SMART CARD NEWS

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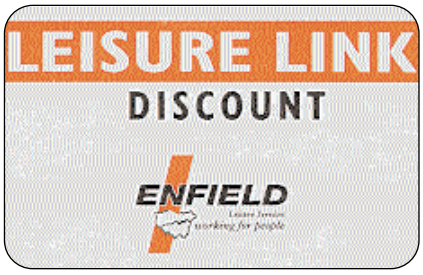
Dual Chip Cards to Target Banking and Transport

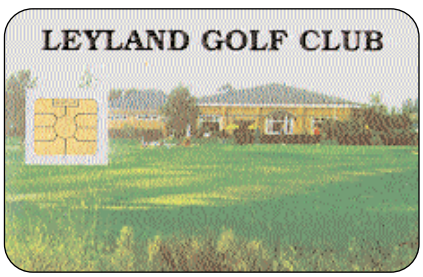
Positive moves towards implementing combined contact and contactless Smart Cards for use in both banking (and other applications) and public transport - applications generally considered to require different technologies - have been made in recent weeks by major players in the industry.

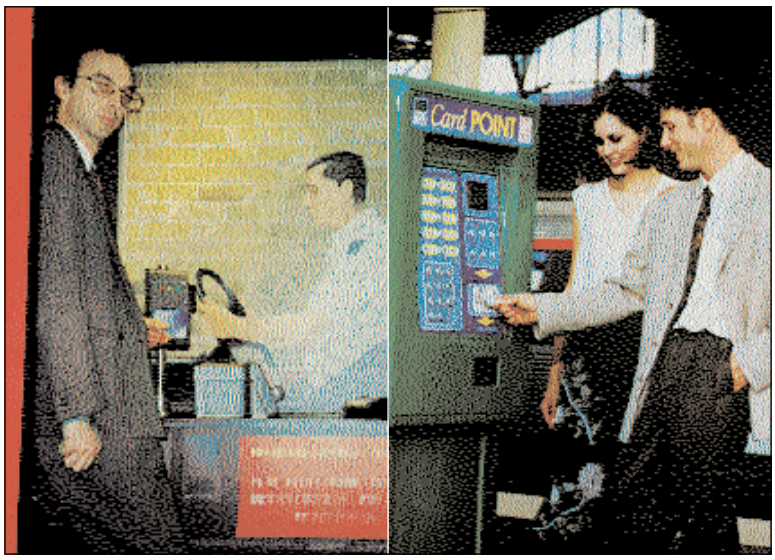
Early this month, Banksys, the Belgian developer of the Proton electronic purse, and ERG, the Australian leader in automatic fare collection in public transport, formed a joint company. Plans include the development, with card manufacturers, of a multi-purpose Smart Card capable of providing both contact and contactless functionality.

The announcement follows the decision by Smart Card chip manufacturer Motorola to enter the field as a card manufacturer, significantly targeting transportation and banking as its initial markets and concentrating on combination and contactless cards.

Continued on page 63







April 1997

News

Smart Card Tutorial

Cards on the Cover
The Praxicarte, a Contactless Smart Card
Page 71
ORGA DENTCard
Page 66
Enfield Leisure Services' Leisure Link Discount Card
Page 72
Leyland Golf Club
Page 72

How to Subscribe
If you wish to subscribe to Smart Card News please complete the form on page 79

Don't Forget!
Our On-Line Website, containing a Library of Smart Cards and information about the full range of SCN services, can be found at the following address:
http://www.smartcard.co.uk

The International Smart Card Industry Guide 1997 / 98

Smart Card News Ltd publishes an annual directory, The International Smart Card Industry Guide. Written and edited in close liaison with Smart Card Manufacturers and Scheme Operators, this indispensable guide is the definitive text on the Smart Card Industry. The Guide also includes Technical Tutorials, written by the leading experts in the field, essential for a working knowledge of the technology. Entries of company details are free, and companies have the opportunity to advertise in the Guide.

We are currently researching the third edition, due to be published in September of this year.
If you would like your company details to be included, or if you would like to advertise in this year's Guide please contact our Marketing Manager, Albert Andoh, who will be pleased to discuss this with you.

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Managing Director *Patsy Everett* ***Editor*** *Jack Smith* ***Technical Advisor*** *Dr David B Everett*
Journalist *Anna Ronay BA (Hons)* ***Graphic Designer*** *David Lavelle BA (Hons)*
Editorial Consultants *Dr Donald W Davies CBE FRS, Independent Security Consultant*
Peter Hawkes, Principal Executive Electronics & Information Technology Division, British Technology Group Ltd
Simon Reed, Marketing and Business Development, Orga Card Systems UK
Printed by Design and Print (Sussex) Ltd. Telephone: +44 (0) 1273 430430.

Dual Chip Cards

Continued from page 61

Public transport operators have long been in favour of contactless Smart Cards for automatic fare collection (AFC), primarily because they speed boarding as the traveller does not have to insert the card in a reader.

By simply holding the contactless, or proximity, card close to the reader, the fare can be electronically deducted without even removing the card from a wallet or purse. This also reduces the "fumble" factor for the elderly or disabled and people carrying babies and shopping.

The banks, however, concerned about security, have adopted the contact Smart Card for its secure storage of information and protection with encryption algorithms such as DES and public key cryptography.

All the major Smart card fabricators are now offering contactless cards in their range of products and many are developing cards combining the two technologies.

Banksys/ERG Joint Asian Venture

Banksys, the Belgian developer and implementor of the Proton electronic purse technology, and ERG, the Australian leader in contactless Smart Card public transport fare collection technology, have announced the formation of a joint company to promote multi-purpose Smart Card electronic payment systems throughout Asia.

In an announcement early this month, the two companies said these systems will allow payment for all types of goods and services including Internet transactions.

Terms of the agreement provide for Banksys to license its Proton technology to the joint company which will sub-license the technology to operating companies to be established throughout Asia.

The Proton technology is currently the most widely used electronic purse technology on an international basis *(see SCN March 1997)*.

ERG has licensed its Public Transport Central Clearing System and Financial Clearing System technology to the joint company. These systems allow operation of the Proton system on an in-country basis interfaced to the local banks and enables a broad range of card issuers to use the system including public transport operators.

Dual functionality development

In a statement, the two companies said that as part of their co-operation they will work together on the integration of the two technologies and will collaborate together with card manufacturers on the development of a Smart Card capable of providing both contact and contactless functionality.

Licences and territories covered by the joint company are: Cambodia, China, Hong Kong, Indonesia, Korea, Laos, Malaysia, Singapore, Sri Lanka, Taiwan and Vietnam.

ERG will provide project management and technical support in the Asian region for the joint company and represent the Banksys technology in the region.

ERG is currently implementing a pilot transport system, called QuickLink, in Australia using contactless Smart Cards.

The joint company will be funded by the share-holders and sub-licence fees. In addition the partners expect to finalise the raising of an initial round of new capital to expand the activities in Asia.

Contacts: Sarah Manners, *Corporate Comms, ERG* ***- Tel: +61 9 273 1100. Fax: +61 9 273 1208. Daniel Skala,*** *International Sales Manager, Banksys* ***- Tel: +32 2 727 6427. Fax: +32 2 727 6767.***

Motorola to Manufacture Smart Cards

Motorola announced last month that it is to manufacture Smart Cards and offer total solutions in the global market. The news will dismay the major card manufacturers as Motorola, already a developer and manufacturer of IC chips, is also the biggest chip supplier in the world.

