

Finnish Banks to Run Avant Electronic Purse

Finland's three largest commercial banks have taken over the running of the Avant electronic purse scheme. Early this month the joint electronic purse company Automatia Rahakortit Oy, set up in September by the country's largest banks, Merita Bank Ltd., Okobank and Postipankki Ltd., acquired the company running the electronic purse scheme, Toimiraha Ltd, from the Bank of Finland.

The objective is to establish one national electronic purse system combining the experience of Toimiraha Ltd with the branch and ATM networks and customer base of the banks. It is estimated that the system meeting this goal will be built by the end of 1996.

Continued on page 203

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
Vice President, Chip Card Technology
MasterCard

Published monthly by:

Smart Card News Ltd
PO Box 1383, Rottingdean
Brighton, BN2 8WX, England
Tel: +44-(0)1273- 626677 / 302503
Fax: +44-(0)1273- 624433 / 300991

email scn@pavilion.co.uk

Printed by Design & Print Ltd.
Tel: +44 (0)1273 430 430

ISSN: 0967-196X

Next Month

Smart Card Tutorial - Part 11
From There to Here -
Transmission Protocols continued.

CONTENTS

Ontario to Launch Mondex	203
Bank Joins Australian Transcard	204
Cards for US Football Fans	205
Electronic Purse Review - Part 4	206
Mobiles for Taxis	210
Financer Certification for Thyron	211
Gemplus Licenses Supertag	212
9 million Phonecards for Greece	213
Market Forecast	214
Australian Contactless Order	215
Smart Card Tutorial - Part 10 The T=1 Communications Protocol	216
Smart Card Diary	218
Motorcyclists Touch and Go	219
Solaic's Mosaic Wins at CarteS	220

Finnish Banks to Run Avant

Continued from page 201

Eino Halonen, Chairman of the Board of Automatia Rahakortit Oy and Executive Vice President of Merita Bank Ltd., said: "It was necessary to make a decision on how to proceed with building the national electronic purse system, otherwise there would have been a risk of several closed systems being developed in the country. This would not have benefited the consumer or the national economy."

The customer base and advanced electronic services offered by the banks along with their accessibility provide the best platform for the joint electronic purse company.

Bank of Finland Board Member Harri Holkeri, said: "The goal of the Bank of Finland has been to create one open system based on the concept of a reloadable electronic purse. This deal meets this goal."

"Following the guidelines drafted by the European Monetary Institute, the system is based on the principle that it is administered by credit institutions," he said, adding: "In Finland, all retail banks have a right to join the system."

Toimiraha Ltd, established in 1992, introduced the rechargeable Avant electronic purse at the beginning of 1994 and by the end of October 1995, 12,000 rechargeable Avant cards were in use. Fixed value Avant phonecards have been used for making more than 2.3 million phone calls by the end of last month. Currently there are 105 Avant recharging points and 1,500 Avant points of payment.

Big Mac Joins Avant

In Avant's most recent success, 13 McDonald's restaurants in three Finnish cities have started an experiment in which customers can pay for their purchases with the rechargeable Avant card. Kim Hanslin, Managing Director of McDonalds Oy, says they began the experiment because they believe in Smart Card payment.

Contact: Tapani Penttila, Managing Director, Automatia Rahakortit Oy, Finland - Tel: +358 0 133 6331. Fax: +358 0 133 6974.

Ontario to Launch Mondex

Mondex, the electronic cash payment system, is to be launched in the city of Guelph, Ontario, Canada, in the second half of next year.

A one-year pilot has been announced by Canada's two largest banks - Royal Bank of Canada and Canadian Imperial Bank of Commerce (CIBC) and the country's largest telecommunications company Bell Canada which will be a major supplier and marketing partner.

D L (Dan) Schnurr, Acting Major of Guelph (population 100,000) situated 90 kilometres south west of Toronto, said: "We believe that the successful implementation of the Smart Card technology will help all of our businesses to reduce costs and lead to a more highly competitive business community.

"We also believe we will be able to use this technology in our own city operations and we will be initiating detailed reviews to assess the cost benefits."

Mondex terminals will be set up in the city's retail stores and many other places where people currently use cash, such as restaurants, parking lots, arenas, theatres, buses, vending machines, fast food outlets and even hot dog stands.

Next year, Bell Canada will be adapting hundreds of payphones in strategic locations throughout the city, and offering residents new telephone technology. Using the card in combination with a telephone equipped with a card reader, gives users their own personal automated banking machine at home or place of business enabling cash to be transferred to or from bank accounts.

Global roll-out of Mondex is scheduled to start in 1997. It began with the launch in the town of Swindon in England last July and latest figures show that over 8,000 consumers and more than 75% of the 1,000 local merchants are using Mondex. In addition to Canada, other pilots are expected in the United States, Asia and Europe.

Contacts: David Morton, Mondex, UK - Tel: +44 (0)171 726 1957. Fax: +44 (0)171 726 1326. Dan Maceluch, Royal Bank of Canada - Tel: +1 416 974 5506. Rob McLeod, CIBC - Tel: +1 416 980 3714. Perry Blocher, Bell Canada - Tel: +1 416 581

4397.

Motorola Chip Production Plans

Motorola, the world's leading supplier of microchips for Smart Cards, is to increase its production capacity tenfold by the year 2000.

Speaking at Cartes '95 in Paris last month, Allan Hughes, Worldwide Smart Card Operations Manager for Motorola, said the company will have capacity to produce on average 10 million Smart Card microchips per week by the end of the decade.

