

# Stored Value Card Trial in Australia This Year

Australia's Stored Value Card (SVC) - a Smart Card to replace cash for the purchase of small value goods and services - will go on trial in Newcastle, New South Wales, in the second half of this year.

In a six-month pilot scheme more than 50,000 residents will be invited to use the card to buy everything from their daily newspaper to the weekly supermarket shopping.

The QuickLink consortium, chosen last June as the preferred tenderer for the project, is confident that the trial will pave the way for a national scheme.

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*ICL Payment Security AB's new hand-held PaySec 101 PIN pad and Smart Card reader in use at a point-of-sale in Sweden. (See story on back page).*

**Smart Card News**

**Managing Director:** Patsy Everett

**Editor:** Jack Smith

**Technical Advisor:** Dr David B Everett

**Editorial Consultants:**

**Dr Donald W Davies, CBE FRS**  
Independent Security Consultant

**Peter Hawkes,**  
Principal Executive  
Electronics & Information Technology Division  
British Technology Group Ltd

**Chris Jarman**  
Orga Kartensysteme

Published monthly by:

Smart Card News Ltd  
PO Box 1383, Rottingdean  
Brighton, BN2 8WX, England  
Tel: +44-(0)1273-302503  
Fax: +44-(0)1273-300991

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**Next Month**

So much has happened since we first started our tutorial in September 1992 that the time has come to go back to the very beginning and start again. In February 1995 a new series of the Tutorial will start which will incorporate a major revision of our original work taking into account the various changes in the technology, standards and applications.

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## Stored Value Card Trial

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Anne Cohen, NSW Administrative Services Minister, says: "A successful scheme will reap major benefits for New South Wales, including significant savings in cash-handling costs for transport agencies and important state development gains such as the local headquartering of the scheme operator in NSW and the possible future manufacture of equipment and cards."

QuickLink is a private sector consortium which will fund and operate the scheme. The original members who successfully negotiated the contract are ERG Ltd and Fujitsu Australia Ltd.

ERG is the world's largest supplier of Smart Card-based Automated Fare Collection (AFC) systems with contracts to supply systems to Sydney, Melbourne and Brisbane in Australia; cities in Canada, Denmark, France, Belgium, and Norway. In the UK it is the joint operator of the AFC system for Greater Manchester. It has also won the contract to supply Hong Kong with one of the biggest AFC systems in the world involving over three million Smart Cards.

Fujitsu Australia, in which ICL in the UK has a 20% share, is a leading supplier of information systems and telecommunications products and services. In Japan, Fujitsu has developed and is using Smart Card based systems for access and SVC applications for its employees and is also involved in a major Smart Card based system in Singapore.

Two other companies - AIDC Australia and Optus Communications Pty - have signed a Memorandum of Understanding with QuickLink and have become shareholders. Optus Communications is Australia's first private phone company and has an advanced digital telecommunications network. AIDC is an Australian based international financial house with assets in excess of AS\$3.4 billion, shareholders funds of AS\$220 million and last year posted a record profit of AS\$48 million. It brings an investment commitment for 20% of the equity capital and will be the cash custodian for the project.

In addition to the SVC project, the consortium has

### **Avant Electronic Purse Progress**

the capability and expertise to expand the applications for the cards into use in cable TV, telephony, interactive banking and shopping.

Peter Fogarty, Director of QuickLink, says: "There is considerable interest overseas and among state governments and private organisations here in SVC technology and the Newcastle trial will pave the way for a national scheme."

He said that the Smart Card was not a credit card or charge card. The cardholder transfers money from his or her bank account to the card and then uses it instead of carrying cash. However, the card is not linked to a bank account and does not carry the cardholder's name or personal details.

Among the participants are ANZ Banking Group, Coca-Cola Amatil, National Australia Bank, Optus Communications, State Rail Authority, State Transit Authority, Telecom Australia, The Smith's Snackfood Company and Visa International. In addition to multi-national groups it is expected that more than 200 local retail organisations will provide the QuickLink service.

## ORGA Supplies PROXIMUS

Belgian GSM operator Belgacom Mobile, which has over 60,000 subscribers, has signed an exclusive three-year contract with Heynen in Houtalen, Belgium to supply Smart Cards on the PROXIMUS network. The SIM Smart Cards are produced by ORGA Kartensysteme GmbH in Paderborn, Germany.

The contract involves the delivery of some 200,000 GSM cards over a three-year period, including the switch to Phase 2 SIMs with extended features. Heynen is also to supply Dr SIMs - the card maintenance systems at point-of-sale - and personalisation centres. ORGA already supplies SIMs to GSM operators such as D1 in Germany, Telecom Italia, Luxembourg, Singapore Telecom and the UK Orange PCN.

Contact: Bernd Schäfers-Maiwald, ORGA, Germany - Tel: +49 5254 991-140.

Tampere Telephone Co-operative TPO, the private telephone company of Finland's second largest city,

has become the first telephone company to introduce the nationwide rechargeable electronic purse option for public payphones.

The first call to inaugurate its use was made early this month by Harri Holkeri, central bank board member and former Prime Minister of Finland.

TPO's Managing Director Erkki Ripatti said that the rechargeable Avant purse was a common medium of payment which could be compared to cash money.

"We want to take part in the creation of an open nationwide small payments system. Public payphones will be a central field of application. The consumer will get the full benefit from the system when it comes to cover other services as well."

He expects the Avant system to expand in Tampere once the city has decided on arrangements for collecting payments for parking and public transport.

Some 30 private telephone companies as well as Telecom Finland have agreed to provide a staged introduction of the rechargeable Avant purse as a payment option for public payphones in all parts of the country.

The new card is already becoming widely available for single fare payment options on buses. Other applications include postal vending machines and payment for municipal services, including in-car parking meters in the cities of Helsinki and Jyväskylä.

Sales and recharging of the Avant purses are handled by a nationwide chain of convenience stores and a major fuel station chain.

Other participants such as the various providers of specific services also have these facilities.

