (EFTPOS and Home Services) conference in Edinburgh, Scotland, last month, he said the new product, called the TBHF card, was a true integration of both communication methods in a single chip and would build a bridge between the potentially enormous markets for Smart Card technology - the electronic purse and the mass transport sector.

As a simple illustration he said a payment function would be carried out using the contacts in an ATM or point of sale device, but using the contactless interface when boarding a bus.

The technology enabled the production of ISO Standard thickness cards and the contactless communications interface allowed for reading and writing at 5-10cms.

Currently, CP8 Transac offers the Racom product range manufactured by themselves and using Ferro-electric Random Access Memory (FRAM) in a single chip microprocessor contactless Smart Card.

FlashFlex from Schlumberger

A contactless Smart Card system for public transport ticketing has been launched by Schlumberger. Known as FlashFlex, it has been specifically designed to integrate with other related applications such as the Stored Value Card (SVC) or electronic purse.

The system was designed by French public transport operator RATP in conjunction with technology partner Innovatron and has been licenced by Schlumberger.

Using RF communications in the megahertz range and magnetic induction, the cards can be read easily

at distances of up to 15 cms using high data-rate communication links. Schlumberger says this allows sophisticated transaction performance, with the benefit of DES encryption to combat fraud if required, in around 200 milliseconds.

Schlumberger has integrated this communications method with its own range of Smart Cards. The FlashFlex system uses a microcomputer-based ASIC (Application Specific Integrated Circuit) coupled with a simple loop antenna which can be mounted in the plastic body of an ISO Standard sized card, or within a badge or tag. The power required for a transaction comes from mounting the card or badge inside a small holder containing a battery and an optional button and LCD for user information.

Initially, Schlumberger is offering the contactless card or badge for passengers. The card can be produced with a range of EEPROM memory capacities to manage multi-modal ticketing applications involving different transport networks.

The cards will be supported by a compact reader which can be integrated by OEMs easily into entry doors, turnstiles, etc.

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ULYSSE Cash Machine

CP8 Transac, a Groupe Bull company, has announced ULYSSE, an outdoor cash machine designed for through-the-wall installation.

It is priced at under 100,000 FF for the basic configuration with a monochrome screen and a safe compliant with UL 24-hour standards. A model with a C1-type configuration is also available.

The customer interface comprises either a monochrome or colour VGA screen, a 16-key keyboard with four function keys for transaction control, a magnetic card reader or combined magnetic and Smart Card reader and a ticket printer.

Contact: D Mercier Chevalier, CP8 Transac, France - Tel: +33 1 39 66 45 20.

Electronic Purses: A Comparative Review - Part 5

Country	Austria	China
Name of scheme	QUICK	Great Wall Card
Capital investment	approx. US \$25 million	n/a
Operator	Europay Austria	Bank of China
System developer	Austria Card and Europay Austria	Bank of China
Status	1994: pilot project countrywide since Nov. 1995	Started February 1995
Multiple currencies	No	no
Loadable amount	Up to ATS 1.999 (US \$200)	Rmb 50, 100, 200, 1000
Current applications	Parking meters, vending machines, public transport, taxis, restaurants, shops (Payment for low value amounts) etc.	Multi-application banking card (electronic pass book and purse), debit card.
Planned applications	Special banking applications, teleshopping, saving books etc.	-
Method of settlement	Settlement direct from terminal over telecommunication lines (phone lines) or via settlement card or settlement portable terminal unloaded at bank branch	
Card fabricators	Austria Card, a company of the Austrian central bank	Gemplus Technologies Asia
CPU (Yes/No)	Yes	Yes

