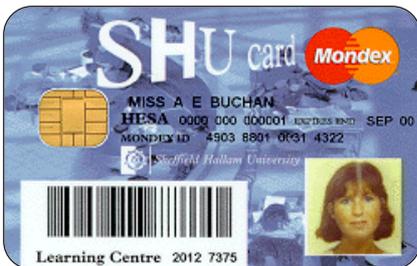# Malaysia Super Corridor Projects Face Delay

Turmoil in the financial markets, particularly in Asia, may delay the Malaysian government's plan for an Multimedia Super Corridor which includes an ambitious Multipurpose Smart Card project (*SCN December 1997*).

The 750 sq km Super Corridor, which will incorporate two new cities and will cost around £6.7 billion, is backed by Prime Minister Dr Mahathir Mohamad who regards it as key to positioning Malaysia as the Asian leader in information technology.

While senior officials have said on many occasions that the project will go ahead on schedule, the government said recently it would curb spending on IT. Bidders for two further Smart Card projects will be watching to see if the contracts will be announced as planned on 26 February.

January 1998

News

Smart Card Tutorial

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Bull/DNP Strengthen Collaboration

Bull and Dai Nippon Printing Co. (DNP), after 10 years of successful co-operation, have signed a master agreement extending the fields covered jointly to research and develop new products, production, exchange of licenses and distribution agreements in the Smart Card field. They intend to co-ordinate their efforts and launch specific joint projects decided by a specially appointed committee and will work together, particularly in the field of standardisation and opening of Smart Card operating systems.

In addition they intend to invest together in the creation of regional production units when this is necessary, either directly, or through association with local partners and say various projects are at the discussion stage.

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New Single Chip Solution

SGS-Thomson Microelectronics and On Track Innovations (OTI), based in Israel, are co-operating to develop a family of single microprocessor solutions for contact and contactless Smart Cards.

The new single chip solution is being designed to meet the banking community's strictest security requirements and is expected to be released in mid-1998. According to Oded Bashan, OTI President and CEO, their current EYECON MultiCard provides customers with the flexibility to choose required EEPROM size for each project. Existing SGS-Thomson microprocessors are then bonded with the OTI Antenna Interface chip, resulting in a true contact/less card using the same operating system and the same EEPROM for both contact and contactless interfaces.

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Customers Like Smart Meters

In a survey carried out on behalf of Tasmania's Hydro Electric Corporation, customers approved their Smart Card meters. An overwhelming 98% said they are happy with the system and want it to continue.

The trial scheme began in July last year with Landis & Gyr supplying the total system, including 2,000 meters, point of sale terminals and software.

Hydro commissioned a study by Enterprise Marketing and Research Services to establish customer reactions to their Smart Card meters and this covered about half of the Hydro Pay as you go customers. Questions were designed to establish a number of issues:

■ levels of satisfaction with the system (81% are very happy, with a further 14% quite satisfied)
■ whether the meter provided all the information they wanted (96% said yes)
■ ease of use (100% found it easy to use)
■ awareness of 'time of use' pricing (95% are aware; 90% said they liked it)
■ frequency of visits to a point of sale terminal to recharge their Smart Cards (43% go once a fortnight, whilst 36% go once a week)

Interestingly, 61% said they now thought more about how they used electricity and the cost of running appliances.

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Bull to Unveil Java Card

Groupe Bull is expected to unveil its first Java Card to rival offerings of competitors Schlumberger and Gemplus at next month's Smart Card '98 show in London.

It is understood that Bull is working with chip supplier SGS-Thomson Microelectronics to increase the card's RAM from 256 bytes to 1K bytes and, for card cost reasons, is not at this stage planning to manufacture a Java Card with a 32-bit microprocessor like that announced by Gemplus last year. A 32-bit card is scheduled for 1999.

Industry Review 1997

The year was notable for the number of takeovers, joint ventures, alliances, agreements, memorandums of understanding and co-operations as players in the Smart Card industry further strengthened their positions in specific markets or moved to offer turnkey solutions.

French-based specialists in EFT terminals, **Groupe INGENICO** turned its attention to the Americas in an alliance with **International Verifact Inc (IVI)** of Toronto, Canada, to offer a range of products including Smart Card technology. IVI is a developer of electronic payments solutions with products including point of sale terminals and Smart Card readers. In addition, a new joint venture owned by IVI (51 per cent) and Groupe INGENICO (49 per cent) will be the exclusive distributor for both companies' products in Latin America while INGENICO will have the right to distribute selected IVI products in all countries outside the Americas.