Contacts: Olli Harjama, Managing Director, Avant Finland - Tel: +358 0 8941 4100.

Matti Tuominen, Development Engineer, Tampere Telephone Co-operative - Tel: +358 31 224 4111.

## First GSM Service in China

## CombiCard Project

A combined contact and contactless Smart Card is

China's first GSM digital mobile phone system will use SIM (Subscriber Identity Module) Smart Cards supplied by Schlumberger Smart Cards & Systems, France.

The new service run by public operator Guangdong Mobile Communications Co. (GMCC) covers the industrialised Pearl River delta region and allows users to roam between some 28 cities in Guangdong Province and link to existing GSM services in Hong Kong.

Schlumberger has won the contract to supply a complete subscriber management package including 20,000 SIM cards and Smart Card personalisation equipment. The SIM card is a 3K bytes EEPROM microprocessor card with a Motorola SC21 chip. This is Schlumberger's first SIM card contract in China and a boost to their Asian operations.

Contact: Sally Chew, Schlumberger Measurement & Systems Asia, Singapore - Tel: +65 746 6344. Fax: +65 747 5186.

## BT Testing Smart Cards

BT, the British telecommunications giant which is changing its payphones from optical to Smart Card technology, plans to have some 60,000 Smart payphones installed by the end of 1995.

Alpha trials of products started at the end of last year with lucky students at a university in the north of England happy to accept free prepaid phonecards from BT. Extensive Beta testing will start in the Spring after which BT will start installing Smart Payphones from three suppliers.

Landis & Gyr is providing a Smart reader for BT's Payphone 2000, GPT is supplying both a Cash/Smart and Smart-only variant of its Sapphire model, and Schlumberger is supplying a version of its PF08 range.

Smart Cards using the Siemens 4438 chip (BT is also testing the SGS-Thomson ST133X chip) are being supplied by Gemplus and GPT. Currently BT is selling over 30 million cards per year through 50,000 retail outlets.

being developed by ADE Angewandte Digital Elektronik GmbH, of Dasserdorf, Germany, in the CombiCard project.

The CombiCard combines the standard ISO 7816 contact features with the ISO 10536 contactless features in a single card. This means that the card can be used at any contact card reader terminal and will also work within a distance of 8cms from a CombiCard reader.

ADE, system inventor and supplier of contactless C2-Card technology, gives the following cost comparison.

	Contact Card/DM	CombiCard/DM
card processor chip 3K bytes	3.50	4.00
foil with coil	-	2.50
mounting, test	1.50	1.50
card, print	2.00	2.00
Total	7.00	10.00

ADE is now developing the chip CCI 2000 for transforming a normal contact card into a remote card. It does not intend to bring any product to the market but is looking for partner companies to do this in a contractual relationship.

System houses, card suppliers, card issuers and chip manufacturers interested in participating in the CombiCard concept are invited to contact ADE.

A first CombiCard will be demonstrated at the CeBIT '95 Trade Fair in Hannover, Germany, on 8-15 March.

Contact: Hans Diedrick Kreft, Managing Director, ADE, Germany - Tel: +49 4104 9710-11. Fax: +49 4104 9710-99.

### Schlumberger Acquires Malco

Schlumberger has acquired Malco, Inc., giving it a **FISC Orders 500,000 Cards**

FISC (Financial Information System Centre), the Finance Ministry Authority set up to plan,

manufacturing base for Smart Cards in the United States.

Malco, located in Owings Mills, Maryland, is the largest US producer of secure credit and debit cards for banks, retailers, telephone operators and other customers. It employs around 350 people and has annual revenues of \$27.5 million.

Clermont Matton, Executive Vice President of Schlumberger Measurement & Systems, says: "Schlumberger's Smart Card expertise will provide Malco with the technology necessary to maintain its leading position. The acquisition of Malco uniquely places Schlumberger with a US manufacturing facility that will satisfy customers requirements for quality security and chip cards technology.

"The strategic significance of this move is clear given the recent Visa and MasterCard announcements on their migration to chip-based bank cards."

Contacts: Mike Smith, Schlumberger, USA - Tel: +1 804 366 4400. Lou Bisasky, Malco Plastics, USA - Tel: +1 410 363 840999.

### BskyB Subscriber Report

British Sky Broadcasting (BskyB), the largest user of Smart Cards in the UK with its Smart viewing cards for unscrambling its pay-TV channels, reports that it has added a net 180,000 direct to home (DTH) subscribers in the last three months of 1994 bringing its subscriber base to 2.82 million.

Broadcasters Audience Research Board (BARB) figures for January 1995 show that the total number of homes which subscribe to Sky's programming now exceed four million for the first time. The difference in the figures is accounted for by cable companies and communal share dishes.

Contact: David Beck, Lowe Bell Financial, London, England - Tel: +44 (0)171 353 9203.

implement and operate a national IC Card EFTPOS system in Taiwan, ROC, has ordered 500,000 Smart Cards from Schlumberger Smart Cards & Systems with local distributor Systex Corporation.

The scheme was launched in October 1992 and the number of Smart Cards in use is expected to rise from 700,000 in 1995 to four million by 1997. As the scheme goes nationwide it is expected that over 40 banks will be issuing cards.

The microprocessor card has been produced by Schlumberger to specifications issued by FISC and features 3K bytes of EEPROM, and DES data encryption system capability to provide the functionality required for implementing credit, debit and prepayment transactions, and for integrating these with applications such as telephony and public transport.

Banks currently participating in the project are: Bank of Kao Shung, Bank SINOPAC, Bank of Taiwan, Chang Hwa Bank, Commercial Bank of China, Hua Nan Bank, Land Bank of Taiwan, Pan Asia Bank, Tainan Business Bank, The Farmers Bank of China, Taipei Bank, Taiwan Co-operative Bank, Taiwan Business Bank and The International Commercial Bank of China.

