Leading US Banks Plan Rapid SVC Roll-out

In a strategic move which will exercise some control and secure a major share of the market, leaders in the US financial, Smart Card and payments industries are planning to speed the introduction of Stored Value (electronic purse) Cards nation-wide starting in mid-1996.

The move, initiated by MasterCard International and Electronic Payment Services, Inc. (a five-bank joint venture company), is described as a "multi-million dollar commitment" and as "unprecedented industry co-operation" and will involve the formation of SmartCash, a for-profit company which will develop, finance, implement and manage the nation-wide stored value card business.

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US Banks SVC Plan

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Founding owners of SmartCash include the five members of Electronic Payments Services, Inc (EPS) - (Bank One Corporation, CoreStates Financial Corporation, KeyCorp, National City Corporation and PNC Bank Corporation), Bank of America, Chemical Banking Corporation, First Union Corporation, Gemplus SCA, MasterCard International, NationsBank Corporation, VeriFone Inc., Wachovia Corporation and Wilmington Trust Corporation.

Participation in SmartCash will be open to all US financial institutions, networks and technology providers and a 60-day time frame has been set to encourage interested parties to join the scheme.

It is expected that all SmartCash applications will be fully compliant with the Europay/MasterCard/Visa (EMV) IC Card specifications giving compatibility and international interoperability.

The SVC application enables value from the cardholder's deposit or credit account to be loaded onto the card from an ATM or a Smart Card terminal. This value is then used instead of cash for small payments.

SmartCash partners will initially develop pilots or start roll-outs of the SVC in multiple locations throughout the United States in mid-1996. The major impetus will come from the EPS already announced roll-out in the State of Delaware. This project (originally known as the MAC, the Money Access service network Card), was developed by EPS, Gemplus, MasterCard and VeriFone.

Commenting on the plan, MasterCard International President and Chief Executive Officer H Eugene Lockhart, says: “The SmartCash venture is an outstanding example of collaboration by aggressive leaders in the payments industry to meet the challenge and bring a viable consumer offering to market.”

David Van Lear, Chairman and Chief Executive Officer of EPS, comments:”This multi-million dollar commitment is intended to bring stored value into the mainstream. Stored value is a complex system and SmartCash provides the momentum to introduce this advanced technology into the marketplace quickly and effectively.”

According to Amy Brinkley, Executive Vice President, NationsBank Marketing: “This is another opportunity for our customers to enjoy the added convenience of making small purchases without carrying cash. This will be possible through unprecedented industry co-operation to develop an innovative financial product.:

Contacts: Nancy Elder, MasterCard International - Tel: +1 212 649 5439. Barbara Link, Electronic Payment services, Inc. - Tel: +1 302 791 8529.

New Stage for Mondex in US

Wells Fargo has started piloting Mondex, the Smart Card global electronic payment system, in the financial district of San Francisco with 90 employees and nine merchants.

During the pilot, the maximum amount that can be held on the card is US$ 300 in Mondex cash.

Cardholders can set and change their personal code, lock and unlock the card with a PIN and transfer Mondex cash between their account and card at the specially adapted Wells Fargo ATM at the 464 Californian branch.

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Next Month

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L&G Production Record

Landis & Gyr (UK) Ltd., manufacturer of Smart Card payment systems, has announced record production figures. It is currently producing 35,000 Smart Card meters a month to meet demand from British Gas and the Regional Electricity Companies.

These are record figures for the Telford factory, which supplies the Smart Card-based Quantum payment system for British Gas, and Pisces, the UK's first Smart Card prepayment system for domestic electricity.

Last year, L&G was awarded a five-year contract for further supplies of the Quantum system with a total requirement for meters expected to be around 1,250,000.

Following the first order for Pisces from Midlands Electricity, L&G says that the system is rapidly becoming the de facto standard for prepayment electricity metering with NORWEB rolling out the system to customers and a pilot scheme with Yorkshire Electricity. The system is also under trial in a suburb of Sydney, Australia.

Managing Director Peter Robertson says: "The Telford factory is now running close to capacity to meet the shipment levels demanded by our major customers across the world."

Contact: Martin Pollock, Landis & Gyr (UK) -Tel: +44 (0)1952 677661. Fax: +44 (0)1952 677591.

Visa Certifies IDS Terminal

Innovatron Data Systems' TPScam 1000 point of sale terminal, which can accept Smart Cards, has been certified by Visa International.

The terminal, which can be upgraded from on-line to off-line mode by adding an external module, is also approved by GIE Cartes Bancaires, the French Bank Card Group.

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

Dutch Choose CP8 Card for EP

Interpay has chosen CP8 Transac's Cash Card 60

MeridienCard Falls with Bank

The collapse of Zambia's Meridien BIAO Bank has made the MeridienCard the first electronic purse casualty. A bank spokesman said that the bank is no longer trading and consequently the MeridienCard cannot be used until the fate of the bank is resolved.

The electronic purse scheme, launched in August 1994, was intended to be extended to 18 African countries.

US-based Productivity Enhancement Products (PEP) supplied 70,000 Bull CP8 TB100 cards to Meridien.

Traditional credit cards have not been widely available in Africa due to unreliable telecommunication systems, making on-line authorisation difficult.

The MeridienCard was designed to be available to all Africans, hold up to 10 different currencies, function as an ID card for bank transactions via a four-digit PIN, and for use as an electronic wallet.

Smart Money Purse for Uganda

International Credit Bank in Uganda is launching an electronic purse pilot scheme called Smart Money in the capital Kampala in February 1996 with 1,000 TB100 3K bytes EEPROM Smart Cards from Micro Card Technologies Inc.

The system is being developed by Productivity Enhancement Products (PEP) of the United States which is also supplying card readers. Security on the card includes a PIN and DES encryption.