DataCard Corporation entered an alliance with Smart Card production systems company **Meinen, Ziegel & Co. GmbH** of Germany. Under the agreement, DataCard acquired a majority equity in the Munich-based company taking responsibility for global marketing and product distribution. Meinen, Ziegel & Co manufactures contact and contactless Smart Card production systems while US-based DataCard specialises in card personalisation systems.

Australian company **Intellect** signed an OEM agreement with **NCR**, enabling NCR to sell and support a range of Intellect electronic payment devices in the US markets. A number of Intellect products will appear with the NCR logo giving NCR a broader range of products to create total banking and finance solutions.

MasterCard International completed its 51 per cent acquisition of **Mondex International** in February.

Gemplus acquired Austrian company **Skidata** which specialises in access control systems for ski lifts and car parks, including contactless applications. According to Skidata their ski lift system is used in over 80 per cent of the installed base of access control equipment in Europe. In addition to contactless cards, the company also packages access control into wristwatches. **Giesecke & Devrient GmbH** of

Munich, Germany, announced a co-operation agreement with **Kaba Holding AG** of Rümlang in Switzerland to combine the production of contactless cards by G&D with technology developed by Kaba for identification and access control applications.

G&D also set up a joint venture with the Russian companies **Znak/Perm and Znak/Moscow** to provide services for Smart Card projects in Russia. The new enterprise, called **G&D-ZnakCard ZAO**, is based in Perm and will benefit from the Znak companies' branch infrastructure throughout Russia and G&D's broad range of products.

Mondex UK acquired a 10 per cent share in **GiroVend Cashless Systems**, Europe's leading supplier of cashless vending, giving Mondex a solid base into which it can integrate its Smart Card expertise.

Dassault Automatismes et Télécommunications signed a co-operation agreement with **IPC Corporation** of Singapore for the distribution of Dassault electronic payment products, equipment and software in Asia by IPC.

Pretty Good Privacy, Inc. (PGP), provider of digital privacy software and **Schlumberger Electronic Transactions**, supplier of Smart Cards and systems, announced an alliance for the development and marketing of integrated network security products. PGP's encryption technology will be integrated with cryptographic Smart Cards from Schlumberger to provide communications security across corporate intranets and the Internet.

Hewlett-Packard Company, the second largest computer supplier in the United States, acquired **VeriFone**, provider of electronic transaction systems, with plans to accelerate Internet-based commerce and Smart Card applications. VeriFone continues to operate independently as a wholly-owned subsidiary of HP.

De La Rue acquired for £54.2 million the Smart Card business of **Philips** which now trades under the name **De La Rue Card Systems**. De La Rue Fortronic, which specialises in electronic transactions and is based in Fife, Scotland, also had its name changed to De La Rue Card Systems as part of a worldwide strategy to take advantage of the De La Rue brand name.

ICL Retail Systems agreed to collaborate with **VeriFone** to use VeriFone's card payment solutions in its EPOS system, GlobalSTORE, and also act as a reseller of VeriFone devices.

IBM and **Card Services International (CSI)** announced a joint marketing agreement giving IBM the rights to sell CSI-developed CardBASE2000 on a worldwide basis, strengthening IBM's Smart Card solutions, particularly in the area of implementation of multiple electronic purse schemes such as Proton, Visa Cash, Mondex and CLIP.

A group of Smart Card technology vendors - **CyberMark LLC, Debitek Inc., Gemplus Corporation, Product Technologies Inc., VeriFone Inc., V-ONE Corporation and 3G International** - formed an alliance to produce and market multi-application platforms for university and college campuses, stadiums, resorts and other "closed" sites across the US.

American Express and **ERG** of Australia formed an alliance for the development of multi-purpose Smart Cards. The agreement enables Amex to issue cards, including the Banksys Proton electronic purse technology, and to utilise what will become the Proton network in Australia and New Zealand.

ERG also formed a marketing alliance with **Motorola's Smartcard Systems Business (SSB)**, in the USA to pursue global opportunities in transit fare collection and multi-application Smart Card system technologies.

NBS Technologies and **Bull** announced they will jointly develop terminals for the Smart Card and electronic purse market in the US and Canada with the first product scheduled for early 1998.

Landis & Gyr Communications and **Tianjin Telephone Equipment Factory** formed a joint venture to manufacture chip card payphones for the Chinese market. Called **Tianjin Landis & Gyr Communications Co. Ltd**., the new company is based in Tianjin City.