Country	Austria	China
ROM	16K bytes	n/a
EPROM/EEPROM	4K bytes EEPROM	1K bytes EEPROM
RAM	256 bytes	n/a
Co-processor (Yes/No)	In all terminals only (for asymmetric authentication)	Yes
Chip manufacturer/ Type No.	Siemens SL 44C42	information not supplied
Security algorithm(s)	Triple DES, RSA	DES
PIN	No	Yes
Cards issued	2.5 million cards in 1995 (rechargeable, multifunctional)	40,000 in field test
Card target	More than 5 million cards in 1996. Eventually 6-8 million cards	not known
Card reader/terminal suppliers	More than 20 suppliers (Siemens, Bull, Thyron, Krone, ICL, IBM, Ascom, PDTS, Austria Card etc.)	Keycorp, Ingenico
Number installed	More than 5,000 in 1995 More than 40,000 in 1996	1000
Portable balance reader	OKI value checker	No
Card recharging points	ATMs and bank branch devices	Bank branch
Contact	Ernst Piller, Austria Card	Remy de Tonnac, Gemplus Asia
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Electronic Purses: A Comparative Review - Part 5

Country	France	Italy
Name of scheme	La Poste EP	CASSAMAT
Capital investment	-	US \$4 million
Operator	La Poste (French Post Office)	Raiffeisenverband Südtirol (Federazione delle Casse Rurali Altoatesine) a federation of 52 rural banks
System developer	CP8 Transac, a division of Groupe Bull, and Philips Smart Cards & Systems are developing operating systems for the purse and security modules	VERON SpA
Status		Field trial 1992/93 Pilot July 1994 Product launch October 1994 Pilot phase extended to account holders in Selva di Val Gardena and Merano and then to other sites where the banks are located
Multiple currencies	Possibly	No
Loadable amount	May be 500FF, but amount not yet decided	
Current applications	-	Electronic purse for bank account holders and tourists
Planned applications	Paris Metro, bus, rail, Paris Council, McDonalds, France Telecom and vending machines	Bus tickets and subscriptions; parking
Method of settlement		Sum per charge or discharge (no details)
Card fabricators	CP8 Transac / Philips	VERON SpA (NEWCASH architecture using C-Less Smart Cards)
CPU (Yes/No)	Yes	Yes

Country	France	Italy
ROM	Yes	6K bytes
EPROM/EEPROM	Yes	3K bytes EEPROM
RAM	Yes	224 bytes
Co-processor (Yes/No)	n/a	No
Chip manufacturer/ Type No.	n/a	SGS-Thomson ST 16623
Security algorithm(s)	Triple DES, and in one year RSA	O.S. features: DES, mutual authentication, secure increase/decrease balance, secure access method (3 level with separate pwd for read/write also on files)
PIN	No	Five digits: card holder decides PIN during card activation; PIN is always requested during loading transactions; for purchase, PIN verification depends on - random criteria, transaction amount, cumulative amount (US \$30)
Cards issued	information not supplied	36,000 in 1995
Card target	n/a	70,000 by end 1997
Card reader/terminal suppliers		VERON SpA - Moneybox portable, battery powered, off-line terminals; EFTPOS multifunctional on-line terminals; and motorized Smart Card reader for unattended terminals
Number installed	not known	1,500 Moneybox
Portable balance reader	no	1,100 EFTPOS multifunctional terminals
Card recharging points		ATMs (180)
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New Card Manufacturing Process

A card body manufacturing system based on injection moulding and In Mould Labelling (IML) has been developed by GPT AXXICON, a leading manufacturer of high precision moulds in The Netherlands.

Jeroen Jonker, Group Marketing Manager says the key need of the international Smart Card market is the ability to produce small batches in a cost-effective way.

“Despite the rapid growth and newness of the Smart Card market, prices are falling,” he explained. “Telephone cards, for example, currently cost no more than around DM 0.90 per card and, although this is a high volume market, the need for small batches is increasing. Germany alone has issued more than 12,000 different cards, yet batch sizes are often only around 10,000 cards.”

Already established in the production of injection moulds for highly accurate, high volume

components, AXXICON decided to focus on the Smart Card market as their next step in the data carrier arena and believe that the injection moulding process is the right technology for future manufacturing because of its flexibility, productivity and quality level.

