Mikron Austria Bid for World Ticket Card

Mikron of Austria is promoting its multi-functional contactless Smart Card and reader system for automatic fare collection (AFC) and electronic purse applications as "the world's ticket card". The system has already been ordered in Europe, Australia and the United States. According to Roland Koo, founder and Chairman of Mikron, its strategy is "to make the MIFARE Smart Card system the *de facto* world standard."

To achieve, this Mikron is selling the IC of the card to selected card manufacturing partners all over the world and these partners are given support to manufacture the MIFARE system based on MIFARE ICs. The photograph below shows working samples of MIFARE cards manufactured by (left to right): Kapsch (Austria), Giesecke & Devrient (Germany), Printoplast (Switzerland), Cross (USA), McCorquodale (UK), Gemplus (France), and Picopak (Finland).

Next Month

Smart Card Tutorial Part 26
An Update on Smart Card Memories

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World Ticket Card

MIFARE can also be bought directly at Mikron or its sales agents. The manufacturing of the IC is carried out by Mikron in conjunction with subcontractors as well as by silicon licence partners like Siemens AG which supply the card IC independently of Mikron.

Mikron also grants licences for MIFARE reader core modules.

The company believes that these combined factors guarantee a high demand in volume, attractive prices and a high safety in delivery. Demonstration kits with ISO cards are available.

Three orders

System integrator Scanpoint, has ordered 3,000 reader core modules and 20,000 cards to be installed in Oslo, Norway, by the end of April 1995. A further 580,000 cards will be required for the AFC project later.

In Sydney, Australia, Mikron will carry out a field trial with the Australian system integrator Card Technology Australia starting in November this year.

The MIFARE system is being used in Ann Arbor, USA for automatic fare collection which is carried out together with the German system integrator GSI.

Features of the MIFARE Smart Card system include:

*   High speed data transmission (105 kbaud) which means that transactions can be handled in less than 0.1 seconds.

*   Contactless technology does not require users to stop at the target reader which has a reading distance of 10cms and cards can remain in a wallet.

*   A proprietary anti-collision algorithm enables the system to handle several cards in the field.

*   High security via challenge and response authentication, data stream ciphering and message authentication signatures protect the card and reader system from fraud and make it attractive for electronic purse applications.

Gala Bingo Club Card

Smart Cards are being used in the Gala bingo club chain in the UK in a loyalty scheme which has substantially increased the number of regular attenders who receive points for the number of times they visit each week.

*   Radio frequency system with a passive card (no battery).

*   Proven EEPROM technology

*   Availability from independent sources around the world

Transport card battle

Meanwhile, in the transport card battle, attention is focused on the other side of the world as the industry waits to see where ERG Australia, a pioneer in the use of Smart Cards in the public transport fare collection market, will be placing orders for some of its major contracts.

ERG is expected to place an order soon for half-a-million contactless Smart Cards for the AFC scheme in Greater Manchester. It also has the contract to implement the new fare collection system in Hong Kong which involves the supply of three million contactless Smart Cards.

In addition, ERG is a member of the OneLink consortium managing the Melbourne, Australia, AFC project expected to start late this year and use contactless Smart Cards.

Contact: Alexander Harrer, Mikron, Austria - Tel: +43 3124 23033-95. Fax: +43 3124 23033-27.

AT&T Appointment

AT&T has appointed Frederick J Honold as Vice President and General Manager of its Smart Cards unit which supplies contactless Smart Cards and applications.

Previously Vice President of Sales for AT&T Smart Cards, he will now be responsible for most aspects of the operation of the business, including sales, marketing, research and development, customer support and product development.

The six-month trial started in Southsea, Hampshire, in southern England, and around 11,000 Smart Cards have now been issued to loyal members of Gala Clubs in 10 locations.

Called the Gold Card, the Smart Card supplied by

Euclid has a Siemens chip on the rear side along with a magnetic stripe used in the club membership system.

Selected members

Cards are issued free to selected members and contain their membership number and name. Points awarded can be redeemed in the prize shop and uses are being extended so that points can be used at change machines, for bingo cards and in amusement machines. The same card can be used in other Gala clubs equipped with the system.

Euclid provided the hardware and software solution. The project included sourcing and printing the cards, developing their own reader and operating system, designing and writing software through to installation and on-site training.

The system has an audit trail which provides the club with information on the number of points allocated to cards and how many points have been redeemed. If a card is lost, the audit trail enables the club to blacklist the card and re-issue a new card to the member with the points accrued. Similarly, should a card malfunction, the points can be reinstated on a new card.

Euclid says that savings over the first year will far outweigh the initial cost of installation and running, and revenue earned by increased trade will ensure a return on the investment within a short period.

Contact: Geoffrey Neal, Managing Director, Euclid, England - Tel: +44 (0)705 454637. Fax: +44 (0)705 474224.

New Data Protection Registrar

French Carte A Plus

French city Aulnay-sous-Bois (population 82,000) is using its A Plus Smart Card for the management of its water sports stadium and access to the table tennis club facilities, courts and staff ID.

The water sports stadium of Coursailles includes several pools totalling an area of 2,550 sq. metres -

The UK's new Data Protection Registrar, Mrs Elizabeth France, took up her appointment this month. She succeeds Eric Howe, CBE, who has retired after two five-year terms of office.

Formerly head of the Home Office's Information and Pay Services Division, Mrs France will have to decide whether to press for amendments to the existing 1984 UK Data Protection Act to facilitate its enforcement, or to wait for changes resulting from the European Commission Draft Directive which is currently under review but not expected to be adopted into UK law before 1997.