Contacts: Sally Chew, Schlumberger Measurement & Systems Asia, Singapore - Tel: +65 746 6344. Fax: +65 747 5186. Catherine Kuo, Marketing Manager, Systex Corporation, Taiwan - Tel: +886 2 356 1311. Fax: +886 2 356 8275.

## Five Million Phonocard Order

Solaic, the Smart Card manufacturing subsidiary of Groupe Sligos, is to supply five million phonecards in 1995 to PTT Telecom Hollande. Solaic recently signed a contract to supply 15 million phonecards to Deutsche Telekom.

Contact: Nathalie Six, Groupe Sligos, France - Tel: +33 1 49 00 92 08.

## GiroVend/AT&T Agreement

GiroVend Holdings and AT&T have announced a joint agreement to promote new contactless Smart

### Mondex to take Cash Market

Mondex, the global electronic payment service, will take the cash access market by storm, squeezing out non-Mondex Automatic Teller Machines (ATMs)

Card applications for cashless, low value consumer payments.

They are aiming initially at the United States market for Smart Card payments as an alternative to cash handling systems in the educational field and will later target global markets in healthcare, banking, retail, entertainment and travel.

The agreement brings together the global reach of GiroVend's blue-chip customer base of cashless system users and the contactless Smart Card technology and systems solutions of AT&T Smart Cards.

GiroVend Holdings, a London-based company with US and European subsidiaries, is the world's largest manufacturer of cashless catering and vending systems, supplying about 60% of the in-house prepaid card systems markets. It has more than 3,000 cashless payments sites worldwide including the Royal Mint, the European Commission, Citibank and The Coca-Cola Company.

John Bermingham, President of AT&T Smart Cards, which is based in Somerset, New Jersey, USA, says: "Our society is clearly moving towards an era where cash is no longer the most common form of payment. Smart Cards will be the standard currency of this cashless society."

GiroVend's Chairman, Richard Smart, comments: "The potential major market for Smart Card systems is the payments industry. Cashless systems which eliminate enormous cash handling costs, offer huge efficiencies and much greater pricing flexibility."

The joint agreement will be co-managed by William Cook, Director of Planning for GiroVend Holdings, and Jack Doering, Director of Applications Marketing, AT&T Smart Cards.

Contacts: Elizabeth Coyle-Camp, GiroVend, UK - Tel: +44 (0)171 738 6462. Monty Hoyt, AT&T, USA - Tel: +1 201 581 4067.

and Over the Counter (OTC) methods, says management consultancy Datamonitor.

In a report on money transmission mechanisms, Datamonitor predicts:

- \* Mondex will revolutionise the cash access market
- \* Cash backs are the fastest growing method of cash access
- \* Mondex will also be a major force in the payments market

Mondex is a project between National Westminster Bank, Midland Bank and BT designed as a replacement for cash and is scheduled to be launched in Swindon, England, in July this year.

Datamonitor's figures assume national availability of Mondex from mid-1996 onwards and that nine million customers use the card regularly. The report points out that NatWest and Midland have a combined customer base of 12 million, of which two thirds may reasonably be expected to use the card regularly by the year 2000. If other banks and the larger building societies join the venture, then up to 20 million people may be using the Mondex card for cash.

Non-Mondex ATMs will lose out to Mondex and electronic purse schemes in the future, says the report. On the back of strong increases in the use of debit cards, cash backs through retailers will increase by around 20% each year, to reach just under 4% of cash acquisition transactions in the year 2000.

Assuming nine million customers are charging up their cards once a week, some 450 million cash access transactions will take place using Mondex by the year 2000 (approximately 15% of all transactions by volume.)

Cash was still king in the spontaneous payments market, accounting for 77% of all payments.

On the basis of national availability from the middle of 1996 onwards, and with nine million cardholders making payments worth over £1 twice

## All-Europe Drive for Telematics

Standardised Smart Card-based systems for traffic telematics - the utilisation of information and telecommunications technology to provide new systems and services - could be up and running Europe-wide in 1996. Deutsche Telekom Mobilfunk GmbH (DeTeMobil) and six leading

a week, it is possible that Mondex could account for 900 million payment transactions by 2000.

This means, says the report, that by the turn of the century, roughly 3% of payments over £1 in value will be made using Mondex cards.

Mondex could be even bigger in the market for payments under £1 in value, a market which is almost totally dominated by cash payment. If nine million Mondex holders use their card four times a week by the year 2000 to pay for goods and services in transactions worth under £1, then 1.8 billion transactions in this payment band will be made by Mondex.

Money Transmission Mechanisms: The Move Towards Cashless Payments is available from Datamonitor, 106 Baker Street, London, W1M 1LA, England. Tel: +44 (0)171 625 8548. Fax: +44 (0)171 625 5080. Price £995.

## GAUDI Project Correction

In our report on the European Commission sponsored GAUDI Project in Marseille, we wish to point out that the Smart Card used for automatic payment on buses, metro, train, car parking and tunnel is supplied by Gemplus, France, and not McCorquodale Card Technology as reported.

Gemplus has been involved in the GAUDI project since the beginning and supplied the first MPCOS cards which provide fast I/O at 115K bits, fast DES in 10ms, payments routines. In addition to supplying the cards, Gemplus designed the security scheme for the complete application, supplied the card interfaces for the point-of-sales and the validators, MaxiCards for collecting information in the validators, and the personalisation tools (GPS220).

Contact: Farid Amara, Gemplus, France - Tel: +33 42 32 52 35.

manufacturers of telecommunications terminal equipment have signed a memorandum of understanding to develop equipment based on joint standards.

Cost-effective mass production will be possible with standardised function profiles, interfaces, input and operating elements as well as identical technology for reading Smart Cards.

ORGA Kartensysteme GmbH of Paderborn, Germany, is supplying 8K bytes EEPROM cards for data storage and/or electronic purses, while DeTeMobil's D1 mobile phone network, based upon the European GSM standard and the international GPS (Global Positioning System), provides the multi-functional basis for traffic telematics services. These include:

Vehicle theft protection; remote diagnosis of vehicle malfunction; traffic information; public transport and park-and-ride information; route guidance; fleet management; management of dangerous freights and automatic tolling.