SMARTLINER

In its new approach to cost-effective small batch card production, GPT AXXICON has developed the SMARTLINER production unit which offers:

- * flexible chip hole manufacturing to accommodate different chip designs
- * flexible card body decoration for quick change-overs in card appearance
- * exchangeable mould islands to produce cards in different plastics
- * elimination of secondary operations (e.g. degating, printing)
- * optimum reuse of waste material

Production unit

The SMARTLINER production unit is a flexible four cavity modular system which can be modified within minutes to use other raw materials with differing shrinkage rates, or other card types with different chip hole designs by simply replacing one or more “islands” in the mould base. Output per system is 2,500 cards per hour and it runs automatically enabling one operator to manage several systems at the same time.

The production line is based on injection moulding technology with In Mould Labelling (IML) and In Mould Degating. An advantage over traditional moulding is that the card bodies are decorated in the mould with labels which are pre-printed on large sheets of ABS, PC or PET film with a thickness of 80 micron.

Printing is done on a standard off-set printing machine and a large variety of labels can be printed on one sheet quickly and easily. Cutting the labels

to card size can typically be done at the rate of over 800 pieces per minute.

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These labels are fed into the moulding system (1) (*see diagram*) using special label cassettes (4) which can be removed and changed during production, ensuring maximum flexibility in changing decorations.

The labels are automatically separated from the cassettes and fed to a high speed handling robot (3) which positions the labels accurately in the injection mould (2). Each card requires two labels - one for each side. The mould closes and the injected plastic material bonds together with the label material.

After a short cooling period, the sprues are cut in the mould and the system opens allowing the robot to take out the finished cards. These are placed on the downstream equipment (5) for quality control (6) and stacking (7) for shipment. The cut off sprues can be reground and reused in combination with virgin material.

New UK IT Team Welcomed

The creation of a Central IT Unit (CITU) by the British Government has been welcomed by Smart Card Club Chairman Richard Poynder as a "big step in the right direction," and he urged the government to consult with industry experts

"If various schemes such as a national ID card, a driver's licence card, a tolling card and others are being considered, a fragmentary approach needs to be avoided at all costs," he said.

"We need a long term and cohesive central strategy under a common Smart Card design architecture, which enthuses the business sector and the public, and encourages a development process which takes cost, security, economies of scale, functionality and acceptability into account."

The creation of the new unit was announced by public services minister Roger Freeman.

Biometric Security Projects

Positive authentication of the user of a Smart Card as the rightful owner of that card takes a further step forward with developments in biometric technology in the UK and in Sweden.

Facial recognition

A UK project is underway to develop neural networks to analyse a Smart Card user's face to authenticate the owner. Neural Computer Sciences (NCS) last month received a £45,000 SMART award presented by Ian Taylor, Minister of Technology at the Department of Trade and Industry, to aid the development and testing of the security system.

Brian Kett, General Manager of NCS, said the award will accelerate their development of this important addition to Smart Card security in time to meet the burgeoning demand. He explained that card owners can inadvertently, or under duress, disclose personal account and PIN information to thieves, but the NCS face recognition system will make this information useless to criminals.

The face of the card owner is scanned digitally with a solid-state camera at the time the Smart Card is issued. This image is analysed by a neural network and results stored on the card. Each time the card is used, a similar camera scans the face of the user and a neural network compares the live data with the stored information.

The NCS approach is self-contained and, with the neural network software embedded in the chip together with the parametric data on the owner's face, comparison can take place on the card as part of the normal security process. This approach also eliminates the need for neural network processing to be fitted to all Smart Card terminals, allowing the system to be adopted quickly and easily.

The system is being developed by Dr Martin Lefley, Snr. Lecturer at Bournemouth University's Applied Psychology Department, using NeuFrame, NCS's graphical CASE-like framework for manipulating intelligent technologies.

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Contact: Richard Poynder, Smart Card Club - Tel: +44 (0)1223 329900.

Lefley, Bournemouth University - Tel:+44 (0)1202 524111. Fax:+44 (0)1202 595314.

Fingerprint identification

The Swedish patented fingerprint identification system enabling a fingerprint to be carried in digitised form in the memory of a Smart Card and compared with a finger placed on a sensor within the card (*SCN May 1995*), is now to be developed. The first part of the development work has already started and by the end of April 1996 costs for the remaining development work will be established - at this stage estimated at US \$2,300,000. A Swedish government-backed fund is prepared to finance half the total cost.

