

Shell Loyalty Scheme Launched in Scotland

Shell has launched a customer loyalty scheme in Scotland using Smart Card technology to provide electronic points as a replacement for paper petrol vouchers and stamps. Motorists and charities will benefit from the new fuel promotion scheme, called Shell Smart, and it will give the Smart Card industry in the UK a major boost as it provides the opportunity for many people to try out the technology personally for the first time in the biggest scheme of its kind in the world.

Continued on page 123

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Next MonthSmart Card Tutorial Part 24 - Multi-Application
Cards continued.**Shell Loyalty Scheme***Continued from page 120*In the Shell Smart fuel promotion, customers will
use a Smart Card to collect "electronic points" at**CONTENTS**

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Shell service stations when they buy Shell fuels,
motor oils or Shell-branded AquaValet car washes.Customers can then exchange their points for free
cinema tickets, Air Miles, tapes, CDs, or other gifts
- or donate them to charity.

The electronic points are stored in the Smart Card

memory and deducted when redeemed for gifts or given to charity. Shell Smart Cards cannot be used to pay for fuel or other goods or services, but this may be part of their future plans.

Shell says that Scotland was chosen to pioneer Shell Smart because they wanted to carefully monitor its introduction in a market of around three million motorists before rolling out the promotion to the rest of the UK later this year.

Run indefinitely

Ian Sutcliffe, Forecourt Marketing Manager at Shell UK said: "Shell Smart aims to be the most technically advanced, yet easy-to-use fuel promotion in Britain. Shell has opted for Smart technology rather than traditional magnetic stripe technology still used by most credit card companies and banks because it offers scope to add extra offers in future without having to change customers' cards. The promotion is designed to appeal to both high and low mileage drivers and will run indefinitely."

Initially, customers will be able to donate their points to the British Heart Foundation or The Save the Children Fund, and the points will pay for charitable aid and research. As examples, Shell says 87 points pays for enough grain to feed a family of eight for a month in West Sudan, and 134 points hires a minibus for children from a family centre in Britain to enjoy a day out.

To boost customers' contributions Shell will double the first 333,000 points donated to the British Heart Foundation, and will celebrate The Save the Children Fund's 75th birthday by doubling the first 500,000 points donated to this charity.

Customers can exchange their points for Air Miles on British Airways flights and package holidays etc, free cinema tickets at UCI cinema box offices in Scotland (35 points for an adult ticket and 25 for a child's ticket), mail order gifts from a selection of over 100 at Shell service stations, gifts at Shell

Three Contracts for AES Prodata

AES Prodata, the Automated Fare Collection division of ERG Australia, has been awarded three major contracts in Egypt, Mexico and Tunisia, worth more than A\$13 million.

Egyptian National Railways (ENR) has placed an initial contract valued at more than A\$7 million for

service stations such as Kodak film and Scotch tapes, and exchange points for discounts on CDs, tapes and other goods available from HMV stores in Scotland (three points entitle customers to a 25 pence discount off HMV goods).

Customers can apply for a Shell Smart card by filling in an application form available at Shell UK's 240 participating service stations in Scotland. For every £6 spent on approved products, customers can choose either one Smart Point or an Air Miles Point.

The technology

The point of sale technology was developed by De La Rue Fortronic in Dunfermline, Fife, and consists of their F85 terminals equipped with built-in magnetic stripe and Smart Card readers.

Michael Pettit, Business Development Manager, said: "The launch of Shell Smart in Scotland marks the first opportunity many people will have had to experience Smart technology."

The cards, from Gemplus, are personalised for each customer and carry the cardholder's name. If the card is lost, Shell can issue a new one with the same number of points as in the last card which will be electronically cancelled.

Gemplus have supplied their GPM Memory Card designed for applications requiring a controlled access such as electronic purse, subscriber cards, vending machines etc.

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the supply of portable ticket issuing machines and associated central computer systems and software.

The initial contract is the first of four stages in the full system implementation of a high security Automated Fare Collection (AFC) system for ENR's 1,600 ticket conductors.

The portable ticket machine will be designed and

engineered for dual language operation (Arabic and English) with all transactions to be controlled by password protected Smart Cards. The system will feature AES Prodata's dual audit trail to enhance overall system security.

In Mexico, AES Prodata will supply AFC equipment to Autobuses Unidos, a private bus company catering for long distance travellers throughout Mexico, in a contract valued at more than A\$2 million.

The initial pilot project requires the delivery of equipment for buses, regional terminals and system software. Smart Cards will be used for transferring data from the vehicle to the central computer in Mexico City. There is an expansion programme for system implementation to over 13,000 buses operated by Autobuses Unidos.

Contracts valued at an estimated A\$4 million have been placed to supply portable ticket issuing machines and associated central computer systems and software to cities throughout Tunisia. The orders follow an initial contract won in Bizerte, Tunisia, last year.

Equipment for the projects will be manufactured at AES Prodata's facilities in Belgium, Canada and Australia.

Contact: Sarah Manners, Public Affairs Manager, AES Prodata, Australia - Tel: +61 9 273 1100. Fax: +61 9 273 1208.

Gemplus Reports Profit of FFr 59m.

Gemplus reports a turnover of 752 million French francs and net profits of 59 million FFr in 1993. Hubert Giraud, Deputy General Manager says: "This success should be even more pronounced in 1994. During the course of the year, we should climb beyond 1 billion FF in earnings, confirming our position as world leader in the Smart Card Industry."

Europay Unveils Chip Card

Europay International says that the introduction of Smart Card payment systems will save European Member banks more than ECU 2 billion over the next seven years through off-line savings and reduced fraud losses.

At a meeting of the Board in Bergen, Norway, last month, they unveiled a prototype Eurocard-

Last year, Gemplus sold 103 million cards worldwide, and at the end of 1993 was producing 13 million cards every month at its three production facilities. The number of cards produced monthly is expected to reach 16 million units for the second quarter of 1994.

The Group reports that its investment in research and development represents 9% of corporate earnings and rapid growth with more patents for innovative new products: card readers, personalization systems, remote transaction products, specialised software, new chips, more practical and more powerful microprocessors. So far, Gemplus has filed more than 134 patents.