Perhaps the most important from a road safety angle is the management of vehicles carrying hazardous goods. The GSM/GPS equipped terminal unit can simplify the monitoring of dangerous freight on a pan-European basis. A Smart Card containing all relevant information about manufacturer, transporter, receiver and the latest GPS position would substitute standard freight documents. Polling its memory at checkpoints on the way would reduce administration time.

Stolen vehicles may be located anywhere via a customer-subscribed register at the service centre which is activated by the alarm unit or immobiliser connected to the terminal equipment. An on-board computer can transmit details of component malfunctions via GSM to the service centre and the driver advised where to get help.

GSM traffic information offers the best route taking traffic conditions into account. The regular transmission of GPS-position data to a logistics unit helps HGV fleet managers to avoid unnecessary journeys.

The signatories to the memorandum of understanding are: DeTeMobil; AEG Mobile Communication GmbH; Robert Bosch GmbH;

### **A Lesson from the "Trekkies"**

Pay-TV channels hold out the promise of offering their subscribers the best in programming. With their massive buying power they can often obtain the exclusive rights to broadcast premier sporting events and be the first to screen the latest films or mini-series.

It is natural that the independent programme

Siemens AG; Nokia Mobile phones GmbH; Orga Kartensysteme GmbH, and Motorola GmbH.

Contact: Bernd Schäfers-Maiwald, Orga Kartensysteme - Tel: +49 5254 991 140. Fax: +49 5254 991 199.

### **John Tunstall Joins MasterCard**

MasterCard International has appointed John Tunstall to the newly created position of Vice President Card Accepting Device (CAD) Development, Chip Card Technology, reporting to Senior Vice President Robin Townend.

Tunstall has had more than 25 years experience of international banking and standards development in the chip card industry. He was General Secretary of the International Association for Microcircuit Cards (INTAMIC) where he led a working group concentrating on the creation of chip card standards. He also served as General Secretary of the European Committee for Banking Standards (ECBS) and is chairman of the International Standards Organisation (ISO) Working Group developing standards for financial sector security architecture for the use of chip cards. He will continue his work with ISO while at MasterCard.

At MasterCard he will be handling development of the technology and security requirements for all types of payment terminals or CADs from point-of-sale devices to ATMs and parking meters among other points of interaction. He will play a major role in the terminal specification for chip cards being developed by MasterCard, Europay and Visa.

Tunstall holds a B.Sc in Mathematics and an M.Sc in statistics and operational research from London University.

producers will sell to the highest bidders. But the downside for members of the general public who do not subscribe, or cannot afford to pay, is that they are gradually being deprived of viewing the prime programmes and have to be content with the highlights or wait months until programmes become available, if they ever do.

This bleak scenario is likely to encourage attempts to hack into the system. A case in point was outlined by John McCormac, Editor of *McCormac's*

*Hack Watch News* when he spoke at the Smart Card Europe Conference in London last month.

## The Omigod Hack

When Sky One was scrambled in September 1993, many European viewers were cut off from watching *Star Trek - The Next Generation*. A high proportion of hackers were also "trekkies" so a massive amount of mind power was thrown at the task of hacking the system, he said.

As most hackers had a PC or at least access to one, it was logical that if some emulator program could be written it would be possible to hook the computer to the decoder and Star Trek could once again be seen. Some of the commercial hacks were examined and in one case the code was extracted from one of the chips. This 8052 code was transformed into C then into a PC program known as Season 7 or Omigod.

McCormac said the distribution of the Omigod hack only took a few hours. It was available on all major electronic bulletin boards (BBSs) and at many Internet sites in Europe.

The Omigod program was killed by Sky when it switched to its new Smart Cards (issue 09) on 18 May.

This particular hack illustrates an important aspect of the hacking scene - not pirates looking for substantial gains by selling pirate cards, but disgruntled viewers taking action when deprived of their favourite programme.

Ironically, Sky One could be viewed in Europe via satellite until the channel was scrambled, but once the picture was unwatchable, the Sky viewing card required to unscramble it was not legally available for use in mainland Europe. No doubt this was a

## MicroBank Smart Electronic Wallet

contributory factor in the Omigod hack and certainly an encouragement to hackers to break the system, and for others to make use of their solution.

## Pay-per-view

A number of pay-TV companies are interested in providing pay-per-view programmes with a special Smart Card for viewing specific programmes. These cards may be purchased in shops or given away in promotions.

As well as perhaps introducing potential customers to pay-TV and being an additional source of revenue for channel operators, pay-per-view could help to minimise the threat from one section of the hacking fraternity and make it less attractive for viewers to circumvent the scrambling system by using illicit programmes from bulletin boards etc. or to purchase counterfeit cards from the pirates.

The Star Trek TV series would have been an ideal programme for issuing a series of viewing cards with striking visual graphics which would become valuable collector's items.

## Slovakia Orders Smart Payphones

Slovakia has placed a £3 million order for Smart Card payphones and prepaid Smart Cards with GPT Payphone Systems.

The order includes eight Payphone Management Systems and 200,000 GPT manufactured prepay Smart Cards. Future plans are being made for the expansion of the network and the introduction of a credit card system.

Intellect Australia has developed a new product called MicroBank which brings together the electronic wallet with the benefits of the Smart Card as well as a powerful programming interface and its own Open Security Architecture.

In prototype last year, the first models have now been produced and will be shown by Intellect at the CeBIT fair in March.

The unit can communicate to any location in the world by placing it on the receiver of any telephone - even a mobile phone.

Features include an integrated Smart Card reader/writer, LCD, keypad, serial port for connection to a laptop or PC workstation, and DTMF (telephone tone) transmit and receive capability. Programs developed for MicroBank can be stored in either the unit's internal storage or can be loaded from a Smart Card.

Applications include checking the balance and previous transactions on an electronic purse; performing a remote ID over the telephone; making payments over the phone or via a PC or modem; reading, writing and updating data stored on a Smart Card.