The Smart Money card will be a credit card with an electronic purse which can be used for making payments in shops, hotels, restaurants and at petrol filling stations. The maximum amount that can be loaded onto the purse has still to be decided.

The bank anticipates that the new card could eventually by used by around 100,000 customers.

Contact: Patrick Katto, International Credit Bank - Tel: +256 41 242291. Fax: +256 41 256972.

(CC60) Smart Card for the Dutch national electronic purse project due to be piloted in October (*SCN December 1994*).

Christophe Zehnacker of CP8 Transac's International Marketing Division claims that the CC60 is "the most secure electronic purse product on the market." Features include triple DES encryption and dynamic key management.

All the Dutch banks are co-operating in the launch of the national electronic purse called Chip Knip (Chip Purse) which is being developed by Interpay BV.

A joint venture company, Interpay brings together the Bank Giro Center, which handles giro payment systems: BeaNet, a national switch for on-line debit card authorisation and processing, and Eurocard Netherlands. Company chairman is Ben van Eldik, former Europay chairman.

The Interpay order for 195,000 cards will be delivered through Banksys, operator of PROTON the Belgian electronic purse, which is also supplying some of the equipment used in the PROTON scheme which was launched in February this year with 30,000 cards issued in the trial cities of Leuven and Wavre. It will be rolled out nationwide in early 1996.

PROTON Success

In addition to its involvement in the Dutch electronic purse in terms of cards and technology, Banksys has successfully sold the PROTON technology to Telekurs in Switzerland; to ERG Australia for the Quicklink consortium for use in Australia, HongKong and New Zealand; and to MITEL which has bought rights to the system in Brazil.

Contacts: Antoon Kuipers or Evert Fekkes, Project Managers, Interpay, The Netherlands - Tel: +31 2503 71717. Fax: +31 2503 33152. Christophe Zehnacker, CP8 Transac, France - Tel: + 33 1 39 66 43 62. Fax: +33 1 39 66 43 73. Dominique Hautain, Banksys, Belgium - Tel: +32 2 727 6428. Fax: +32 2 727 6767.

Contacts: Isabelle Ferdane-Couderc, Schlumberger Electronic Transactions - Tel: +33 1 47 46 70 20. Fax: +33 1 47 46 68 66. Bernd Schäfers-Maiwald, ORGA Kartensysteme, Germany - Tel: +49 5254 991-140. Fax: +49 5254 991-199.

SIM Card Orders in Malaysia

Binariang, one of two GSM service providers in Malaysia, is dual sourcing its supply of phase two SIM (Subscriber Identity Module) Smart Cards from manufacturers in France and Germany.

Schlumberger of France is supplying phase two Subscriber Identity Module (SIM) cards in a contract worth US $500,000, and ORGA Kartensysteme GmbH of Germany has been awarded a contract to supply 50,000 SIMs, GSM test equipment and Dr SIM, a point of sale device to enable Binariang to offer full customer service to its network subscribers.

Binariang has chosen the latest technology SIM cards to gain competitive advantage over its rival GSM service, three Personal Communication Networks (PCNs) and two analogue cellular system operators.

The service, called Maxis Mobile, is being launched this month. The phase two cards can be utilised for fax, e-mail, broadcast messaging, conference calls, closed user groups, numbers storage and charge advice.

Fast growth area

The Asia-Pacific region is one of the world's fastest growth areas for cellular communications. By the year 2000, GSM is expected to be the largest single network type in the region with some 37% share of subscribers.

Malaysia's cellular industry currently has a subscriber base of more than 600,000 and this is forecast to grow significantly to some three million over the next five years.

Binariang has committed to invest RM 4.1 billion (US$ 1.68 billion) for the development of its network infrastructure over the next five years. It will also launch Malaysia's first communications satellite - Malaysia East Asia Satellite (MEASAT-1) - at the end of this year.

Electronic Purses: A Comparative Review

This first comparative study of major, national and international electronic purse schemes will run over several issues of *Smart Card News* due to the amount of information in the tables we have devised to compare the various projects.

It shows how quickly they are developing in Europe and many other parts of the world and, importantly, how they differ from each other. National schemes are a long way from the cross-border interoperability sought by the big three credit card issuers - Europay, MasterCard and Visa - who have a vested interest in international compatibility.

"Wouldn't it be nice" if we could use one electronic purse all over the world is one side of the coin. Others say if you do your shopping locally and only travel abroad once a year on holiday, a card which can be used nationally is all that is required - a scenario that encompasses the vast majority of people who will be attracted to the electronic purse.

There are concerns about what happens if the card is lost or stolen. In most schemes, all transactions are logged and pass through a clearing system so the value on the card can be eventually refunded. In the case of Mondex, however, electronic cash parallels the cash in your pocket and there can be no replacement as there is no record of transactions. Mondex, of course, offers anonymity and some special features like telephone banking and exchange of money between cards via an electronic wallet.

Some systems have security algorithm and/or PIN protection: others do not. Card operating systems and memory capacities vary from scheme to scheme; some purses only hold one currency while others offer dual or multi-currency capabilities; and the Transcard scheme under trial in Sydney, Australia, is the first major use of contactless Smart Cards in a multi-purpose electronic purse scheme.

System operators are mainly banks or other financial institutions, but in Australia the Stored Value Card will be run by government agencies and private sector companies.