At a press conference in Schaumburg, Illinois, USA, Motorola Chief Executive Officer Christopher Galvin, announced a new business

unit called the Smartcard Systems Business (SSB) and said they would be "actively competing for market leadership" and offering a full portfolio of products that support multiple Smart Card applications and offer high levels of security.

Added to its chip production expertise, Motorola is also to use its RF (Radio Frequency) and software technological expertise to develop and expand the market for combination and contactless cards and offer migration to next-generation architecture. Initial markets include transportation and banking.

"Our decision to provide a total solution to the Smart Card market comes at a very crucial time in this industry's development," explained Galvin. "We believe consumers are going to demand more functionality, higher standards of security and greater ease of use from their Smart Cards.

32K bytes card

Motorola will start shipping the first cards in the fourth quarter of this year with 32K bytes of memory - double the only recently achieved memory of 16K bytes - and forecasts 100K bytes by the year 2000.

The first cards are expected to come off the production line at a Motorola factory in Indala, California, which, until now, has only manufactured single function cards. Future plans are for Motorola to manufacture in the major market areas using its worldwide facilities, but in some cases in partnerships with key industry players.

Mark Davies, Vice President of SSB commented that technology advances will enable consumers to personalise their individual Smart Cards to their specific needs, selecting applications such as electronic commerce and frequent-user programs that are important in enhancing personal and business life. According to Davies, the consumer will ultimately carry a multi-purpose "white" Smart Card and simply load the desired applications into it just as a painter would fill a blank canvas.

But the immediate reality is seen in Motorola's initial target markets as transport and banking - two growing and potentially huge markets.

Contact: Sue Rizzello, *Smartcard Systems Business* ***- Tel: +44 (0)171 344 1200.***

L&G Transaction Processing Trial

Landis & Gyr is entering the field of payment transaction management with a new service to be offered to utilities, particularly the electricity authorities.

The Payment Systems division has started trials in Ireland and Switzerland involving L&G's PISCES Smart Card-based electricity system with the aim of not only installing the infrastructure, but also managing the processing of transactions.

Points of sale at the trial sites are polled from L&G's Payment Systems headquarters in Telford in the UK and the transactions managed by staff. This means that the utility only has responsibility for the installation of meters in domestic premises - all other operations on the system can be managed by L&G as an independent third party with anticipated significant operational savings for the utility.

Contact: Martin Pollock, *Director of Payment Systems* ***- Tel: +44 (0)1952 677661. Fax: +44 (0)1952 677594.***

Cash Machines Top 22,000 in UK

There are now more than 22,000 cash machines in the UK with supermarkets, train stations and football grounds amongst the locations. Figures announced by APACS, the Association for Payment Clearing Services show there are now 22,121 machines of which over 4,000 are situated away from bank branches.

Richard Tyson Davies of APACS told SCN that "as yet there are no ATM's able to read chip cards within the UK, but there are expected to be between 40 - 50 ATM's able to read chip cards in Northampton and Dunfirmline for the trial in October 1997 *(see SCN March 1997)*. By mid 1998 there is expected to be a rapid upgrade town by town with 50% upgraded within a year".

Contact: Richard Tyson-Davies, *APACS* ***- Tel: +44 (0)171 711 6234. Fax: +44 (0)171 711 6276.***

Gemplus Restructures Capital

The Gemplus Group, which achieved a 55 per cent increase in sales to FF 2.3 billion last year, continues to restructure its capital with the Dassault group taking a 9 per cent holding.

Gemplus capital has been based on French and foreign venture capital companies since it was established in May 1988, but now it is seeking to replace those purely financial initial partners by industrial investors with a long-term strategic purpose.

The company explains that it has now matured and reached a critical size and with the Smart Card market in full boom significant efforts will be required in Research and Development as well as in marketing, sales and the setting up of new associated services worldwide.

Financière Immobilière Marcel Dassault, represented by Thierry Dassault, offers what Gemplus describes as "outstanding potential of synergy with the activities of Gemplus."

The Dassault group is a technology company, has a presence in many state-of-the-art niches and an established competence in electronic funds transfer (with its subsidiary Dassault Automatismes et Telecommunications). Plans include the development of new products and services.

Apart from a significant involvement of the German family Quandt (who contributed the American company DataCard's magnetic stripe business and personalisation services to Gemplus), the company's capital includes the Japanese telecom operator KDD and the Singapore state-owned Singapore Technologies.

The French portion of the company's equity is held essentially by the founders and in-house executives.

Gemplus says that other industrial investors whose involvement will be strategic to the group are expected to join in the near future, among them an American company.

Contacts: Ms Flavie Gil, *Gemplus* ***- Tel: +33 (0)4 42 36 56 83. Fax: +33 (0)4 42 36 51 17. e-mail: flavie.gil@ccmail.edt.fr Thierry Dassault,*** *Dassault* ***- Tel: +33 (0)1 53 76 93 46.***

Oki Value-Checker Plus

Oki Advanced Products has launched the Value-Checker PLUS, the next generation in its popular line of personal Smart Card readers, which enables users to read cash balances and is capable of linking with a Personal Computer to download values onto the Smart Card.

The new product includes a keypad that allows consumers to read balances and other information stored on credit cards, banking cards, phone cards, etc., lock and unlock electronic purse cards, and scroll through multiple card applications and is compact enough at 90m x 61mm x 5mm to fit into the user's pocket or purse.

Gerry Vandenengel, Director of Oki Advanced products, based in Marlborough, Massachusetts, said: "It is a clear step toward the electronic wallet that will be commonplace in the 21st Century."

He explained that the Value-Checker PLUS also has an optional Personal Computer connection adapter and software that allows the user to connect to any PC through as serial port, giving access to home banking for loading and unloading cash to a card through their bank, network access control and secure electronic commerce.

Oki Advanced Products will start shipping the Value-Checker PLUS next month.

Contact: Brian Dobson, *Dobson Communications, Inc.* ***- Tel: +1 203 790 6360.***

Cash Dispenser for Indoor use

Siemens Nixdorf has announced the ProCash CRS (Cash Recycling System), a compact ATM that automates cash dispensing, cash deposit and electronic purse functions in a single closed system. The new machine checks deposited banknotes for forgeries and automatically makes the money available to subsequent customers for withdrawal. It also includes all hardware and basic software needed to load electronic purses with cash.

Contact: Chris Maycock, *Siemens Nixdorf Information Systems* ***- Tel: +44 (0)1344 862222. e-mail: cmaycock@sni.co.uk***

Dental Card Trial in Germany

Dentists in the Bühl area of Germany are taking part in an extensive patient information system trial based on Smart Cards. Called DentCard, the project is intended to assess the opportunities, effects and risks of a patient card system.

DentCard is a joint project between ACG, BUILT, IZB (a group of dentists in the Bühl area) and ORGA Kartensysteme GmbH.

The objective is to improve the exchange of information between patients, dentists, dental laboratories and suppliers of dental materials. The central component is the patient's microchip processor Smart Card which stores information on master data, risk factors, treatment and materials used.

Data security is provided by a dentist/patient card system with DES authorisation, or alternatively by a PIN, so that only the dentist or patient can access the information using multi-functional write/read terminals in the dental practice.

The operating software is Windows-compatible and configured for input and output in the file card system.

Contacts: Joachim Scholz, *IZB and DentCard* ***- Tel: +49 9102-99. Dr Heiner Grönewald,*** *ORGA* ***- Tel: +49 4347 715-270. Fax: +49 4347 715-272.***

One Millionth Cryptocontroller

Philips Semiconductors, a leading supplier of high security Smart Card controller ICs with onboard public key data encryption for high security applications such as digital Pay TV, has presented its Appreciation Award to Irdeto Consultants BV in The Netherlands to mark the use of one million cryptocontrollers in its Pay TV systems.