Sales of 752m FFr in 1993 were up from 491m FFr in 1992, an increase of around 53%. Of the total, 62.9% were earned outside of France through exports or local manufacturing. Net income at 59.4m FFr shows a 67.9% increase over 35.5m FFr in 1992.

Buscom Cards for Swedish Buses

Buscom Oy, Finland, is to supply its automatic fare collection system using contactless "proximity" cards to the Swedish towns of Uppsala, Ostersund and Lulea. The system is to be installed in 300 vehicles.

Proximity cards have been used widely in Finland for a number of years and are simple to use. All passengers have to do is flash their cards in front of a card reader as they board the bus and the fare is automatically deducted from the value held on the cards.

Contact: Veli Heikkinen, Managing Director Buscom Oy, Finland - Tel: +358 81 5514366. Fax: +358 81 5514766.

Mastercard with a chip (see front page) and approved a plan to enable banks to begin introducing chip cards by late 1996.

Ron Williams, Director and Chief Executive Officer of Europay, said: "Europay will enable its banks to be at the forefront of the next major financial services technology and to seize the benefits offered by chip cards, including improved risk management and the ability to offer value-added

services to customers.

"The business case for the Board's endorsement of chip cards is very strong," he said. "The potential savings from reduced counterfeit fraud and lower processing and telecommunications costs justify the investment.

"Further potential benefits exist through the introduction of such advanced services as the electronic purse."

Europay, MasterCard and Visa recently published Part One of a three-part series on global IC specifications (SCN June 1994) which gives card and Point-of-Sale terminal manufacturers the information needed to begin planning mass production.

Incentive plan

To maximise merchant acceptance, the Board endorsed the principle of creating an incentive plan to assist Acquiring banks when they begin the migration to full-functionality terminals which will be capable of handling transactions made with chip or magnetic stripe cards, verified by a PIN or signature in on- or off-line environments with card issuer control.

Contact: Mark Sievwright, Senior Manager, Commercial Services, Europay International, Belgium - Tel: +332 352 5669.

PA Consulting to Advise on Road Tolling

PA Consulting Group have been appointed by John MacGregor, Secretary of State for Transport, to provide expert analysis of electronic motorway tolling research and development plans in the UK.

They will help the Department to assess equipment and associated technology, scrutinise the first tolling trials next year, and to prepare a detailed

Slovak Access Control Systems

Two Smart Card access control systems have been installed in the Slovak Republic, formerly part of Czechoslovakia, by Universal Security & Card Systems, Bull CP8's local partner.

One system controls access to the building and offices of the Narodna Banka Slovenska, the central bank in the city of Banska Bystrica. Access is controlled using Bull CP8 cards (see photograph on

specification for an electronic tolling system for the British motorway network.

Heading the PA Consulting Group advisory team is Mike Tate, Operations Director in the IT Group. Tel: +44 (0)71 730 9000.

Hospital Phone Card

Patients at two hospitals in Berne and Geneva in Switzerland can use Smart Cards to make calls from public payphones.

The system, designed to simplify the management of hospital phones, has been developed by Ascom Autelca, of Switzerland, who have supplied 1,500 Smart payphones to the hospital in Geneva and 1,000 to the hospital in Berne, as well as 8,000 Bull CP8 SCOT 30 cards.

Patients pay a deposit for the card which stores their telephone extension number in memory. The card can be used to unlock, use and then lock the phone in their rooms, eliminating the abuse of the patient's private extension while they are absent for examinations or operations.

In the Geneva project, the card is a pre-paid card and patients can add value to the card by inserting bank notes in self-service machines in public areas.

On leaving hospital, the patients return their cards and recover their deposit together with any unused credit.

In Berne, the card is used for identification and patients are billed at the end of their stay.

Contact: Peter Wullschleger, Corporate Communications, Ascom Autelca, Switzerland - Tel: +41 31 999 6724. Fax: +41 31 999 6208.

front page) and CAD card readers.

In the second application at the head office of the customs authority in Bratislava, access through the entrances is controlled by Bull CP8 cards and CAD readers.

A further measure of security is supplied by equipping the lifts with TLP 224 NV readers in their external control panels (which control access to the lifts themselves) and the internal panels

(which check and validate the stops at the required floors).

Contact: Yves Girardot, Communication, Bull CP8, France - Tel: +33 1 39 02 44 00. Fax: +33 1 39 02 44 02.

Smart Card Training Workshops

Three-day Smart Card training workshops are being organised by Cardinal (UK) at the Chartered Institute of Marketing, Moor Hall Training Centre, Cookham, Berkshire, England on 13-15 September, 8-10 November and 6-8 December with a maximum number of 20 per course.

The workshops aim to introduce and explain Smart Card technology and its applications, provide in-depth practical understanding of the issues as they relate to commercial and marketing requirements, provide guidance to plan, develop and manage a Smart Card programme.

Courses will cover the Smart Card concept, operations, applications and their implementation, including the preparation, presentation and review of case studies.

Costs, excluding accommodation, is £925 +VAT; Smart Card Club members £795 +VAT.

Contact: Trevor Edwards, Course Directorate, Cardinal (UK), England - Tel: +44 (0)442 236665. Fax: +44 (0)442 236604.

Bank Order for Bull

French bank BNP has ordered a further 6,000 CAD **GPT Payphones Acquires Card Business**

GPT Payphone Systems has taken over GEC Card Technology, the UK supplier of payphone cards and Britain's only manufacturer of contactless Smart Cards.

Last year Payphone Systems supplied some 60 million magnetic stripe payphone cards to 47 administrations around the world and sales this year are expected to be around 80 million cards.

Until now, they have not manufactured Smart

1000 and 2,000 CAD 2000 reader/encoders to expand its bank branch access control system.

Bull CP8 cards are used in the reader/encoders attached to workstations to allow authorised access by employees to the information and data services they require in their jobs. They can also use the same card to offer bank machine functions to customers such as changing their bank card credit limits or re-enable cards that have been disabled due to three consecutive incorrect PIN entries.

Finnish Phone Card Order

TELE, one of the leading telecommunications operators in Finland has ordered a further 120,000 payphone cards from Solaic, France, bringing the total supplied this year to 220,000.