Brett Tyson, Industry Specialist, Personal Payments Systems, Intellect, says: "MicroBank is programmable and secure and can run applications that are stored on a Smart Card.

"It will dramatically alter the electronic payments market over the next two to three years by putting the technology for making electronic payments in the hands of the individual."

Contact: Brett Tyson, Intellect Australia - Tel: +61 9 333 4333. Fax: +61 9 470 5002.

## **Packaging*plus* from Gemplus**

## **Compact Card Terminal**

The new F95 Micropos terminal from De La Rue Fortronic is designed for all retailer requirements and can process all major debit, credit, store and charge cards and has a Smart Card reader fitted as standard.

It is designed mainly for retailers who have no previous experience of an electronic card payment terminal. It is supplied with the Micropack removable memory module which stores transaction and configuration data. Should any problems occur in communicating with the terminal, all the key information is protected and can be accessed by inserting the Micropack memory module into another F95 Micropos terminal.

Contact: Robert McLaughlin, De La Rue Fortronic, UK - Tel: +44 (0)131 459 8800. Fax: +44 (0)131 479 8321.

Card manufacturer Gemplus, which also provides card personalisation services, is now offering a *Packagingplus* service to produce the design and card delivery package which might consist of card carrier with marketing messages, introductory letter, instruction booklet etc.

Contact: Bertrand Darrouzet, GSM Product Manager, Services - Tel: +33 42 32 50 48. Fax: +33 42 32 52 39.

ringing telephone entitled "Submarine Konversation" - will appear on DM6 telephone cards which will become collectors' cards.

The photograph below shows the winning design being displayed by Heide Simonis, Minister President of the State of Schleswig-Holstein and Harald Book, Director of ORGA Kartensysteme.

Contact: Bernd Schäfers-Maiwald, ORGA - Tel: +49 5254 991-141. Fax: +49 5254 991-199.

## Telephone Card Art

Smart Card manufacturer ORGA Kartensysteme GmbH is to produce a limited edition of 2,000 German telephone cards featuring a design created by Jens Schmidt, a 26-year-old communication design student at the Mutesius School of Art & Design. Students were invited to produce a design representing ORGA's location at Flintbek, near Kiel, and 41 students presented their work to a panel of jurors.

Her winning design - a composition of fish and a

## First for Smart Card Europe

Express, Europay's proposal to bring interoperability to European electronic purse schemes was previewed at the Smart Card Europe Conference in London last month, marking up another first for the conference which provided the first public demonstration of the Mondex electronic cash system in December 1994. It was also notable for high-level presentations on electronic purse projects, transport and telecommunications which attracted delegates from all over the world.

## Cross-border electronic purse

Richard Phillimore, Europay International, said Express was a cross-border, multi-currency electronic purse targeted at lower value (ECU 25) cash transactions.

It was important to see Express as a global solution, he said, as it would add an international purse facility to existing Europay cards and add cross-border functionality to domestic purse schemes, and reduce low value transaction processing costs.

## Security concerns

Security on Smart Cards, particularly electronic purses, was one of the concerns of delegates, but they received little comfort from the first speaker, John McCormac, Editor of *McCormac's Hack Watch News* and one of Europe's leading experts on piracy and access control system hacking.

You could almost feel a collective shudder from the audience, largely from a financial background, when he extrapolated satellite television piracy in terms of a Smart Card-based credit card operation.

He asked delegates to imagine a credit card operation with 2.5 million cardholders each generating £200 revenue a year - a total of £500 million. Then a fake card appeared which worked and was cheap to produce. Soon there were some 300,000 fake cards in their main market and some 200,000 fake cards in the rest of Europe, costing them losses of about £100 million.

The company that sold you the card's security system was ready to sell you an improved card which would cost at least £20 million to issue.

He said this was close to what happened last year in the satellite television business. After giving an insight into several successful hacks into pay-TV systems, he said he believed that the only systems capable of long-term survival in the hostile pay-TV world were those with a completely fluid architecture with both the decoder and the Smart Card being configurable.

## Call for a UK National Strategy

In her presentation on BT's progress towards Smart Cards, Ms Fielding covered its involvement through part ownership of Cellnet's GSM service launched in the UK, its partnership with NatWest and Midland in the Mondex electronic cash system, and its plans to introduce prepaid Smart Card payphone cards.

She said BT was developing a series of new products, moving the phones from the basic public telephone to a multi-functional multi-media terminal in a public environment.

A series of customised applications from public fax through to complex interactive multi-media services were being developed all of which required a flexible secure access and payment token. Parallel

A call for a government-led national strategy on the development of Smart Card technology in the UK was made by Sue Fielding, BT Payphones' Senior New Business Manager.

The Smart Card was an important key to services available on the information super highway and BT had a major role to play in the background systems which linked to the super highway, the terminal access point, and the key - or access methodology.

All of these elements had a high entry price - the super highway in the billions, the terminal access in the tens of millions. With other utilities - water, gas and electricity - using Smart technology and major government initiatives in feasibility stage such as road tolling, DHSS cards, identity cards, driving licences - "a cool hard look at a national strategy for the technological development is required," she said.

"There has been recent announcements of a high-powered cabinet committee (SCN December 1994) being set up to do this, but are the people who will build the Smart infrastructure involved?"

There could be savings for all the multi-nationals on this very expensive development path if there was greater co-operation. Customers would then benefit indirectly from the lower cost base for the introduction of the technologies and its resultant effect upon the entry and end product price they would pay. There was also the need to hear the views of the customers on all these disparate developments.

initiatives were being developed in the home and work environments, the most prominent recent example being Video on Demand - again requiring a secure access token.

She also revealed that BT has its sights on the customer loyalty market.

"We can see particular customer benefits in using Smart Cards in closed user groups for all simple purchases especially in colleges, sport centres and industrial or office complexes," she said.

"We believe that BT will have strong synergies with loyalty schemes bearing in mind our future network of 60,000 Smart reading terminals on every street corner."