Contact: The Data Protection Registrar, UK - Tel: +44 (0)625 535711. Fax: +44 (0)625 524510.

Post Office Installs DANMONT

A new concept for the DANMONT electronic purse card is to be tested at Osterbro Post Office in Copenhagen and at the end of this year it will be possible to use the card in self-service vending machines, to send a fax, make a telephone call, take photo-copies and to buy stamps.

There is also growing interest from advertisers with Coca-Cola, Ledoje-Smorum municipality, Miele, IBM, and department store Daells ordering advertisements on DANMONT cards.

Contact: Henning Jensen, Managing Director, DANMONT, Denmark - Tel: +45 4344 9999. Fax: +45 4344 9030.

1,900 sq. metres of outdoor and 650 sq. metres of indoor pools providing water activities for young children, swimming lessons and swimming school; and sports activities such as diving, water polo, canoeing, and aquatic exercise.

In summer, the stadium accommodates up to 3,000 people with over 4,000 at peak periods, when queuing can last as long as 90 minutes.

La Rose-des-Vents municipal tennis courts with four outdoor and four indoor courts, is managed with the Smart Card which is used to control access, booking and payment to use the courts

Minitel terminal

A Minitel terminal installed at the entrance to the Club House simplifies the booking procedure. The system rationalises the management of time slots for the tennis courts, improves their monitoring, shortens the waiting periods, etc.

To book a tennis court the player must make a reservation on the Minitel terminal or by phone (the operator enters the information directly on the datacom server). The reader checks if the court is free, or suggests selecting another one. The system also accommodates delays. After a certain time the reservation is cancelled and the court become available for other players.

The electronic purse can be reloaded at the sports department, at the secretarial office of the water sports stadium or at a self-service reloading terminal with a bank card.

The system has been designed by Innovatron Ingenierie as a Smart Card-operated management system of leisure and sports facilities. Benefits are seen as programming of days and times of access for staff, cuts in operating costs by creating a single centralised management centre, optimum use of the sports facilities, access control, real-time knowledge of the number of bathers, enhanced administration and the generation of comprehensive statistical reports.

Contact: Ms Genevieve Boeuf, Communication Manager, Innovatron Ingenierie, France - Tel: +33 1 40 13 39 42. Fax: +33 1 40 13 39 19.

MasterCard Smart Card in 1996

MasterCard International has announced in New York that the first application it will offer on its new Smart Card will be a pre-paid feature, enabling cardholders to use the card for purchases which traditionally require coins or small bills. It will be available on a limited basis but not before the beginning of 1996.

Why MasterCard has chosen to announce its intentions with such a long lead time before the new card will be available leads to speculation that it is trying to limit competition from the many national and other electronic purse schemes already launched, or about to be launched, in the marketplace, as well as to influence member financial institutions considering schemes of their own.

MasterCard has nearly 22,000 member financial institutions worldwide, many of them concerned about losing potential business to other Smart Card operators. .

It is the declared intention of MasterCard to move its entire payments platform from magnetic stripe technology to chip technology. It is also estimated that more than $3 billion dollars worldwide could be saved over a seven-year period, in addition to offering new services, by adopting chip technology.

Philip P Verdi, MasterCard Executive Vice President, says: "The microchip will not only make MasterCard the most protected brand on the market, it will make it the smartest brand on the market by offering the cardholder a variety of new services that were not possible before. The pre-paid feature is just the first of many smart services that MasterCard will be developing."

In the United States alone, says MasterCard, more than 237 billion transactions totalling $600 billion are made with cash each year and it is estimated that 84% of those transactions are for less than $20. It is this market that MasterCard seeks to penetrate by offering its pre-paid feature on both credit and automated teller machine (ATM) or debit cards.

Diane Wetherington, Senior Vice President, Chip Card Business/Marketing, comments: "The research that we have conducted shows that consumers like the idea of a pre-paid feature, citing its added convenience and security. They also like the versatility it will offer, as the chip will enable multiple currencies to be stored and used on a single card. Our pre-paid card will also increase the types of locations where the cardholder can use his or her card, such as newspaper stands, vending machines and parking meters to name just a few."

Contact: Jana Weatherbee, MasterCard

Change to Chip Card Technology

Cards and terminals will change completely over the next 10 years but it will not be before the next century that we will have a complete chip technology to replace the magnetic stripe solutions, says Per Ladegaard, Managing Director of PBS and Chairman of the Board of DANMONT.

Speaking at the DANMONT Conference in Copenhagen, Denmark, he said the change would be a migratory process. More and more embossed

International, USA - Tel: +1 212 649 5206.

ICC Specifications Part Two

The three major card issuers, Europay, MasterCard and Visa have published the second of the three-part common technical specifications for the integration of microprocessor chips in payment cards.

Called "Integrated Circuit Card Specifications for Payment-Systems - Part 2," it defines data elements.

What elements will be located in the chip such as the account number and expiry date as well as other items such as transaction counters and cryptographic elements; Structure and coding of messages - defining what communication will take place between the chip and the terminals to handle transactions; Application selection process takes place for the terminal to determine which applications are on the card and the process to select the desired application.

Part 3, to be published later this year, will illustrate how the chip card and merchant POS terminals will work together. When completed, the specifications will set the stage for the worldwide introduction of IC cards capable of functioning across borders and systems.

The specifications are intended for manufacturers, system designers and financial staff responsible for implementing financial applications in ICCs.