"Smart Cards have finally come of age," he said. "After 18 years of slow but steady growth, the market is set to take off with a number of major applications throughout the world."

"The only major obstacle to growth at present is lack of microchip production capacity, hence our major investment now to increase capacity."

He said that Motorola was investing \$2.5bn worldwide in semiconductor manufacturing facilities during 1995, of which "a significant proportion" is being dedicated to Smart Card production.

Smaller chips

The company has designated Scotland as its worldwide headquarters for Smart Cards and will form a key focus for the investment. Motorola's South Queensferry plant, recently purchased from Digital Equipment Corporation, will start production soon. In addition the company's two chip plants in East Kilbride are being expanded to handle a new manufacturing process which will shrink the size of Smart Card microchips by half - giving twice the number of chips from a single wafer of silicon.

Motorola's microcontroller chips currently use 1.2 micron geometrics. Next year Motorola will shrink this to 0.8 micron, and will also introduce a 0.65 micron double level metal process.

It says its newly established Research & Development facility in East Kilbride is currently working on adapting existing 0.5 micron technology for Smart Card use.

Contact: Kathleen Reid, Marketing Communications Manager, Motorola, - Tel: +44

(0)13552 40447. Fax: +44 (0)13552 40564.

Bank Joins Australian Transcard

St George Bank will trial Australia's first reloadable bank Smart Card with the issue of a combined Freedom/Wizard card for use in the Transcard/Wizard contactless electronic purse network in Western Sydney.

Selected cardholders will be able to use the card in the Wizard system and enjoy incentive benefits offered by retail outlets such as Shell, Coca-Cola vending machines, Video Ezy, small merchants including newsagents, fast food outlets and chemists participating in the scheme. It can also be used with local public transport companies including Westbus and Premier taxis. The card also operates as a St. George Bank Freedom Select card for use at all EFTPOS terminals in Australia.

Richard Fleming, Executive Director, Transcard (Australia) Pty, says: "Transcard has always been committed to open systems and we welcome the trial of the systems in the wider market place."

Transcard will be rolled out into the Greater Western transport corridor later this year and then into other major cities.

Contact: Richard Fleming, Executive Director, Transcard (Australia) Pty - Tel: +61 2 331 1355.

New Reader from Philips

Philips Smart Cards & Systems has announced its new PE122 Smart Card reader/encoder - a reduced size successor to the PE112 which sold over 50,000 units in the three years of its existence.

The new reader offers full upward compatibility with PE112 while being more compact and convenient, needing no external power supply and improved price/performance ratio.

Philips says it expects to sell over 10,000 units in the first year with the primary target market in the laptop portable personal computer environments where confidentiality of transmissions may be important, particularly in the financial area.

Contact: André Jacques Selezneff, Philips Smart

Cards & Systems - Tel: +33 1 41 28 55 84. Fax:

Cards for US Football Fans

First Union National Bank of Florida is offering Stored Value Cards (SVCs) to football fans of the Jacksonville Jaguars of the National Football League at all home games.

Called the Spot Card, it is not a credit card or offer a credit function - not yet anyway. It will be available in fixed values of US \$20, \$50 or \$100 and can be used to purchase food, drinks and merchandise from concession stands, souvenir stands and club seat servers within the stadium. When the value on the card has been used fans will throw it away or keep it as a collector's item.

The card is available at First Union branches in the area and at various stadium locations. Fans will benefit from not having to carry cash and quicker transactions, while traders should benefit by reducing the risk of theft, time spent tabulating register receipts and auditing notes and coins.

The move by First Union is the first of several Smart Card initiatives in Florida. In 1997, First Union says it expects to offer Smart Cards in Miami, Orlando, and Tampa-St. Petersburg metropolitan areas.

It says that eventually the cards will be used in an "open environment" throughout Florida allowing consumers to make purchases at fast food outlets, convenience and grocery stores.

Future plans include customer loyalty programmes, airline and events ticketing using loadable cards which can be loaded and unloaded at "home ATMs" through screen phones.

The bank has teamed up with Diebold Incorporated, Schlumberger Smart Cards & Systems and Tangent Associates Inc. (provider of point of sale systems for stadiums and sports arenas in the US and Canada) to launch the programme.

First Union is one of Visa's four bank partners in its biggest SVC project in Atlanta, Georgia, where it is planned to issue one million cards by the start of the Summer Olympics in 1996. This scheme will offer two types of cards - prepaid fixed amount disposable cards and rechargeable cards.

Contact: Kenneth Darby, First Union - Tel: +1 904

+33 1 41 28 79 68.
361 3183.

Delay in Urban Road Pricing

Urban road pricing is "not a realistic option this century," says UK Transport Secretary Sir George Young, responding to the Transport Select Committee's report on congestion charging.

He said he was grateful for its significant contribution to the debate, but congestion charging raised complex questions about possible future urban transport policy that needed to be aired and examined. He wanted to encourage the widest possible debate on the subject and it remained under consideration.

The Government's Response comments on its conclusions and recommendations. In particular:

- * it accepts that the Department should seek views on what, if any, further research should be undertaken at present
- * it agrees to consider on its merits any local authority private Bill to enable congestion charging to be implemented and
- * it accepts the general principle that financial arrangements should ensure that the communities which implement congestion charging should gain economically.

The Government's Response to the Third Report of the Transport Select Committee 1994-95 is available from HMSO (Cm 3019), price £1.10.