Irdeto used the million cryptocontrollers, purchased from Philips under a single-source agreement in just one year. Martijn Hoefelt, Chief Executive Officer of Irdeto, said: "Philips supported us as production ramped up steeply. We expect cryptocontrollers to dominate the Pay TV market, and aim to use another 2 million units by the end of 1997."

Pre-paid SIM for France Telecom

France Telecom has launched a new pre-paid SIM (Subscriber Identity Module) Smart Card to attract users to its Itineris GSM mobile phone service.

Called Mobicarte, the new pre-paid system, launched last month, is aimed at the mass consumer market and should be particularly attractive to people who do not want to be tied to an operator service package and gives the less credit worthy the opportunity to use the service. The no subscription and no bill scheme will enable France Telecom to further build its subscriber base without the fraud risks and bad debt associated with subscriptions.

Instant access is provided to the cellular phone service by purchasing a Mobicarte which is available for 270 francs at most French mobile service sales outlets and department stores. It allows up to 30 minutes of domestic calls in France to be made within two months. By inserting the Mobicarte SIM card and dialling 222, the user is given a cellular number. After that, outbound calls are made by accessing the 222 interactive Voice Response Server and dialling the number required. Inbound calls are processed in the usual way.

When the credit has been used, the customer can "reload" call credit by purchasing a Mobicarte plastic scratch card costing 144 francs and available at most tobacco shops. This card carries a 14-digit code hidden under the scratch panel. Once revealed and entered on a GSM phone after dialling 222, the user is allowed another 30 minutes worth of calls. After reloading, the credit is valid for two months for making calls and four months for receiving calls. Customers can keep the same number without having to sign up for a cellular service subscription as long as they reload the card at least once every four months. Both types of card are manufactured by Gemplus in its various plants worldwide.

Itineris is the leading GSM service in France and had around 1.4 million customers at the end of last year, representing a 60 per cent share of the French digital cellular phone market.

Contacts: Laurence Allet, *France Telecom* ***- Tel: +33 (0)1 44 44 93 93. Fax: +33 (0)1 44 44 80 34. Flavie Gill,*** *Gemplus* ***- Tel: +33 (0)4 42 36 56 83. Fax: +33 (0)4 42 36 51 17.***

Personal ATMs for Spanish Bank

Australia-based Intellect has announced the first sale of its new generation electronic wallet, the MicroBank II Personal Terminal, to Spanish bank, Banco Sabadell.

Intellect will team with IBM to supply 10,000 of the personal terminals to the bank in a deal worth more than Australian $1 million. The sale followed recent multi-million dollar MicroBank sales into the Swedish market.

According to Intellect, the new MicroBank II will deliver what it describes as the much anticipated "personal ATM" to the banking industry.

Company officials explained that the device will allow customers to upload value from their bank account to their stored value card and perform many common stored value transactions such as balance enquiry as well as giving customers the ability to check the details of different bank accounts - all from the comfort and safety of the home.

Ms Anna Birules, Secretary General of Bank Sabadell, said: "The functionality and programmability of the MicroBank II Personal Terminal allows us to best serve our customers' needs and also provides extra value added functions.

"The key to the success of our stored value cards is convenience and Intellect's terminals provides this and more."

The MicroBank II, which comes with its own software development environments, can be programmed and distributed to customers by banks, retailers and telecommunications companies.

Contact: Amanda Spalding, *Marketing Communications Manager, Intellect Australia Pty* ***- Tel: +61 9 333 4333. Fax: +61 9 470 5002. e-mail: amanda.spalding@intellect.com.au***

Mondex / Hypercom Agreement

Hypercom International, a division Phoenix, Arizona-based point of sale technology provider Hypercom Corporation, has announced a global agreement with Mondex International to enable merchants to accept Mondex electronic cash cards and Hypercom's T7P terminals and S7SC PIN Pads.

Tim Stewart, Executive Vice President of Mondex International, Latin America, said the agreement would help to accelerate Mondex installations. "A large installed base of retailers around the world, especially in Latin America where Hypercom is the leading point of sale terminal supplier will be able to easily embrace the Mondex system in conjunction with their current credit and debit automation systems, " he said.

Contacts: Mary Ann Lawson, *Hypercom International* ***-Tel: +1 602 504 5333. Robin O'Kelly,*** *Mondex International* ***- Tel: +44 (0)171 557 5036.***

New RF/ID Products from Gemplus

French Smart Card manufacturer Gemplus has released the Gemplus Tag, in its new RF (Radio Frequency)/ID product range called Serie200.

The tag will be available in two versions - read only from this month, and read/write at the end of this year, and Gemplus says it can be produced in several million units at a cost to the public of US $1 for the read only module.

Even when invisible, the Serie200 tag is still readable at several centimetres with a portable reader so it can be integrated or injected into a product. Possible uses are to guard against fraud and pirate copies by authenticating the item, identifying packaging, tracking domestic gas cylinders or industrial laundry batches, aiding the management and security of library books and facilitating the taking of physical inventories of various equipment.

The chip and antenna are engraved on a semi-rigid support, and the radio tag measures 13.6mm x 13.9mm for the small module and 27.85mm and 28.6mm of the large module, thickness 0.6mm. The tag is reusable with up to 100,000 read/write cycles.

There is a range of multi-standard readers, portable or fixed and couplers. The communication frequency between the radio tag and the reader is 13.56MHz.

Contact: Jackie Shambrook, *Gemplus (UK)* ***- Tel: +44 (0)1705 486444. Fax: +44 (0)1705 472081.***

Visa Partner Programme

Visa is packaging its card payment offerings in a newly announced Partner Programme aimed at helping member financial institutions to develop their core businesses using chip technology and open systems as they migrate from magnetic stripe cards.

The scheme will enable banks worldwide to customise their own products and services and differentiate themselves from their competitors, says Visa.

Hans van der Velde, President of Visa's European Union region, said: "Europe is leading the field in the development of chip technology with a large number of electronic purse schemes across the region. Our goal, through the Partner Programme, is to ensure that our members can take maximum advantage of this new technology. It means that they will be able to customise and differentiate applications on their chip cards, while capitalising on Visa's leading global acceptance network and brand.

"In addition, by using an open technological platform based on Java, we will be able to progress with other schemes on interoperability and common standards."

Five components

The Partner Programme features five components:

1 Set of applications: A set of payment services, including Visa credit, debit and stored value, that can be combined with members' proprietary applications, such as a loyalty programme.

2 Open Technology Platform: A technologically advanced, open chip and terminal architecture which makes it easy to combine multiple functions on a single card and maximises space on a chip. The technical architecture is based upon the high-level language, Java, an open industry standard endorsed by major companies.

3 Implementation Tools: A group of implementation processes and tools which allows members to develop and implement their applications and provide personalised products so that they can strengthen their relationship with the customer. These processes include an application development workbench and personalisation tools.

4 Acceptance Infrastructure: A strategy to ensure worldwide acceptance of chip-based cards and to adapt the electronic payments network, VisaNet, to the new strategy.

5 Industry Standards: Compliance with EMV (Europay/MasterCard/Visa) specifications for integrated circuit cards for payment systems.

Contact: Colin Baptie, *Visa International* ***- Tel: +44 (0)171 937 8111. Fax: +44 (0)171 937 0877.***

Access Control for PCs

Chip Lock, a Smart Card-based access control system for Personal Computer Security, has been introduced by ORGA Kartensysteme GmbH of Paderborn, Germany.