Electronic Purses: A Comparative Review - Part 1

Country	**Belgium**	**Denmark**
Name of scheme	PROTON	DANMØNT
Capital investment	300 million Belgian francs (£6.5 million)	£8 million
Operator	Banksys, operatoar of the Belgian network for electronic payment - Bancontact/Mister Cash	DANMØNT A/S established 1991 by TeleDenmark and PBS (Danish telephone companies and banks/savings banks)
System developer	Banksys	DANMØNT
Status	Launched February 1995	Since 1992: Disposable cards. Since 1995: also rechargeable. June 1995 50 cities in Denmark
Multiple currencies	Belgian francs - may be extended for Ecu/other currencies	No
Loadable amount	5,000 Belgian francs (approx. £100)	Up to DKK 500
Current applications	Payment for low value amounts, for example, car parking, ticketing and vending machines, public transport, telephone calls and at newsagents, grocery shops and fast food restaurants	POS, parking meters, laundry, recharger for electrical cars, photocopiers, vending machines for postage stamps, drinks/snacks, fax, underground ticketing machines, telephones, cafeterias etc.
Planned applications	Banksys is evaluating the loading of cards over home or public payphones	Multi-function microprocessor card, limited progressing to full functionality
Method of settlement	Merchants deposit transactions directly from terminal over phone lines or via settlement card unloaded at ATM or bank branch	Single or multiple clearing centre
Card fabricators	Bull CP8 CC60 card	dz Danmark, S-card, Gemplus (all disposable); Giesecke & Devrient (rechargeable)
CPU (Yes/No)	Yes	Disposable - No; Rechargeable - Yes

Country	**Belgium**	**Denmark**
ROM	8K bytes	Disposable - 16 bits; Rechargeable - 8Kb
EPROM/EEPROM	1K bytes EEPROM	Disposable 352 bits; Rechargeable 4Kb
RAM	128 bytes	256 bytes (rechargeable)
Co-processor (Yes/No)	Yes	No
Chip manufacturer/ Type No.	SGS-Thomson ST 16601 CMOS	Siemens/ SLE4404 (disposable); SLE 40C40 rechargeable
Security algorithm(s)	Triple DES	Secure Application Module (SAM) authenticates card
PIN	No	No: transactions off-line
Cards issued	24,000 in trial	Over 300,000 June 1995
Card target	6-7 million cards	50% of Population of 5 million Danes by 1998
Card reader/terminal suppliers	Banksys designed and manufactured	POS: Hamag and Siemens Nixdorf. Parking meter: Peek Traffic. Laundry: Miele and Nyuborg Vbaskerimaskner. Vending: Wittenborg Møntsystgem. Stamps: Frama/ Danastar. Recharge: Hamag. Photocopier: Miele and Rank Xerox. Fax: Miele
Number installed	1270	Over 500
Portable balance reader	Yes	Yes for collectors
Card recharging points	ATMs, unattended load devices and bank branch devices	Special terminals and ATMs. Individual banks will decide to modify or not
Contact	Dominique Hautain, Banksys	Henning N Jensen, DANMØNT
Telephone	+32 2 727 6428	+45 4344 9999
Fax	+32 2 727 6767	+45 4344 9030

Electronic Purses: A Comparative Review - Part 1

Country	**Finland**	**Latvia**
Name of scheme	AVANT	LATkarte
Capital investment	20 million FIM	$320,000 (private company)
Operator	Avant Finland Ltd	A/S Latkarte (data operating center)
System developer	Avant Finland Ltd and Setec Oy	A/S SWH Informatīvās sistēmas
Status	Rechargeable cards since January 1994	Started 1993
Multiple currencies	only FIM	Two - Lats and US$
Loadable amount	Max 1,000 FIM ($180)	Re-loadable EP, usual 600 Lats and 600 US$ (max 99,999), and for credit/debit card
Current applications	Parking, payphones, public transport, municipal services, company canteens, kiosks, convenience stores, postal machines	Cashless payments for goods and services by EP and reloadable credit/debit card based on bank account .
Planned applications	1995: all areas of small payments (below 50 FIM - 10 ECU)	Identification card and savings book
Method of settlement	Service based with coins, banknotes, bank and credit cards.	Daily data collection from POS and transfer to bank card issuer
Card fabricators	Setec Oy	Solaic and Gemplus
CPU (Yes/No)	Yes	

Country	**Finland**	**Latvia**
ROM	6K bytes	Solaic - 16 bytes, Gemplus (PCOS) - 3 K bytes
EPROM/EEPROM	3K bytes EEPROM	Solaic - 452 bytes, Gemplus (PCOS) 1K bytes EEPROM
RAM	128 bytes	PCOS 128 bytes
Co-processor (Yes/No)	No	No
Chip manufacturer/ Type No.	Motorola/68HC05SC21	Solaic - E3744, Motorola, Gemplus
Security algorithm(s)	DES	DES
PIN	No	Yes with possibility to define min. amount for PIN use
Cards issued	11,000 rechargable 650,000 disposable	Approx 7,000 cards issued by five Latvia banks
Card target	National coverage (population 5 million) 1.5 million in five years	500000
Card reader/terminal suppliers	Setec, ICL Data, Schlumberger, Sondi, Buscom, Inter Marketing	Innovatron Ingeniere, Gemplus, SIS
Number installed	1200	260
Portable balance reader	Coming	
Card recharging points	Kiosk chain, fuel station chain, service providers, outlets	5 banks, by bank operator
Contact	Olli Harjama, Avant Finland Ltd	Valdis Lokenbahs, SWH Informatīvās sistēmas
Telephone	+358 0 8941 4100	+371 2 360541. +371 2 374764
Fax	+358 0 8941 4141	+371 2 360534. +371 7 821457

UK Road Toll Trials

Eight consortia are to take part in a research programme to test motorway tolling technologies in the UK to enable the government to start charging drivers for using the motorway network within five years.

Announcing the trials, Transport Secretary Sir George Young, said: "Industry has come up with some exciting proposals." These involve three different technologies - microwave and infra-red systems using transmitters from roadside beacons or gantries and global positioning satellites sending signals which are picked up by an in-car unit and used to establish the vehicle's position.