The Third Report of the Transport Select Committee 1994-95: Urban Road Pricing (Cm 104) is available from HMSO in three volumes.

Gemplus "Designer Label"

New Smart Cards coming off the Gemplus production line now carry the Gemplus name to promote the company and authenticate its products.

The "signature" also adds to the security features of the cards due to a complex procedure of chemical engraving on the gold foil covering on the chip which Gemplus says gives an additional guarantee that the Gemplus module cannot be counterfeited.

Hubert Giraud, Chief Operating Officer, describes

the Gemplus signature as “more than a brand name,
the Gemplus micromodule is now designer label.”

Electronic Purses: A Comparative Review - Part 4

Country	Singapore	South Africa
Name of scheme	CashCard EP	Interbank EP
Capital investment	information not supplied	information not supplied
Operator	Network for Electronic Transfers Pte Ltd (NETS) comprising seven shareholder banks	ABSA, FNB, Nedcor and Standard Bank
System integrator	Singapore Computer Systems Ltd.	Gemplus and Net 1
Status	Six-month pilot began 1994 Nationwide launch 1996	Pilot near Johannesburg 1994, national roll-out 1995/96
Multiple currencies	Single	Single
Loadable amount	Initially S\$10 for students; S\$20 for public. Maximum value S\$200.	Set by individual banks
Current applications	First, common bearer CashCard as basic CashCard, pre-loaded; then bank specific composite CashCard also functioning as ATM, NETS (EFTPOS) and credit card, with magnetic stripe as well as chip	Two types of purse: Pin Purse (EP with PIN) and CashPurse (EP without PIN). CashPurse can reside on either a Debit card or Pin Purse card
Planned applications	1997: electronic road pricing system and mass rapid transit (trains and buses)	Payment for electricity
Method of settlement	information not supplied	Present CR-Card system
Card fabricators	Gemplus Technologies Asia Ltd	Gemplus
CPU (Yes/No)	Yes	Yes

Country	Singapore	South Africa
ROM	-	6Kb
EPROM/EEPROM	1K bytes EEPROM - PCOS / MPCOS	3Kb EEPROM
RAM	-	224b
Co-processor (Yes/No)	No	No
Chip manufacturer/Type No.	Information not supplied	SGS-Thomson/ST16623
Security algorithm(s)	DES	DES
PIN	No PIN at POS	Yes at POS/reloading points
Cards issued	40,000 plus in pilot	Pilot: 8,000
Card target	9 million by year 2000	National roll-out projection: 15 million
Card reader/terminal suppliers	Ingenico International Pte Ltd	Monatel, Natech and Schlumberger
Number installed	Current POS terminals to be modified	100
Portable balance reader	Yes - 2 suppliers	information not supplied
Card recharging points	ATM's, self service terminals, payphones	ATMs, load devices
Contact	Sang Chu Yong, NETS	Cedric Edwards, First National Bank of South Africa

Telephone	+65 374 0557	+27 11 352 8608
Fax	+65 272 2334	+27 11 353 8606

Electronic Purses: A Comparative Review - Part 4

Country	Spain	Thailand
Name of scheme	SEMP Spanish EP	Thai Farmers Bank (TFB) EP
Capital investment	-	US \$1.5 million
Operator	Sociedad Española de Medios de Pago (SEMP) - Spanish banking consortium	Thai Farmers Bank (TFB)
System developer	SEMP	Loxley Business Information Technology (LOXBIT)
Status	Trials October 1994 (universities). February 1995 (SEMP trial). April 1995 in closed sites, followed by second phase with many service providers (ATMs, POS, vending machines, public phones, etc.) Launch: April 1995 (Granollers), October 1995 (Gerona, Tarragona), November 1995 (Miami, Colombia, Argentina).	Launched November 1993; SmartCash launched April 1995
Multiple currencies	Yes - card could hold several EPs related to different currencies	single
Loadable amount	EP issuer decision	5000 baht (US \$20)
Current applications	Multi-purpose Smart Card allowing: open EP due to transactions interchange through SEMP for clearing and settlement; closed EPs generated by issuers to allow private agreements with service providers; exclusive EP for public phones; other applications (access control, portable data, etc.)	SmartCash small transaction prototype of Thai EP, Smart ID (large account withdrawals), bonus points and medical records
Planned applications	Public transport, taxis, public phones (in trial)	
Method of settlement	Clearing and settlement through	via EDC

	SEMP. Transaction traceability	
Card fabricators	Solaic, FNMT, others	Gemplus
CPU (Yes/No)	Yes	Yes

Country	Spain	Thailand
ROM	16 K bytes	-
EPROM/EEPROM	Motorola: 3K bytes / 8K bytes EEPROM SGS-Thomson 4K bytes / 8K bytes EEPROM	1K bytes EEPROM
RAM	Motorola: 240 bytes SGS-Thomson: 384 bytes	-
Co-processor (Yes/No)	No	No
Chip manufacturer/Type No.	Motorola: MC68HC05SCXXX SGS-Thomson: ST16XYZ	Gemplus - PCOS
Security algorithm(s)	DES	DES
PIN	Loadings: mandatory Purchases: optional	Yes
Cards issued	70,000	20,000 in first phase
Card target	Several million in 1995/1996	100,000 in 1996
Card reader/terminal suppliers	Several Spanish and foreign manufacturers	Verifone CM450 Smart Card reader/writer and PIN pad
Number installed	4,000	200
Portable balance reader	Expected in the future	To be developed
Card recharging points	700 ATMs, POS and Self-service machines	VeriFone POS - now ATM - 4th quarter 1996 Self-service - 2nd quarter 1996

Contact	José-Maria Pérez Soria, Technology Manager, SEMP	Natalie Leerapun, LOXBIT, Thailand
Telephone	+34 1 346 5300	+662 201 3104
Fax	+34 1 346 5444	+662 201 3108

Mobiles for Taxis

Schmidt Electronic Laboratories Pty of Victoria, Australia, has developed a battery powered Smart Card terminal for mobile and portable applications and a Fleet Management and Transaction Processing solution for Australian taxi fleet operators and expects to install around 1,000 terminals by mid-1996.