The system comprises access software, a built-in card reader and user chip cards and can be used on most PCs running WIN 95/NT (Windows 3.11).

A user must insert his authorisation card into the reader first. If this is not done or the card is not recognised, the system locks the mouse and keyboard and obscures the screen with a cover page.

Simply, the user "proves" his authorisation with the chip card instead of using password interrogations. The program also documents the time of use of the computer by independently producing a list of all log-ons and log-outs.

An additional security measure is possible through the encoding of data performed automatically as soon as the user pulls his card from the reader. By pressing a button, the user himself can also permanently encode certain data files.

Contact: Ekkehard Klysch, *ORGA Kartensysteme* ***- Tel: +49 5254 991-280. Fax: +49 4347 715-272.***

SCN Tries Electronic Shopping

The Fujitsu Showcase located in Bracknell, Berkshire offers a permanent exhibition area where all those interested in Fujitsu can test out the products and speak to Fujitsu and ICL research and development professionals.

Fujitsu bought 80% of ICL in the early 1990's and currently owns 90.1%. ICL and their Retail Systems Business is an important reseller of Fujitsu products throughout Europe.

SCN visited the showcase during the ICL Retail Business Symposium and were shown a demonstration of one of the products on display; 'The Power Shopper - Electronically Assisted Shopping'.

To shop electronically a home PC with Internet access is necessary. A daily, weekly or monthly shopping list can be stored on the shopper's PC. The Internet provides the shopper with a pictorial layout of the local store. By clicking on any aisle a list of contents will be given for each particular cabinet or shelf. The items can be added or removed from the list.

The Home PC can also contain an up-to-date list of the content of the shopper's cupboards, fridge and freezer. As the shopper 'shops' items can be checked to see if they are actually needed.

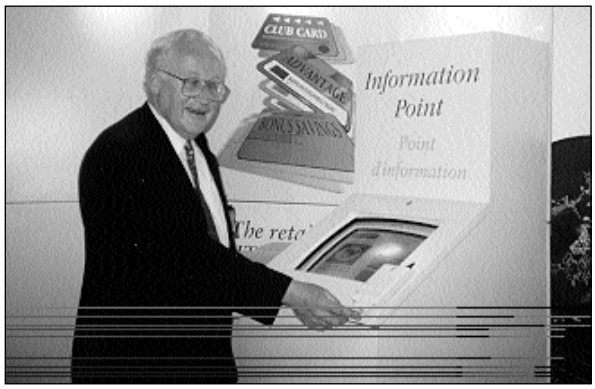
Once the list is complete the shopper transfers the information to their Smart Card (which may also be a loyalty card) and goes to the store. On arrival the shopper inserts their card into one of the multimedia information kiosk readers. Their list is 'read' and attention can be drawn to special offers or deals.

The system also offers the shopper a 'pick and pack service'. The list is scanned and heavy or bulky items can be chosen for the shopper whilst they select other goods. At the checkout the Smart Card is again inserted into a reader. The trolley is scanned, or a self-scanning system may be used. Payment can then be made using the same card. On returning home the new information on the Smart Card can be loaded back onto the PC. This can include a record of receipt and an update of the electronic larder.

A recent retail survey in The Financial Times suggests that electronic shopping will have little impact in the next five years. However retailers are not ignoring the long-term potential of the market.

According to Mike McSherry, Showcase Manager, the exhibition centre is visited by re-sellers, distributors and customers from the UK, South Africa, Australia, Eastern Europe, Kuwait, France and Germany. Over 30,000 visitors have been welcomed since the £750,000 centre's opening in September 1994.

Contact: Mike McSherry, *Showcase Manager.* ***Tel: + 44 (0) 1344 472223. Fax: +44 (0) 1344 473000. Jane Berry,*** *Marketing Communications Manager, Europe.* ***Tel: +44 (0) 1628 582000. Fax: +44 (0) 1628 582001.***



Left:
Ian Chandler, Marketing Manager, Payment Systems, ICL demonstrating electronic shopping
[Smart Card News]

UK Smart Card Forum Meets

Following the first meeting of the National Smart Card Forum last month *(see SCN March 1997)* SCN spoke to the British Retail Consortium for their reaction. Elizabeth Stanton Jones, Director of Financial Services Forum said she was "very glad it had been held at all" and hoped it would be used in the future as a genuinely independent arena.

Elizabeth acknowledged that the retailer is likely to be a focal point for many Smart Card schemes and can see benefits in Smart Card technology. She is, however, concerned about how costs will be off-set in the short term. She called for co- operation without driving out competition.

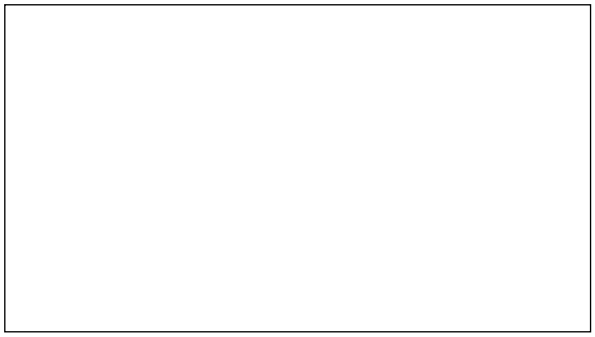
Contact: Jan Dixon, *Department of Trade and Industry,* ***Tel: +44 (0) 171 215 1297 / 1736. British Retail Consortium. Tel: +44 (0) 171 647 1540.***

The NatWest IC Test Laboratory

Right:
The Dry Lab at the NatWest IC Test Laboratory

Below Right:
The Dynamic Bending Stress Test

Opposite Page:
The Decapsulation Unit in the Wet Lab [NatWest]



National Westminster Bank's IC Test Laboratory in London is believed to be the first of its kind in the UK and provides a means of independently testing IC cards.

Graham Higgins, Senior Executive of the NatWest Development team and co-inventor of Mondex, told SCN that there had been a demand for this service from one specific client which had lead NatWest to see a "good business opportunity".

He identified potential clients as anyone who makes or uses Smart Cards and their components and stressed that the laboratory should not be viewed on its own. It has the support of a "world quality" technical services team, he explained and provides a service "much richer" than anything currently on offer.

Three Specific Services

Lorraine Everett, IC Test Laboratory Manager, took SCN on a tour of the premises and explained how she puts the cards through their paces. Lorraine began by explaining that the lab offers three specific services; type approval, batch testing and card failure analysis. The laboratory also offers a tailor-made service to cater for individual requirements. The lab is divided into two sections; the dry and wet areas.

Type approval vigorously tests the cards to ensure they meet ISO standards. The laboratory offers independent quality assurance and an additional level of confidence prior to companies choosing a particular chip platform.

Batch testing, the second service, allows cards to be tested before they are issued and throughout a pilot or scheme to check performance and consistency. Card failure analysis, the third service, is carried out to discover why a card fails once it is in circulation.

Lorraine begins by checking basic but fundamental card details. For example hand held gauges provide a means of quickly measuring card specifications. If this measurement is in any doubt it can be tested again using the Profile projector which provides a more accurate test of card dimension. It also checks card warpage and the exact location of the contact plate.

The environmental test equipment at the NatWest IC laboratory submits the cards to a variety of tests which check they can withstand the necessary amounts of heat and pressure inflicted through general use.

For example the Cyclic Oven is used to see what temperatures the cards can withstand ranging from - 17 to 50. The aim is to simulate conditions such as the heat the card may experience if left on the dash-board of a car.

