Fly London - Paris on a Smart Card

Air Jet has introduced pre-paid Smart Cards for business travellers on its scheduled flights between Paris and London City Airport in a scheme which does away with the normal paper tickets and traditional reservations.

The card costs £750 and is valid for five flights between the two airports - Charles de Gaulle in Paris and London City Airport (£300 return) excluding passenger/airport tax. As a launch promotion until December 1995, Air Jet is giving a sixth flight free.

Services include card purchase by telephone, free delivery from Air Jet, car parking with privileged space at Charles de Gaulle Airport in terminal car park (your car is parked for you) and immediate boarding after check-in which is done automatically. At London City Airport, passengers pick up their tickets automatically and can go to the VIP lounge where they will be offered a drink.

Next Month

Smart Card Tutorial - Part 10
From There to Here continued
The T=1 protocol

CONTENTS

Air Jet Card

Air Jet passengers purchase their Air Jet Cards from normal travel agencies or direct from the company. The card is customised to the owner and delivered free of charge by Jet Services in France or in London. Booking is simple with either a phone call or fax to the Air Jet Club based in Paris. It also enables the cardholder to have priority up to five minutes before boarding.

One flight is deducted from the outstanding credit every time the card is used. Passengers go to one of the automatic check-in readers located in the satellite at Charles de Gaulle and in the hall of the air terminal at London City Airport, where they insert their card and receive a ticket serving as a boarding card after being debited on the Air Jet Card. When all flights have been taken, the card is thrown away.

The Air Jet Card system has been supplied by CPS Technologies of France. Schlumberger Smart Cards and Systems have supplied the ME2000 Smart Cards. Initially about 700 cards have been personalised for customers and a further 5,000 cards will be delivered during the rest of the year.

The Paris-London route is described by Air Jet as the biggest business class market in Europe with four million passengers in 1994 - 44% in business class. Currently three airlines hold 94% of the market: British Airways (47%), Air France (30%) and British Midland (17%). With its no-ticket no-booking concept, Air Jet is aiming to become a major operator on this route.

Contacts: Simon Greenbury, Infopress, UK - Tel: +44 (0)171 353 2320. Jet Services, France - Tel: +33 72 80 77 77.

China Orders Smart Payphones

Beijing Telecommunication Administration (BTA) and the Guangdong Telecommunications Administration have ordered 2,000 Smart Card payphones from GPT Payphone Systems for installation by the beginning of 1996.

GPT is supplying its Sapphire IC payphones which will enable customers in China to make calls using the latest technology pre-paid IC cards; and its all-payment variant of the Sapphire which accepts coins, pre-paid IC cards and credit card payment options. This initial contract follows successful field trials by GPT and BTA in the Chinese capital. According to BTA, Smart Card technology will play an important role in turning Beijing into an international metropolis with a popular, convenient public payphone network.

GPT has been active in China since 1986 in the improvement of telecommunications access in the Shenzhen Special Economic Zone in the Guangdong province where the Shenda Telephone Company, for example, has been operating GPT magnetic card payphones since the early 1990's.

Contact: Bernard Brooks, Managing Director, GPT Payphone Systems, UK - Tel: +44 (0)151 228 4830. Fax: +44 (0)151 254 4586.

DataCard Security Badging System

DataCard Corporation has announced two new software driven options which enhance security for its badging system. QuickWorks image retrieval software can be used at point-of-entry for ID verification. As people enter the facility, a receptionist or security guard can retrieve electronic images from the database for ID confirmation when the standard ISO Smart Card is inserted in a reader.

The other product, QuickWorks image report generation allows users to access the image database and print customised full colour or black and white reports. For example, security guards can be provided with printed reports that show exactly who is authorised to enter a facility, or college professors can be given student rosters on the first day of a class.

Contact: Mark Iverson - Tel: +1 612 988 1763.

US/Japan Contactless Cards Plan

A partnership announced between Racom Systems, Inc., of Denver Colorado, USA, and Rohm Co. Ltd. of Japan, is targeting the contactless Smart Card market and offering what the partners describe as "significant price reductions and world-wide availability."

Rohm, one of the world's largest semiconductor companies with $2.8 billion in sales in 1994, is currently starting up a new 0.6 micron wafer fabrication in Kyoto, Japan, dedicated to the high volume manufacture of ferroelectric application specific integrated circuits (ASICs) and has licensed Racom's contactless, battery-free ferroelectric technology to specifically serve the Japanese market.

The partnership includes the manufacture of ferroelectric ASICs for use in Racom's contactless, battery-free Smart Cards as well as a new generation of advanced microprocessor based ASICs currently under development for use in high security financial applications.

Optimistic

Hidemi Takasu, General Manager R&D at Rohm, says: "We are very optimistic about the future of ferroelectric technology and its impact on the Smart Card industry."