## Crossborder Telephone Cards

Deutsche Telekom and Telekom BV Netherlands were co-operating in a scheme introducing prepaid telephone chip cards for transborder use, said Ellen Neymeyer, Deutsche Bundespost Telekom.

The aim was to increase traffic in the network, reduce costs through lower prices for standard equipment, and increase services for European customers.

Since the introduction of the first chip card phones in The Netherlands in April 1994 and transborder acceptance of German telephone cards in The Netherlands and Dutch telephone cards in Germany, a memorandum of understanding had been signed with Switzerland on the mutual acceptance of cards from the three countries.

First results showed about one million DM/year revenue in Germany for the usage of Dutch cards in Germany.

## Road Toll Trials in Germany

An overview of the trials being conducted by the German Ministry of Transport for an automatic toll metering system (AGE) for German motorways was given by Manfred Reichherzer, Siemens Nixdorf Informationssysteme AG.

Traffic tests were carried out in real traffic and some testing in difficult conditions such as at high speeds, heavy traffic and bumper-to-bumper traffic when the motorway was closed to normal traffic. The various participants have yet to test in severe winter conditions of snow and ice, but by the end of March it is hoped that a total of 30,000 test drives with 90,000 toll debits and 60,000 checks will have been carried out.

Then there will be the final analysis and performance estimates from which an independent manufacturer specification will be written by the end of 1995. Motorway tolling is scheduled to start in 1998.

The political objective, besides the obvious reduction in costs to the state, he said, was to introduce the "drive more, pay more" principle as well as tackling the ever increasing traffic problems and, thereby, reducing the damage to the environment.

Currently the German motorway network covers about 11,000 kms but this was planned to increase to 13,200 kms in the future.

Available technologies were being tested in field trials by the German Transport Ministry (Bundesministerium für Verkehr (BMV) with project management provided by an independent advisory organisation, TUV Rhineland Security and Environmental Protection Ltd.

Ten consortia were selected to take part in the trials (see following table) on a seven kms stretch of four-lane motorway with no speed limit on the A555 from Cologne to Bonn. Ten gantries are used to install system equipment.

During the trials the emphasis was placed on reliability and performance with regard to guaranteeing the system functions in changeable weather and traffic conditions and the measures taken to provide data protection and security. TUV also developed a representative traffic convoy of approximately 30 different vehicles, including car, lorries and buses.

The table below gives details of the part played by the 10 participating companies during the trials on the heavily-used A555 four-lane motorway between Cologne and Bonn, specifying the communication medium and the use of either Smart Card or Tag.

There is no speed limit on the seven kms stretch selected for the trial.

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	<b>Communication Medium</b>	<b>Number of Gantries</b>	<b>Location of Balance</b>	<b>Smart Card/Tag</b>
Alcatel	beacons: MW 2.4 GHz	1	central	Tag
GZS	beacons: MW 5.8 GHz	1	central	Tag
Micro Design (withdrawn) (now with Mannesmann)	beacons: MW 5.8 GHz	1	central	Tag
Bosch/ANT	beacons: MW 5.8 GHz	2	OBU	Smart Card
Dornier/Marconi	beacons: MW 5.8 GHz	2	OBU	Smart Card
Saab-Scania	beacons: MW 5.8 GHz	1	OBU	Smart Card
Siemens/ITF/SN I	beacons: IR	1	OBU	Smart Card
DeTeMobil	GPS/GSM	-	central	Smart Card
Mannesmann/ Micro Design	GPS MW 5.8 GHz	-	OBU	Smart Card
Techno Trend	beacons: RF/IR	2 poles	OBU	Smart Card

## Smart Card Diary

**Smart Card '95, Olympia 2**, London, England, 14-16 February.

The international advanced card exhibition and conference will target prepayment and finance, technology and markets, transport, communications and advanced identification. Contact: Conference Secretariat, QMS Ltd., England - Tel: +44 (0)1733 394304. Fax: +44 (0)1733 390042.

**Moving Money in Europe: Payment Systems in**

**the Internal Market**, Radisson SAS Hotel, Brussels, Belgium, 22/23 February.

This third international conference will examine the whole area of European payment systems while an international panel will use case studies to provide an appreciation of the latest developments in this fast moving sector. Contact: Sarah Filsell, International Conference Group, London - Tel: +44 (0)181 743 8787. Fax: +44 (0)181 740 1717.

**Lafferty's Cards & Payments Convention**, Marriott Hotel, Frankfurt, Germany, 27 February-2 March.

Includes the 8th International Bank Card Conference (1.5 days), 2nd International Smart Card Conference (1.5 days) and 2nd International Electronic Payments Conference (1 day). Smart Card issues to be addressed include the status and future development of Smart Cards in the financial services industry, innovative applications, security (fraud and counterfeiting prevention) and the development of the electronic purse. Contact: Lafferty Conferences, Dublin - Tel: +353 1 671 8022. Fax: +353 1 671 8240.

**The 1995 Asian Smart Card Summit**, The Pan-Pacific Hotel, Singapore, 22-24 March.

Contact: Joyce Wi, AIC Conferences, Singapore  
-Tel: +65 222 8550. Fax: +65 225 5906.

**Payment Cards '95**, The Hyde Park Hotel, London, England, 27/28 April.

2nd annual conference looking at the commercial opportunities and applications in prepayment and electronic purse schemes. Contact: AIC Conferences - Tel: +44 (0)171 242 2324. Fax: +44 (0)171 242 2320

**The 9th European Financial Self-Service '95**, Sheraton Grand Hotel, Edinburgh, Scotland, 23/24 May.

Conference and exhibition preceded on 22 May with a tutorial on Smart and Prepay Cards chaired by Bob Carter of Orchard International. Contact: SETG, Scotland - Tel: +44 (0)141 553 1930. Fax

**Intelligent tags - a review of current and emerging technologies - Part 2.**

**Cordless Connection of Tags/Cards to/from a Terminal**

As shown in Figures (*page18*), the generic connection between a tag/CICC and a read/write terminal is a nominally two-way communications channel. This applies whether the connecting medium is radio or an optical link such as infra-red light.