Contacts: Richard Tischler, Europay - Tel: +32 2 353 5304. Nancy Elder, MasterCard - Tel: +1 212 649 5439. Gail Murayama, Visa - Tel: +1 415 432 3645.

cards which today have a magnetic stripe will be replaced by cards containing both a magnetic stripe and a chip in the first phase because it is not possible to replace 600 million magnetic stripe cards with chips and change the complete infrastructure to chip technology overnight.

Due to the fraud and counterfeit situation a more secure verification method is required and he believes that the PIN-code verification of magnetic stripe cards will gain ground internationally, also in POS systems and particularly as far as debit cards are concerned.

Some countries, as France has already done, may jump directly to PIN-chip verification due to lack of infrastructure for on-line PIN authorisation. Other countries, like Denmark, will introduce electronic purse or pre-paid cards as a first step in chip development.

Gradual approach

Denmark has chosen the gradual approach because it already has a safe and effective PIN-code based system in combination with the magnetic stripe.

Further development of the terminals will be necessary - from signature-based terminals to combination terminals which are able to accept both magnetic stripes, PIN-codes and chips.

Denmark's approach to chip development is to migrate to where the technological and initial investments match the demands of the market which is why it started with the pre-paid DANMONT card and will later introduce rechargeable cards.
In addition, the chip cards provide new areas of use, for example, pay-TV, home shopping and electronic signature.

He welcomed the co-operation by Visa, Europay and MasterCard with regard to international standardisation of chips, communication and reading equipment for this purpose.

"Only via international standardisation and an open infrastructure will it be possible to obtain a further efficient and low-priced development of both the national and international card systems and to increase the level of security," said Mr Ladegaard.

Home ATMs for Loading EPs

The concept of having a personal ATM at home where value could be loaded onto an electronic purse was the "ultimate expansion" of Load Value Stations (LVSs) said Robert J Merkert, Sr., Executive Vice President of DANYL Corporation, speaking at ESCAT 1994, the European Smart Card Applications & Technology Conference in Finland early this month.

The success of the electronic purse required a multitude of merchant point locations which accepted the card and a multitude of LVSs for adding value to the purse, he said. Value could be

Orange Cuts Phone Price

Orange, the UK Personal Communications Network (PCN) launched last April by Hutchison Telecom (UK) has cut the price of the Motorola mrl "flip" phone by £100 to £149.99 in its Autumn sales drive. The new price precedes a multi-million pound TV, poster and newspaper advertising campaign to be launched at the beginning of October.

The new price for the digital mobile phone still includes free insurance against theft, a three-year guarantee and a two-hour replacement service.

View on Bank Card Security

Security of bank cards is an important consideration among British users and most would like to see their photograph on their cards (51%) or fingerprint (32%).

However, the concept of a national identity card incorporating full bank account details, photograph, fingerprint, driving licence and national insurance details, receives a mixed reaction - 37% liked the idea and 48% were against it.

These findings are the result of research on consumers' attitudes to home finance and technology conducted by MORI (Market & Opinion Research International) on behalf of ICL Financial Services, supplier of IT products to the retail, banking, and insurance sectors.

loaded onto the card using cash, and possibly credit cards, and by using funds resident in an issuing bank account.

The first step in making LVSs ubiquitous was to modify the current installed base of Automatic Teller Machines to interface with the electronic chip of the electronic purse to allow the dispensing of electronic cash rather than currency.

Cashless ATMs

He forecast that the initial impact of the electronic purse card would most likely expand the placement of current ATMs. But as the market expanded

further, "Cashless ATMs" (CATMs) would be introduced. These units would be less expensive than the ATM and would be sited where cash dispensing functions were not required, for example, within company cafeterias, office buildings (near the vending area), and college dormitories.

The ultimate expansion of the LVS was the "Home ATM" (HATM) where value could be loaded onto the electronic purse at a screen phone or other phone related device. The HATM would contain a security module assuring the integrity of the transfer from the cardholder's account to the electronic purse.

In addition, the HATM would allow parents to transfer funds daily to their children's purse card, providing them with a secure way to carry money for meals and transportation, as well as being a secure and private way for adults to load value into the electronic purse.

Cash would still be a viable way for the unbanked population to use electronic purse cards, as well as being a convenience for the banked population, he said. Cash Value Machines (CVMs) accepted bills ($1, $5, $10 and $20) and transferred the value into the electronic purse. They could also be configured with a magnetic card reader to accept credit and debit cards, becoming a full Card Service Centre (CSC).

He added: "The easier it is to load value into the purse, the more receptive consumers will be to use the card."

Major Retailers Accept Mondex

A significant number of Britain's largest retailers have agreed to accept payment by Mondex, the "electronic cash" system, in the first phase of its global introduction which will start in Swindon, England in 1995.

The "High Street" names include Boots the Chemist, BHS, Comet, McDonald's Restaurants, Sainsbury's, Tesco Stores, Woolworths and WH Smith, as well as oil companies BP, Esso and Mobil; travel agents Thomas Cook and Swindon Town Football Club.

Mondex is being launched jointly by National

German Health Insurance Card

The German Health Insurance Card in Germany is a successful volume application of the Smart Card, the conference was told in a paper by Amo Reith and Jurgen Hammerschmitt of Siemens Semiconductors, who said that there were now some 60 million cards in the field.

A field test with around one million chip cards and l2,000 practitioners was successfully performed by the end of 1993 before nationwide implementation.