In April, 1993, Racom announced its new contactless FRAM (Ferroelectric Random Access Memory) card which is able to store data in the absence of power. Racom claims that there are already over 100 customer installations world-wide using them.

These include Hong Kong's new airport where all workers are being issued with cards as the only form of payment for goods and services, including those provided by the airport's cafeterias, bars and shops. The cards include two separate electronic purses to enable segregation of employer funded purchases from personal purchases.

The cards are also being used in an Automatic Fare Collection (AFC) pilot in the Greater Manchester area in the UK and in a trial with bus and rail commuters in Toronto, Canada.

Racom President, Richard Horton, says: "With Rohm's support we are now able to deliver to our customers throughout the world all the advantages of contactless Smart Cards. More importantly, we can do so in high volumes and at a total cost that is below that of contact Smart Cards."

Contact: Richard Horton, President, Racom Systems - Tel: +1 303 771 2077 Fax: +1 303 771 4708.

Personal Information Card Plan

An alliance to develop a secure infrastructure which will enable corporations to speed new services to consumers via a Personal Information Card (a Smart Card) has been announced by the Hewlett-Packard Company, Gemplus and Informix.

It is intended that the data carried on the card will be fully encrypted for secure international communication enabling it to be used anywhere in the world, for example, for secure communications between employees of a multi-national corporation, secure transactions on the Internet, secure international transactions between credit card and service providers and secure personal information that also is managed by the owner.

This depends on the US government lifting export restrictions on products in Phase (1) of HP's International cryptography framework standard - one of the underlying technologies in the infrastructure that will enable the international use of Personal Information Cards. According to the company, the US government is currently reviewing the cryptography framework to determine exportability.

Hewlett-Packard says: "Personal Information cards, along with the international cryptography framework, will allow corporations to deliver services while still ensuring the privacy of each consumer's personal information."

Hewlett-Packard adds that consumers will be able to use their cards with multiple service providers to purchase airline tickets and storing air miles, reward transactions, etc.

Contact: Bart Coddington, HP - Tel:+1 408 447

1129.

Multi-function Student Card

Twenty thousand students at three Dutch universities have been issued with multi-functional Smart Cards in a one-year pilot scheme which may lead to the cards being issued to all 700,000 university students in The Netherlands.

The trial is being implemented by Informatie Beheer Groep (IBG), the organisation responsible for financial flow management between the government and students; IBM Netherlands and Dutch PTT Telecom.

The student card will act as a university ID card, public transport card, library card, PTT calling card and payment card for use in telephones, canteens and vending machines on the campus. Students can also use the card for making changes and updates to student data, for example, address change on the IBG database.

Recharging the purse

At the same time, PTT Telecom are piloting the card for loading and recharging of the electronic purse within their telephone network.

In Groningen, 7,000 students within the faculties of law and literature at Groningen University and 6,000 students at the School of Economics are involved in the pilot. In Twente, 7,000 students at Twente University are taking part. In addition, 4,000 employees in Twente and 700 in Groningen are being issued with a card, but without the transport function.

IBM's multi-function microprocessor card will enable further functions to be added and these will be investigated as the trial progresses.

A Card Production Station (CPS) has been developed by IBM for the distribution or replacement of the student card and consists of a card printer and a PC with special software which enables immediate on-site production of complete cards. The station can print all of the necessary personal information, including a passport photo (which can also be made on-site), onto the pre-printed chip card.

A small chip card reader can be used by students to change their PIN codes and to read electronic purse balances.

Contacts: Jan van Pelt, IBG - Tel: +31 50 999717. John Noakes, IBM (UK) - Tel: +44 (0)171 202 3706.

500,000 Meters Installed by L&G

Landis & Gyr (UK), which has pioneered Smart Card metering systems in Britain, recently installed its 500,000th system for a customer of Midlands Electricity plc (MEB). The householder, Mrs Anne Darby, will receive "free" electricity for a year which will be credited to her every time she recharges her Smart Power prepayment card.

Smart Power card customers are issued with their own unique Smart Card which can be recharged at over 600 outlets such as 24-hour garages, supermarkets and corner shops.

MEB now has 25,000 meters installed and five other electricity distributors are supporting the project.

Contact: Martin Pollock, Landis & Gyr (UK) - Tel; +44 (0)1952 677661. Fax: +44 (0)1952 677594.