The hand held, programmable, battery powered Smart Card terminal has been developed for merchants and service providers who wish to accept electronic purse cards in mobile and portable environments. Called the TX-1000, it enables users to deduct value from a customer's stored value card. All transactions are stored securely in the terminal's non-volatile memory and at the end of a day's trading, the transactions can be transferred to a merchant Smart Card which can then be inserted into a bank's ATM for

transaction delivery. Alternatively, the terminal can be connected to a phone line and transactions sent via the terminal's built-in modem to a collection point before being transferred to the merchant's bank. The terminal can also read magnetic stripe cards.

Gary Schmidt, Managing Director, says: "Our terminals will make it possible for merchants and service providers who do not have access to mains electricity at the time of sale, to complete electronic purse transactions for their customers. "Examples include taxis, kiosks, market stall operators, roadside vendors, pizza and other fast food delivery services, ice cream trucks, door to door salespeople, lawn mowing and gardening services and the like."

The terminal incorporates a built-in calculator which is useful to retailers who transact large numbers of small value transactions. It has three serial ports for communications with external equipment such as bar code readers, printers, taximeters etc.

Taxi fleet application

The taxi industry application involves fitting taxis with Schmidt TX-1000 Smart Card terminals, taximeters and high speed printers all linked together so that taxi fare information is transferred automatically to the terminals at the end of every fare. The terminals will accept payment via selected Smart Cards and magnetic stripe cards.

Taxi drivers will be issued with special Smart Cards called Driver Cards. Details of every fare recorded by the meter, including the time elapsed and distance travelled between fares, is captured and stored by the terminal.

At the end of a shift, the driver inserts the Driver Card into the terminal and all of the day's transactions and other operational information is

transferred to the card which the driver then gives to the taxi depot cashier. The card is inserted into another terminal connected to the office computer and all transaction details etc are transferred to the depot computer which maintains accurate records of driver earnings and vehicle activity.

Schmidt estimates that this automated system will save fleet operators tens of thousands of dollars every year in data entry and other clerical costs. The company has begun to supply systems to Australian taxi fleet operators and expects to install around 1,000 terminals by mid-1996.

It is also involved in a government-sponsored trial of an automated payment subsidy programme for handicapped persons using the new automated system and TX-1000 Smart Card terminals.

The current docket based programme has 140,000 handicapped members and subsidises approximately five million taxi rides a year worth \$25 million. If the trial is successful it is expected that all handicapped passengers and taxi drivers will be issued with new identification cards based on contact Smart Cards.

Established in 1980, Schmidt Electronic Laboratories is a major manufacturer of taximeters and exports more than 75% of its production. The vast majority of Australia's 14,700 taxis are already fitted with Schmidt meters.

Contact: Gary Schmidt, Managing Director, Schmidt Electronic Laboratories Pty. Ltd., Australia - Tel: +61 3 9531 8011. Fax: +61 3 9531 9015.

Record Attendance at CarteS 95

Attendance at CarteS 95 was up 18% from last year of whom 25% were from outside France. This high profile event drew 5754 attendees from 76 different countries.

A total of 111 firms exhibited from 37 countries worldwide. CarteS estimates there will be a 44% increase in worldwide Smart Card sales next year.

Financer Certification for Thyron

Thyron has announced that its Financer EFT terminal has been certified by Visa, MasterCard, Eurocard, American Express and Diners to process their credit and debit cards in an off-line mode. Financer is a low-cost, portable, handheld Smart Card and magnetic stripe card acceptor and data transfer terminal.

The card issuers also approved the transaction delivery mechanism which provides the communication protocols between Thyron's Front-end Transaction Processing Systems and hosts.

Contact: Bill Thompson, Sales & Marketing Executive, Thyron Ltd. - Tel: +44 (0)1727 875800. Fax: +44 (0)1727 875891.

Healthcare Prototype Terminal

A prototype Smart Card terminal aimed at the healthcare market was demonstrated by Schlumberger Electronic Transactions at Cartes '95 in Paris. It integrates Smart Card interfaces with a hand-held pen-based terminal and with developed applications software, automates medical transactions securely.

By using RSA encryption techniques, the terminal allows doctors or other health professionals to create and transmit electronic bills to a central host, to access confidential medical data remotely and perform a variety of other electronic transactions on-line or off-line.

The ability to accept two Smart Cards simultaneously provides the means to perform transactions which can be secured by both a patient and a healthcare worker's unique Smart Cards.

Schlumberger says the system offers the potential to make massive savings in health budgets, pointing as an example to France's social security department which currently processes around one billion paper-based bills each year.

The terminal will allow authorised bills to be transmitted automatically into a health service's computer system, eliminating massive amounts of data entry and administration and speeding payment to healthcare workers.

Schlumberger intends to launch the terminal, which weighs just 800 grams, at the end of 1996.