The first part of the project has been financed by Digital Descriptor Systems Inc., of Pennsylvania, USA, in return for an option to buy all patent rights. The deal has been negotiated by Finansforum AB of Gothenburg, Sweden, an innovation broker with exclusive rights to the technology.

Digital Descriptor Systems develops and sells electronic identification systems for passport and police authorities in the US and Europe. Development work is being carried out by Nordic VLSI AS, a high-tech company in microelectronics and leading designers for ASICs (Application Specific Integrated Circuits).

The invention, patented in all important industrial countries, enables a card holder's fingerprint to be read three-dimensionally and then digitally encoded and stored in the memory of a Smart Card microchip. To use the card, the owner places the same finger on the sensor in the card which is activated within a second and may be used for 30 seconds for a transaction.

Lars Linde, Finansforum Technical Director, says: "This biometric method means that we will get a system that is fraud and forgery-proof. The unique thing about this system is that the entire process of identification takes place within the card itself." He says the market potential is gigantic for applications where correct identification is necessary. These include bank payment cards, access cards, passports and driving licences, GSM cards, future car keys etc.

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VISA Cash Stored Value Card

Visa International announced last month that it has adopted the name VISA Cash for its Stored Value Cards issued in the United States.

The Smart Cards, carrying the VISA Cash name and logo, are being introduced in metropolitan Atlanta, Georgia, in advance of their usage at the Summer Olympics in July 1996.

Carl Pascarella, President and CEO of Visa USA, says: "VISA Cash is the first step in bringing a new breed of chip-based financial products and services to consumers. Its ease and speed translate into greater convenience and control today. In time, banks will tap the intelligence of the chip to combine multiple banking functions and value-added services on the card."

VISA Cash cards are already being used by employees and guests at Visa International headquarters in California.

In Atlanta, First Union National Bank, NationsBank and Wachovia Bank are introducing their own VISA Cash cards. The three banks will expand their individual programmes in preparation for full-scale usage at the Summer Olympics.

Visa says that an estimated four million visitors from around the world will have the opportunity to use VISA Cash cards at more than 5,000 targeted acceptance terminals throughout Atlanta.

Metropolitan Atlanta Rapid Transit Authority (MARTA) is the first merchant to announce its participation in the launch. Other announcements are expected for a variety of acceptance locations ranging from vending machines to quick-service restaurants.

Gemplus to supply cards

Gemplus Technologies Asia has announced that it has been selected to supply Smart Cards for the public launch of VISA Cash in Australia. It will supply disposable and Stored Value Cards for the pilot programme which will be followed by a national roll-out during 1996.

VISA Cash cards will be available for sale to the

005. Garrett Cohn, Digital Descriptor Systems - Tel: +1 215 752 0963. Fax: +1 215 752 5910.

public through participating financial institutions such as Australia and New Zealand Bank (ANZ), the Commonwealth Bank of Australia, CUSCAL (representing credit unions throughout Australia), the National Australia Bank and Westpac.

Gemplus, which supplied 20,000 cards for the trial at Visa headquarters, expects to supply more than 100,000 cards for the pilot in Australia which involves more than 1,000 merchants.

Contacts: Barbara Kalkis, Visa, USA - Tel: +1 415 432 2077. Remy de Tonnac, Managing Director, Gemplus Technologies Asia - Tel: +65 776 1989.

Card Loading Software

Applied Communications, Inc., of Omaha, Nebraska, is to provide its BASE24 software to load cash value onto First Union VISA Cash Smart Cards at a variety of ATMs for the launch of reloadable cards in the second phase of the Atlanta, Georgia pilot scheme.

Contact: Shelli Ryan, Applied Communications, Inc. - Tel: +1 402 390 8906.

Smart Swipe for Leisure Industry

Smart Swipe from Microcache is aimed at multiple site facilities, for example, in the leisure industry where user's data can be transferred from one site to another. In this case, the Leisure Pass user's name, address and membership type is stored on the Smart Card enabling them to visit any valid site within the scheme.

On their first visit to the site, the receptionist can input the data onto the site system via a Smart Card reader. On subsequent visits, the Swipe bar-code reader on the card is used for identification.