Electronic Purses: A Comparative Review - Part 3

Country	Australia	Australia
Name of scheme	Quicklink SVC	Transcard
Capital investment	AUD 5-10 million	US$ 8 million
Operator	Quicklink Card Systems Ltd	Card Technologies Australia Limited
System developer	Quicklink consortium of ERG Australia and Fujitsu Australia	Transcard (Australia) Pty Ltd. and Card Technologies Australia Limited
Status	Pilot scheme late 1995	March 1995 start of six-month trials. Roll-out in Sydney's Great Western transport corridor early 1996 and then to other major cities
Multiple currencies	AUD only	Yes
Loadable amount	Up to AUD 500	Varies
Current applications	Fast food, transport, general retail, entertainment, payphones, petrol etc.	Electronic purse, tickets, incentives, memberships. Charge account.
Planned applications	Parking, taxi, tolls	-
Method of settlement	Banking system	Bank direct entry
Card fabricators	CP8 Transac	Gemplus, CHD, Mikron
CPU (Yes/No)		No

Country	Australia	Australia
ROM		No
EPROM/EEPROM		EEPROM
RAM		No
Co-processor (Yes/No)		No
Chip manufacturer/Type No.		Mikron
Security algorithm(s)		Proprietary and DES
PIN	No	Optional
Cards issued		2,000 plus
Card target	50,000	
Card reader/terminal suppliers		CTA Reader
Number installed	500 plus	150
Portable balance reader		Under development (wallet available)
Card recharging points		Optional
Contact	Peter Flower, General Manager	David Mac.Smith
Telephone	+61 2 252 4500	+61 2 332 4955
Fax	+61 2 252 4550	+61 2 332 1285

Electronic Purses: A Comparative Review - Part 3

Country	Indonesia	Lebanon
Name of scheme	SMARTBRI EP and Passbook	LINC EP
Capital investment		
Operator	Bank Rakyat Indonesia	23 Lebanese banks
System developer	n/a	LINC, Lebanese Interbank Card
Status	Start date September 1993	Start 1993
Multiple currencies		Dual currency card for different payments in US dollars/Lebanese pounds
Current applications	Multi-function card to provide off-line banking for BRI customers in 13,500 islands. Passbook can hold three PINs for family to share card	Mono or dual currency card, the card offers both electronic purse and credit facilities
Planned applications	---	Mixing Visa/MC application
Method of settlement	Transfer from Passbook to EP through ATM or bank terminals	Up loading of the transactions on-line or via a merchant Smart Card. Settlement performed by LINC
Card fabricators	Gemplus Card Technologies, Asia	Gemplus

Country	Indonesia	Lebanon
EPROM/EEPROM	3K bytes EEPROM	EEPROM
Chip manufacturer/Type no.	N/A	Gemplus Protected Memory Card GPM 896
Security algorithm(s)		Security by means of an internal fuse and secret codes. Blowing the fuse freezes the identification area contents. Identification area 64 bits (access controlled by fuse); application area 2 x 256 bits (access controlled by secret code), counter and secret codes 304 bits. ISO 7816-1/2 compliant, single 5V supply voltage
PIN	One to three (on shared family card)	Yes
Cards issued	20,000 for launch	14,000
Card target		40,000 end of 1996
Card reader/terminal suppliers		Dassault Automatismes et Telecommunications, France
Number installed		1,000 Dassault TPC 232 EFTPOS (The hand held module communicates with the servers of financial organisations via the communication module which also serves at the terminal support base. TPC 232 A is standalone; TPC 232 G is cluster version).
Portable balance reader		LCM
Card recharging points	ATMs and bank terminals	Card reloading is made in bank branches through Dassault AT LCM 102 Smart Card reader connected to a PC. Card recharging functions on ATMs will be implemented in 1996.
Contact	Remy de Tonnac / Chou Fang Soong, Gemplus Technologies	Valerie Lorcin, Dassault
Telephone	+65 776 1989	+33 1 30 81 28 17
Fax	+65 773 0648	+33 1 30 81 22 24

Chip Knip Launch in October

Transcard Roll-out in Australia

Transcard, Australia's first contactless electronic purse, ticketing and incentive Smart Card is to be rolled out following a successful six month trial which began in the western suburbs of Sydney, New South Wales, in March of this year.

More than 2,000 consumers now hold a Transcard which is accepted on local buses, by taxi drivers and at sporting facilities and retail outlets.

Transcard (Australia) and systems developer Card Technologies Australia (CTA) announced the roll-out last month and released the results of an AGB McNair report on the trial.

David Mac.Smith, Managing Director of CTA, said the survey showed that consumers find Transcard convenient and simple to use as it does away with the need to carry coins, notes and tickets. "More than 90% of cardholders consider Transcard easy to use, which is very encouraging given that Smart Cards are a new and unfamiliar territory to most consumers," he said. "Not only that, but Transcard's contactless technology was approved of by more than 80% of cardholders."

Chip Knip, the Dutch national Electronic Purse Card (*see front page*) is being launched this month in the city of Arnhem (population 144,000).

System developer, Interpay BV, comprising Bank Giro Centre, BeaNet, Eurocard Netherlands and representing all Dutch banks, has been finalising the arrangements.

Some 800 card readers are being installed in a wide variety of retail outlets including supermarkets, grocery shops, bakers shops, snack bars and restaurants. Several vending machine manufacturers are also taking part in the scheme and adapting their machines to accept the electronic purse. At the same time motorists will soon be able to pay with their Chip Knip cards when parking at any of the 22 car parks in the city.