Contact: Isabelle Couderc, Schlumberger Electronic Transactions, France - Tel: +33 1 47 46 70 20. Fax: +33 1 47 46 68 66.

South Africa Order for Philips

Philips Smart Cards & Systems of France is to deliver 500,000 Smart Cards through its local distributor Natech to First National Bank of South Africa for the Interbank electronic purse scheme which also includes ABSA, Nedcor and Standard Bank. Interbank is dual sourcing its card requirements with Gemplus supplying its 3K bytes EEPROM Smart Card.

Contact: André Jacques Selezneff, International Marketing Comm., Philips Smart Cards & Systems - Tel: +33 1 41 28 55 84. Fax: +33 1 41 28 79 68.

Gemplus Licenses Supertag

In a departure from its role as a major card producer, Gemplus has signed a licence agreement for Supertag technology which will enable it to manufacture and sell products incorporating the technology throughout the world.

Supertag is a simple electronic tagging system which contains a unique number encoded on a silicon chip and acts as an "electronic label," enabling up to 50 objects to be remotely scanned, identified and counted in a second without the need to separate and scan items individually.

An "anti-clash" protocol eliminates the contention problem which normally occurs when conventional radio tags respond simultaneously to an identification command. Possible uses for Supertag technology include tracking and monitoring applications in parcel delivery services; commercial and military logistics; self-service libraries; tagging of animals and perishables and baggage handling at airports.

J P Gloton, Chief Executive Officer, Gemplus Electronics, said the Supertag technology would

form part of the company's development programme to enable it to expand market penetration in RF/ID applications and they would provide Supertag tags and readers to other companies for a wide range of applications. First products will be available in 1997.

The Supertag technology was invented in the Research & Development laboratories of the CSIR in Pretoria, South Africa and is handled by the British Technology Group (BTG), one of the

9 Million Phonecards for Greece

Solaic, Smart Card subsidiary of French Groupe Sligos, has won an order to supply nine million phonecards to Greek telephone operator O.T.E. for a period of 18 months starting this month.

Perivallon SA - Solaic's Greek distributor partner will handle pre-personalisation through a local production unit.

Solaic recorded an annual turnover in 1994 of Ff 421 million.

Contact: Boris Eloy, Solaic - Tel: +33 1 49 00 96 33. Fax: 33 1 49 06 04 12.

New CEO for Europay

Ron H Williams, Europay International's founding Chief Executive Officer who has held the post since the company was created in September 1992, is retiring and will be succeeded by Louis-Noël Joly.

Mr Joly will begin on 1 January, 1996, first as the Deputy Chief Executive Officer and then assume full responsibility and become a member of the Board at Europay's Members' Meeting in Seville, Spain in June 1996.

A graduate from Ecole Centrale des Arts et Manufacture in Paris, and with a Master of Sciences degree from the University of Berkeley, California, Mr Joly began his career in engineering and computer development. In 1971 he joined French bank Caisse Nationale de Credit Agricole as head of data processing and as a member of the management committee, and became the Vice Chairman of Eurocard France.

In 1982, he joined Société Générale as Deputy General Manager in charge of technical services

world's leading technology transfer companies.

A spokesman from the BTG said that Gemplus had the ability to produce the Supertag at low cost with good reliability but it was not possible to predict when it could be produced for under \$1.

Contacts: Frédéric Coustère, Gemplus, France - Tel: +33 42 08 71 12. Fax: +33 42 32 50 90. Mary Clark, BTG Plc, UK - Tel: +44 (0)171 403 6666. Fax: (0)171 403 7586.

and as a member of the management committee.

He played a leading role as co-founder of Groupement des Cartes Bancaires "CB" and was chairman of the managing committee for Smart Card. Mr Joly was awarded the Mérite National and Mérite Agricole in recognition of his contributions to the French business community.

Contact: Richard Tischler, Euopay International - Tel: +32 2 352 5304. Fax: +32 2 352 5732.

DataCard Personalisation System

DataCard Corporation has announced the UltraGrafix 285 desktop card personalisation system offering high resolution thermal print capabilities and optional modules for magnetic stripe encoding and Smart Card personalisation.

The UltraGrafix thermal print module can print logos, text, bar codes, photos and other graphic elements directly on plastic cards in a single-pass operation. By adding an optional module, users can encode magnetic stripes or personalise Smart Card chips as part of the in-line process.

It can be connected directly to a host system or can utilise Windows based software. QuikWorks simplifies card design and uses an open architecture that allows card issuers to download data from existing databases. Other features include card previewing, password access and automatic card feed.

Newly appointed, Vice President of DataCard's instant issuance business unit, Richard Swingle, says the system is ideal for credit, debit and ATM cards; employee, student and member IDs and frequent user cards.

Contact: Mark Iverson, Director,
Communications, DataCard Corporation - Tel: +1
612 988 1763.

Gemplus Smart Card Market Forecast

Segment	1994 - Million Units	2000 - Million Units	Average Yearly Growth
Phonecard	310	1400	29%
GSM	9	50*	33%
Health	62	400*	36%
Bank & Loyalty	20	500*	71%
Identity	1	400*	171%
Transportation	1	200*	142%
Pay-TV	10	100*	47%
Gaming	1	500	182%
Metering	2	50	71%
Access Control / Vending	4	200	92%
Total	420	3800	44%

*Microprocessor cards

New Chip from SGS-Thomson

SGS-Thomson Microelectronics has added a new member to its family of secure Smart Card ICs based on the popular ST16XYZ intelligent memory family.