Track tests will start at the Transport Research Laboratory at Crowthorne, Berkshire and will be followed by trials on the M3 motorway between junctions 6 and 7 south west of Basingstoke starting in summer 1996. Here a number of gantries will be erected and a base established on land beside the motorway. The trials will run for two years.

Normal traffic will not be charged during the trials which will only involve vehicles operated by or loaned to the department of transport.

The Transport Secretary said "These tests will be comprehensive and thorough. They will establish the feasibility of systems and demonstrate whether technology has advanced sufficiently to enable the government to consider bringing forward legislation to Parliament.

They will also guide us on the sort of locations and platforms which are best suited for siting ground based equipment which combine maximum efficiency and minimum obtrusiveness.

We will also be looking at other aspects of the capability of different systems - how far they can distinguish different types of vehicle, for example and whether and how the toll might be evaded. The likely costs of the systems, their accuracy, the possible effects on the environment and the privacy of the individual citizen are among the crucial matters which will require very careful thought and investigation."

The eight consortia were chosen from 29 interested consortia showing the high level of interest in the trials. While there could be huge financial rewards and international prestige for a UK Government approved motorway toll system, the trials also offer members of the consortia a valuable testing and proving ground for their technologies at a time when many governments are looking at road charging systems. One which deals efficiently and reliably with the volume and speed of traffic on UK motorways would probably perform even better in most other parts of the world.

The eight consortia

The following consortia will be involved in the trials:

ANT Bosch (microwave system): ANT Bosch (Germany), Robert Bosch (Germany/UK), Brown and Root Civil (UK), Centre-File (UK), EDS (US/UK), Post Office (UK), Mondex (UK), Syntegra (UK).

Autolink UK (microwave system): 3M (US/UK), AT/COMM (US), MVA Sytematica (UK), Syntegra (UK).

Easytoll (global positioning satellite): Centre-File (UK), Green Flag (UK), Mannesmann (Germany), Ram Mobile Data (US/France/UK).

Euro Passage (microwave system): Texas Instruments (US/UK), MFS Network Technologies (US), Gesellschaft fur Zahlungssysteme (Germany), Computer Recognition Systems (UK).

GEC-Marconi (microwave systems): GEC-Marconi (UK), Lockheed IMS (US/UK), Syntegra (UK).

Siemens Traffic Controls (infra-red system): Siemens (Germany/UK), Lockheed IMS (US/UK), Golden River Traffic (UK).

Tollstar (microwave system): Peek (UK), Orga (UK/Germany), Combitech Traffic Systems (Sweden), RACAL Messenger (UK), Scott Wilson Kirkpatrick and Partners (UK), University of Newcastle-upon-Tyne (UK).

Tollway (microwave system): Amtech World Corp (US), Golden River Traffic (UK), Serco Systems (UK), W S Atkins (UK).

France Pilots Vaccicard

A Smart Card from Gemplus is being used to manage vaccination data in a pilot scheme in France.

Called the Vaccicard, it has been developed in an 18-month collaboration between Gemplus and the world's leading producer of vaccines, Pasteur-Merieux.

The card contains the user's name, address and profession and dates of any vaccinations together will full details of the vaccine used, making up-to-date information available to anyone consulting the card in a pharmacy or surgery.

Contact: Caecilia de St Victor, Communication, Gemplus, France - Tel: +33 42 32 51 54. Fax: +33 42 32 51 17.

Gemplus says tens of thousands of the card have been distributed in Grenoble, Marseille and Gemenos where pilot tests involving general practitioners and pediatricians are underway in health centres and hospital casualty wards.

Smart Deal by De La Rue

De La Rue is moving towards the manufacture of Smart Cards in the United States by acquiring Thyron, the UK-based Smart Card systems and transaction automation house, reports a 30% growth for the 1994-95 financial year through sales of its dual Smart Card and Magnetic strip Financer terminals and host data collection systems.

It has also announced the establishment of a software development centre in Indore, India, called Thyron Informatics (P) Ltd.

The new company will support Thyron UK with major system developments, longer term R&D, and marketing sales activities in India and the Far East.

The new company, headed by Sanjeev Patni as Managing Director and Atul Saran as Technical Director, has 14 staff.

Thyron Informatics (P) Ltd is at 24 Jaora Compound, II Floor, MYH Road, Indore - 452001, India. Tel: +91 0731 460 425. Fax: +91 0731 462 425.

McCorquodale Security Cards Inc. (MSCI), the leading producer of MasterCard and Visa payment cards in North America.

De La Rue says that the purchase of MSCI by one of its US subsidiaries, De La Rue Inc., will provide its transaction systems division with a substantial base of card operation in North America in advance of the move from magnetic stripe to microprocessor cards.

The US subsidiary is paying MSCI parent company LHC Corporation $22.3 million (£14.5 million) to be adjusted depending on net assets, plus an earn-out of up to $5 million related to performance up to 31 March 1996.

MSCI is a US Corporation based in Exton, Pennsylvania.

Last year, De La Rue Card Technology in the UK bought McCorquodale Card Technology's financial card facility in Reigate, England.

Contact: Sarah Stroyan, De La Rue plc, UK - Tel: +44 (0)171 836 8383.

Thyron Reports 30% Growth

Solaic Mask for Swiss PTT

Solaic, Smart Card subsidiary of French Groupe Sligos, is to develop and supply its GSM phase two mask for Swiss PTT's new mobile phone card.

The Solaic mask contains three basic files: the subscriber's level, the subscriber's operator and the phone's operability within the GSM network. It offers highly secure data management and allows files to be added, enabling operators to create the new services authorised in phase two.