It is anticipated that in this first phase, before national roll-out in 1996, that around 100,000 1K bytes EEPROM Smart Cards manufactured by CP8 Transac, a division of French Groupe Bull, will be distributed. Although this is more than two-thirds of the city's population there could be a demand from card collectors to obtain samples of the country's first electronic purse card.

More New Cards from DANMØNT

To mark the one thousandth anniversary of the first Danish coin *(see front page for DANMØNT card)*, DANMØNT has issued six different cards in co-operation with the Royal Mint and Collection of Medals, the national Museum and the Danish Numismatic Society. Recent advertisement cards issued are those promoting AVIS (car rental), Siemens, Miele (Laundrettes) and Tele Denmark.

Louda Offers Direct Support

Louda Systems has announced that all its major card production machines can now incorporate modems to give customers a direct link to their plant in Munich so that engineers can provide direct support with program modifications and servicing.

Contact: Bernhard Schmidt - Tel: +49 89 61 38 51-31.

Towards PO of the Future

Post Denmark, the Danish postal service, has launched the first self-service stand at Østerbro Post Office in Copenhagen where customers can send a fax, make photo-copies, obtain stamps and make telephone calls without queuing - provided they have a DANMØNT card, which can also be purchased there.

The survey involved face-to-face interviews with more than 200 cardholders in early May with follow-up interviews carried out four weeks later.

The majority of card use during the survey period was on buses with 88% of cardholders considering travel an important use of the card, but use in retail is growing strongly with retailers actively supporting the concept.

"Given the overwhelming success of the Western Sydney trial, Transcard will be rolled out into Sydney's Greater Western transport corridor early next year and then into other Australian capital cities," said Mac.Smith.

The system was developed by Transcard (Australia) Pty Ltd and Card Technologies Australia Ltd in co-operation with large Australian public transport groups. Unlike other Smart Cards being mooted by credit card operators, says the announcement, Transcard is anonymous and does not need any slots, PINs or signatures.

Contact: David Mac.Smith, Managing Director, Card Technologies Australia - Tel: +61 2 332 4955.

Postmaster Bent Pedersen said it would fill a need for busy customers and was another step towards the post office of the future - "a communication centre in the local community."

Contact: Bent Pedersen, Post Denmark - Tel: +45

35 28 91 20. Fax: +45 35 28 91 99.

Barclaycard Mobile Services

Barclaycard, the UK's biggest credit card issuer, and Cellnet, which has 40% of the UK mobile telephone market, have joined forces to provide value-added services via a jointly branded Smart SIM (Subscriber Identity Module) Card.

They are planning to market a specially developed phone to Barclaycard customers which will give them direct access to a number of Barclaycard services such as statement enquiries, credit limit increases, the payment of household bills, Barclaycard International Rescue and Barclaycard Assist.

Cellnet calls and other service charges will be automatically billed to the Barclaycard account giving up to eight weeks interest free credit. In addition, double Barclaycard Profiles points can be exchanged for gifts and leisure breaks, while rebates on Ford cars and Barclays mortgages will be awarded for the purchase of the handset and for all mobile charges.

The Cellnet phone will be made available by Barclaycard to its customers at a special price of £49.99 and cardholders will be offered a 20% reduction on Cellnet's Regular Caller Plus tariff for standard calls. Cellnet also has international roaming agreements which enables the user to make and receive calls in many countries around the world. Barclaycard is to offer the package to its nine million cardholders so Cellnet will be looking at substantially increasing its subscriber base.

The credit card company was the first to offer mobile credit card services to its customers using the Mercury One-2-One mobile phone network in June last year, and maintains its pioneering lead in this field in the partnership with Cellnet.

There are currently around four million mobile phone users in the UK and projected growth figures are estimated at up to 12 million by the year 2000. It seems logical that, in the near future, Barclaycard will launch a mobile phonecard electronic purse for the payment of small amounts and perhaps with a credit card option.
Contacts: Sara Mak, Barclays Bank - Tel: +44 (0)171 699 2673. William Ostrom, Cellnet - Tel: +44 (0)1753 565453.

Opposition to National ID Cards

A survey by the UK Data Protection Registrar has revealed that 54% of those taking part were opposed to the introduction of any identity card in Britain.

Some 54,000 information booklets, each containing a response form to enable readers to write to the Registrar with their views were distributed to libraries and Citizen Advice Bureaus. Of the 1046 which were returned, 57% were from those aged 55 and over and only 2.2% were from the under 18's.

Commenting on the survey, the Registrar, Mrs Elizabeth France, says: "It is not possible to draw any firm conclusions, given that this self-selected group cannot be representative of the population at large, if only because of the age distribution of those responding. Nevertheless there is a clear disparity of view. It would be difficult to argue on the basis of these responses that there was clear support for an Identity Card."