The card is the Solaic 256 bits EEPROM card with the TS1200 chip from SGS-Thomson.

Contact: Charles Juster, Communication Manager, Solaic, France - Tel: +33 1 49 00 96 33.

Bull Cards for PROTON Trial

Bull CP8, of France, has announced that along with Bull Belgique, it has been chosen by Banksys to supply 50,000 CC 60 Smart Cards for the trial of PROTON, the Belgian electronic purse system. The cards will be used in the field-testing in the cities of Leuven and Wavre starting in December.

Contact: Yves Girardot, Bull CP8, France - Tel: +33 1 39 02 44 00.

memory cards but assembled cards and chips in their production plant. Current production is around 20 million cards a year making them the biggest supplier in the UK, with plans to increase production capacity by 50 per cent.

Future direction

GPT is 60% owned by GEC and 40% by Siemens so the take-over of GEC Card Technology is viewed more as an internal matter, but it raises some interesting questions as to its future direction.

GEC has been a major supplier of magnetic stripe payphone cards with high quality graphics to GPT, but has had problems in the production of contactless cards and this year lost its contract to supply 5,000 cards for the Greater Manchester transport project. However it has supplied contactless cards for the automatic fare collection trial on London buses and for a similar scheme in Tampere, Finland.

It remains to be seen if GPT has taken over the company to safeguard a major supply of payphone cards or whether it will fund the expansion of contactless card production by the UK's only producer.

Contactless card trends

The recent Frost & Sullivan report "European Smart Card Markets," expects substantial expansion in the contactless card market from 1995, following the implementation of major projects in ticketing, transport and road tolls, with smaller scale applications such as access control, continuing to grow. By the year 2000 revenues are expected to reach \$100 million, and the compound annual growth from 1993 to 2000 will amount to 33.3 per cent.

Looking at trends by country, the report forecasts that the UK will become the leading market for contactless cards, accounting for 31.2% of the total revenues, followed by Italy with 24.1 per cent.

Contacts: Brian Dolby, Media Relations, GPT Payphone Systems - Tel: +44 (0)602 430300. Valerie Bouchet, Account Executive, Frost & Sullivan - Tel: +44 (0)71 730 3438. Fax: +44 (0)71 730 3343.

Los Angeles Tests Racom Cards

A trial of advanced automatic fare collection (AFC) technology and IVHS (Intelligent Vehicle Highway Systems) for public buses is underway in the California cities of Gardena, Los Angeles and Torrance.

Echelon Industries, Inc., has integrated the system and co-ordinated the funding, installation, concept plans and technology selection for the trial on behalf of the US Federal Transit Administration and CALTRANS Fund Automatic Fare Collection Programme for Los Angeles area bus passengers.

GNC Takeover by Monetel

Ascom, Switzerland's subsidiary Monetel SA, based in Valence, France, has taken over Great Nordic Communications (GNC) which specialises in payphones and EFTPOS systems and is a member of the Danish GN Great Nordic Group.

Monetel is a leading worldwide supplier of chip card-operated payphones, and Ascom says that the takeover of GNC will allow Monetel to augment its business volume as well as consolidate its international payphone activities.

GNC has a workforce of 164 and reported revenues in 1993 of Sfr. 36.5 million, some 80% of this from exports, particularly in the Scandinavian countries, Eastern Europe, Greece and Africa.

While GNC supplies products primarily for off-line applications, Monetel controls about 50% of the worldwide market for on-line applications.

Over the last two years, Monetel has won several major international orders, including an order from Mexico's telecoms operator, Telmex, for an on-line management system for a Smart Card operated payphone network. When completed, the system will monitor 400,000 payphones.

This contract was followed by an order for 9,500 telephones, bringing the total value of the contract to over Sfr. 50 million.

Contact: Peter Wullschleger, Ascom, Switzerland - Tel: +41 31 999 6724. Fax: +41 31 999 6208.

Ray Rebeiro, President of Echelon Industries, said: "The concept is to use the fare collection system as the core of an advanced passenger transaction and vehicle monitoring system.

"The system is designed to collect and process passenger and vehicle data in order to improve bus operations and reduce costs, and will also involve automated vehicle location, transfer and receipt printing, voice announcement of stops and passenger data collection," he said. "It will also have the ability to monitor vehicle performance, videotape security problems and integrate on board electronics."

The Racom contactless Smart Card, known as the In-Charge Card, will be used to automatically debit bus fares by waving it in front of the fare collection terminal while boarding the bus, and acts as a two-way radio that responds to specific commands from the on-bus fare collection system during passenger boarding.

"This is one of the first wireless electronic payment systems to go on-line in the world," says Richard Horton, President of Racom Systems, Inc., of Colorado. "By embedding a highly specialised computer chip and an antenna inside a plastic card we have created an electronic means of replacing cash, tokens, and tickets. The whole process of boarding a bus and paying is faster and easier for passengers and operators alike."

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

SWIFT Order for Bull

SWIFT, the Belgium-based Society for Worldwide Interbank Financial Telecommunications, has placed a further order with Bull CP8 for 30,000 8K bytes EPROM Smart Cards for its USE (Users Security Enhancement) system for Electronic Funds Transfer messages by member financial institutions.

This brings the total number of cards ordered from Bull to 90,000.

First Licence Option for Supertag

Bull/Oberthur Agreement

Bull CP8 and CP8 Oberthur, a subsidiary of FCO - Francois-Charles Oberthur (66%) and Bull CP8 (34%), have reinforced their co-operation for the sale and marketing of all types of Smart Cards as well as for industrial partnership projects related to card manufacturing. The strategy excludes Japan where Bull CP8 and Dai Nippon Printing jointly own SPOM, Japan.

The agreement augments the partnership between the companies which began in 1990 and led to the creation of two jointly owned subsidiaries, CP8 Oberthur and CP8 Microelectronique (manufacturer of micromodules for Smart Cards), and more recently Aycarte (a subsidiary of Oberthur) for card personalisation.

Supertag, forecast as the revolutionary replacement for barcodes, came closer to commercial reality with the announcement last month of an agreement with British Technology Group giving ICL the first licence option to commercialise the system. Invented in the laboratories of the CSIR organisation in Pretoria, South Africa, Supertag was acquired by BTG for licensing worldwide.