Microcache says the system is ideal for local authorities, universities or any operator with more than one facility.

ORGA Card Systems (UK) assisted in the development and are supplying an ABS card with

bar code print and an ST14C02 chip with 256 bytes from SGS-Thomson.

Boots Launches Advantage Card

Boots the Chemists is trialing a customer advantage Smart Card scheme in 13 stores in the Norwich area of England.

Called the Boots Advantage Card, it is designed to reward customers by awarding one point for every 10p spent in any of the stores. Points can be redeemed against over 1,500 lines from Calvin Klein to espresso makers to children's toys. They can also be used to claim a day package or special treatments at the La Fontana Health Spa at Norwich's four star Sprowston Manor Hotel.

Points can not be redeemed against prescriptions, medicines, vitamins and other supplements, stamps, gift vouchers or earned or redeemed at Boots Opticians.

Contact: Jayne Mayled, Boots the Chemists - Tel: +44 (0)115 959 2872.

Customer Activated Terminal

Innovatron has unveiled its new range of customer activated terminals designed for the Smart Card-based management of access control and payments. The terminals will be marketed to public authorities for use in public places such as cities, high schools, companies and recreation areas. The terminals are based on the TPScam 4100 and are available for either indoor or outdoor use with various options.

Contacts: Microcache - Tel: +44 (0)1491 652121. Simon Reed, ORGA Card Systems (UK) - Tel: +44 (0)1491 410997. Fax: +44 (0)1491 410295.

Contact: Geneviève Bœuf, Communication, Innovatron Data Systems, France - Tel: +33 1 49 13 39 42. Fax: +33 1 40 13 39 59.

Dione's EP EFTPOS Terminal

Dione Developments, one of the UK's largest suppliers of financial transaction terminals, has announced a new EFTPOS terminal designed to support the Smart Card projects by Europay, MasterCard and Visa. The Solo 2010 terminal, which will be available in 1996, will be capable of processing multiple electronic purse schemes and associated security systems. It is designed on a modular basis and can be adapted to support customer loyalty programmes, which are increasingly being offered by retailers and in addition can provide price look up, stock control and bar code scanning facilities.

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Smart Card Diary

ICMA Winter Workshops on Magnetic Stripes, Chips and Lamination, Princeton Marriott, Princeton, New Jersey, USA, 17/18 January, and in Strasbourg, France in February.

The workshops will be chaired by Mike Swiecicki, President of the International Card Manufacturers Association and include testing, printing and equipment demonstrations. Contact: Mike Pincus, ICMA, USA - Tel: +1 609 799 4900.

Asia Pacific Smart Card '96: Improving Services and Profitability Through Smart Card Applications, Grand Hyatt, Hong Kong, 5-7 February.

Wide ranging conference including a global update, technology, security, standards, electronic cash, cards on the Internet and as marketing tools. Contact: Ms Rochelle Li, IBC Technical Services, Singapore - Tel: +65 732 1970. Fax: +65 733 5087.

Smart Card '96, Olympia, London, 13-15 February.

Three day international Smart Card conference and exhibition. Contact: QMS - Tel: +44 (0)1733 394304.

IMRG/CBI Conference, Centrepont, London, 29 February.

Secure electronic payment systems and the impact of interactive media on advertising and publishing are just a couple of the issues to be discussed at this conference. Contact: Jo Tucker, IMRG - Tel: +44 (0)171 303 6603. Fax: +44 (0)171 303 5881.

CeBIT '96, Hannover, Germany, 14-20 March.

One of the biggest computer and communications trade shows in the world and expected to attract some 700,000 visitors. Contact: Deutsche Mess AG - Tel: +49 511 89-0. Hannover Fairs USA - Tel: +1 609 987 1202.

CardTech '96, Atlanta, Georgia, USA, 13-16 May.

Contact: Tel: +1 301 881 3383.

Cards Australia '96 Conference & Exhibition, State Sports Centre, Sydney, Australia, 4-6 June.

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. Contact: Erika Morton, AIC Exhibitions, Australia - Tel: +61 2 210 5700. Fax: +61 2 223 8216.