The Card Characterisation machine exposes cards to voltage stress to ensure that the card "dies sensibly". Lorraine explained that if a card does fail it must simply stop working and not give away data or allow false data to be created.

The Bond Wire Tester checks the connection integrity between contact plate and chip. The varying types of 'break' reveal the quality of the wire. The X-Ray System is used to check bond wires and dye.

The Dynamic Torsional Stress machine puts the card through 1,000 bends, an amount set by ISO. A similar test is provided by the Static Bend Machine, or back pocket test.

The Tensile Tester is used to exert pressure on the chip to show how much force it can cope with. The Spot Distortion test is a further pressure check which involves resting the card on four points. The micro Module Pull test quite basically tries to wrench the chip from the card.

The 'wet' section of the laboratory deals mainly with card failure analysis. The decapsulation unit is used to view the chip. Once revealed the chip is put under a microscope and projected onto a television sized screen. The condition of the chip is checked visually and it can then be estimated whether any damage has been caused deliberately. If there is no problem found at this stage a probe is fitted onto points and attached to a simulator. This is used to discover if the card is 'alive'. If it is it can be brought 'back to life'.

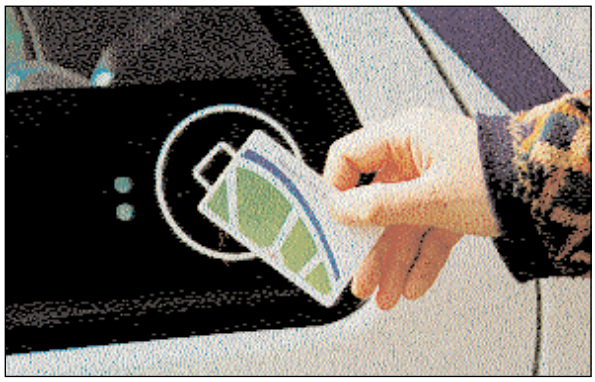
The laboratory was a fascinating place to visit and will provide a much needed independent means of checking the quality of IC cards.

Contact: Lorraine Everett, *IC Test Manager, NatWest Development Team.* ***Tel: +44 (0) 171 714 1000. Fax: +44 (0) 171 714 8246.***

Smart New Transport Service

A new transport service will begin in Saint Quentin en Yvelines, near Paris in October. The Praxitèle system, named after a fourth century Greek sculptor, positions itself mid-way between public transport and the private car. It aims to offer the driver flexibility that is user friendly and pollution free. A major advantage if the scheme if successful would be the reduction of traffic on the roads. The pilot will run for a minimum of 18 months.

The project has been developed and implemented by a number of specialist companies working together. The companies involved are: CGEA, EDF, Renault, Dassault, GTIE and SOBEA. Two French national institutes of research are also involved; INRETS (computing and automation) and INRETS (transport and security).



Left:
The Praxicarte, a contactless Smart Card, allows you to operate a Praxitèle car

Below Left:
The Praxicarte in use. [Inria]

The system uses mass-produced electric cars and works on a subscription basis. A contactless Smart Card, the Praxicarte, is issued to each subscriber. To gain entry to the car the driver holds the card near the external reader. Once inside the car the card is inserted into a second reader and the driver keys in his PIN. The vehicle is then ready to start. Drivers pay according to how long they keep the car. The rates change depending on the time of day. When the driver has finished with the car s/he must return it to a Praxiparc. Removing the card locks the car and the cost is stopped.

The terminals will be supplied by Dassault. At this stage it is not known who will supply the cards and chips. According to Michel Parent response from all those that have tried the scheme has been very positive. If the pilot is successful the Praxitèle system will be rolled out to other areas.

Contact: Michel Parent, *Inria.* ***Tel: +33 1 3963 5511. Fax: +33 1 3963 5330.***

Leisure Link Card in Enfield

Enfield is the latest Borough Council in England to adopt a Smart Card system for the management of its leisure centres.

The system, which went live last month, was developed by Microcache who supplied the software, and ORGA Card Systems (UK) who supplied the cards, readers and Smart Card system expertise.

Nine thousand cards have been issued and the number is expected to grow over the coming year. The cards can be used in the Borough's leisure scheme, initially at three centres, but eventually at all leisure facilities, both public and private.

The card supplied by ORGA is their OMC 240 SP with a 256 bytes EEPROM Siemens SLE 4442 chip.

As well as holding personal data, the chip has space for a cash purse for use within the scheme and for vending applications. Future plans include using the card for the payment of council tax, rent and for bus passes.

Similar schemes already exist in Barking and Dagenham *(SCN January 1997)*. Congleton Borough Council will launch their scheme in the next two months and private sector hotel chain, Village Leisure, has ordered 60,000 cards to be used across their hotels.

Contacts: Simon Reed, *ORGA Card Systems (UK)* ***- Tel: +44 (0)1628 24265. Fax: +44 (0)1628 24838. e-mail: sreed@orga.co.uk. Keith Emery,*** *Microcache* ***-Tel: +44 (0)1491 652121. Fax: +44 (0)1491 651751.***

GZS / Gemplus Deal

Gemplus will take over the personalisation of 2.5 million cards annually from the GZS Gesellschaft für Zahlungssysteme mbH as of 1 May this year

GZS is restructuring to concentrate on processing. Dr Laurenz Kohileppel, Managing Director, explained: "The aim of the co-operation with Gemplus is to improve the services offered by GZS with respect to quality, speed and price."

The management and maintenance of the master data important for processing will continue to be undertaken by GZS. The embossing data for new cards and renewals will continue to be generated in Frankfurt and sent to Gemplus by data transmission.

Franz Haniel, Managing Director of Gemplus GmbH, said: "By each partner concentrating on their particular core specialisations, card processing at GZS and card manufacture and personalisation at Gemplus, the particular value-added stages are further optimised to the benefit of customers."

Gemplus employs 300 people at two sites in Germany - Filderstadt, near Stuttgart, and Herne, near Dusseldorf - with an annual production capacity of 100 million cards.

Contacts: Sabine Belling, *Gemplus, Germany* ***- Tel: +49 71 58 185230. Martina Kloss,*** *GZS* ***- Tel: +49 69 79 3319 62.***

Golf Clubs Get Smart

Smart Card International Ltd. have developed a Smart Card system for Golf Clubs using Sharp point of sale terminals, Gemplus GCR400 card reader terminals and Gemplus 2K bit memory cards.

To date 15,000 cards are in circulation in 20 golf clubs throughout the UK.

Bob Cuthbertson of Smart Card International estimates a further 20,000 - 30,000 cards will be issued during the next 12 months.

The cards are multi-functional and can be used as proof of membership, as an electronic purse and as a loyalty card. Benefits include improving club cash flow, increased speed at point of sale and greater cash security both in the club and on the golf course.

Smart Card International are currently working with NRI and Hengstler to provide vending and door access facilities on their multi-function Smart Card system.

Contact: Bob Cuthbertson, *Managing Director, Smart Card International* - ***Tel: +44 (0) 1482 654445. Fax: +44 (0) 1482 652271.***

Dutch Banks Develop I-Pay

Interpay Nederland, on behalf of the Dutch banks, is to expand the digital I-Pay payment system for digital banking on the Internet, following a trial evaluation of the system which showed that the system meets a growing demand and is secure for national payment transactions.

I-Pay is based on the security protocol iKP (Internet Keyed Payment), but will change to the SET (Secure Electronic Transaction) protocol being developed by MasterCard and Visa and other companies and seen as the standard protocol for secure international payments over the Internet.