ICL believes the first applications will be in distribution, but other possibilities include baggage handling at airports, parcel delivery services, self-service libraries, and the transport of livestock or meat.

Each Supertag is a simple electronic circuit containing a unique number encoded on a silicon chip. It acts as an electronic label, enabling up to 50 objects a second to be scanned, identified and counted at a range of four metres. It can also be deactivated and double as an anti-theft device. It derives its energy from the illuminating radio beams of the scanner's transmitter.

"Ultimately it could revolutionise the way we shop," said Dr Ed Turner, ICL's Manager Retail Technology. "With Supertag included on supermarket packaging, you would be able to pass your trolley through a specially adapted archway at the check-out, and receive your itemised bill a few seconds later, without unpacking any of the items."

Contacts: Peter Hawkes, British Technology Group - Tel: +44 (0)71 403 6666. Dr. Ed Turner, ICL Retail Systems - Tel: +44 (0)344 476000.

Oberthur is already responsible for card production, which includes magnetic stripe cards, micromodules (memory only and microprocessor), embedding operations and card personalisation. It has manufactured more than 50 million Smart Cards, including 30 million microprocessor cards, in its factory in Vitre, Brittany, and plans to double production capacity in the next 18 months.

Responsible for overall industrial policy concerning card manufacturing, Oberthur will decide on the development of new products, industrial processes and, if appropriate, the setting up of manufacturing facilities outside France. The partners have agreed that marketing of cards in the United States will be carried out before the end of the year by a subsidiary controlled by Oberthur.

Bull CP8 specialises in the design and development of operating systems (masks) used in Smart Cards and the implementation of software in card-based systems and applications.

The FCO Group has around 50 agents and sales and marketing staff which cover all five continents, and Bull CP8, through its own sales network and the 90 subsidiaries of Groupe Bull, will continue to market and sell card-based solutions and systems.

Contacts: Suzanne Felix, Bull CP8, France - Tel: +33 1 45 63 85 94. Micheline Gilbert, Groupe FC Oberthur, France - Tel: +33 1 41 25 28 28.

New Gemplus Marketing Division

A new information highway, Pay-TV and Multimedia Division created by Gemplus will be headed by Michel Roux, former European Sales and Marketing Manager for Scientific Atlanta.

Aged 37, he holds an engineering degree from the Ecole Centrale in Paris, and an MBA from INSEAD (1989).

He began his career in 1982 working as a research engineer for Air Liquide, and then in 1985 moved to Thomson Consumer Electrics where, among other positions, he was Business Manager for Personal Computers from 1987 to 1988.

After graduating from INSEAD, he was appointed Research Director for Thomson CSF

German Road Toll Trials

Field trials of new motorway technologies for road pricing are being carried out on behalf of the German Ministry of Transportation on the A555 Cologne-Bonn motorway. Below are reports on a further three of the ten trials taking place.

EUROPASS Road Pricing System

videocommunications networks (1990) and then as Managing Director of Thomson Broadband Systems (1991).

Between 1992 and 1994 he was director of the French subsidiary and European Sales and Marketing Manager for Scientific Atlanta, an American company specialising in electronic equipment for cable-TV networks and satellite-based communications systems.

Mr Roux, who joins the Gemplus Group as Vice President, Pay-TV & Multimedia Products, is based at Gemplus headquarters at Gemenos, France - Tel: +33 42 32 51 20.

Peru Phonocard Order for Solaic

Solaic, who supplied Tele-2000 in Peru, South America, with 250,000 payphone cards earlier this year has received a further order for its E1 12B cards which will bring the number supplied this year to one million.

This is an important order for Solaic as it breaks into the South American market and follows an order for 5 million payphone cards from CAN-TV, the telecommunications operator in Venezuela in January of this year.

Contact: Charles Juster, Communication Manager, Solaic, France - Tel: +33 1 49 00 96 33.

The Dornier-Marconi Consortium are demonstrating their EUROPASS automatic road pricing system in which toll collection, vehicle classification and the detection of non- and incorrect payers, and data processing is carried out automatically in compliance with data security requirements without affecting traffic flow.

The system consists mainly of an on-board unit (OBU) installed in the vehicle and equipped to

OBU has no link to the vehicle, there is no connection between the driver and the Smart Card in the pre-paid mode, tracking by the OBU is impossible, and in a case of non-infringement, no location data is stored or forwarded.

Contact: Dr. Bernhard Neumeyer, Project Leader,
Dornier GmbH, Germany - Tel: +49 7545 88513.
Fax: +49 7546 88981.

take a credit card (post-paid mode) or a Smart Card (pre-paid mode), and "roadside" equipment (installed on gantries) comprising a communication system, vehicle detection and classification system, and the control unit.

In the German multi-lane application the card is a contact Smart Card from Gemplus with the charging process being carried out by short range communication between the gantry system and the OBU unit at 5.8 GHz.

Standard procedure for the pre-paid mode requires two gantries. Toll collection is carried out at the first gantry while its execution is checked and acknowledged at the second. Enforcement is carried out with video cameras which are only triggered if a violation occurs.

The card used is a contact card from Gemplus. Privacy is guaranteed because the data stored in the **Mobile Pass from ANT**

operation across four lanes, including enforcement at speeds up to 250 km/h.

The OBU, which is fixed to the front windscreen, communicates with a charge station while passing

The Mobile Pass system for automatic road pricing developed by ANT Nachrichtentechnik GmbH, part of the Bosch Group, is based on communications via microwave radio between a fixed station installed at the motorway and on board units (OBUs) installed in the vehicles. The system uses the frequency bank of 5795 MHz to 5805 MHz and in the field trial it is designed for multi-lane

Contact: Dr Zurmühl, ANT Nachrichtentechnik GmbH, Germany - Tel: +49 7191 130. Fax: +49 7191 133212.

below the transceiver equipment fitted to a gantry on the motorway. A wake-up system ahead of the charging station triggers the OBU from standby-mode into the active state shortening the time required to process a transaction within the communication zone thus permitting higher vehicle speeds. After crosswise authentication, the fees transmitted by the charging station are either directly debited from the card (pre-payment mode) or can be debited from the account of the card owner (post-payment mode). Infringements are recorded by video for enforcement purposes.