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

Russian Card Heads West

Zolotaya Korona, a Russian Smart Card system is

being launched throughout the world.

The card was primarily developed by the Center of Financial Technologies for customers of the Siberian Trade Bank and is the largest Russian Smart Card bank payment system with more than 100 banks throughout Russia and CIS states and Germany where ATMs have recently been installed at major railway stations and airports in a partnership with Deutsche Verkehrsbank (DVB).

Negotiations are also taking place for the installation of ZK ATMs and points of sale in German city shopping centres and supermarkets.

It is now planned to extend the card throughout the world in countries such as Cyprus, Turkey, China, Israel, Poland, Finland and the USA etc. with the aim of providing ZK cardholders in each country the convenience of using banks in these countries when they visit to cash the money they have loaded from their accounts onto the Smart Card.

Currently, the US branch of the Center of Financial Technologies is negotiating with US banks in New York, Chicago, Los Angeles, San Francisco, Miami and Washington to establish Zolotaya Korona regional processing centres. These centres will process transactions of international visitors that are part of the ZK system.

Next year, Zolotaya Korona plans to establish Contact: Brian Claire Senior Product Director Citicorp Svcs. Inc. Tel:+1 312 380 5358 Fax:+1 312 380 5800

South Africa Order for GPT

Over 6.5 million Smart payphone cards have been ordered from GPT Card Technology of Coventry, UK to be distributed in South Africa and Namibia by TM (Telephone Manufacturers of South Africa). The order follows one for the supply of 900,000 Smart Cards to mark the 1995 Rugby World Cup in South Africa.

Contact: Trevor Crotch-Harvey, Business Director, GPT Card Technology - Tel: +44 (0)1203 564565. Fax: +44 (0)1203 564540.

Philips/AT&T Agreement

business relationships and strategic partnerships with leading world payment systems outside of Russia. The intention is to issue a combined Chip/magnetic stripe international card that will be compatible with all international systems.

Contact: Tatyana Nesterova, Chicago office of the Center of Financial Technologies - Tel: +1 312 640 2675. Fax: +1 312 640 2679.

Ohio EBT Plan

Citicorp has been chosen to implement the State of Ohio's Electronic Benefit Transfer scheme State-wide using Smart Cards to replace paper coupons. The first part of the scheme will involve replacing paper food stamps with electronic money which cardholders will be able to use to pay for goods in grocery stores. Later it is expected that the scheme will be extended to include benefits for single mothers and Women, Infant and Children (WIC) benefits.

The decision to implement the scheme follows a two-year trial involving 13,000 benefits recipients and 40 grocers in Montgomery County and involved the US Department of Agriculture Food and Nutrition Service.

Philips Electronics and AT&T Network Systems have announced that they have signed a Memorandum of Understanding expressing their intent for AT&T to purchase a portion of the public network assets held by Philips' Communication Systems division and involves cellular infrastructure systems, managed transport networks, microwave transmission and access and transmission.

The sale does not affect Philips Smart Cards & Systems. Pieter van der Wal, CEO of Philips Communication Systems, says "This move is in line with our strategy of concentrating our efforts on personal communications, including such products as cellular, corded and cordless telephones; faxes and pagers; business communications systems, data communication, private mobile radio and Smart Cards and systems."

Book Reviews

The Case for Smart Cards (2nd edition) *by Ramananuj Banerjee, Penelope Ody & Richard Poynder*. IBC Financial Publications, £125

The Future of EFT-POS (Retail Payments in the UK in the Year 2000) *by Mike Hendry*. RMDP, £450.

In so far as they cover the same ground, both these books reach the same conclusion: Smart Cards are coming, but their progress will not be smooth. Initial costs, standardisation and the need for international co-operation and interoperability, not to mention EC politics, will stand in their way. The slow trudge towards European Monetary Union is another obstacle.

Mike Hendry, one of the group who set up Cardcast Ltd in 1989 to provide a data communications solution to payment card fraud, is currently involved in several Smart Card and electronic purse projects and is also active in satellite communications for retail applications.

The scope of *The Case for Smart Cards* is necessarily much larger. In this completely re-written edition, topics covered include Smart technology, Card options, the business case for Smart Cards, a comprehensive survey of UK applications, overseas developments and a look at future trends.

The UK government is censored for its lukewarm and careless attitude (early papers relating to a high level Cabinet Office debate on Smart Cards turned up in a North London junk shop in 1994).

Nevertheless, despite the lack of government encouragement and financial support, Britain has "perhaps the greatest number of Smart Card projects, covering the widest variety of applications, in the world." Extraordinary, when the average Briton has no idea what a Smart Card is, or what it is for.

The authors conclude: "Multi-functionality could clearly be a winner: no consumer wants eight Smart Cards in his or her wallet or purse, costing about £40 and carrying eight monetary floats, tying up possibly £100 of "dead' cash," and bemoan the fact that this useful facility is seldom seen in practice.

His survey of retailers, admittedly based on an extremely small sample (only 37 responded out of 270 questioned) indicates the areas of concern for major retailers. A response time requirement of less than five seconds to an authorisation or on-line transaction was important, with supermarkets citing less than one second.

Security was rated highly, although, as Hendry points out, it is rare for a retailer to run a financial risk if there is a breach of security in the payment system. It is more likely that retailers stress security in response to customer needs and perceptions: "if customers do not feel a system is secure, they will not use it."

Extrapolating into the future, in a sections titled "Scenarios", Hendry gives full weight to the debit card structure, with credit handled through the customer's bank account rather than a separate card account - attractive to retailers because the charges are lower. Electronic purses also find favour in that the cards are handled through simple terminals provided by the bank. EP transactions can also be accepted through debit card terminals and infrastructure, but at a lower cost.