To avoid unreasonable ramp up, the country has been divided into five regions, each having about 14 million insured persons. Every three months a new region is switched to the electronic health card system. By the end of this year every member of the statutory health system in Germany will have his or her chip card.

Products from News Datacom

News Datacom, provider of conditional access and subscriber management systems for pay-TV operations worldwide, will be announcing new products and services at the IBC Exhibition in Amsterdam this month.

The suppliers of Videocrypt, the picture scrambling and decoding system used, for example, by British Sky Broadcasting in the UK, will be announcing an analogue conditional access system for satellite "direct to home", cable markets called NewsCrypt, and new Subscriber Management software among other products.

Westminster Bank, Midland Bank and BT. Negotiations with major financial institutions around the world are also progressing to enable its global introduction.

Based on the electronic storage of money on a Smart Card, Mondex can be used to pay for goods and services in the same way as cash. The cash can also be transferred from one card to another, or to and from a bank account using a range of Mondex devices or specially designed BT phones.

The card also has an electronic locking system which can make it more secure than cash.

Contact: David Morton, Mondex, England - Tel: +44 (0)71 920 5061. fax: +44 (0)71 920 5505.

UK Road Tolling Systems

The UK's Department of Transport has begun assessing proposals for tolling systems for Britain's motorways.

It is being assisted by the PA Consulting Group appointed to provide expert analysis of electronic motorway tolling research and development plans in the UK, assess trials next year of two or three complete systems, and prepare detailed specifications for the final scheme.

An essential element of the system will be that tolls can be paid electronically while vehicles are on the move.

Submissions include microwave, infra-red and satellite communication technologies and embrace privacy and enforcement issues.

It is thought that about 29 companies have responded with proposals for complete systems or system designs. About four or five major consortia have submitted complete systems.

Tollstar consortium

Among the interested parties is the Tollstar consortium comprising Peek Plc, UK-based and the biggest specialist traffic product and systems group in the world; Saab-Scania Combitech, currently implementing the first multi-lane, free flow

Avant Electronic Purse Progress

Finland's electronic purse system, called Avant, is reaching the critical mass necessary for full-scale national operation says Olli Harjama, Managing Director of Toimiraha Oy, the company responsible for the development, security, marketing and management of the Avant card.

motorway toll system in Austria; the University of Newcastle-upon-Tyne, project managers for the European Commission's PAMELA and ADEPT projects within the DRIVE programme; and Scott Wilson Kirkpatrick, international consulting engineers specialising in transportation planning and systems design.

Chairman of the technical consortium is Ken Maud, Chairman of Peek Plc. Dr Tony Pratt, who has held a number of senior management posts for Peek, is Technical Executive with day-to-day responsibility for managing the consortium.

GEC-Marconi

Another consortium offering a total system solution comprises GEC-Marconi, BT and Lockheed Information Management Services (UK) Ltd.

GEC-Marconi's expertise will be supported technically by Computer Recognition Systems with its vehicle detection and video processing capabilities. BT involvement will be co-ordinated by its system integration business, Syntegra; while Lockheed will be utilising its experience in the fields of violator identification, debt recovery and service centre operation.

Contacts: Ken Maud, Tollstar Technology Consortium - Tel: +44 (0)235 528271. Fax: +44 (0)235 532836. Phil Gallagher, GEC-Marconi - Tel: +44 (0)81 953 2030. Fax: +44 (0)81 953 5262. Department of Transport, UK - Tel: +44 (0)71 276 6694. Fax: +44 (0)71 276 6364.

He estimates that some 450,000 disposable and 40,000 rechargeable Avant cards will be in circulation in Finland within a year as new services come on stream.

An open nationwide pre-payment system, Avant began in November 1993 with a trial using disposable pre-paid phonecards offered by the Helsinki Telephone Company, the largest private telephone company in Finland. Since then Toimiraha has signed Avant agreements with 30 private phone companies.

Rechargeable card

The private telephone companies will start introducing payphones accepting the rechargeable card at the end of this year. Telecom Finland will

follow in the Spring of 1995. By the end of 1997 the rechargeable card will be an open and nationwide medium of payment for all public payphones with a total of 25,000 phones accepting the card.

The rechargeable card was introduced in Helsinki last February as a payment option for public parking. This application involves an in-car parking meter and it is estimated that 40,000 devices will be sold within a year. Next month, Jyvaskyla will become the second city to join the parking scheme. During the opening stages, the parking launch is supported by a fee discount of 20% for motorists paying with the Avant card.

New services

Starting this Autumn, the rechargeable card will become a payment option for self-service postal services with 50 postal service points in Helsinki accepting the card in the near future. By the end of 1995, some 500 self-service postal facilities throughout the country will offer the Avant option.

In addition, early next year, passengers will be able to pay single fares with the card travelling with Finland's largest private bus company, Koiviston Auto, operating services in and between five large cities.

The Finnish banking sector expects to make considerable savings through the introduction of the electronic purse for small payments, and it is estimated that the rechargeable Avant card will account for one-third of all payments below the value of FIM 50 within seven years.

The Avant electronic purse technology was developed by Setec Oy, the security printers for Finland's central bank, the Bank of Finland.

Contact: Olli Harjama, Managing Director, Toimiraha Oy, Finland - Tel: +358 0 894 161. Fax: +358 0 8941 4141.

Remote Monitoring by Card

A popular defence in the fight against rising crime is to have home or business premises alarmed and connected permanently via the telephone line to a remote monitoring service which will analyse data received and take action according to their agreement with the client.