No personal data is recorded or stored during a normal charging transaction in the pre-payment mode as there is no link between the card and the owner. In post-payment it is possible to relate card identification to an account, but encryption prevents unauthorised access to the data.

The contact Smart Card used in the system is supplied by GAO Gesellschaft für Automation und Organisation GmbH, Germany.

Smart Card Diary

2nd International Seminar on Pre-paid Cards, Denmark, 31 August/1 September.

Organised by Danmont, the programme includes system technology and marketing experience from the first two years of operation as well as strategic and more political issues. Contact: Ms Berit Nielsen, Marketing, Danmont - Tel: +45 4344 999. Fax: +45 4344 9030.

ESCAT 1994 (European Smart Card Applications & Technology), Hotel Inter-Continental, Helsinki, Finland, 7-9 September.

Three days of Smart Card applications and user experiences from international speakers from ten countries. Contact: Congrex, Finland - Tel: +358-0-752 3611. Fax: +358-0-752 0899.

Paycard '94, The Gloucester Hotel, London,

England, 19/20 September.

Topics include Europay International on the business case for the introduction of chip-based POS payment systems and BT on exploiting chip card technology in telephony, as well as loyalty schemes, fraud reduction and co-branding opportunities for retailers. Contact: IIR - Tel: +44 (0)71 412 0141. Fax: +44 (0)71 412 0145.

Profit from the Payment Card Business, Forte Crest Bloomsbury Hotel, London, 26/27 September.

Focuses on current market status and making the business more profitable, development of the electronic purse and some of the major applications for Smart Card technology. Contact: IBC Financial Focus - Tel: +44 (0)71 637 4383. Fax: +44 (0)71 323 4298.

CarteS 94, Palais des Congrès, Paris, France, 18-20 October.

The 9th international forum for plastic cards technologies with plenary conferences on Smart Cards in the fields of payment, security, information management, commerce and technology, electronic payment systems; one-day forums on Cards and Local Authorities and Health Care Cards; and half-day seminars on Card and Law, Cards and Telecommunications, Technocard, Stored Value Ticketing, Components 2000 and Cards and Security. There is also a major exhibition with over 100 exhibitors. Contacts: Joelle Catalano (Congress) - Tel:+33 1 49 68 52 60. Gilles Benay (Exhibitors) - Tel:+33 1 49 68 52 84.

European Payments 94 (EFTP0S & Home Services), Sheraton Grand Hotel, Edinburgh, Scotland, 15-17 November.

Celebrating its 10th anniversary, the conference aims to provide an in-depth review of financial payment systems throughout the world. Contact: Scottish Electronics Technology Group - Tel: +44 (0)41 553 1930. Fax: +44 (0)41 552 0511.

CardTech/SecurTech '94 West, Westin Hotel, Santa Clara Convention Center, California, USA, **Top View on Electronic Purses**

Ms Bodil Nyboe Anderson, Governor of Danmarks Nationalbank - the central bank of Denmark - will talk on electronic purse systems at Danmont's 2nd International Conference on payment Systems and Pre-paid cards to be held in Copenhagen on the 31st August and 1st September (see Diary).

Henning Jensen, Managing Director, Danmont, says "As far as we are aware this is the first time that a Governor of a Central Bank will speak about the view on electronic purse systems in public."

Other speakers include Jens Loft Rasmussen, Deputy General Manager, Legal Affairs, Danish Bankers Association, who will talk about the new legislation for home banking. He was deeply involved in the preparatory work for this law which is the first of its kind in the world.

Danmont's Vice President Special Projects, Jens Lindboe-Larson, will report on their experience with non-rechargeable IC Cards and progress towards rechargeable cards.

30 November/1 December.

Conference designed to augment the larger East show held each Spring, will provide a general session on major industry trends followed by two tracks - the developers track focusing on technical issues associated with integration of advanced card and security technology into hardware and software systems, and the applications track looking at the business justifications and strategies. There will be over 40 booths in the associated exhibition. Contact: CTST - Tel: +1 301 881 3383. Fax: +1 301 881 2430.

Smart Card Europe, Royal Lancaster Hotel, London, 13/14 December.

The 2nd annual European conference focuses on the security issues, particularly regarding electronic purse schemes, and examines the major applications in the rapidly developing fields of transport and telecommunications. New to the conference is a tutorial on 12 December by Dr David Everett for those who want to get up to speed on Smart Card technology. Contact: IBC Technical Services - Tel: +44 (0)71 637 4383. Fax: +44 (0)71 631 3214.

Orange Service Expanding

Orange, the UK Personal Communications Network, has expanded rapidly since its launch at the end of April and now covers 35 million people - over 60% of the UK population.

The service, which uses standard size Smart Cards SIMs (Subscriber Identification Modules) or smaller plug-in cards, to activate and personalise the handset and for billing, is well ahead of its expansion target, says owners Hutchison Telecom.

The company aims to achieve coverage for 40 million people (70% of the population) by the end of the year and 50 million people (90% of the population) by mid-1995. This is four years ahead of the licence requirements.

In addition, an in-fill programme is also underway to provide a high level of service inside buildings as well as busy areas such as shopping centres, railway stations and motorway service stations. Total investment in the Orange Service is in excess of £700 million with a target network of over 2,000 base stations.

Hutchison Telecom (UK) is owned by Hong Kong Hutchison Whampoa (65%), British Aerospace (30%) and Barclays (5%).

Youths from 60 Countries

French Smart Card manufacturer Gemplus and a number of local authorities, are to play host to 60 13/14 year olds from 60 different countries that now use Smart Cards, and will be the ambassadors of the technology. A three-day event from 28-30 September will show how active local business concerns can be as evidenced by the locally-made high-tech Smart Card which is used worldwide.

The event, entitled "Gemplus and the Young People Have a Card Up Their Sleeve for the Year 2000", will highlight the assets of the region, Department and Metropolitan area, focusing on a shared industrial success which has a bright future.