A spokesperson for Interpay explained; "The current iKP, on which SET is largely based, functions excellently for secure national payment transactions, but SET is needed for international payments."

The transition to SET is expected to begin in the first quarter of next year. Chip Cards with an electronic purse function could be used for transactions on the SET system and this is an option which I-Pay has under consideration.

In the meantime, about 10,000 Dutch consumers have installed the I-Pay software, and the evaluation reported that the system was greatly appreciated by them while suppliers of products and services on the Internet were also satisfied. Advantages were seen as being the learning process, lack of debt risks and reliability of the payment system.

But there is a need for further development, for example, the number of suppliers must grow. There is also a need for a more competitive and differentiated product supply, and credit card payments must be possible, as must international payments.

The number of Internet connections in the Netherlands is estimated at 600,000 and is expected to grow to three or four million by the year 2005. Approximately two per cent of Dutch households have an Internet connection and this figure is expected to top 25 per cent by 2005.

Contact: Yvonne Kersten, *Interpay Nederland* ***- Tel: +31 30 283 5024. Fax: +31 30 283 5002.***

SmartPen Verification

Last month LCI Computer Group introduced the SmartPen; a pen with sensors that is able to authenticate the writer through the biometric characteristics of their signature. The pen depends on the dynamics of the act of signing rather than on the graphic image of the signature. A team in Belguim has apparently succeeded in fitting an entire computer into the pen.

According to LCI Computer Group and IMEC the SmartPen can be used to make Internet transactions or bank transfers secure "because it unequivocally authenticates a person". Sam Asseer, Chairman and Chief Executive Officer of LCI claims the pen "will forever impact the way electronic commerce is conducted".

Unit price of the product will range from US50 to US250 depending on the features.

Contact: Sam Asser, *Chief Executive Officer LCI Computer Group NV.* ***Tel: +31 7364 55255. Fax: +31 7364 55257.***

New Club Med Card

Club Med is to try out a new electronic purse card in the three resorts of Pompadour, L'Alpe-d'Huez and Saint-Moritz.

Holiday makers will receive the personal card on arrival in the resort. The card, which is protected by a secret code, can then be credited with an agreed amount to pay for purchases.

The system has been developed by Datagram, a Gemplus value added reseller (VAR) and uses GPM896 multi-purpose memory cards, GMX 200 data collectors and GCR500 readers.

Gemplus also designed and produced the promotional literature for the scheme.

Club Med has introduced the new card following an initiative by Club Aquarius which has equipped its resorts with a similar system.

Contact: Flavie Gill, *Gemplus* ***- Tel: +33 (0)4 42 36 56 83. Fax: +33 (0)4 42 36 51 17.***

16K SIM Card from Schlumberger

Schlumberger Electronic Transactions has announced the first 16K re-programmable memory SIM card for mobile phones. With double the current amount of memory in SIMs (Subscriber Identity Modules), the new card will allow mobile phones to run more sophisticated application software and enable network operators to implement powerful value-added services.

Multiple subscriptions is an example of potential applications. In this case, a SIM could hold both a company and a private subscription, or separate subscriptions for parents and children.

Other functions include more short message space allowing the phones to also operate like pagers, increase the size of phone books and allow the use of Asian characters in languages such as Chinese and Thai.

Schlumberger has an eye on the Asian market where many businessmen carry both a pager and a mobile phone. The extra memory capacity in the SIM could allow operators to increase short message storage space to allow phones to serve dual functions. Typically the new SIM will allow the storage of 50 short messages and 200 phone book entries.

The company says the extended memory also provides great flexibility for operators to add extra Smart Card applications to SIMs, employing the new over-the-air customisation and pro-active commands containing the latest GSM specifications, for example, allow access to private databases holding information such as stock market prices.

If privacy is required, such data can also be protected by the SIM's encryption and security techniques. The card uses Schlumberger's SIMflex Smart Card modular operating system for SIM applications.

SIMs could even be used to store and run complementary applications such as loyalty schemes or co-branding to give operators an advantage in a highly competitive market.

Contact: Isabelle Ferdane-Couderc, *Schlumberger Electronic Transactions, France* ***- Tel: +33 (0)1 47 46 70 20. Fax: +33 (0)1 47 46 68 66. e-Mail: ferdane@montrouge.et.slb.com***

In Brief

Odense in Denmark is to alter its 47 parking meters to enable drivers to use DANMØNT pre-paid cards as well as coins for payment. The change over starting next month is expected to be completed in August. ***Contact Kim Jørgensen,*** *Parking Manager, Odense* ***- Tel: +45 66 13 13 72.***

Gemplus Corporation has opened new offices in Bethesda, Maryland, USA, which will include the emerging markets business division, telecommunications sales and marketing staff, the closed systems group, and will also support the US government's efforts to integrate Smart Card technology into its computer systems. The new office, which replaces the company's Gaithersburg office, is located at 6701 Democracy Boulevard, Suite 505, Bethesda, MD 20817 - Tel: +1 301 581 1000. Fax: +1 301 581 1006.

DANMØNT has relocated to the PBS company offices following PBS' acquisition of all the shares held by partner Tele Denmark. The new address is: DANMØNT, Lautrupbjerg 10, DK-2750 Ballerup, Copenhagen, Denmark - Tel: +45 44 68 44 68. Fax: +45 44 89 76 46.

ICMA, the US-based International Card Manufacturers Association has enhanced its Web site with new graphics, added options, up to date plastic card industry news and interactive capabilities as well as a members-only help line. Web site :http://www.icma.com

Dassault Automatismes et Télécommunications of France and IPC Corporation of Singapore have signed a co-operation agreement for the distribution of Dassault A.T. electronic payment products, equipment and software in Asia by IPC and to offer complete solutions to retailers in the Asia-Pacific. The agreement is also expected to lead to joint venture projects.

Smart Card Diary

CardTech/SecurTech 97, Orlando, Florida, USA, 19-22 May, 1997.

Now established as the biggest Smart Card conference and showcase in the world, the 1966 conference attracted a record 5,543 attendees. Ben Miller, Conference Chair - Tel: +1 301 881 3383.

Retail Solutions and Retail 97, National Exhibition Centre, Birmingham, UK, 20-22 May.

Europe's leading retail systems exhibition, Retail Solutions, expects a record total of 275 exhibitors with the focus on Smart Cards, electronic retailing and communications. Alongside the show will be Retail 97, a newly-launched exhibition of retail design, shopfitting, point of purchase and security. Exhibition details - Tel: +44 (0)181 277 5346.

See our website (the address is on page 62) for a more detailed listing of conferences.

People on the Move

Oki Advanced Products, headquartered in Marlborough, Massachusetts, USA, has announced the appointment of **Jeffrey Wilkinson** as Engineering Manager to oversee engineering, new product development and outside services.

Aged 39, Wilkinson was previously an executive of National Semiconductor for 13 years, most recently as manager of the PCMCIA products line.

Visa International, Asia-Pacific has appointed **James G. Murray** as General Manager and Executive Vice-President for South-East Asia. Based in Singapore, he will oversee the development of the payment card brand in Indo-China, India, Indonesia, Malaysia, Philippines, Singapore and Thailand.

Previously he was Managing Director of Corporate Banking in the UK and Northern Europe for Chase Manhattan Bank in London.

Prior to that he spent several years in Asia with Chase Manhattan as a specialist in Corporate Finance and Banking.