The problem is that such services are usually offered under contracts for one-year or longer and many people feel that they are paying for round-the-clock surveillance which they do not need all the time.

Now the Heimdall remote monitoring by card system from Asgard, a French company offering Smart Card applications in the security market, provides an alternative which allows users to switch on and switch off the remote surveillance system

according to their requirements. For example, they can switch on protection during weekends and holidays. A householder might want protection during the day but not in the evening when he is at home, and would want to connect the office system out of normal working hours.

The concept is that the client simply buys the reader from his installer and obtains the Smart Cards from the monitoring company which sells them pre-charged for 20 or 40 days of surveillance.
Connection to the surveillance service is made by inserting the card into the reader, and the client only pays for the time actually used. Apart from cutting down user costs, the system could also attract new users who have found year-long security beyond their financial reach.

Contact: Patrick Schiltz, Asgard, France - Tel: +33 1 47 88 15 97. Fax: +33 1 47 88 00 36.

Smart Laundry Controller

DANYL Corporation, New Jersey, US manufacturer of pre-paid card systems, has announced a Smart Card-based addition to its Valet Laundry System product line, the SoloVend Single Unit Laundry Controller.

The new model is applicable to all makes and models of machines and compliments DANYL's

Schlumberger Smart Payphone

Schlumberger Smart Cards & Systems, of France

larger centralised room controllers (from eight to 40 machines) and makes card-based convenience more affordable for smaller laundry rooms.

Described as "tenant friendly," SoloVend is operated by the user inserting a pre-paid card into the slot and the appropriate cost for the washer or dryer is deducted. The Smart Cards are reusable and can be revalued at any DANYL Card Value or Card Service Centre.

Advantages are seen as the elimination of coins and with it the attraction for thieves, fewer service calls, and the collection of usage data with a special Smart Collector Card.

Contact: David Borgese, Laundry Business Segment Manager, DANYL Corporation, USA - Tel: +1 609 234 8000. Fax: +1 609 234 7178.

has unveiled the new version of the PF08 Smart Card payphone it will be supplying to BT in the UK telecommunications company's transition from optical card to Smart Card payphones.

The French company is delighted to have been selected to share this major manufacturing contract, involving 39,000 payphones, with GPT and Landis & Gyr. (SCN August 1994.)

Sue Fielding, BT's Payphone Smart Programme Manager, says: "With a share of over 50% of the world market for Smart Card payphones, Schlumberger's Smart Card track record played a key role in winning this recognition from BT."

The new version of the Schlumberger PF08 payphone for BT will be manufactured in Normandy, in northern France, and is based on a new, fourth generation design enhancing the price/performance ratio of the unit.

A key element is the ability to accept the latest generation of phonecards. The payphones will be used in an "off-line" mode in the public network and will operate and store transaction data locally until polled by a host BT control centre.

Contact: Bertrand Dussauge, Communications Manager, Schlumberger Smart Cards & Systems - Tel: +33 1 47 46 62 47. Fax: +33 1 47 46 68 66.

China Trials Electronic Purse

Bank of China's Haikou Branch has launched the Great Wall Smart Card as a multi-application (electronic pass book and purse) banking card.

As an electronic banking pass book, it holds the electronic equivalent of a hardcopy bank book and can be used to deposit or withdraw cash from bank branches. An electronic purse application co-existing with the banking pass book application will hold the equivalent of cash for funds transfer.

Gemplus is supplying its PCOS (Payment Chip Operating System) card with 1K bytes of EEPROM. Some 40,000 cards will be used for the field test. The back of the card holds a photograph of the cardholder plus card number and identity card number.

In China, Gemplus Technologies Asia has been active in the promotion of Smart Card applications

Banks Launch Purse in Italy

A group of 52 rural banks have launched an electronic purse in the Selva di Val Gardena and Merano areas of Italy in the first application of Olivetti's NEWCASH system using contactless Smart Cards.

Promoter of the project is the Raiffeisenverband Sud-Tirol (Federazione delle Casse Rurali Altoatesine), a federation of agricultural banks.

The scheme has been introduced because of the need to evolve from large amount EFTPOS transactions to low value electronic purse payments. The aim is to spread electronic payments to small sales shopkeepers and to customers who are not normally clients of the bank, for example, tourists.

The banks expect to issue around 23,000 Olivetti C-Less Smart Cards usable at over 2,000 outlets this year.

and has delivered cards to university students in Harbin, for an electricity metering project and a share transaction scheme.

Lufthansa Plans Smart Card

Lufthansa the German airline is reported to be planning to introduce a Smart Card in 1995 to make flying simpler and faster for passengers and cut time on the ground for aircraft.

Plans said to be under consideration for airports linked with the "Euro-Shuttle" programme will enable passengers using a Smart Card with a PIN to reserve a parking place, check in at an automatic machine, pass through controls and board the plane.

MasterCard names Presidents

MasterCard International has announced the appointments of Jerry McElhatton to the newly created position of Executive Vice President and President - Global Operations and Technology Services; and Robert W Selander to the new postion of President - Europe Middle East/Africa and Canada regions.

Pilot phase

A pilot phase began with a few shops and some bank employees and their families or friends, and was extended to account holders in Selva di Val Gardena and Merano and then to other sites where the banks were located. Later stages included the ATM network and distribution to tourists.

Tourists are seen as an important element in the use of the electronic purse - providing additional financial flows, encouraging the cardholder to shop locally, cutting down on the use of ready money during the tourist season when demand increases, reducing the risks of cash and cheques and promoting the image of the banking service.