Gemplus has its original headquarters in Gemenos

MasterCard Chip Platform

MasterCard International has announced its programme to support the issuance and acceptance of Smart Card-based payment products throughout its global payment system and says it expects to reveal its first chip card-based application "within the next several months."

The announcement made in New York appears to be a firm commitment to Smart Cards. It says that having endorsed microchip technology as the acceptance platform of the future, it estimates that virtually all MasterCard branded payment products and acceptance locations will include chip technology in some form by the year 2000.

This creates a considerable market for cards and products with nearly 22,000 MasterCard member financial institutions worldwide, over 210 million credit cards in circulation, and 12 million acceptance locations.

Research by several financial services consultants on Mastercard's behalf to evaluate the economics of implementing chip technology, including the business case as a global fraud prevention method, proved that the cost of chip technology for debit and credit cards could be recovered through the

and more recently completed facilities nearby in La Ciotat.

Gemplus says, "These young people will be 20 in the year 2000 at the dawn of the new millennium when the Smart Cards will have become an object of everyday life, offering independence, freedom, ease of use and security."

"They will be the ambassadors of this technology among the young people of our region. Together they will share their vision of future applications, showing how Smart Cards will facilitate communication between people in all parts of the world."

Local authorities taking part are Conseil Regional Provence-Alpes Cote d'Azur, Conseil General des Bouches du Rhone, the Marseille Provence Metropole Inter-City Association and La Chambre de Commerce et d'Industrie Marseille Provence.

Contact: Aline Calvo, Gemplus, France - Tel: +33 42 32 50 03

benefits of reduced fraud and processing costs. Over a seven-year implementation period, the cumulative net savings is estimated at more than \$3 billion worldwide.

In addition to fraud prevention, says MasterCard, chip technology offers new opportunities for product differentiation and expansion that cannot be achieved with the existing magnetic stripe technology.

It is these new opportunities presented by Smart Card technology that are probably the key to MasterCard's decision as member financial institutions, fighting for market share, watch with growing alarm the large number of national electronic purse schemes already launched or under development in many parts of the world.

As Richard Greenawalt, President of Advanta, says: "The competition that is developing outside of our industry for a place in the cardholder's wallet is tremendous. MasterCard strategy is absolutely the right direction for financial institutions like Advanta to stay competitive by adding even more value to our customers' MasterCard branded cards."

Implementation Schedule

MasterCard says the core elements of its implementation schedule include:

* The joint effort with Visa and Europay to create payment industry standards upon which Mastercard's new Smart Card technology platform will be built. This work will be consistent with developing ISO Standards, and is scheduled to be completed by the end of 1994.

* The development of MasterCard's global rules for the acceptance and issuance of chip-based payment products, which will be completed by the end of 1995. These rules will also define how PIN's will be used in conjunction with microchips at the point-of-sale, and will apply to the use of the chip-based products at both the point-of-sale and at ATM's.

* It envisages that terminals which accept both magnetic stripe and Smart Cards that conform to MasterCard rules will be available to merchants by 1996.

TechnoTrend System

In the Automatic Toll Exaction System from TechnoTrend Systemtechnik GmbH, the on board unit (OBU) consists of an antenna designed to pick up external code signals such as motorway section number, direction of travel, identification code of the maintaining company, indication of the charges and synchronized time.

In the memory of the OBU, the above details on motorway section, direction of travel and time are stored. This memory is only accessible by the owner of the car by PIN code and the user may chose between permanent clearing, short storing and full storing.

Toll charges are deducted from a pre-paid contactless Smart Card inserted in the OBU which has a display from which details such as charge amount and total amount paid can be read.

Roadside equipment

The roadside component of the system (beacon) is equipped with a transmitting station and has a range of 30 to 80 metres. A microcontroller with low power consumption and a clock are further components of the system, as well as a Wide Area Network (WAN) connection to existing central traffic management departments. Each sector is

"Chip technology has been successfully married with payment products in markets the world over," said H. Eugene Lockhart, President and Chief Executive Officer. "It can be used to reward customer loyalty through electronic couponing, open new markets by reducing our dependence on local telecommunications systems, and increase consumers' feeling of security by dramatically reducing fraud. We think that this is only the beginning.

"As a global payment services provider, MasterCard is in an ideal position to support the use of chip technology as a means by which we can both increase the value that our payment products deliver to consumers and merchants and reduce the risk associated with these products to our member financial institutions."

Contact: Jana Weatherbee, MasterCard International, USA - Tel: +1 212 649 5206.
defined by two beacons.

The roadside device can be installed either on the central reservation of the motorway or at the roadside. It is also possible to fix it to masts, trees, road signs or buildings depending on the high frequency transmission chosen.

The user purchases a chip card representing a certain amount of money paid in advance and the card is rechargeable at vending machines.

Tracing offenders

The basis of any tracing system is the recording of statistics only of unauthorised road users, thus ensuring the highest possible degree of data protection for legitimate users.

Tracing units can be used either stationary or mobile and are equipped with a video camera, a long term video recorder, visual processing unit for the recording of number plates, infra-red flashgun, as well as a computer control unit.

Expansion possibilities

TechnoTrend says that apart from the main application of the system on motorways, the system could also be used region-wide as it creates minimal infrastructure costs. For that reason, the

system could be installed in regional areas in order to regulate access to city centres, parking areas or closed zones.

In principle, the system, via the OBU, could define a "home area" - a zone in which local residents are charged lower fees than visitors to city centres.

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Electronic Purse for Prague

An electronic purse system using disposable cards is operating in Prague in the Czech Republic. The system, installed by Innovatron Data Systems' franchisee, is used in stores belonging to the Easy Card network and allows customers to make low value payments. The card is pre-paid with 400

Workshop on Transport

Progress, problems and the way ahead were discussed at a workshop on the use of Smart Cards in road transport applications held in Brussels, Belgium, last month by DRIVE Area 1. The speakers, all recognised experts in their particular area of Smart Cards, security or payment, were asked to concentrate on identifying the potential problems and obstacles that might exist with the technology but might not be common knowledge to the implementers and players in the transport field.