This book serves as both a good introduction to the Smart Card world, with a balanced debate on its pros and cons, and as an overview of current trends in Britain and elsewhere.

The section titled *The business case* is particularly relevant to waverers - the authors honestly conclude that some schemes cannot justify Smart Cards.

They also point out that a scheme operator could buy or rent a channel in a Mondex card, for instance, and run its retailer loyalty scheme there quite successfully - an idea which might appeal to the finance director rather than the brand manager.

Perhaps the strongest business justification for adopting Smart Cards, they conclude, is simply that everyone else is planning to use them.

Smart Card Diary

Card Manufacturing in Transition: The Future is Now, Munich, Germany, 5-8 September.

The ICMA (International Card Manufacturers Association) Conference and Exhibition. Contact: Jen Busch, ICMA, USA - Tel: +1 609 799 4900. Fax: +1 609 799 7032.

ESCAT '95 (European Smart Card Applications & Technology) Conference, Inter Continental Hotel, Helsinki, Finland, 6-8 September.

One of the features of this well-established conference, now in its 8th year, is the presentation of the award for the most innovative Smart Card accomplishment of the year. Contact: Conference Secretariat, CONGREX, Finland - Tel: +358-0-752 3611. Fax: +358-0-752 0899.

The Retail Automation Conference '95, Mount Royal Hotel, London, 27/28 September.

An update on the key information systems issues affecting retailing today including sessions on Smart Cards and on remote shopping. Contact: RMDP Ltd, UK - Tel: +44 (0)1273 722687. Fax: +44 (0)1273 821463.

The 10th International Forum for Plastic Card Technologies & Applications includes conferences on Access to New Solutions and Cards and Security plus an exhibition. Contacts: CEP Exposium, France - Tel: +33 1 49 68 52 64. Fax: +33 1 47 37 75 09. IMEX Management, Inc., - Tel: +1 301 460 9751. Fax: +1 301 460 0045.

Converging Technology Applications Conference and Intelecard Marketing Applications Cardexpo, Stouffer Resort, Orlando, Florida, USA, 29 October-1 November.

Contact: Rita Skehin, The Paradygm Forum/Panther Production Strategies, USA - Tel: +1 800 221 5334. Fax: +1 905 935 7478.

Maximising the Potential of the Electronic Purse, Rembrandt Hotel, London, 30/31 October.

Updates from key players in the electronic banking industry. Contact: SMi - Tel: +44 (0)171 252 2222. Fax: +44 (0)171 232 2292.

The Revolution in Technology for Retail Smart Cards in Telecoms, Regus Conference Centre, London, England, 28/29 September.

Presents emerging market trends and opportunities in Smart Card technology and global telecommunications with a number of case studies. Contact: AIC Conferences +44 (0)171 242 2320. Fax: +44 (0)171 242 2324.

Smart Cards International '95, Regents Park Marriott Hotel, London, 12/13 October.

Conference plans to focus on the operational aspects of Smart Card applications. Key areas will be: card population management, matching card designs to the operational environment, loyalty schemes and putting Smart Cards into operation from concept to monitoring results. Contact: ICM Marketing, UK - Tel: +44 (0)1483 37557. Fax: +44 (0)1483 33082.

CarteS '95, CNIT Trade Centre, La Defense, Paris, France, October 25-27.

Banking, Café Royal, London, 8/9 November.

Includes using chip cards to build customer relationships and developing strategies for the information superhighway. Contact: IBC Financial Focus - Tel: +44 (0)171 637 4383. Fax: +44 (0)171 323 4298.

The 11th European Payments '95 (EFTPOS & Home Services) Conference, Sheraton Grand Hotel, Edinburgh, Scotland, 21/22 November.

Overview of the changing payments scene plus sessions on fraud and security, Smart Cards and the electronic purse, chip standards, cross border payments, etc. Contact: SETG, UK - Tel: +44 (0)141 553 1930. Fax: +44 (0)141 552 0511.

From there to here Part - 7

Electronic Signals and Transmission Protocols.

There is currently much debate about the interoperability of the various Smart Card schemes being developed around the world. The picture of multiple terminals on the retailers counter is still fresh in the minds of those people involved in the development of EFTPOS (Electronic Funds Transfer at the Point Of Sale) terminals. The implication of various standards and specifications is often misunderstood so in this part of the tutorial we will try to resolve the key anomolies.

In general we can consider the scenario where the application running in one host computer (the chip in the Smart Card) and an application running in another host computer (the terminal) wish to exchange data. Clearly both the Smart Card and the terminal may contain several different applications. There is no reason to expect that these applications are in any way interoperable. This may be electronic purse applications, medical applications or even retailer loyalty applications. Unless the same application exists in both host computers, the meaningful exchange of application data is not valid. These applications are normally implemented by software modules running on both host computers. Clearly the hosts may be technically different as may the software modules but they are functionally compatible.

The International Standards Organisation ISO has developed an OSI (Open Systems Interconnection) model which defines a number of layers (7) by which data can be exchanged between applications running on systems that are "open" to each other by means of mutually agreeable standards. We can apply the same approach to Smart Card systems but can avoid most of the complexity of the OSI model which is not relevant to a much simpler implementation.

Smart Card applications are usually invoked as a simple command/response architecture using a direct link between the two hosts. As such our greatest interest here is to ensure interoperability that will allow data exchange to use a common standard for the lowest two layers of the OSI model,
- T=0 transmission protocol
- T=1 transmission protocol

the physical layer and the data link layer.
It is primarily these two layers which are the subject of ISO 7816-3 which is the standard for electronic signals and transmission protocols.