Student Card in Hungary

Students at the University of Pécs in Hungary are using a multi-application Smart Card from Gemplus for identification, access control and electronic purse applications on and off the campus.

Hungarian applications developer Compuworx - a Gemplus value-added reseller - developed the campus card system in partnership with Gemplus.

Students can use the card to access computer rooms and libraries, look up their courses using a touch-sensitive screen, pay tuition fees and buy drinks from on-site vending machines. Off campus, students can also use the card to purchase books and pay for bus tickets.

The university says the card has reduced administration costs, Pepsi-Cola reports increased on-site sales and the bus company says ticket fraud is decreasing.

Other universities in Hungary are said to be watching the Pécs scheme with interest.

Contact: Flavie Gill, *Gemplus* ***- Tel: +33 (0)4 42 36 56 83. Fax: +33 (0)4 42 36 51 17.***

More ATMs Accept Chip Cards

Over 13 per cent of all ATMs in Europe can now read chip cards, according to a report from London-based Retail Banking Research.

ATMs are being upgraded to accept Smart Cards as the banking industry changes to chip cards. The leading countries are Spain and Portugal. Others include Finland, Belgium, Switzerland and Austria, all of which have introduced electronic purse schemes.

In terms of ATMs installed, Germany leads the way, followed by Spain. Italy has now overtaken both France and the UK to become the third largest market. The five countries together account for over 77 per cent of all ATMs in western Europe.

Contact: Stefano Salata, *Retail Banking Research* ***- Tel: +44 (0)171 495 8871 Fax: +44 (0)171 493 0539. e-mail: sala@rbrldn.demon.co.uk***

Integrated Circuit Card Standards and Specifications - Part 7 :

Inter - Industry Commands for Interchange.

So far in the tutorial we have discussed the scope of the ISO Standard 7816 parts 1, 2 and 3. As we have mentioned previously any concept of interoperability requires adherence to these basic standards for the physical and electronic properties of the IC card. Whilst we encountered problems, due largely to the need to maintain conformance with early commercial implementations of the IC card system, there is none the less an overwhelming industry acceptance of these standards. We are now going to have a look at the scope of the ISO 7816-4 standard.

For the purpose of the tutorial we will skate around the detail and concentrate on the basic principle which is really the definition of a file management system and its interaction with a user. The following discussion will examine the four basic concepts of the ISO standard,

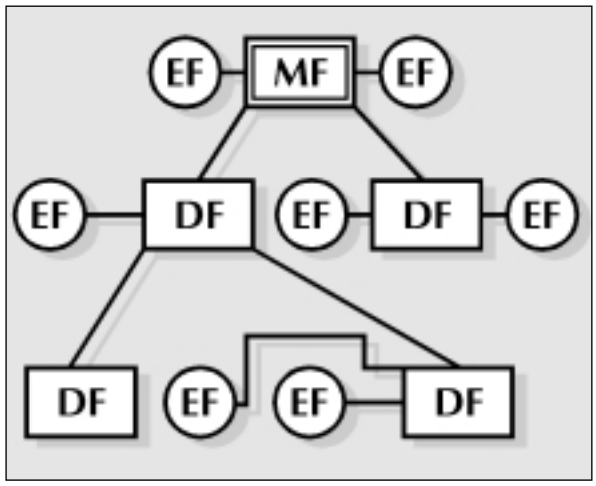
- File structure
- Message structure
- Basic commands
- Command and data transport.

File structure

There are two categories of files:

- Dedicated file (DF)
- Elementary file (EF)

A special case of the dedicated file in the Master File or MF which is the root of the file structure. This file is mandatory for compliance with the standard. All files are descended from the MF whilst DFs may also have dependant EFs. There are two types of EF; an Internal EF which stores data intended for internal interpretation by the card and working EFs where the stored data is intended for use by external application. An example file structure is shown in *figure 1*.



Right:
Figure 1
Logical File Organisation

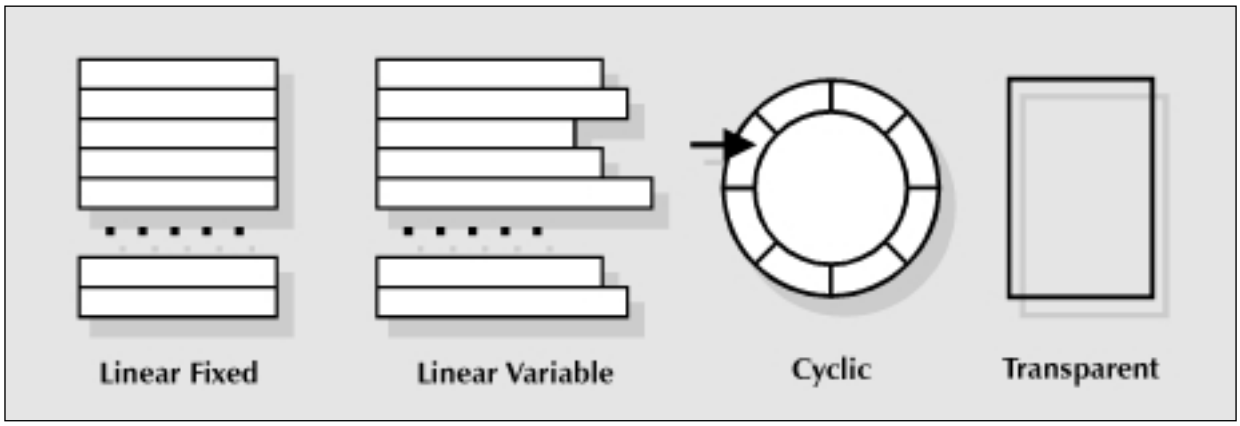
Files may be referenced by one or more of four methods:

- File identifier, which is a 2 byte code. The Master File is assigned a unique reference of $3F00_{hex}$.
- Path, this is a similar concept to that used in a PC where you can identify a file by its path using file identifiers starting from the root or Currently Selected File.
- Short EF Identifier, which is a 5 bit code valued in the range 1-30. Such an identifier clearly cannot be used as part of a path description nor can it be used by the Select File Command (to be described later).
- Name, a DF file may be referenced by a name coded between 1 and 16 bytes. This permits the use of Application Identifiers as specified in part 5 of the standard.

The data structure for an elementary file allows four options:

- Linear fixed
- Linear variable
- Cyclic
- Transparent

These four structures are shown symbolically in *figure 2*. The first three options are based on the use of records as encountered in any computer system.



Left:
Figure 2
Elementary File Structures

The transparent option just refers to a block of data without the record structure. In this case the data must be accessed by a relative address to the start of the data block. The first three structures would normally access data by reading and writing records. Where the file management system takes care of the absolute address of the data.

This concept of a file structure really only permits the concept of reading and writing data into elementary files. The dedicated file concept allows a partition between data structures where a particular application may select a particular structure. This dedicated file may be used to control access to the data in the daughter elementary files by the use of password verification. In this sense the file structure supports the segregation of multi application data where the separate applications exist at the interface device.

This is really an incomplete picture which may support the historical use of IC cards as data carriers but does not define the principle of multi applications co-existing in the IC itself. What is really required is the concept of executing application programs in the IC and maintaining adequate security segregation between these applications. We shall return to this subject when we discuss the security of the IC card and we will show how this file structure concept may be extended in order to allow active multi - application operation.

The ISO 7816 - 4 standard makes considerable use of the ASN.1 (Abstract Syntax Notation One) syntax rules for the encoding of data. These rules use the principle of TLV (Tag, Length, Value) encoding of the data field.