Chairman, Phil Blythe of the University of Newcastle-upon-Tyne, England, said that projects in the DRIVE programme identified a number of key issues which might create obstacles to the implementation of demand management strategies, and their associated technologies. He also said a number of workshops were being held to bring together a diverse group of experts to firstly highlight and explain some of the issues and problems that exist, and secondly, to try and agree upon a mechanism for exploring these problems.

Manuel Carbajo, from TTCO, Belgium, gave the current status of the CARDME initiative and said a task force would be appointed soon to tackle interoperability while a future task would study the requirements for a Smart Card for toll collection.

John Turnstall, ECBS, Belgium, said that three issues were listed as important to the banking world

Czech crowns.

Currently over 100,000 cards have been issued and are used in about 100 stores equipped with TPSCAM 1000 terminals manufactured by Groupe Innovatron.

Health card

In Mexico, Innovatron say a health card is being issued by an American pharmaceutical laboratory to monitor its sales, identifying leading products and providing patients with an accurate monitoring of medicines.

The card is therefore used as a portable medical file as well as a marketing and management tool.

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- interoperability (which already existed for the banking world), card authentication, and definition of the pre-paid instrument. On card authentication, he said it was important to preserve the integrity of the card and this could already be guaranteed by the banks. As for the pre-paid instrument, he said if the card was only to be used for transport services then it could be issued by the service provider, however, if the card was to be used by other services then it should be issued and managed by a regulated institution.

Data and card security

Several speakers addressed the issue of data and card security. Graham Turner, Viatica, UK, suggested that around 60% of cards used for Pay-TV in the USA were fake due to the fact that the Pay-TV application was a one-way link (from transmitter to TV) and authentication and checking of cards was difficult. With automatic tolling, where a two-way communications link existed, fraud would be more difficult as a closed-loop existed, but he advised designers not to underestimate the skill of the criminal or over estimate the security of the card and system as a whole.

Henny van der Pavert, Intercai, said that toll system security had been studied by the consortium working on the Stockholm toll ring expected to be operating by October 1997. Some solutions had been proposed but there was still a great deal of

work to be undertaken to analyze the threats and propose counter measures.

Lars Kallstrom of TFK, Transportforschung, Germany, spoke about the ENS funded project INCA which had brought a number of players in the field of data exchange together to look at ways of exchanging information between agencies in different European countries. Smart Cards had been considered as a way of implementing portable data files for such applications as driving licenses, insurance and vehicle details and hazardous goods monitors. The main issues to be addressed were the amount of data to be stored, memory capacity and variable field lengths, economical design, portable file/purse and card encryption.

Industry view

Philip Maes, Gemplus, France, gave an industry view on what was currently available and what might or not be possible in the near future. He suggested that any automatic debiting transponder should be designed to accept all kinds of cards, from memory cards to highly sophisticated processing and encryption cards.

Smart Card Tutorial - part 23

Multi - Application Smart Cards - continued.

We have already discussed the ISO specifications that relate to the management of standards in an ICC. That however was only just the start of the story, now we need to try and understand what all

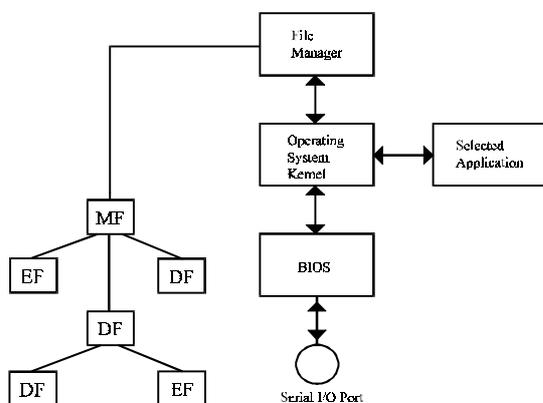


Fig. 1. A Multi Application Architecture

this means in practice. Security as we shall see is an over riding issue in the management of Multi-

The problems of encryption processing and card I/O speeds were being tackled by Gemplus. A fast DES algorithm had been implemented that would encrypt 8-bytes of data in 10ms (rather than the usual 30-40ms), and a sub-routine for existing Smart Cards had been developed which allowed the card to operate with an I/O speed of 115.2kbps compared with the standard 9.6kbps.

application Smart Cards and one that as yet is not really covered by the ISO 7816 standard.

Lets start off by considering a software model for a Multi-application Smart Card as shown in figure 1. We have derived this model in so far as is possible using the ISO proposed file structure using a master file (MF), dedicated files (DFs) and elementary files (EFs). We could spend days discussing operating systems but their primary role is a resource management system. The purpose of the operating system is to select applications and to control the resources they need to achieve their functionality. The core of an operating system is the file structure which determines how applications can co-exist without interfering with each other.

There are four entities shown in our Multi-application architecture,

- Operating system kernel
- BIOS (Binary Input/Output System)
- File manager
- The application

The operating system provides the interfaces to the application and controls the two primary resources available on a Smart Card, the file manager and the BIOS (Binary Input/Output System) which is the

driver that controls the serial interface available to the outside world.

The segregation between applications is totally dependent on the way the architecture is implemented. In figure 2 we show three ways by which the application can realise its functionality.

For application 1 the interface to the CPU is indirect since the application interface operates through the file manager. This is really the approach assumed by ISO7816-4. The task of the file manager is to control the access rights to the file structure. Before a file is made available for reading and writing the file manager can insist on proof of rights of access. This can be achieved by the use of a simple pass word or even more complex challenge and response techniques. These later techniques are widely used for authenticating a second party and are invoked by sending data to the other party which then forms a suitable cryptographic transformation such as a digital signature to produce a response that may be checked by the issuer of the challenge.

If the application user is genuine as checked by the appropriate authentication techniques then we can assume that, subject to errors in the application, that the data will be manipulated correctly. Clearly the application will be restricted to those data files for which the user was able to prove the necessary access rights. The security of this approach is as good as the strength of the authentication technique. The use of a simple pass word may be inadequate if such a pass word can be determined by monitoring the Smart Card communications path or by delving into the terminal that invokes the application.

The approach adopted by application 2 as shown in figure 2 is the dangerous one. Here the application takes control of the CPU and whilst in an ideal world it should access the data files through the file manager this cannot be enforced. Any application that controls the CPU directly is clearly capable of bypassing any controls implemented by the file manager. Such applications are equally capable of controlling the serial I/O port directly avoiding any controls that might be implemented by the BIOS driver.