The NEWCASH system

NEWCASH is the product name of the Olivetti proposal for an electronic purse system comprising the Olivetti contactless Smart Card called C-Less

and a simple, portable, battery powered, off-line terminal named Moneybox.

The C-Less card has been developed by Olivetti Sixcom and is based on AT&T technology. It provides high levels of physical and logical security to allow a secure off-line management of financial transactions.

Moneybox is a V25 microprocessor based terminal with a 16x2 alpha-numeric display and a keyboard with 10 numeric keys and 10 function keys. Equipped with a rechargeable battery module, this handheld terminal measures 17.5 x 8.5 cms. The terminal has two card reader/writer units, one for the dealer card and the other for the user card.

The Moneybox terminal moves money from user card to dealer card. Financial transactions are stored on the dealer card and can be transferred to the central host computer via an ATM or at an on-line terminal, or directly at a bank counter.

Different platforms

Retailers can range from market stallholders and small shopkeepers to mass merchandise dealers like department stores and supermarkets.

Smart Card Diary

Paycard '94: Competing for Maximum Profitability in Plastic Cards, The Gloucester Hotel, London, 19/20 September.

Specialised streams on customer loyalty, co-branding, fraud and technology and Smart Cards. Contact: IIR Ltd - Tel: +44 (0)71 412 0141. Fax: +44 (0)71 412 0145.

CarteS 94, Palais des Congres, 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

NEWCASH provides different platforms to meet the need of the retailers. Options include:

- the portable off-line terminal described above; a desk top on-line EFTPOS terminal for shops and small department stores and able to read/write Smart Cards and magnetic stripe cards;

- an EFT Server System for department stores and supermarkets which is a PC-based EFTPOS PIN pad system configured in a Local Area Network.

There is also a self-service terminal for supermarkets where the cardholder can check the balance on the card and load value.

Upgrade kits are available to replace magnetic stripe readers installed on existing ATMs in the field.

NEWCASH provides all the facilities for the management of system operations - NEWCASH transactions, telecommunication network, terminals control and maintenance, and card issuing and mailing.

Contact: Luciano Cavazzana, EFT & Smart Cards Department, SIXTEL, Olivetti Group, Italy - Tel: +39 2 3192 315. Fax: +39 2 3192 343.
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, 14-17 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.

Smart Cards & Plastic Cards Conference, 21/22 November, Sandton Holiday Inn, Johannesburg, South Africa.

Conference includes the latest information on the Interbank Smart Card pilot study, applications in the main sectors, developments in technology, local and international manufacturing, security and the Bloemfontein Taxi Smart Card pilot study.

Contact: AIC Conferences, South Africa - Tel: +27 11 463 2802. Fax: +27 11 463 6000.

Global Smart Cards 1994: Exploiting The Commercial Opportunities, The Mount Royal Hotel, London, 23/24 November.

The conference will highlight the major benefits to organisations from around the world that have pursued innovative Smart Card systems. Organised in association with The Smart Card Club. Contact: AIC Conferences - Tel: +44 (0)71 827 5964. Fax: +44 (0)71 329 4442.

CardTech/SecurTech '94 West, Westin Hotel, Santa Clara Convention Center, California, USA, 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 a developers track focusing on technical issues associated with integration of advanced card and security technology into hardware and software systems; and an applications track looking at the business justifications and strategies. Associated exhibition with over 40 booths. Contact: CTST - Tel: +1 301 881 3383. Fax: +1 301 881 2430.

Smart Card Tutorial - part 25 Contactless Cards

In our previous discussions we have concentrated on the contact integrated circuit card (ICC) as defined by the ISO 7816 family of standards. Contactless cards have been around for some time but their penetration, certainly up to now, has been minimal. A number of emerging applications particularly in the mass transit area have been based on the contactless technology which leads to a wider interest in such technology. One can not help but notice the confusion and diffusion of the principles of such technology in the market place. In this part of the tutorial we will attempt to bring some perspective to the discussion where the advantages and disadvantages can be assessed in the light of any particular application.

In our thinking we tend to concentrate on the ubiquitous plastic credit card type of format more correctly defined as an ISO ID-1 card. The incorporation of an integrated circuit or chip into this card by the early entrepreneurs of Arimura in Japan and Moreno in France is now legendary. However the concept of small data carriers as radio

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.

Smart Card '95, Olympia 2, London, England, 14-16 February 1995.

The international advanced card exhibition and conference will target pre-pay and finance, technology and marketing, transport, communications and advanced identification. Programme available from November. Contact: Conference Secretariat QMS Ltd, England - Tel: +44 (0)733 394304. Fax: +44 (0)733 390042.

tags predates their discoveries. These devices were used to identify objects by being tagged to them. When immersed in an RF (Radio Frequency) field they would respond with their relevant data field. One of the earliest applications and one that is seeing a major revival today is in the retail field where they can be used to prevent shoplifting or just to identify articles at a point of sale. Whether the economics of manufacturing such tags can extend to everyday goods purchased in the supermarket remains to be seen.

It is readily apparent that the technology of contactless communications is extremely well developed and is the core of our every day life. Of course the same is true for the technology surrounding data storage and processing. So when we are discussing contactless IC cards (CICC) what we are really looking at is bringing these technologies together in a reliable and low cost way into a physical object that meets our form requirements (e.g ISO ID-1)

However there are as always a few other problems that in many ways form some of the major limitations. In the first instance we have to find a way of providing power in the card to run the chips,

and we have to satisfy the appropriate regulators that any radiated signals will satisfy their current requirements in terms of frequency used and the transmitted power levels.