The tag identifies this field, the Length parameter gives the size of the data (in bytes) whilst the value represents the field data. This concept allows variable length fields which may be individually identified. This is an alternative approach to a bit mapped structure where the fields and length are predefined and a single bit in a tag field is used to indicate the presence or otherwise of the field. A bit mapped approach was used in the ATR (Answer To Reset) data to indicate the presence or otherwise of the specific interface characters.

The ASN.1 encoding has a two byte overhead for each data field compared with the one bit of the bit mapped approach. Each encoding scheme has its benefits but it is clear that when data space is at a premium then the bit mapped approach is better whilst the ASN.1 encoding offers more general flexibility.

The file control information in the data returned in response to a Select File Command. This data is TLV encoded in one of three templates:

- File Control Parameters (FCP)
- File Management Data (FMD)
- File Control Information (FCI), conveys both FCP and FMD.

The file control parameters are defined as an ASN.1 encoded data field that describes the necessary parameters such as file size, file identifier and optionally the file name. It also defines the type of file (i.e DF, or EF) and the data structure (i.e Linear fixed, linear variable, cyclic or transparent). The coding tables are given in the standard.

The file management data is also constructed as an ASN.1 object and may contain Inter - Industry or provider specific objects. It may be used for example to store security data for encipherment or password checking.

Message Structure

This part of the standard builds on the command response structure described in part 3 of the standard by defining the concept of an application protocol data unit (APDU). This APDU contains the command or response message and allows for all options of data transfer, as shown in *table 1.*

The result is an APDU which can define the length of data to be transmitted in each direction. The structure of the APDU is shown in *figure 3*.

The fields in the APDU are an extension of those described earlier as shown in *table 2*. for a command APDU.

It should be noted that this allows a number of options. The data length field may be either 1 byte (the default) or up to three bytes. This extended operation is identified by an optional field contained within the historical bytes of the ATR. Depending on the command/response data type shown in *table 1*. the Lc and Le field may or may not be present, for the cases 1 and 2 there is no command data. The APDU only contains those fields that are used as shown in *figure 4*.

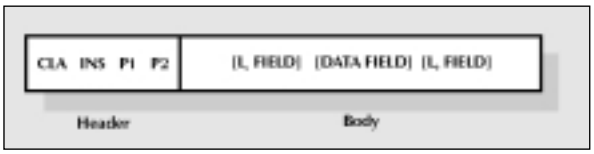
The response APDU contains the response data field (if present) and the status bytes referred to previously as shown in *figure 5*. These status bytes have a normal response code of 9000 hex. A number of error conditions have been identified and are described in the proposed standard.

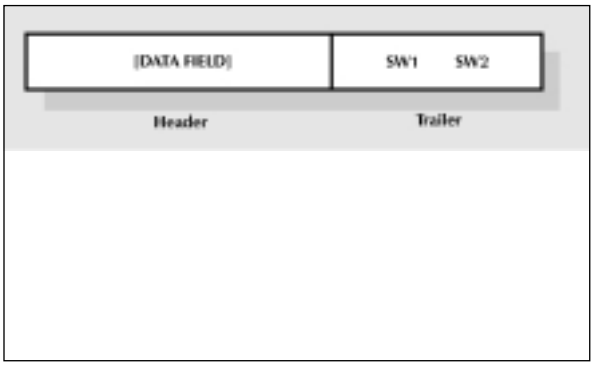
Right:
Table1
Command / Response
Data Option

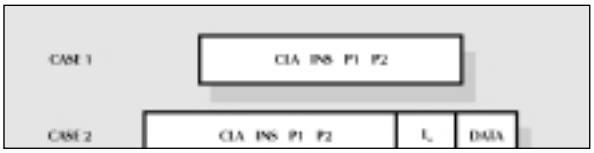
CASE	COMMAND	RESPONSE
1	NO DATA	NO DATA
2	NO DATA	DATA
3	DATA	NO DATA
4	DATA	DATA

Below Right:
Table 2
Fields in the application
protocol data unit

CODE	NAME	LENGTH	DESCRIPTION
CLA INS P1 P2	Class Instruction Parameter 1 Parameter 2	1 1 1 1	Class of Instruction Instruction Code Instruction Parameter 1 Instruction Parameter 2
Lc field	Length of Command Data	Variable 1 or 3	Number of Bytes present in the data field
Data field	Data	Variable =Lc	String of data bytes sent in the command
Le field	Length of Response Data	Variable ≤3	Maximum number of data bytes expected in response







Next month we will continue our analysis of the Inter-Industry commands.

David Everett

Loose Chippings

- Hong Kong introduces the first feature reloadable stored value card to follow the success of Prime Visa Cash launched in August 1996. The card offers stored value payment on existing ATM cards.
- NTT Data and US based Visa International plan to jointly operate a Smart Card electronic money system in Tokyo beginning in June 1998.
- Motorola reports first quarter earnings of $325m or 53 cents a share. Sales have decreased from $7bn in the first quarter of last year to $6.6bn. The company blame a 16% drop in sales of semi-conductor products and predict a gradual recovery for the market.

Left:
Figure 3
Command APDU

Below Left:
Figure 4
APDU Structures for different Data Cases [table 1]

Bottom Left:
Figure 5
Response APDU Structure

Smart Cards at Universities

Right:
South Bank University Smart Card

Below Right:
The 1,000,000th Quantum Smart Card Gas Meter from Landis and Gyr

Following the introduction of Smart Card schemes at Aston, York and Exeter Universities other institutions are now ready to get smart *(see SCN September and October 1996)*.

South Bank University began using a Smart Card system devised by ICTS (UK) Ltd. in December 1996. An initial 30 cards were issued to IT staff as a pilot group. Once tests are complete a further 20,000 will be issued. The cards are currently used for identity, access control, vending and electronic purse functions. Further applications are planned.

This month the University of Hertfordshire will begin using a similar system to the one at South Bank University . A total of 1,000 cards will be issued to staff and students. In the future this figure will rise to between 18 - 20,000 cards offering multi-function use including time attendance and 'Info-Centre' access. Thames Valley University also has plans to implement a Smart Card system in the future.

The chips (ST16CF54) are produced by SGS Thomson using Fortress U&T Crypto Chip technology and operating system (SCOS++). To date the cards have been manufactured by Sempac. At present Fortress U&T reader terminals are used in conjunction with Amphenol acceptors.

Contact: Garry Malone, *Marketing Executive, ICTS.* ***Tel: +44 (0) 171 637 7876. Fax: +44 (0) 171 580 7875.***

One Millionth Quantum Meter

Landis & Gyr has just produced the one millionth Quantum Smart Card gas meter for British Gas at its Telford factory in the UK.

The company started making Smart Card meters for British gas in 1992 in response to a need to change from traditional coin and mechanical token meters.

Coin meters had been attracting significant levels of theft with their contents often around £700 and required high security collections. In addition to the risk factor, the operational cost to British Gas was high.

Mechanical token meters, which were developed to replace coin meters, were not sufficiently reliable and had no emergency credit feature.

A solution, developed by British Gas and L&G, became known as the British gas Quantum system and the first meters went into production in 1993. By June 1994, 168,000 customers' homes were equipped with a Quantum meter.

L&G says that in the last three years, demand for the Quantum system has grown and early this year the one millionth meter was produced at Telford.

A recent customer survey indicates that over 90 per cent of Quantum customers are happy with the product and find it easy to use.

Contact: Martin Pollock, *Director of Payment Systems, Landis & Gyr Utilities (UK)* ***- Tel: +44 (0)1952 677661. Fax: +44 (0)1952 677594.***