The European Commission approved the takeover of the Swiss **Electrowatt Group** by the **Siemens Group** in Germany on condition that Electrowatt sold the payphone activities of its subsidiary **Landis & Gyr Communications** to prevent a near monopoly situation, particularly in Germany where both companies compete.

Emerging markets

Where are the emerging markets for Smart Cards outside of Europe which is currently well served? Despite the numerous predictions in market surveys, the most reliable guide is to look at where the manufacturers are putting their resources.

During 1997 card production started at the Tianjin Gemplus Smart Cards Company in Tianjin in **China.** The plant, a partnership between Gemplus and Tianjin Telephone Equipment Factory, is producing Smart Cards for payphones to be followed later with microprocessor cards. Output is given as over 10 million cards during the first year and over 100 million by the year 2000.

Also in **China**, ORGA Kartensysteme GmbH, of Germany, announced that it would start producing Smart Cards with Chinese partners at a new plant being built in Shenzhen in the south-west of China on the Hong Kong border. The joint venture company, called the Shenzhen ORGA Smart Cards & Systems Co., was formed by ORGA, Shenzhen Honbo Communications Investment & Develop-ment Co-operation, Shenzhen Post Telecom Co and Shenzhen International Commerce Machine Co.

Schlumberger opened a new Smart Card manufacturing plant in the Aberdeen district of **Hong Kong**. Called the Hong Kong Cards Industrial Centre (HKCIC), the facility has an initial capacity to manufacture up to 6 million cards a year and has room for expansion.

Gemplus took a 51 per cent equity stake in Secur-Card Technology Pte Ltd., a leading manufacturer of financial cards, with plans to extend output to Smart Cards for the Asia-Pacific region. Secur-Card Technology, based in Singapore, manufactures cards for most of the leading banks in Asia at its two plants - one in **Singapore** and the other in Zhuhai, **China**, which have a combined capacity to produce 100 million cards annually.

IRIS Technologies completed a new headquarters and Smart Card manufacturing facility in the National Technology Park in Kuala Lumpur, **Malaysia**, which will have an initial production capacity of 60 million contact Smart Cards and between 5 and 10 million contactless cards per year.

Motorola, the biggest supplier and manufacturer of Smart Card IC chips, announced plans to also

manufacture Smart Cards and offer total solutions in the global market. The new business unit called the Smartcard Systems Business (SSB) is headquartered in Schaumburg, Illinois, USA, and plans to concentrate on the production of contactless cards and combined contact and contactless cards with the first cards expected to come off the production line at a Motorola factory in Indala, California, **USA**. Future plans are to manufacture in major market areas using its worldwide facilities, but in some cases in partnerships with key industry players. Motorola said the first cards would have 32K bytes of memory and forecast 100K bytes by year 2000.

Giesecke & Devrient GmbH of Germany, bought Cardtech Inc., based near Cleveland, Ohio, **USA**, which produces 50 million high-security cards a year. G&D said a new production line would have an initial annual capacity of 7.5 million cards.

American Microdevice Manufacturing, Inc., (AMMI) launched into the Smart Card industry with a claimed 1997 production capacity of 30 million cards from its San Jose, California, **USA** plant.

Schlumberger opened its Smart Card plant in Mexico City to serve markets in **Mexico** and **Latin America**. Schlumberger said it was investing US $40 million and manufacturing would grow from 20 million to 50 million cards in 1997, with Smart Cards accounting for most of the production.

Electronic Commerce on the Internet

Perhaps the vision of global electronic commerce on the Internet caused the most excitement in the industry, focusing minds on the need for a high level of security to satisfy financial institutions and consumers alike.

A standard for Secure Electronic Commerce (SET) was developed by Visa and MasterCard with assistance from Microsoft, IBM, NetScape, SAIC, GTE, Terisa Systems and VeriSign. Based on encryption technology developed by RSA Data Security, SET enables cardholders and merchants to exchange digital certificates to authenticate each other and allow cardholders to safely send card details over the Internet. Towards the end of 1997, American Express and JCB Company joined with Visa and MasterCard to lead the introduction of SET under the name SETCo.

Interestingly, the European Commission chose C-SET technology in preparation for drawing up Community norms for electronic commerce on the Internet. Banksys, the Belgian interbank payment system organisation and Groupement des Cartes Bancaires representing the French bank card issuers, jointly submitted proposals for the use of C-SET (Chip-Secured Electronic Transaction) architecture and related security features.