Basic read-only, passive tags receive energising power from the transmitter of the terminal in the form of alternating current (radio connection) or

+44 (0)141 552 0511.

## NEC's Sing-along Smart Card

A 32M byte memory Smart Card which will give the user 24 minutes of recorded music has been announced by NEC Europe Ltd, London.

Silicon Audio, developed by the parent company in Japan, is a solid state device with no moving parts, thus eliminating vibrations and "jumping".

It compresses a 20MHz, 770K bits signal to one-eighth of its original size (96Kbits/s) - the loss of sound quality is claimed to be "virtually undetectable" - which are then recorded onto the 16 flash microchips on the card.

Silicon Audio combines MPEG/Audio decoding LSIs developed by NEC with conventional memory card chips to achieve wide-band audio compression and reproduction of CD quality sound.

The downside is the price: £1,400. This is predicted to fall to around £90 by the end of the century, when card users will be able to record favourite pieces in music stores and other outlets. Future developments may increase listening time to as long as 90 minutes.

Contact: Kirsty Chubb, NEC Europe Ltd., 76 Shoe Lane, London EC4A 3JB - Tel: +44(0) 171 353 4383. Fax: +44 (0)171 353 4384.

infra-red light (solar powered, passive, infra-red transponders). Implicit in receipt of this energy is a request to repeatedly broadcast their data contents. Read/write tags receive additionally new data. Where appropriate, messages from the terminal can also include encrypted challenges and other secret commands (Ref2).

Since the read-only devices send the significant messages only to the reader, the communications channel is essentially one-way. In telecoms jargon this is called simplex.

In contrast, a read/write tag requires a two-way channel. This is described as a duplex. Where appropriate, the messaging between transponders and terminals can be described by analogy with space stations. In that case also the uplink from

the earth to the space station is easily powered, but the downlink back to earth will be very weak and must use as little energy as possible from the limited supply on board the space station. The main benefits of infra-red are its line of sight action and associated freedom from the spectrum limitations imposed on radio broadcasting of whatever type.

The very utility of radio makes radio spectrum a scarce commodity in most parts of the world. It is therefore subject to regulatory restrictions governing both frequency and power.

### Radio Tag Contention and its Control

Another aspect of the utility of radio is to penetrate most types of packaging except metallic foil. To capitalise on the benefits of radio fully, one must be able to deal with contention, i.e. allow reading of tags to proceed when multiple tags are being illuminated by the transmitted radio beam. See page 18 for an illustration of the situation whereby the receiver of the terminal is rapidly confused by ID and other codes broadcast by all the tags in its transmitter's beam. The simplest solution is so-called singulation, i.e. physically separate the tagged objects and move them past a fixed scanning head adjacent to a conveyor belt. This use of slots is of course the basis of supermarket check-out scanning. Singulation is, however, impractical or impossible in many commercial and industrial situations. A more general solution is used by CSIR, South Africa, in the "supertag" technology. This is shown in its simplest form, Figure 4(b). I call it one of a number of "turn-off" algorithms. The half duplex communications procedure employed results in each tag being separately tuned off once its code number has been correctly read by the terminal. A subtlety of the particular protocol devised by CSIR is that even if two tags carry the same number, they will be separately read and, hence, counted as members of a particular EAN or other class of good.

The count rate is independent of the number of tags in the scanned volume. In the (multi-component) prototype supertag systems, now available for demonstration to interested parties, a count rate of 50 tags per second is achieved (Ref 5). This is for a 915 Mhz implementation. The data transfer rate is 10 Kb/s.

Variants of the turn-off algorithm exist. In general they need a fairly elaborate radio receiver on each

Hence there is growing interest in other methods of avoiding individual mechanical handling of the tagged items when clustered together.

Two main types of "anti-clash" protocol are becoming prominent. The first method goes under various names. I shall call it random restart. The technique is illustrated in the Figures below. Each tag repeatedly broadcasts its codes at, say, 25 times/second. The tags each have a clock operating on a random basis and, hence, the broadcasts are asynchronous so far as the receiver on the read/write unit is concerned. If the randomness and timing mismatch are sufficient, it is possible to rapidly identify a few tags without physical separation. In terms of Figure 1, this is a simplex communications procedure.

Note, however, from Figure 2, that the two tags bearing the number "1" will not be separately identified. A random restart protocol will not therefore identify a collection of tagged items each bearing the same number, i.e. it is not capable of counting. If counting is essential, each tag must carry a unique number assigned to it by the tag manufacturer with use of a look-up table to find items with the same unit code. While this is possible, it is not particularly compatible with large-scale article number schemes, as practised in retailing and other industries.

tag's transponder. For a single chip realisation this will result in a large and expensive chip with inflexibility as regards the chosen radio frequency. In contrast, the CSIR supertag protocol is essentially frequency independent and requires no radio receiver on the tag. Studies for single chip realisation are currently in hand (see Figures). These focus on the need to put a relatively large "charge pump" capacitor somewhere on the chip. This capacitor is needed to store energy in the chip to enable it to continue broadcasting when its power supply from the transmitter of the terminal is interrupted. This energy storage capacitor also plays a part in another useful feature of the generic supertag design. This is the design's ability to act as an anti-theft tag, capable of repeated activation and deactivation. The first investigations suggested that a one hour deactivation period was easily obtainable. Following feedback from users, it is planned to make this a programmable deactivation period.

### Antenna Design

Depending on the radio frequency selected, the antenna for RF tags and contactless cards can be wound coils, or printed conducting ink panels (see Figures). As mentioned earlier, it is also sometimes possible to print an antenna as a flat spiral coil on the surface of an integrated circuit. Such coil-on-chip designs may be less suitable for long range, passive tags systems than those using printed flat-plate antennae on a separate cardboard substrate. Obviously the complication entailed in a design like supertag is the need to have two contacts to connect to the antenna plus a third one to input the chosen number codes. It remains to be seen which is the more economic in high volume production.