One of the objectives raised by the terminal manufacturing industry against contactless cards has been the lack of standards. There is an equivalent standard to ISO 7816 for contactless cards which is ISO 10536 (Identification Cards-Contactless Integrated Circuit Cards). Three parts have been identified,

ISO 10536 - 1   Physical characteristics
ISO 10536 - 2   Dimension and location of coupling areas
ISO 10536 - 3   Electronic signals and mode switching

The first two parts are international standards whilst the third part is currently at the CD level (committee draft).

Contactless ICCs do not have the industry support that has been given to the contact card and this is clearly reflected in these emerging ISO 10536 standards. As of today there are only four major

suppliers of contactless cards for general commercial applications.

There are a number of issues surrounding the use of contactless cards brought about largely by misunderstanding in the use of the technology. The advantages relating to the use of such cards in hostile environments are readily apparent, however the claimed advantages in performance and reliability are a function of much more than the contactless communications interface which we will expand upon further.

Contactless card technology

The components of the contactless card can be best considered by reference to the diagram shown in fig.1. The card can be broken down into the following functional components,

- Power supply
- Data communications
- Microcontroller

It should be noted that we have used a microcontroller here to compare with contact Smart Cards but it is understood that many contactless cards are based on memory only type devices. In other respects the principles are the same. It is the objective of the standards committee to have an alternative of ISO 7816 parts one to three where the higher parts can be considered common to all ICCs. We should note however even at this stage that only the AT&T contactless card has the ISO ID-1 card thickness of 0.8mm. The other major manufacturers cards are 1mm or more in thickness.

Data can be communicated to the card by modulating the same carrier signal that provides the power source to the chip. There are in principle two common approaches to this problem, one is based on low frequencies (100KHz-200KHz) and the other on microwave frequencies (typically 2.45 GHz). Each approach has its various advantages and disadvantages. Low frequency systems require larger coils, have lower data rates and are more susceptible to ambient noise interference. However the lower frequency approach is easier to implement and is less likely to upset the regulatory authorities given the low level of transmitted energy. The allocation of microwave frequencies is more difficult. At the current time 2.45GHz has been allocated for wireless LAN applications or applications within a single building using spread spectrum technology. It would appear that 5.8GHz may become more widely adopted for point to point sources particularly for microwave links on motorway tolls.

The sinusoidala signal can be modulated by the digital data signal using one of three techniques,

- Amplitude Shift Keying   (ASK)
- Frequency Shift Keying   (FSK)
- Phase Shift Keying   (PSK)

Amplitude shift keying is when the carrier is either on or off, frequency shift keying is when the carrier is switched from one value to another and phase shift keying is when the phase of the carrier is either in phase or out of phase. These modulation techniques are just digitised versions of the more general analogue modulation techniques of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM). Frequency modulation and phase modulation are closely related but in practice FM systems are more

The supply of power to the IC chip can be by battery or by externally radiated power. Mitsubishi has developed a card using a paper thin lithium battery, this is new technology and most contactless cards obtain their power from an external source. This is achieved by absorbing power from an externally radiated source using a coil fabricated in a planar fashion on the card. The received signal is rectified and regulated to produce the necessary (typically 5 volt) voltage supply for the microcontroller.

common.

The GEC card uses frequency shift keying for communication between the terminal and the card. The return channel is achieved by switching the loading of the aerial coil in the card so that more energy is adsorbed which produces an effect equivalent to amplitude modulation in the terminal circuitry.

As an alternative to modulating the power signal AT&T uses a capacitive coupling system to manage the data communication. This potentially

gives a higher data communication rate but is also more fussy on correct alignment. The operating range for contactless Smart cards is of the order of a few centimetres although RACOM quote up to 15cms under ideal conditions for their card.

Microcontroller

The microcontrollers used in contactless cards are usually based on standard designs such as the Motorola 6805. Such chips contain their own EEPROM memory and ROM memory. In this sense the security is little different to that achieved with a similar contact card. In both cases the communication path can be interrupted and it is necessary for the security designer to assume an insecure channel. The storage of sensitive data and the buses connecting them is still contained within a single chip and hence forms the necessary tamper resistant module.

The control logic for the microcontroller needs to provide the necessary reset circuitry and also the clock signals. The I/O line from the microcontroller is processed by the modulator /demodulator circuitry.

Main products

At the current time there are four major manufacturers providing main stream products.

The characteristics of these products are shown in the table below,

Manufacturer	Type	Power Transmission	Data Transmission	Data rate	Thickness
AT&T	Microcontroller	Microwave	Capacitive bi phase	19.2Kbps	0.8mm
GEC	Microcontroller	180KHz	FSK/ASK	9600 bps	1.3mm
Intag/Racom	memory	125 KHz	FSK/PSK (62.5KHz)	7812 bps	1.65mm
Mitsubishi/ Sony	Microcontroller	Battery	2.45GHz or 30MHz	9600bps	1.0/1.4mm

Perhaps all we need to comment on at this stage is the variation between the different products.