Mrs France may well be right but perhaps if the distribution of this report had been given more thought, such as sending it to schools/colleges, youth centres and pubs, the response would have been greater and from a wider cross-section of the public.
Mrs France goes on to say in her report to the Home Secretary that the very existence of an Identity Card and its supporting database brings a privacy threat. The existence of such systems facilitates what has been called the "surveillance society".

Surely then those people who could possibly be living in this "surveillance society" should be made aware of it and given the chance to express their opinion before the powers that be put the wheels into motion. What advice would the Citizen Advice Bureau be able to give to them then?

Referring to the card itself, Mrs France says whether it is a simple manual card or a sophisticated Smart Card, it should provide an appropriately secure medium for storing the personal information it displays or carries.

Contact: Mrs Elizabeth France, Data Protection

Server for Cashless Payphones

Schlumberger Electronic Transactions demonstrated at Telecom 95 its new server system to automatically manage payphone payments made by bank cards or new Stored Value cards. Called Mercure, it consists of a UNIX workstation with software to authorise and manage electronic payment transactions. Payments are consolidated in an Oracle database for subsequent download to banks or financial organisations.

The new technology results from a two-year development programme undertaken for France Telecom's network of some 140,000 payphones. Schlumberger plans to make the server technology available throughout 1996 in a range of systems.

Contact: Isabelle Ferdane-Couderc - Tel: +33 1 47 46 70 20. Fax: +33 1 47 46 68 66.

DANMØNT in Mass Transit

The DANMØNT card is now in use with the Copenhagen Mass Transit System where automatic ticket machines have been adapted to accept the card at four stations - Nørreport, Østerport, Vesterport and the cental station, Hovedbanegården.

If customer reaction is positive then it is expected that all ticket machines in the system will be changed to accept the card before the end of 1996.

Customers are already used to using machines as 85% of all tickets are paid for with cash and 4.6% of coupon books are bought from automatic ticket machines. This way of buying tickets will increase as, with the DANMØNT card, there is no need to carry change.

To help customers to familiarise themselves with using the card, DANMØNT's team of instructors will be on the stations to give advice and instructions. There is also a special display to guide customers through purchasing a ticket.

Contacts: Birte Brandt, Danish State Railways - Tel: +45 33 14 04 00, ext. 13801.
Henning N Jensen, DANMØNT - Tel: +45 43 44 99 99.

Registrar - Tel: +44 (0)1625 53571

GSM Public Payphone

GSM is the Global System for Mobile Communications with customers carrying their mobile digital phones around in their pockets or handbags, but Schlumberger and Alcatel have now produced the first GSM public payphone

Schlumberger says it provides an ideal means of extending the reach of public telephone networks in developing economies and rural regions as the GSM payphone can be installed in areas which are too expensive or difficult to serve by conventional fixed lines. The GSM payphone can be installed quickly and simply anywhere up to 35 km - and in certain cases 70 km - from a base station.

The development partnership between Schlumberger and Alcatel was formed to exploit the opportunities opened up by digital cellular communications and Smart Cards.

The new product is based on Schlumberger's outdoor payphone with Schlumberger responsible for the payphone and the user interface to the GSM network, with Alcatel providing the GSM communications interface based on its third generation handheld mobile phone.

Designed for Smart Cards

It is designed to accept pre-paid Smart Card phonecards, giving operators a simple and familiar means of providing customers with access to GSM technology. An option is for the operator to specify the payphone's reader capability to include credit cards.

Security and reliability are two of the key features of the payphone because of its use in remote locations. It is not possible, for example, to remove either component of the GSM interface - the mobile terminal or the subscriber module - and misuse them elsewhere
The partnership estimates that within the next five years alone, the market for the new phone is between 150,000 and 250,000 units. They also plan to introduce future features and services associated with GSM.

Contacts: Isabelle Ferdane-Couderc, Schlumberger, France - Tel: +33 1 47 46 70 20.

Sally Chew, Schlumberger, Singapore - Tel: +65 746 6344.

Phone Boost for Mondex

BT's introduction of 250 Mondex compatible payphones in Swindon, England, will give a boost to the worlds first electronic cash system pilot by virtually putting an ATM on every street corner.

The new payphones, supplied by the British telecommunications giant which is also a partner in Mondex, enables cardholders to access their bank accounts to withdraw or deposit cash.

Mondex Chairman, Tony Surridge, described the new payphones as "key to Mondex" and added; "we believe that having a cash machine on every street corner and over 80 in shops, is going to be a great attraction."

Bob Warner, BT Director of payphones, said the conversion of GPT payphones was "a non-trivial modification" and said it was never planned to have the phones installed for the launch last July. The introduction of Mondex compatible payphones was part of a sequence and with car parking, payphones and shortly buses accepting the card there would be a major impetus for Mondex.