Called the ST16SF42, it offers 16K bytes of ROM, 384 bytes of RAM and 2K bytes of EEPROM. Thomson says the new IC is ideal for SIM (Subscriber Identity Module) cards (GSM phase II), multi-application cards and other high volume, cost-sensitive applications requiring enhanced security features and a medium size EEPROM memory combined with a large ROM

for customer code.

A useful security feature is the ROM and EEPROM segmentation, allowing the user to configure both the ROM and EEPROM as two ROM sectors and two EEPROM sectors. Access rules from any ROM or EEPROM sector to any other sector are governed by a user-defined Memory Access Control Matrix, with a non-maskable security interrupt generated whenever an unauthorised access is attempted.

The company is also offering its successful ST16CF54 Smart Card IC with a built-in library of cryptographic functions which have been validated internally and by a number of key

customers. With public key encryption becoming increasingly important in security applications, the cryptographic functions will generate interest in banking, network security and other security-conscious applications.

Contact: Simon Loe, Technical Press Relations Manager, SGS-Thomson, France - Tel: +33 50 40 25 58. Fax: +33 50 40 28 60.

DANMØNT Order for Philips

Australian Contactless Order

According to Mikron of Austria, supplier of the Australian Transcard Stored Value Card (SVC), Card Technologies Australia is planning to order one million cards for the initial roll-out phase and a tender has been submitted to all qualified MIFARE card manufacturers.

Mikron adds that another order for one million cards will be placed in the second quarter of 1996.

Following the successful Transcard trial in Sydney, trials have started on Hong Kong shuttle buses using Card Technology Australia's contactless Smart Card system based on MIFARE components. The system is being implemented in Hong Kong in conjunction with CTS Pacific Technology, a branch of the China Travel service.

Contact: David Mac.Smith, General Manager, Card Technologies Australia - Tel: +61 2 2332 4955. Fax: +61 2 2332 1285. Alexander Harrer, Mikron, Austria - Tel: +43 3124 23033-95. Fax: +43 3124 23033-8.

Little Knowledge of Smart Cards

A considerable lack of knowledge of Smart Cards amongst senior IT personnel in the UK is one of the key facts which has emerged from a new survey. Over three-quarters of respondents state a limited (53%) or very limited (24%) knowledge. Only 2% have extensive knowledge and 21% describe their knowledge as quite good.

Sector knowledge also show surprising results: systems 22%, retail 19%, transport 17%, health 15%, other/sales 12%, banking 8% and utilities 7%.

DANMØNT has ordered 50,000 Stored Value Cards from Philips Smart Cards & Systems of France.

The card is based on the Siemens SLE4404 chip with 352 bits EEPROM and is a disposable fixed value card.

Contact: André Jacques Selezneff, Philips Smart Cards & Systems, France - Tel: +33 1 41 28 55 84. Fax: +33 1 41 28 79 68.

The report says it is interesting that knowledge of Smart Cards within the banking and finance sector is so limited, despite the obvious application. The higher awareness amongst systems companies is no surprise in view of their appreciation of and interest in, new technology.

A surprising 57% say they have not heard of any Smart Card schemes. Mondex is the best known scheme and mentioned by 42 respondents, followed by Shell with 37 and BSKyB with six!

Asked if they foresee any application for Smart Cards by their organisation, in addition to the 5% already using Smart Cards, 57% say that Smart Card use is very likely or possible. On time-scales, 23% state that implementation is likely to take place within 24 months, whilst 63% comment it is "too early to say." Only 16% of companies have anyone assigned to investigate Smart Cards.

These findings, says the report, illustrate how most organisations have yet to take a serious look at Smart Cards, despite earlier statements that application is likely or possible and suggests a need for more proactive marketing by all parties concerned.

Only 10% say they have been contacted about Smart Cards which is only a small proportion when set against the fact that 57% see application likely or possible and reveals a significant "untapped" potential.

Of the 10% who have been contacted only 2% state that they had been contacted by a supplier. An unknown proportion may have been referring to personal schemes such as Shell and Mondex.

The survey was conducted last August by The

Business Research Centre in association with the Marketing Edge and ORGA Card Systems (UK) in the form of a postal questionnaire to 2,370 senior IT contacts in the UK.

There was a 10% response with 238 returns by the end of August. It covered five broad market sectors: banking and finance, retail, health, transport and utilities. Other target areas such as leisure, sales and marketing were covered in a general section called "others" and systems companies were also classified separately.

From there to here - part 10

The T = 1 Communications Protocol

Carrying on from last month, we can now proceed to look at the more comprehensive block protocol.

The T = 1 communication is an asynchronous half duplex block transmission protocol. In terms of the OSI model this protocol operates at layer 2, the data link layer. The physical layer (layer 1) operates in the same way as for the T = 0 protocol except for the error detection and correction. In essence this protocol puts an envelope around a block of characters which allows,

flow control

block chaining

error correction.

The choice of communication protocol for the ICC is still a hot topic and one has to consider what advantages can be offered by the block protocol and then to examine the price that must be paid.

The most obvious advantage of the T = 1 protocol is the ability to manage data flow in both directions. In our discussion of the T = 0 protocol it was shown that for a particular command that the data is either sent to or received from the ICC. This limitation was really due to the use of a single byte for defining the length of the data related to the command.