A Card for Young People

Carte Jeunes, a young people's Smart Card (see front page) designed for the under 25s in France can be used to store electronic discount coupons of all kinds such as for music, cinema, clothing; or to accumulate loyalty points with each purchase.

The 2K bytes card from Gemplus costs 120FF a year and, as of 1996, it can also be used in payphones or as an electronic cash card.

Contact: Caecillia de St. Victor, Gemplus, France - Tel: +33 42 32 51 54. Fax: +33 42 32 50 90.

VeriFone Internet Move

VeriFone has acquired a leading Internet software house, EIT Enterprise Integration Technologies which provides software and consulting services.

As a wholly-owned subsidiary of VeriFone, EIT will develop technology, products and services for VeriFone's Internet Commerce Division.

Contact: Mark McMurtrie, VeriFone, UK - Tel: +44 (0)1895 824031.

Gemplus / ADE Alliance

Gemplus of France and ADE Angewandte Digital

Elektronik GmbH of Germany are to form a joint company to develop the market for the CombiCard - a combined contact and contactless Smart Card.

The new company will hold all patent rights for the CombiCard and plan to grant licences to all card and equipment manufacturers.

From there to here - part 11

The T = 1 Communications Protocol - continued

Protocol control byte

This month we will complete the T=1 communications protocol by looking at the range of possibilities for the Protocol Control Byte (PCB) and then, more particularly, we will look at T=1 in action.

The protocol control byte identifies the different types of block and carries some control information including a single bit sequence number (N) and a block chaining bit (M). Other bits are used to identify transmission errors. The PCB is coded as in the table below:

The I blocks can occur as independent blocks or as part of a chain. The "More" bit is set to indicate that further blocks are to follow. The sequence number of the sender alternates between '0' and '1' starting with '0'.

Type	PCB (bits 8-1)								Function
I	0	N	0	0	0	0	0	0	Standard I Block
I	0	N	1	0	0	0	0	0	Chain bit set
R	1	0	0	N	0	0	0	0	No errors
R	1	0	0	N	0	0	0	1	EDC / Parity error
R	1	0	0	N	0	0	1	0	Other errors
S	1	1	0	0	0	0	0	0	Resynch request
S	1	1	1	0	0	0	0	0	Resynch response
S	1	1	0	0	0	0	0	1	IFS request
S	1	1	1	0	0	0	0	1	IFS response
S	1	1	0	0	0	0	1	0	Abort request
S	1	1	1	0	0	0	1	0	Abort response
S	1	1	0	0	0	0	1	1	WTX request
S	1	1	1	0	0	0	1	1	WTX response

The R blocks are used to acknowledge the successful or otherwise receipt of transmitted blocks. The sequence number N carries the value of the next expected value of N where the transmitter alternates the value as mentioned above.

While blocks transmitted as part of a chain must be The S blocks are used to invoke four control states as shown in the table. The resynch request is used

acknowledged by an R block the receipt of a successful stand alone I block may be acknowledged by an I block response. The two correspondents manage the sequence numbers of their I blocks independently alternating between '0' and '1'. The R block has three possible states as shown in the table.

by the IFD (only) to force a reset of the block transmission parameters to their initial values. A

R Block; R (N)

Where N = Sequence number of next expected block

The protocol defines that the IFD and the ICC each have the right to transmit in turn where

chain may be aborted by either the IFD or ICC perhaps due to some physical error such as memory corruption. The ICC may send an IFS request to invoke a change in the IFSC it can support. Similarly the IFD may send an IFS request to indicate a new IFSD it can support. The S block control also allows the ICC to request an extension to the block waiting time (BWT) that may be necessary to execute a command received in an I block. The INF field in this block contains a single byte integer value which is to be calculated as a multiple of the BWT value. In all cases the receiver of an S block should send the appropriate response block.

The T = 1 Protocol in operation

Using the notation of the ISO 7816 standard we can show the basic operation of the protocol. A more complete definition can be obtained from the standard.

I Blocks; I (N,M)

Where N = Sequence number (alternately '0' and '1')

M = More data bit

The More data bit is set when an additional I block is to follow in the chain

communication commences with transmission of a block by the IFD.