C-SET uses the SET standard but stores sensitive data in the Smart Card instead of in the customer's PC. Global interoperability is made possible by the use of a network server that enables the C-SET and SET protocols to communicate with each other on a standardised, worldwide basis.

Numerous trials have taken place in many countries to test the SET protocols and now the first real-world applications are starting. In Belgium, the Proton electronic purse developed by Banksys will be used for purchases on the Internet and cardholders will be able to charge Proton cards at a Banksys Internet site. In The Netherlands, the Chipper multi-application Smart Card developed by ING/Postbank and KPN/PTT Telecom will enable shopping and reloading of the purse on the Internet.

Bank payment cards

UK banks started trials with Smart Card chips on payment cards in October in two cities and it is expected that the new cards will be progressively introduced from mid-1998. Magnetic stripe technology has been retained on the chip cards to ensure that they can continue to be used globally.

Visa Sweden announced that its member banks would start to issue multi-function payment cards using chip technology. In the first step towards the introduction of a multi-function card, Sweden's electronic purse, called Cash, will be added to Visa cards in early 1998.

Electronic purses

Chase Manhattan and Citibank are piloting **Visa Cash** stored value cards and **Mondex** electronic cash cards in New York in the first joint venture between MasterCard-owned Mondex and Visa to test interoperability between the two competing brands.

Proton took the world lead in the electronic purse market as the most widely used worldwide with over 20 million Proton Smart Cards issued in nine countries. It also formed Proton World to promote global implementation of the Proton system.

Visa International issued some 7 million Visa Cash cards worldwide, including the UK where some 70,000 cards are being issued in a 12-month pilot in the city of Leeds. In this trial, the Visa Cash electronic purse can be added to a debit or credit card or can be issued as a separate card.

Mondex is currently being used in 16 implementations around the world including Australia, Canada, Hong Kong, New Zealand, Philippines, UK and USA. By the end of 1997, Mondex International said it would have produced in excess of one million reloadable Mondex cards - a figure expected to rise to five million reloadable cards by the end of 1998.

Geld Karte became the largest national electronic purse scheme in the world with around 40 million cards in circulation.

Contact/contactless cards

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

Chip manufacturer **Motorola**, which announced its intention to enter the Smart Card production market, said it was specifically targeting transportation and banking as its initial markets and concentrating on combination and contactless cards.

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

Public transport operators have long favoured contactless cards because there is no need to insert the card in a reader, leading to quicker boarding. Banks, concerned about security, have adopted the contact Smart Card for secure storage of information and protection with encryption algorithms such as DES and public key cryptography. As the trend towards multi-function cards continues, there is a growing demand for a hybrid card which, for example, can be used in contact mode for financial transactions and in contactless mode for public transport requirements.

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

In Spain, **Visa España** member banks announced plans to pioneer a contact/contactless Smart Card with a Motorola chip with the Madrid Transport consortium by adding a contactless option to the Visa Cash card. Cardholders will use it as a contact card for purchases at retail outlets and for loading the card with value at cash machines, and also use it as a contactless travel card.

Telecommunications

While telecommunications remains by far the largest market with orders for payphone cards from individual telephone companies running into the millions, GSM (the Global System for Mobile Communications) accounts for over 70 million Smart SIM (Subscriber Identity Module) cards.

An interesting development has been the rise of prepaid cards as operators target the mass consumer market. Prepaid systems attract consumers who do not want to be tied into long service contracts and gives the less credit worthy the opportunity to use a mobile phone. The no subscription, no bill schemes helps to reduce the fraud risks and bad debt associated with subscriptions.

Cellnet, the UK GSM mobile phone network and Mondex International signed an agreement to jointly develop solutions to allow electronic cash to be transferred via digital mobile phones. Cellnet intends to enable customers to use mobile phones to withdraw and deposit cash to their bank account using their Smart Card. It will also be possible to transfer cash to other mobile phones.

The first e-Commerce pilot on a GSM network started in the US at Florida State University where students are testing their Smart campus cards for electronic

commerce using a mobile phone on Powertel's GSM network.

Schlumberger released the first Java-based SIM (Subscriber Identity Module) for mobile phones for beta-testing by leading telecommunications companies. Based on its Cyberflex product, it conforms to the Java Card Forum-endorsed API standard developed for Smart Cards.