The T = 1 protocol also removes the T = 0 restriction of the master slave relationship where the interface device (IFD) always initiates a command to which the ICC responds. For this block protocol a command may be initiated by

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

Smart Card News Workshops

SCN is intending to run a series of intensive Smart Card training workshops in the new year. These will focus on the technology and commercial applications of Smart Cards. For more details,

Contact Patsy Everett - Tel: +44 (0)1273 626677.

either the IFD or the ICC albeit within the restrictions of the protocol.

A further advantage of the T = 1 protocol is the ability to chain the blocks of data such that an arbitrarily large block of data may be transferred as the result of a single command by the transmission of the appropriate number of frames chained in sequence.

The block protocol also has a more sophisticated error management system. This allows the use of a block error detection code (EDC) and the ability to re-transmit blocks that are subject to some error condition. By comparison the T = 0 protocol has a primitive character error detection and correction scheme as described previously in the tutorial (part 4).

Clearly there is a price to be paid for this higher layer protocol. Apart from the more complex software in both the ICC and the IFD the protocol is more demanding on the RAM memory of the ICC which needs to maintain the last sent block in case retransmission is required. In general the T = 1 protocol offers advantages where the application is managing large blocks of data, particularly when it is required to pass data in both directions as part of a particular command. The efficiency of the protocol is only really apparent for larger data transmissions since the underlying physical layer is still operating in character mode as for the T = 0 protocol. The reduction of the character frame to 11 etu (elementary time units) compared with the 12 etu demanded by T = 0 has to be balanced against the administrative overhead of the frame structure which has both a prologue and epilogue.

There can be no doubt that the error control is significantly improved over the T = 0 protocol but at the lower speed of 9600 bit/second operated by many ICC's over very short transmission paths the

probability of communication errors is much reduced. However it is clear that there is a move towards the use of the T = 1 protocol and it seems highly likely that this will become the predominant protocol of the future. We should not however dismiss the use of the T = 0 protocol which in some situations may well offer a more optimum technical solution. The T = 1 protocol is specified in the ISO standard ISO 7816 - 3 / AMD.1

The block frame

The frame consists of three fields,

- prologue field
- information field (optional)
- epilogue field

as shown below.

Prologue Field			Information Field	Epilogue Field
Node Address	Protocol Control Byte	Length	Optional	Error Detection LRC or CRC
NAD	PCB	LEN	INF	EDC
1 Byte	1 Byte	1 Byte	0-254 Bytes	½ Bytes

The prologue field consists of three bytes,

- NAD the node address
- PCB protocol control byte
- LEN the data length

The NAD byte uses bits 3 - 1 to identify the source address and bits 7 - 5 to identify the destination address. The bits 4 and 8 are used for Vpp control which will not be discussed further here. The node address byte allows the use of multiple logical channels where required otherwise both addresses should be set to zero.

The PCB byte allows the identification of three types of block frame,

- An information block (I - block)
- A receive ready block (R - block)
- A supervisory block (S - block)

The information block is the frame which is used to transmit application commands and data between the ICC and the IFD. The receive - ready block is used as an acknowledgment when the protocol is sending data as a sequence of chained blocks. The supervising block is used to establish control parameters and to effect a resynchronisation or abort status as the result of some error condition. The information block also acts as an acknowledgement byte in the non

chaining mode.

The LEN byte indicates the number of bytes (if any) in the information field of the frame. Its allowed range of values are from 00 - FE_{hex}. This allows a maximum information field of 254 bytes.

The information field is used to convey the application commands and data which we will discuss in the next part of the tutorial.

The epilogue field contains the block error detection code which may be either an LRC (longitudinal redundancy check) or a CRC (cyclic redundancy check). The LRC is 1 byte whilst the CRC occupies 2 bytes. This option is defined by the specific interface characters.

Specific Interface Characters.

In a previous part of the tutorial (part 4) we discussed the specific interface characters given by the answer to reset (ATR). The T = 1 protocol uses three of these characters to establish the necessary options before communication can take place. These bytes are assigned as follows (where I > 2),

$$TA_i = IFSC \quad (\text{default} = 32)$$

$$TB_i$$

(bit 4 - 1) = CWI (default = 13)
 (bit 8 - 5) = BWI (default = 4)

TC_i
 (bit 1 = 1) = CRC option
 (bit 1 = 0) = LRC option (default)

The IFSC is the information field size for the card. There is also an IFSD which is the information field size for the interface device. This has a default value of 32 bytes and can only be changed by means of an S - block request from the IFD to The character waiting time is the maximum time between successive characters in a block whilst the block waiting time is the maximum time between the leading edge of the last character in a block sent by the IFD and the leading character of the next block sent by the card.

The character waiting time may be used to detect an error in the length of a block whilst the block waiting time may be used to detect an unresponsive card. There is also a block guard time (BGT) which is defined as the minimum time between the leading edge of the last character of one block and the leading edge of the first character in the new block to be sent in the alternative direction. The CWT and BWT are calculated from the values of CWI and BWI coded as shown previously in the specific interface bytes by means of the following equations,

$$CWT = (2^{CWI} + 11) \text{ etu}$$

$$BWT = (2^{BWI} \times 960 \times 372 / f) \text{ Sec} + 11 \text{ etu}$$

Where f is the clock frequency.

The minimum value for the BWT is 100 mS + 11 etu when the card operates with the default frequency of 3.58 MHZ. The block guard time has a value of 22 etu such that the delay between the start of the last character of a received block and the start of a transmitted block is greater than BGT but less than BWT. Accordingly the minimum inter block time is 11 etu which is equal to one character time.

David Everett (next month part 11 - Transmission protocols continued)

Quicklink Launch

the ICC.