The physical layer covers four concepts,

- Mechanical
- Electrical
- Functional
- Procedural

We have already discussed the mechanical specification so our attention will be directed to the electrical, functional, and procedural aspects of the ISO 7816-3 standard. A well known physical layer standard is RS232-C. This is not actually an ISO standard but came from the Electronic Industries Association of Washington DC (EIA). The International counterpart is V24 which comes from the International Telegraph and Telephone Consultative Committee (CCITT). The Smart Card standard ISO7816-3 does not conform to either RS232-C or V24.

Before we start on the detail of the ISO 7816-3 standard we need to inform readers that this part of the standard is currently under review. One of the briefs is to incorporate the two additional ammendments produced since the original standard was agreed concerning the T=1 communications protocol and protocol type selection (PTS). The significant changes are in the voltage and current supply to the Smart Card where the voltage supply range is to be increased from 5V only to allow 3V to 5V operation. The other significant change surrounds the current supply available from the terminal to the Smart Card. The existing standard specifics 200 mA capacity but this is likely to be decreased to 50mA. This in part represents reality (no common Smart Card takes more than 50mA) and the need to move towards more viable battery operation in terminals.

The electronic properties and transmission characteristics of the IC card are fundamental to interoperability. The principal subjects to be considered are as follows,

- Electrical characteristics
- Character transmission
- Answer to reset (ATR)

- Protocol type selection (PTS)

We will consider each of these topics in turn.

IC Card Electrical Characteristics

We have previously discussed the position and definition of the IC connector and have identified 8 contacts of which 6 are currently defined,

- V_{CC} Power supply
- GND Ground or reference voltage
- CLK Clock
- V_{PP} Programming voltage
- RST Reset signal
- I/O Serial Input/Output

Power supply (V_{CC})

The power supply to the IC is defined to be between 4.75 volts and 5.25 volts with a maximum current consumption of 200mA. Both of these parameters have problems. Newer chip fabrication technologies are moving sub micron, 0.8um is already commercially available and 0.5um is not that far away. These chips may operate with a supply voltage of 3 volts which results in lower current consumption. Most card acceptor devices (CAD) operate at 5 volts as specified in the ISO standard. Whilst a 3 volt IC may be designed to operate between 3 volts and 5 volts, running a 5 volt IC at 3 volts may be a non starter.

A current consumption of 200mA is far too high for modern electronic equipment particularly when the equipment is portable and driven by a battery power supply. Most IC cards have a power consumption of between 10mA and 20mA (at 3.58MHz). ETSI in the development of their standards have adopted a far more rigorous specification of 20mA maximum for normal use and a 10mA maximum for use in portable equipment. They further defined the concept of sleep mode (not covered by ISO 7816-3) where the IC chip can reside in a latent mode preserving volatile memory contents with a maximum power consumption of 200uA.

Clock signal

Although the integrated circuit could contain its own clock circuit for driving the internal logic, in The sequence of operations for activating and deactivating the IC is defined in order to minimise the likelihood of damage to the IC. In particular the inadvertent corruption of the non-volatile memory (EPROM or EEPROM) must be avoided. The practice most IC chips are supplied with an external clock by the interface device. It should be noted that the speed of the serial communications on the I/O line is effectively defined by the frequency of this clock. The ISO standard aligns with the use of two widely used external clock frequencies, 3.579545 MHz and 4.9152 MHz. The former frequency is the more widely used (being based on the NTSC colour sub carrier frequency) and results in a clock divider of 372 in order to produce a 9600 bit per second (not exact but within tolerance) serial communication speed. The latter frequency has a simple divisor of 512 in order to achieve a 9600 bit per second communication speed. The standard defines the situation after reset whilst allowing the frequency to be selectively changed by means of protocol type selection.

Programming voltage V_{PP}

This signal is designed to provide the high voltage required to enable writing to the non volatile memory. The more popular IC'c use EEPROM memory where the high voltage is generated by a charge pump on chip. However the EPROM memory type needs the high voltage (usually 12.5V or 21V) to be externally provided on the IC connector. There have been problems in the past with terminals supplying the wrong programming voltage with somewhat drastic effects. Because of this and the significant advantages of having a rewriteable memory the EEPROM memory is by far the most popular for IC card applications, hence the role of V_{PP} is rapidly diminishing.

The Reset Signal

The reset signal is asserted by the interface device and is used to start up the program contained in the IC ROM. The ISO standard defines three reset modes, internal reset, active low reset and synchronous high active reset. Most microprocessor ICs operate using the active low reset mode were the IC transfers control to the entry address for the program when the reset signal returns to the high voltage level. The synchronous mode of operation is more commonly met with the memory card ICs as used for telephone applications.

activation sequence for the interface device is defined as follows,

- Take RST low
- Apply V_{CC}

- Put I/O in receive mode
- Put V_{PP} in idle mode
- Apply clock
- Take RST high (active low reset)

The IC deactivation sequence for the interface device is as follows,

- Take RST low
- Take clock low
- Deactivate V_{PP}
- Put I/O in the low state
- Deactivate V_{CC}

Serial Input/Output (I/O)

The ISO standard defines a single line for the interchange of data between the IC and the interface device. This means that the line must change direction depending on whether the IC is transmitting or receiving. In practice this cannot be instantaneous and the expression 'line turnaround time' is commonly encountered in the modem world. The transmission protocol must take account of this need to turn the line around.

Character Transmission.

The transmission characteristics operated by most microprocessor IC cards are based on an asynchronous half duplex mode of operation. In the T=0 communication protocol this involves the transmission of bytes whilst the T=1 protocol defines a block mode of operation. As we have already observed the serial communication is operated by the use of a single chip connector, where the direction of data transmission has to change depending on whether the IC card or interface is transmitting data. This is referred to as half duplex communication whereas two I/O signal connectors would be required for full duplex operation where transmission can take place in both directions concurrently.