The application 2 type of system is in fact the one most commonly used today with micro-controller Smart Cards. If you are running a single application then clearly there is no problem but any extension

Once the appropriate authentication procedures have been successfully completed then the file manager allows the application access to the files dependent on the particular rights that have been established. This may be read only or read and write. Clearly at this stage the application has

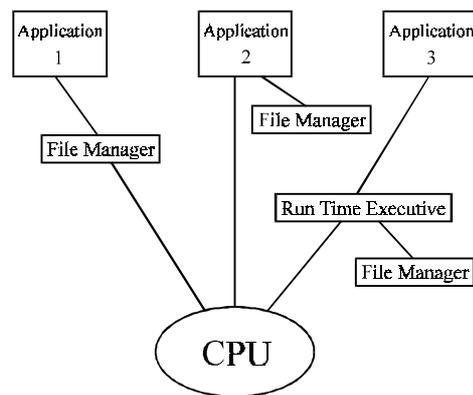


Fig. 2. Application CPU and File Privileges

control of the data file and may invoke operations that manipulate the data.

to a Multi-application environment runs you into severe problems. In a Multi-function environment when a single commercial entity is responsible for a number of applications then this may not be a problem because they can take the necessary steps to ensure segregation of the application.

If two separate commercial entities want to share a single Smart Card for two different applications then we need to apply the appropriate validation and verification techniques. For anybody that has never tried this on a software program you are strongly advised to try and avoid the problem. It is extremely difficult to determine when a software module can accidentally or deliberately step outside its normal mode of operation. It is often practically impossible to exhaust the number of combinations of paths in the software that may be invoked depending on the various decision points that allow a change to the execution flow. In practice the only way you can handle this problem is by implementing a strict methodology in the software design cycle where you can show the correspondence of every line of code to a detailed requirements specification. This would require the two organisations wishing to co-habit the Smart Card to jointly develop the two applications.

It should be clear that this approach has a second limitation in that the whole life cycle of the

application needs to be carefully controlled to ensure that the correct code modules are loaded on to the Smart Card and can not be subsequently changed. This in practice will require the use of software authentication codes and the necessary procedures to ensure that their checking is enforced.

It is actually the third approach as shown for application 3 in figure 2 that is the most interesting and is almost certainly the way forward for the future. Here the application interface to the file structure is controlled by a run time executive. The purpose of this run time executive is to ensure that the application cannot avoid the file manager. This technique can be achieved through software or by the use of memory control hardware in the Smart Card chip. The ST16xyz (SGS-Thompson) chip for example contains a memory access control matrix that is set when the chip is manufactured.

The use of this matrix is very powerful and forms an ideal base for Multi-application systems. In a normal system the operating system which includes the file manager will be implemented in the ROM (Mask Read Only Memory) area of the chip. The application would normally be loaded in the EEPROM (Electrically Erasable Programmable Read Only Memory) memory after the chip is fabricated. The RAM (Random Access Memory) area acts as the primary working memory for both the operating system and the applications. It is also possible to set up a program module to run in RAM space. Although this area on a Smart Card chip is very small, usually 256 bytes or less there may be occurrences when a designer wants to construct a self adaptive module. Whether or not such a technique is desirable we can pass on here for the moment but only to note that the ST16xyz matrix allows for memory control even in this situation.

From a practical point of view the normal matrix would probably prohibit a program in RAM by restricting access to RAM, ROM and EEPROM data space. A program contained in EEPROM would be allowed access to RAM data but would be denied access to EEPROM and ROM data. An application could still gain access to EEPROM

The purpose of this control matrix is to limit the memory that application programs are allowed to access. The access matrix is defined as follows,

Data area to be accessed →	RAM	ROM	EEPROM
Program contained in area ↓			
RAM	X	X	X
ROM	Access always allowed		
EEPROM	X	X	X

X = access allowed / denied can be set.

data but this would have to be implemented through a application interface to the file manager running in the ROM program space.

The Phillips 83C852 crypto chip for Smart Cards has a simpler mechanism where programs running in EEPROM are prohibited from writing to EEPROM memory but they are still allowed to read such memory.

The run time executive could be implemented entirely in software. In this situation the application interface operates at an interpretive level where each instruction is actually executed by the run time executive directly. By this means the necessary memory partitions can be achieved. This method probably offers the greatest flexibility but is the more complex approach.

David B Everett

Next month - Multi-application Smart Cards continued.

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Piaf Personal Parking Meter

not debiting units from the card. It will start again automatically as soon as parking is chargeable. It also stops automatically as soon as payment is no longer required.

Parking attendants can check if the vehicle is legally parked by reading the meter display. When a card runs out of units, the display clock stops so an overstay is immediately evident.

Contact: Innovatron Systemes Urbains. General Manager: Marc Aschenbroich. France - Tel: +33 1 40 13 39 30. Fax: +33 1 40 13 39 39.

The Piaf personal Smart Card parking meter from Innovatron is achieving widespread success with 45 systems installed in France and 22 in other countries.

It has been installed by local authorities in Andorra (2), Belgium (5), Greece (2), The Netherlands (3), Spain (5), Sweden (4) and Austria (1) with two pilots in the United States.

The Piaf parking meter is light, stylish, small enough to hold comfortably in your hand, and easy to use. It takes account of local parking regulations such as parking zones, chargeable periods and maximum authorised stay, etc.

It is operated by Smart Cards which contain pre-paid parking units that are debited while the card is in use. With so many towns or cities using the Piaf system there is a wide range of colourful and attractively designed cards on the market some of which are shown here.

To use the card, the driver inserts the card in the meter, selects the parking zone and positions the meter so that the display can be read from outside the vehicle.

Attractions for drivers include the fact that they do not have to carry coins for parking meters or waste time walking to ticket machines. They are also ideal for regular users such as doctors, tradesmen, and deliverymen who have to park frequently, and for companies and organisations with vehicle fleets.

In addition, drivers only pay for actual parking time. The meter automatically calculates the amount due according to the time of day and the parking zone. Outside chargeable time periods or on free parking days, the meter is on standby and is