Progress report

There are now over 8,000 consumers giving a total household penetration of 4% in just three months, which Surridge describes as "no mean achievement" and compares it with the CD player which has taken 11 years to be in 56% of households but after four years was only in 2%.

Well over half a million pounds has changed hands since the start of the pilot with over £300,000 Mondex cash withdrawn by customers and takings by retailers exceeding £250,000.

More than 700 outlets in Swindon now accept the card and Mondex is working with a number of retailers to put in place promotional deals that will bring added benefits to both customers and retailers.

Japan Construction Industry Cards

It is anticipated that IC cards will be in widespread use throughout the Japanese construction industry within the next 10 years. Currently there are some 6.4 million people working on building sites and one million pieces of heavy equipment plus related machinery and materials. Adding to the management problem is the fact that construction sites are not permanent and personnel and equipment are moved from one area to another.

It is for this reason that Smart Cards are seen as being ideally suited as a "data carrier". As these conform to ISO standards, different types of information can be stored and managed on a single card and from a security point of view, only authorised persons can have access to the data.

Three-year research

To create a working system that companies within the construction industry can use, the Ministry of Construction, the Japan Construction Mechanisation Association (JCMA), 38 private companies and 200 people have been involved in a three-year research programme to create: an on-site office system for the management of construction work; management systems for machinery, engineers and experts and the movement of material; and a usage manual and standard specifications.

This joint research project concluded that an IC Card system in the construction industry would:

* cut down on paperwork and related costs (approximately Yen 70 billion per year)

* increase worker productivity (Yen 1.6 million per worker per year)

* increase safety and save in compensation payments (approx Yen 170 bn per year)

* increase the number of licensed personnel, thereby raising quality and

Smart Cards are being used at several construction sites in Japan and these will be monitored to gauge the common use effect at several work sites and the size of necessary back-up systems.

Contact: Hiroshi Yoshimura, JCMA - Tel: +81 3 3433-1501 Fax: +81 3 3432-0289.

Smart Card Diary

Combatting Fraud in Mobile Networks, Inter-Continental Hotel, London, 9/10 November.

Two-day conference with a one-day pre-conference workshop to be held at Grosvenor House, London on 8 November. Contact: IBC Technical Services - Tel: +44 (0)171 637 4383. Fax: +44 (0)171 636 1976.

Smart Cards in Transport - The Next Steps, The Merchant Centre, London, 13/14 November.

A review of developing card technology and implementing transport applications with an examination of multi-function cards in transport-related uses and the provision of travel information. Contact: International Conference Group - Tel: +44 (0)181 743 8787. Fax: +44 (0)181 740 1717.

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.

Smart Card Expo '95: Into the Smart Card Era, Hong Kong Convention and Exhibition Centre, 22-25 November.

Organised by the Hong Kong Productivity Council (who organised the International Conference on Smart Cards last May) the Expo aims to provide a major window for Smart Card technology and products. Contacts: Ms Joyce Leung or Andrew Hau - Tel: +852 278 85798/278 85840. Fax: +852 278 85770.

On-line & Electronic Payment Mechanisms for Internet & Computer Mediated Transactions, Cafe Royal, London, 28/29 November plus one-day workshop on 30 November. Contact: IIR Ltd - Tel: +44 (0)171 915 5055. Fax: +44 (0)171 915 5056.

Global Smart Cards '95, Marriott Hotel, London, 4/5 December.

Contact: Juliane Jung, AIC Conferences - Tel: +44 (0)171 827 5967. Fax: +44 (0)171 242 1508.

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, Chairman, 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.

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.

Amphenol Quality Certification

Amphenol-Tuchel Electronics GmbH, specialists in chip card acceptor devices, has been certified by the DQS Deutsche Gesellschaft zur Zertifizierung von Qualitatsmanagementsystemen GmbH (German society for the certification of quality management systems). The company is already certified per DIN ISO 9001.

Contact: Axel Nitsche, Quality Assurance Manager, - Tel: +49 7131 929-303. Fax: +49 7131 920-400.

From There to Here - Part 9

The T=O Communication's Protocol

Communication protocols are an emotive subject and Smart Card communication is little different. The ISO 7816-3 standard allows for the card to hold multiple protocols and provides a method of switching between them. In practice this is a debateable concept since at the very least it loads the processor and memory of the Smart Card to the advantage of the terminal.

The ISO standard currently defines two communication protocols,

T=0   asynchronous half duplex character transmission

T=1   asynchronous half duplex block transmission

The T=0 protocol is relatively simple and has the lowest overhead on the Smart Card chip. The T=1 protocol is more sophisticated and includes much improved error handling. You can argue the right and wrongs until the cows come home but the difference is simply in the overhead on the chip. The T=1 protocol is better from a pure communication point of view but requires significantly more memory in the chip, both program memory and RAM working space. The designer needs to assess the reliability of the communication link and whether error handling at the application level is more appropriate.