There is a further problem with the asynchronous character transmission that makes life difficult for a PC to act as the interface device. The 7816-3 standard defines an error detection and recovery operation (mandatory for T=0) that cannot be managed by the normal PC UART. When the receiver detects a parity error on reception it takes the I/O line to the space or low state in the middle of the first stop bit guard time. The transmitter is mandated to sample the I/O line at the start of the second stop bit guard time period. When the error condition is sensed then the transmitter should retransmit the erroneously received character. Clearly the transmitter cannot be outputting stop bits but must let the line go high during the guard time in order to sense the line state. Given the close coupling normally achieved between an IC card and the interface device one has to question whether this level of error control has sufficient benefits to outweigh the disadvantages. Error control at a higher level in the OSI model is preferable in this situation and although this could be handled at the

The asynchronous type of transmission is similar to that used by the serial RS232C connector met on the personal computer. Although the PC operates in full duplex mode. The transmission of a single character (defined as 8 bits) requires an overhead of several bits as follows,

-Start bit (*used for character frame synchronisation*)
-Parity bit (*for error detection*)
-Guardtime (*separation between characters*)

The format of a character frame is shown in fig.1 The receiver examines the I/O line looking for the transition from the mark or high state to the space or low state. The sampling of the line is required to be such that the receiver monitors the state of the line in the centre of each bit period with a precision of $\pm$ 20% . The parity bit is defined to achieve even parity which means that the number of 1's in the 8 data bits and the parity bit together results in an even number.

The guard time is defined to be equal to two bit periods (although for block mode it can be changed to a 1 bit period). This is similar to having two stop bits on a UART (Universal Asynchronous Receiver Transmitter) as used in the PC.

A more common definition of the asynchronous serial transmission at reset would be 9600 bits/second, 8 data bits, even parity, 2 stop bits with half duplex mode of operation. The half duplex refers only to data transmissions in one direction at a time which a PC is perfectly capable of managing with its UART. The RS232C interface however defines two separate wires for data transmission and reception which would need hardware modification in order to interface with the single wire IC card directly.

application level the T=1 communication protocol applies error control at the frame level .

David Everett (next month - part 8)

Electronic Signals and Transmission Protocols - contined.

Telecom Calling Card

France Telecom's calling card will be shown by Solaic at Telecom 95 being held in Geneva, Switzerland, from 3-11 October.

Solaic developed the mask and manufactured the card which has a number plus a PIN and can be used via an operator or automatically to make domestic or international calls. It also has the capability of automatically dialling ten numbers entered by the cardholder.

The card gives access to services such as simultaneous interpreting, document translation via fax or modem, and the transmission of telegrams from a telephone.

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

Isle of Man Order for ORGA

A contract to supply 6,000 phase two SIMs to Manx Telecom, Isle of Man, has been won by ORGA Card Systems (UK).

In addition, ORGA will also supply the Dr SIM point of sale units to enable Manx Telecom to offer customers additional services.

Manx Telecom, a wholly-owned subsidiary of BT, the British telecommunications company, has been operating the current analogue cellular network under licence from Cellnet since 1986 and will launch the GSM service in January 1996.

Contact: Mike Cook, Commercial Controller, Manx Telecom - Tel: +44 (0)1624 636003. Simon Reed, ORGA Card Systems (UK) - Tel: +44 (0)1491 410997.

Siemens to Build £8.1bn Chip Plant in the UK

Siemens AG is to build a new £680 million semiconductor plant in the UK to manufacture chips for Smart Cards, mobile telephones and consumer electric equipment. Work on the first phase will start at the Hadrian Business Park site at Newcastle in North East England later this year with first production runs scheduled for the Summer of 1997.

Plans for a second phase development on the site, subject to market forces, will require a further investment of £450 million.

Although Munich-based Siemens denies that the low value British pound is the prime reason for the decision to opt for the UK site, analysts see it as a move to match production to markets and at the same time avoid over exposure to the strength of the Deutschmark and high labour costs in Germany.

The group's existing plants at Regensburg, in Germany, and Villach in Austria are also to be expanded.

The UK development will create 1,800 skilled jobs, including an initial team of German technologists.

Jürgen Gehrels, Chief Executive of Siemens plc, acknowledged the contribution of the Department of Trade and Industry and the Invest in Britain Bureau in helping to put forward a case for building the plant in the UK.

Jürgen Gehrels, Chief Executive of Siemens in the UK, checks out the greenfield site of the company's new semiconductor plant.

"The decision to make a long-term investment in the UK is excellent news, not just for our company here, but for the whole British electronics industry," he said.

Contact: Graham Nott, Product Specialist Smart Cards, Siemens plc Semiconductors - Tel: +44 (0)1344 396579. Fax: +44 (0)1344 396632.

Tourist Gold Card for London

A pre-paid London Gold card is to be launched next April for Visitors to the British capital who will be able to use it instead of cash at major attractions, entertainment venues, hotels and shops.

Similar to a pre-paid telephone card, it will be available in values of £20,£40 and £50 at travel agents, tour operators, Bureaux de Change, major London hotels and selected retailers.

The new product has been developed by two UK computer software companies, Dione developments and Datahand Technology. The card, a simple memory card with a Siemens SLE 4412 chip, is being supplied by McCorquodale Card Technology which will deliver 25,000 initially.

London Gold Card Company, the sales company set up to promote and distribute the card, says already over a hundred outlets have agreed to participate in the scheme.

Participating venues will rent a card reader terminal and will be featured in a pocket guide that accompanies the card. Approved group organisers can join the scheme for a small annual subscription which includes an initial package of 20 cards and 100 guides, and will be awarded commission on each card they sell to group members.

Contact: Arne Reddy, Promovision - Tel: +44 (0)181 743 8449