### Stored Codes

In general RF tags up to now have been proprietary systems with tag supplier pre-set codes. Where user chooser codes are allowed, the capacity has not always for ANA, UCC or similar industry standard codes.

For future open systems with multiple suppliers and users, user chooser codes would seem to be highly desirable. Hence, most advanced designs of intelligent tags are based on EEPROM or similar field programmable memory technology. Important advantages accrue to designs like Supertag, which permit *in situ* counting of multi-

tagged items on a shelf or other situation. The use of IC factory coded codes for such purposes, followed by on-line table look up, would seem to be impractical on a large scale. Read/write memory technologies enable users to put variable data into the tags additional to the EAN.

### Conclusions

Capitalising on the ever-falling cost of integrated circuit memory, more or less intelligent tags are becoming available which challenge the combination of bar codes and anti-theft devices in a number of potentially important business situations. The winners are likely to be those designs which serve a wide variety of closed user group and open system situations offering a wide range of identification and in-tag data storing capacity without compromising the need to keep tag costs well under a dollar. User chooser field programmable codes are preferable to tag codes pre-set by the tag supplier.

**Peter Hawkes**

British Technology Group Ltd.

### Disclaimer

*The views expressed in the above are the author's own and do not represent the policies of the British Technology Group Ltd. Information supplied is obtained from public sources and is believed to be accurate at the time of writing.*

### Acknowledgement

Please see December 1994.

## **ICMA Appointments**

ICMA, the International Card Manufacturers Association has announced its 1995/96 Officers and Board of Directors as follows: President: Michael Swiecicki, Vice President of Manufacturing, Arthur Blank & Company, Boston, Massachusetts, USA. Vice President: Bill Beattie, President of the Canadian Card Services Division of NBS, Ontario, Canada. Past President: Robert Blum, President of Colorado Plasticard, Inc., Littleton, Colorado, USA.

North American representatives: Gordon Kramer, President of Continental Plasticard Card Co., Coral Springs, Florida, USA; and Paul Patterson, President of Patterson Press, Inc., Nashville, Tennessee, USA; and David Stonely, President of McCorquodale Security Cards, Inc., Exton,

Pennsylvania.

Europe: Dr Pietro E Corsi, Managing Director, Cellograf-Simp, Milan, Italy; Markku Kempfi, Production Manager, ID KORT, Scandinavia; Alan Scott, President, Wessex Interprint, Dorset, UK. Latin America: Juan Rubalcava, General Manager, RG Equipos, Mexico City, Mexico. Pacific Rim: Tai Kyu Choi, President, KBC Corporation, Seoul, Korea. Associate representatives: Matthias Pillardy, President, Louda System, Munich, Germany; and Gregory

Pagonakis, Product Sales Manager, GenCorp Polymer Products, Newcomerstown, Ohio, USA. Issuer representatives: Michael McDonnell, Regional Director, MasterCard International, New York, USA; and Luis Ferreira, Means of Payment Team Leader/Security Inspector, Europay International, Brussels, Belgium.

Contact: Jennifer Busch, ICMA, USA - Tel: +1 609 799 4900. Fax: +1 609 799 7032.

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### DANMØNT Lead in Design

DANMØNT, in addition to having the distinction of launching the first national electronic purse scheme in the world, continues to add to its reputation of producing some of the most beautifully designed Smart Cards.

The latest features a famous Danish painting by P S Krøyer which has been partly reproduced as a 100 Kroner DANMØNT prepaid card in a limited edition of 2,000. (See front page.)

In *Summerevening*, Krøyer shows his mastery in depicting the blue hour so characteristic of the North - specifically The Skaw with its reflections of light from sea and sand.

The two women strolling at nightfall along The Skaw's southern beach in 1893 are the painter Anna Ancher and Krøyer's wife Marie, also a painter.

Another Smart Card produced at the New Year is called *Iceflowers* (see front page) and depicts frost

on a window. On the reverse side is a display of fireworks.

Contact: Henning Jensen, Managing Director, DANMØNT, Denmark - Tel: +45 4344 9999. Fax: +45 4344 9030.

## PaySec 101 PIN Pad

Sweden-based ICL Payment Security AB is now marketing its new PaySec 101 PIN-pad which is designed for desktop or hand-held operation and offers both physical and logical protection. (See photograph on front page.)

The ICL PIN-pad family comes in different versions and are intended for use in various environments such as point-of-sale, banking and PC workstation network security.

The PaySec 101 uses the US data encryption standard DEA-1 and Message Authentication Code (MAC). Encryption and verification methods are PIN encryption according to ISO 9564, DUKPT (Derived Unique Key Per Transaction) according to ANSI X9.24, Visa PVV method and IBM PIN verification. It offers soft programmable adaption of applications. Optional features include a built-in Smart Card reader and a magnetic stripe card reader.

Contact: ICL Payment Security AB, Sweden - Tel: +46 13 117000. Fax: +46 13 117672.

## Multi Smart Card Initialiser

Euclid has announced the new model E600SC Smart Card Initialiser in their 600 Series range of products. With a variety of software modules the system can handle several different Smart Card types.

Current card types which the unit can handle are: Serial Memory - ST 1305, SLE 4412, SLE 4428, SLE 4400, ST 14C02 and SLE 4404. Microprocessor - ST 16612. Other types will be added as required by software upgrade.

The first company to order this version was McCorquodale Card Technology who required an automated system to initialise Smart Cards as well as quality test each memory location on every card produced.

GPT Card Technology commissioned a version, the 600CSC, to initialise their contactless integrated circuit cards.

Contact: Geoff Neal, Managing Director, Euclid, UK - Tel: +44 (0)1705 454637. Fax: +44 (0)1705 474224.

*Keith Whittenham, technician, and Neill Bisiker, senior software engineer, with the first version of Euclid's E600SC undergoing extensive proving trials.*