The $T = 0$ protocol is still the predominant protocol and was the original protocol specified in ISO 7816 - 3. In 1992 ISO standardised the $T = 1$ protocol as amendment 1 to ISO 7816 - 3. Clearly the IC card and the interface device must operate with a common protocol. The method by which they achieve a common optimum configuration has been the subject of much discussion over the last few years. This principle is intended to be achieved by the use of protocol type selection (PTS). This is effectively a special command sent from the interface device to the ICC after the answer to reset. In order to maintain backward compatibility with existing commercial systems that may only be capable of handling the T=0 communication protocol some changes are

necessary to the original ISO 7816-3 standard. A new concept is proposed which identifies the principle of two modes of operation,

- Negotiable mode
- Specific mode

An ICC that operates in a negotiable mode may have its communication protocol changed by the use of the PTS command. An ICC that operates in the specific mode cannot accept a PTS command but may be put into the negotiable mode by a further assertion of the reset command.

Although the ICC indicates to the interface device (by means of TA_2) its capability to change to the negotiable mode, an existing device in the market place may however be unaware of these changes and therefore will not be prepared to reset the card.

The operation of these mode changes are shown in fig.1. It should be noted that a multi protocol card which by definition offers the negotiable mode of operation should give priority to the T=0 communication protocol. In other words if the T=0 protocol is available it should be the default protocol offered in the answer to reset.

The TA$_2$ interface byte which is part of the answer to reset data (discussed in part 4) gives the

necessary information to allow the appropriate choice of protocol. The coding of this byte when present is shown in fig.2. In fact the presence or otherwise of this byte is used to determine the mode of operation of the card as follows,

TA$_2$ present in ATR   -   Specific mode
TA$_2$ absent in ATR   -   Negotiable mode

It can be seen that bit 8 in the TA$_2$ byte is used to tell the interface device whether the card can change to the negotiable mode.

Protocol Type selection (PTS)

Protocol type selection is used by the interface device to change the communications protocol and/or the default values of FI and DI. The PTS command must be issued immediately after the answer to reset and only applies when the IC card is in the negotiable mode.

The interface device may choose to operate by using the first indicated protocol after the answer to reset and by using the default values of F and D. This results in an implicit selection of the protocol and the communication parameters. Should the interface device wish to effect any change to this situation then it must issue the PTS command.

The PTS request consists of an initial character PTSS (coded FF$_{hex}$), followed by a format character PTSO, and three optional characters PTS1, PTS2, PTS3 and PCK the check character. This is shown in fig.17. The response from the ICC follows the same format as the request.

The PTS0 format character is encoded as shown in

fig.3. The bit map is used to indicate the presence or otherwise of PTS1, PTS2 and PTS3. These are encoded by bits 5, 6 and 7 respectively where a logic `1' level indicates the presence of the character. The protocol type is indicated by bits 1, 2, 3 and 4 which are binary encoded for T=0 to T=15.

The PTS1 character when present is used to define the values for FI as coded for TA1. These parameters are used for defining the work etu (elementary time unit).

The check character PCK is computed such that the exclusive OR (XOR) of all the characters from PTSS to PCK inclusive is equal to zero.

When the ICC implements the PTS request message correctly it replies by echoing the same request as the response message. If bit 5 of the PTS1 response character is set to zero then the default values of F and D will be used.

The T=0 communication protocol

The interface device always initiates the command for the T=0 protocol. Interaction between the interface device and the ICC results in successive commands and responses. For this protocol, data can only flow in one direction for the command response pair. In other words, either the command message contains data for the ICC or the command request data from the ICC which is then included in the response. The direction of data flow is implicit on the definition of the command and hence both the interface device and the ICC need to have the necessary a-priori knowledge. When it is required to transfer data in both directions for a particular command then a get response command may be used after the primary command to recover the response data.

The command message consists of a 5 character header which the interface device sends to the ICC. The ICC then replies with a procedure byte after which either data is sent to the ICC, or from the ICC, depending on the particular command. This procedure byte is to allow the interface device to control the V_{pp} EPROM programming voltage. In the case of EEPROM memory this procedure byte is effectively redundant. The message flow for the T=0 protocol is shown in fig.4. The command header consists of the following 5 bytes,

CLA - the instruction class (FF is reserved for PTS)
INS - the instruction code (e.g read memory)
P1 - instruction code qualifier (e.g memory address)
P2 - additional INS code qualifier
P3 - the length of the data block

When P3 is equal to zero the data from the card will be 256 bytes. When data is to be transferred into the card then a zero data transfer is implied.

The normal condition for the ACK procedure byte is for this byte to echo the instruction byte (INS). Other options allow the interface devices to control the V_{pp} programming voltage as required. The card may optionally send a NULL procedure byte (60_{hex}) which allows further time for the processing of the command. In this situation the IFD should await a further procedure byte. The ISO standard also allows the card to send the first status byte (SW1) as the procedure byte.