Contact/Contactless issues

There are a small number of features concerning cards that will dictate the suitability of one approach over another. We will compare these main features under the following headings,
- Reliability
- Performance
- Cost

Reliability

Reliability at the end of the day relates to the overall operation of the system. Availability is what it is all about. If we reduce our scope to just the card then we are comparing the reliability of the card itself and the reliability of the communications process. The comparison of the intrinsic reliability between a contact and a contactless card is straight forward. The contact card will always be more reliable barring abnormal wear of the connector

Interoperability has a long way to go!

plate because for an equivalent card there are less components and less connections. The reliability of the contactless communication channel compared with ohmic contacts is however another story. The main advantage of the contactless card is that the communication channel will operate in some hostile environments where contacts would be inappropriate. Clearly dirt or chemical type contamination environments are one such example but it should be noted that there are also environments where there is electrical noise that makes the contactless card inappropriate. In both cases the quality of the interface equipment is of paramount importance. In a similar fashion part of the environmental problems relate to vandal proof terminals and here the contactless interface is a significant advantage.

In either case for both contact and contactless cards the designer of the system should allow for a communications protocol that has the necessary

levels of error detection and recovery.

Performance

Many people have been lured into the assumption that a contactless card is faster than a contact card. For an equivalent task this cannot be true since the processing time will be the same on the assumption of using the same microcontroller. The data transfer rate cannot be any different since the intrinsic limitation will be set by the data communication rate capability of the microcontroller for a particular clock speed. More to the point is the fact that the contactless card is limited by the ability to transfer adequate power to the microcontroller. It is generally believed that in practice this is likely to be limited to about 20mA. We note also however that the move towards portable battery equipment such as mobile phones is likely to have the same limits for contact cards.

There is no reason why contactless cards should be either more or less secure than a contact card. We would normally expect a contactless card to use a single microcontroller chip containing its own internal volatile and non volatile memory. For both types of card it is essential to assume that the communication path is insecure and therefore that the appropriate steps are taken where necessary. In some cases this may mean enciphering the data comms before transmission.

Pacemaker Patient Smart Card

Heart patients who have received pacemaker implants at the Royal Sussex County Hospital in Brighton, England, are being issued with Smart Cards which store their medical details.

The hospital acts as a local centre for pacemaker patients taking care of implants and post-implant follow-up and holds the details of about 700 on the cardiac department's database. Patients carry a standard European Pacemaker Patient's Card on which their pacing details are handwritten so that this information is available in an emergency. However, the cards are made of thin cardboard and often become lost, damaged or are simply ignored by the patients.

In a pilot study starting this month, all new pacemaker patients are being issued with a Smart

From simple engineering principles it is clear that the contactless card will be more expensive to manufacture. It contains more components and has a more complex fabrication process which involves the lamination of a complete card film substrate. A rule of thumb has often been used to propose that the contactless card will cost twice the price of a contact card to manufacture. However readers are warned that this is just one part of the overall system, printing and personalisation costs of the card as well as the cost for the infrastructure are important when determining the overall cost of the system. Price is very dependent on volumes and at the end of the day is highly correlated to market forces based on supply and demand.

Although the penetration of contactless cards to date has been very small in comparison to contact cards there is none the less a very real need for such technology in many applications. We have tried to put these advantages in perspective to show there is a future for both types of technology where the greater volumes are most likely to remain with the contact card.

David Everett

Next month - An update on Smart Card memories.

Card along with the old card. When they return to the hospital for a check-up after one month, an evaluation of the cards will be made. It is hoped that the cards will return in a better state than their predecessors and will have been carried more frequently.

The card is the COS 2K bytes EEPROM card from Gemplus which can store the whole patient record compared to only a subset written on the previous card,

If the pilot study is successful it is hoped that it will be extended to other centres as a replacement for the European card.

Contact: Jon Lewis, Engineering Research Laboratories, University of Sussex, England - Tel: +44 (0)273 606755. Fax: +44 (0)273 678452.

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Mondex Wins ESCAT Award

Mondex, the new "electronic cash" card developed by National Westminster Bank, was voted the "Most Innovative Smart Card Accomplishment of the Year" at the 1994 ESCAT, European Smart Card Application & Technology Conference, in Helsinki, Finland.

The ESCAT Conference Award scheme mirrors the rapid advancements in Smart Card technology around the world, and this year considered more than 500 projects in drawing up a shortlist of ten from France, Germany, Norway, UK and USA.

The projects were: Healthcare national strategy, France; Gemplus RISC Processor Microprocessor Smart Card, France; Deutsche Telekom and IBM new telephone and pre-paid card, Germany; Lufthansa Multiple Application Card, Germany; Financial institutions move to Smart Cards, Germany; Mikron contactless bank card, USA; Den Norske Bank Smart Card, Norway; Garage accounting for small car fleets, UK, and Mondex Global Electronic Cash, UK.

Tim Jones, Chief Executive of Mondex, said: "I feel sure that the achievement recognised in this award for Mondex is only the beginning of the many innovations which Mondex will make possible around the world in the next few years."

He said that since Mondex was announced in December 1993, it had been contacted by a large number of financial institutions, electronics manufacturers and telecommunications companies from every continent wishing to add the potential of Mondex electronic cash to their existing products and services.

"In particular," he said, "I believe that the reaction from other financial institutions represents a highly significant endorsement of the Smart Card as the best medium for opening up a new world of global electronic cash - carried on a card by everybody and accepted as payment everywhere."

Mondex is being introduced in Swindon, UK, next year and will involve 40,000 people and 1,000 retailers. (See page 168). A full description of the Mondex electronic cash system is given in the December 1993 issue of SCN.

The photograph below shows the Mondex Key ring reader which is now in production. The reader displays the balance on the card and will be available to all cardholders.

Contact: David Morton, Mondex, UK - Tel: +44 (0)71 920 5061. Fax: +44 (0)71 920 5505.