Normal I block transmission

I Block Transmission with chaining

Note that an I block was used by the ICC to acknowledge the last block in the chain sent by the IFD. The ICC may send chained blocks in the same way as shown for the IFD.

Error handling in I block transmission

Error in I block receipt

TNO in Holland.

FreeCash Card Pilot in Mexico

Error in I block chain response

In both cases the transmitter is notified to retransmit the block received in error. There are of course a large number of possible error scenarios but they are all based on the simple concepts shown above.

David Everett

Next month we will publish the first part of an article on Security Evaluation by Jan Pieters of

A FreeCash Card pilot scheme is to be launched in the first half of next year in Monterrey City, the main industrial and financial centre in Mexico and in the country's capital, Mexico City.

Developed by DINEM, the scheme will involve 1,500 trades, 500 in Monterrey City and 1,000 in Mexico City, with a minimum of 15,000 customers.

FreeCash is a debit system which will be franchised by DINEM to institutions, commonly banks. It can be configured to operate as a debit service (handled as a bank or commercial individualised deposit), an electronic cash service (administered as a bank or commercial anonymous deposit) or a prepayment service (which operates as an anticipated purchase

operation of goods or services).

Gemplus will supply its MPCOS 3 K bytes and 8K bytes EEPROM cards for the pilot and DINEM plans to migrate to an asymmetric key system for the volume launch

Contact: Juan Carlos Madrid Abad - Tel: +52 8 387 0971. Fax: +52 8 358 1077.

Gemplus Gaming Cards

Two of the cards on the front page show logos of gaming cards created by Gemplus for use in gaming machines throughout the world.

The system includes player cards to be used for betting, recovery of winnings, cash desks for reloading operations, validators that can be fitted onto all type of gaming machines and software for casino auditing and operations departments.

Donald Duck Card in Denmark

The Disney Card ordered by Serieforlaget and sold to DANMØNT (see front page) proved so popular that "the most funny pocket money in the world" is now sold out but can be bought from Collectors Service, P.O. Box 122, DK-2750 Ballerup, Denmark. Over 7000 100 Kroner cards have been issued.

SingleCard System in Campuses

Schlumberger Danyl has announced an advanced card system for university campuses which can integrate all the payment and ID systems used today as well as link with banks and external retailer communities.

Called SingleCard, the new system draws on Danyl's extensive experience of magnetic stripe card systems - currently installed on several hundred university campuses worldwide - and the Smart Card technology from Schlumberger to simplify administration and provide access to a greatly expanded range of services. Cards utilise both magnetic stripe and Smart Card technology.

Contact: Randy Vanderhoof, Schlumberger Danyl - Tel: +1 609 234 8000. Fax: +1 609 234 7178.

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DANMØNT's new Wooden card

DANMØNT has launched the world's first wooden chip card. Working in conjunction with dz danmark and the manufacturers of the card, Swedish company ECO Card AB, 10,000 cards have been distributed, replacing plastic with birch wood but still conforming to ISO ID1size.

In early 1994, inventor Bengt Liljemark of Sweden, in co-operation with Finnforest, Finland and scientist Bjorn Esping began experimenting to find a suitable type of timber. Birch was selected as it can be cut thinly without splintering.

In the production process:

- * Trunks of birch are cut and placed in a water bath at a particular temperature

- * The trunks are cut to 1/10th mm and homogenized through rolling
- * The warm and humid wooden fibres are compressed to prevent later dehydration
- * The thin plates of wood are dried, formed and glued under pressure to obtain the right thickness

The cards, with a Siemens 4404 chip, can be used for parking meters, the underground, telephones, vending machines, launderettes, stamp issuing machines, convenience stores and fax machines. The front shows "Sunflowers," a painting by Charlotte Thymark. On the back, customers are asked to return their empty card with their opinion of the card and how it compares to a normal one.

Henning N Jensen, Managing Director of DANMØNT, says that when dz danmark first approached him with their idea he saw it as " a unique opportunity and an investment of the future". He continued "Innovation costs money but if we do not take a calculated risk now we will not know if wood is a potential material of the future and a cheaper one."

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