Waiting Times

The T = 1 protocol uses two waiting time parameters to help flow control,

- Character Waiting Time (CWT)
- Block Waiting Time (BWT)

The Quicklink card, an initiative of the New South Wales Government, was launched this month in Newcastle, Australia. The card is a rechargeable Smart Card which securely stores cash electronically.

The pilot in Newcastle will cover over 500 sales points where cards can be used for purchases. 50,000 cards will be issued to residents and there will be 50 locations where stored value cards can be recharged. Major participating corporations include Australia Post, BP, City Rail, McDonalds, NSW State Transit Authority and a large number of local of retail organisations. Coca-Cola are adapting vending machines for purchases using the card.

Smart Card Diary

Smart Card Europe, The Royal Lancaster Hotel, London, 11-13 December.

The third annual conference starting with a one-day workshop exploring both the underlying technology and the commercial issues conducted by Dr David Everett, Independent Consultant and *Smart Card News* Technical Advisor and Richard Poynder, The Smart Card Club. The conference features presentations by pioneers like Moreno and Dethloff on Intellectual Property Rights and Smart Card Patents, the latest developments in electronic purse applications, topical sessions on contactless cards, government applications and data protection and major applications in social security and healthcare. Contact: IBC Technical Services - Tel: +44 (0)171 637 4383. Fax: +44 (0)171 631 3214.

Smart Card '96, Olympia, London, 13 - 15 February 1996.

Three day international Smart Card conference and exhibition.

Contact: QMS - Tel: +44 (0)1733 394304.

IMRG/CBI Conference, Centrepoint, London, 29th 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.

Motorcyclists Touch and Go

French company GEA has started a field trial for a touch and go MIFARE contactless Smart Card system for motorcyclists using the Penang Bridge Toll Plaza in Malaysia.

Launched last month, the system allows motorcyclists to use two lanes equipped with the MIFARE system. Two point of sale terminals are also available inside the commercial office of the plaza for the public.

Ten thousand pre-paid and rechargeable cards have been ordered and if the scheme is successful it will be extended.

Contact: Michael Zass, Overseas Operation Vice President, GEA, France - +33 76 90 72 72. Fax: +33 76 41 00 83.

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

Contact: +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.

First Smart Royal Cards

Official Royal celebrations in Denmark are usually commemorated with silver or gold coins, but DANMØNT, the Danish electronic purse operator, is issuing two Smart Cards to mark the wedding of HRH Prince Joachim and Miss Alexandra Manley on 18 November. Both cards carry a picture of the Royal couple. On the back of one of the cards is a picture of Frederiksborg Castle where the Royal wedding will take place and on side two of the other is a picture of Schackenborg Castle, their future residence.

The cards have a face value of DKK 100 (US\$ 20) and DKK 200 (US\$ 40) and are available from selected sales outlets or the collectors' service: Samler Service Postbox 122 DK-2750 Ballerup, Denmark. Fax: +45 44 97 71 31.

I would like to subscribe to **Smart Card News**, which will entitle me to buy the **International Smart Card Industry Guide** at the discount price of £70:00.

£375 (UK)

£395 (International)

Please invoice my company

Credit card (Visa/Mastercard/Eurocard/Access/Amex)

Card No.-----Expiry date-----Signature-----

As a subscriber to **Smart Card News** I wish to take advantage of your special offer. Please send me ----- copies of the **International Smart Card Industry Guide** at £70:00 per copy, including postage and packing.

Please send me ----- copies of the **International Smart Card Industry Guide** at **£125** per copy,

plus £4:65 (UK), £7:80 (Europe), £12 (outside Europe) airmail postage & packing.

Send cheques to: Smart Card News Ltd., PO Box 1383, Rottingdean, Brighton, BN2 8WX, UK. or fax application to +44 (0)1273 624433.

Name-----Address-----

Tel-----Fax-----

Solaic's Mosaic wins at CarteS

* Elimination of the metallic micromodule and a polycarbonate body mean that the Card is 100% recyclable.

Solaic, the Smart Card subsidiary of Groupe Sligos has won this year's technical innovation prize at the annual Carte '95 Conference held in Paris for their MOSAIC (Microchip On Surface And In Card) memory Card. Twelve international journalists and representatives including the Managing Director of Smart Card News, Mrs Patsy Everett, awarded the Card for it's innovative technology, economic and environmental friendliness, the result of four years research and an investment of Ff 20 million (about £2.6 million).

Mosaic is also revolutionary in that it is made up of only three components; a polycarbonate body, an integrated chip and the printed chip contacts. The silicon chip is embedded by heating the polycarbonate with a specially designed laser machine and the contact points are printed directly on the chip with a fast, silk -screen printer using conductive ink.

Solaic claim that never before has anyone made memory Card production so simple which benefits both the issuer and user. They attribute the success to three key factors:

At present Mosaic can only be used to produce small integrated -circuit memory cards. Primarily it will be used for low-value applications such as phonecards, being issued in January 1996 but Solaic hope to develop it for other uses. Global Telecom operators have shown a keen interest.

* Mosaic requires only one-third as many process stages as conventional technology.

* Time saved in production is used to enhance quality control procedures at each stage and the appearance of the card.

Above - A proprietary laser process is used to heat the polycarbonate card.

Left - Machine that prints chip contact points using conductive ink.

Photo's courtesy of Daniel Pype.

Contact: Boris Eloy, Solaic - Tel: +33 (1) 49 00 96 33. Fax: + 33 (1) 49 06 04 12