There are two status bytes SW1 and SW2. These bytes are sent from the ICC to the interface device on completion of the command to indicate the current card status. The normal response is,

SW1, SW2 = 90_{hex}, 00_{hex}

When SW1 = 6X or 9X various error conditions are reported by the card. ISO 7816-3 defines 5 such error conditions,

SW1=6E - Card does not support instruction class
   = 6D - Invalid INS code
SW1= 6B - Incorrect reference
   = 67 - incorrect length
   = 6F - no particular diagnosis

The T=0 protocol also includes an error detection and correction mechanism. This was described in part 4 and relies on the receiver detecting a parity error upon which it takes the I/O line to the low logic level within the first etu guard time (10.5 $\pm$ 0.2 etu) for a minimum of 1 etu and a maximum of 2 etu. The transmitter looks for this condition and retransmits the corrupt character.

David Everett

(next month - part 10) - The T=1 communication protocol

Smart Card Industry Guide 1996

Following the success of the first edition of the Industry Guide, SCN is now in the final preparation stages for the 1996 version. If your company was not included in the first edition, now is the time to contact Chris Stephenson on +44 (0)1273 626677 or fax +44 (0)1273 624433 for a company questionnaire. Your free entry will be read by over 2000 industry related companies worldwide.

Limited advertising space in this prestigious publication is still available at highly competitive rates. To receive an advertising pack, fax, telephone or email Chris Stephenson (email scn@pavilion.co.uk).

Advertising copy must be with us by the 15th December to guarantee your inclusion.

New Appointments

Following the recent move of SCN to larger premises, Mrs Julie Barnes has been appointed as an investigative journalist. Should your company have any new developments/products/contracts/personnel which would be of interest to our readers and you would like to see featured in SCN, please contact Julie.

Mr David Lavelle has been appointed graphic designer to SCN Seminars to help in the production of next year's Smart Card training seminars.

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)

As a (new) 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.

☐ Please invoice my company   ☐ Credit card (Visa/MasterCard/Eurocard/Access/AMEX)

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

Send cheques to: Smart Card News Ltd., PO Box 1383, Rottingdean, Brighton, BN2 8WX, UK. or fax application to +44 (0)1273 624433 / 300991

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

Tel--Fax---

Fresh Start Watercard in Wales

Fresh Start, the Welsh Water voluntary budget prepayment system using Smart Cards, has completed an 18-month trial in the Cardiff and Newport areas and is now being made available throughout the Dŵr Cymru Welsh Water region of the UK.

The system consists of three main elements - the Watercard, a home unit and a Watercard charger. The Watercard is a Smart Card by which payment is made. Customers can put value on their card at any one of 319 Post Offices throughout Wales using the Post Office's automated payment terminals where the card is inserted in the charger unit and is credited with the payment value.

The chargers are polled nightly by Post Office Counters and the information is sent the following morning to the water company's accounting system. The information includes the date, time and amount of payment together with the Post Office ID where the transaction took place. As the home unit is able to write information to the card, details of the home unit readings are also transferred.

At home, the card is inserted into the home unit which is credited with the payment. The home unit operates a water control valve on the customer's premises. Although not used by Dŵr Cymru Welsh Water the home unit can also operate a water meter for metered tariffs.

The home unit constantly displays the value remaining and at a predetermined level (currently £3) warns the customer both audibly and visually that the value is low. If necessary, the customer can then evoke a week's emergency credit. At the request of the customer, the unit can also display a statement of account.

The system was developed and manufactured by GEC Meters and supplied by Kent Meters. It can be applied to both unmeasured or metered tariffs.

In the case of Dŵr Cymru Welsh Water it's use is applied to the unmeasured sector.

In the system, two types of cards are available, one having a monetary value of fixed amounts - £5, £10 and £15 - for rural operation, while \the other is rechargeable for urban areas as in the case of Dŵr Cymru Welsh Water.

The Smart Cards are supplied by Gemplus and joint venture company Delphic (Philips Smart Cards & Systems and De La Rue).

At the end of the first quarter of this year some 1,800 units had been installed in the Cardiff and Newport areas and a MORI survey showed widespread satisfaction with the system - 92% of customers were satisfied and only 4% dissatisfied.

The MORI conclusion was: "The great majority of Watercard customers are satisfied with the system, find it convenient and affordable, would recommend it to others, find it a better system of payment than their previous method and, critically, wish to continue paying for their water with Watercard."

Contacts: Kent Meters is located in Luton, Bedfordshire, England. Tel: +44 (0)1582 402020. Phil Johnson, Dŵr Cymru Welsh Water - Tel: +44 (0)1222 787106. Fax: +44 (0)1222 464283.