Java or MULTOS?

Two French Smart Card manufacturers, Schlumberger and Gemplus, who together claim 70 per cent of the market, announced compatible Java Card platforms and the formation of the Java Card Forum, with the active support of Sun Microsystems to promote the Java Card API (Application Programming Interface) as an industry standard platform for Smart Cards and exchange technical information between participants. Other Java Card Forum members are Bull, De La Rue, Giesecke & Devrient, Hitachi. IBM, Keycorp and Toshiba.

At the same time, MULTOS is being introduced by an international group of eight leading silicon manufacturers and Smart Card companies, led by Mondex International. A new "open" high security, multi-application operating system, it is being promoted by Dai Nippon Printing, Gemplus, Hitachi, Keycorp, MasterCard International, Mondex International, Motorola and Siemens who have formed a consortium, called MAOSCO, to drive the adoption of MULTOS as an industry standard and to manage its on-going development. Application licences are available at low cost to card issuers and the first MULTOS cards are expected to be commercially available in the first Quarter 1998.

The aim is to bring together a number of separate services on a single card, for example, a loyalty program, electronic ticketing, and a credit, debit or electronic cash product.

A major debate in the industry has been whether Java or MULTOS will be the driving force to speed the roll-out of Smart Card technology.

To explain the difference simply, MULTOS is a card operating system while Java is a computer software language and an operating environment in that the language is used to implement an application in the card - but it is not an operating system. Developing the operating system and the card application are two different tasks.

Perhaps Visa and MasterCard will eventually agree a common chip card platform for the replacement of magnetic stripe bank payment cards with chip cards, but at the moment this apparently is not a subject even under discussion. Visa is using Sun's Java Card API, while MasterCard has chosen MULTOS, the multi-application operating system.

Visa has opted for Java largely because of its potential for use in electronic commerce applications on the Internet and with Personal Computers while MasterCard is concerned that the Java language does not have the same level of security as MULTOS which has been specifically developed for Smart Cards.

While the two major card issuers agree to differ on this subject, it could mean higher costs for non-member banks and other card issuers in having to write cards for each platform.

Industry opinion is that there will eventually be interoperability, probably with Java Cards sitting on top of the MULTOS operating system.

Biometrics

The use of biometrics - physical characteristics unique to an individual - for positive verification also progressed during the year, spurred on by the growth in markets such as electronic commerce, corporate intranets and physical access.

ORGA Card Systems and Software ABS GmbH developed the VoCard biometric system for chip card **voice verification**. The user is identified through voice analysis and word comparison. Primarily, VoCard is applicable to physical access control and access to data and equipment.

SAC Technologies Inc., announced a **fingerprint biometric** solution for positive identification which can be stored in a Smart Card or magnetic stripe card. Called SACMan, it uses SAC's Vector Analysis technology and fingerprint imaging to produce a bio-key record by converting the unique aspects of a fingerprint into a "model" which is different from the traditional "minutia" approach used in most fingerprint biometrics.

Face recognition technology is being introduced in a new biometrics and Smart Card-based airline passenger and baggage security system at the Langkawi International Airport in Malaysia. Called FacIt, the technology was developed by Visionics Corporation in the United States and is being licensed to TL Technology Research, a Malaysian airport security systems company. The system uses face recognition to ensure that only true passengers can enter departure lounges and subsequently board aircraft and that only luggage from passengers who board is loaded. It automatically matches biometric data captured on a video camera during check in and stored on Smart chips embedded in the boarding cards and luggage tag.

Bull CP8 and Keyware Technologies agreed to integrate Keyware's biometric **voice verification** in Bull Smart Cards. At a later stage the companies plan to introduce facial, fingerprint and other biometric solutions.

IriScan, Inc - exclusive owner and developer of **iris recognition** technology for automated biometric identification - and GTE plan to bring the technology into the world of cyberspace. GTE's proprietary digital biometric certificates will be combined and both sender and receiver will be verified by their IrisCodes before the transaction is completed. Called Iris Certificate Security (ICS), a prototype will be available in first quarter 1998. In the UK, the Nationwide Building Society and NCR will test customer reaction to **iris recognition** technology in Swindon. Cardholders will look into a camera which will recognise their unique "eye print." The system has been developed by Sensar Inc., an IriScan technology licencee (*see above*).

More powerful chips

Early in the year, two chip manufacturers introduced more powerful microcontrollers. **Siemens** unveiled the SLE 44C160S chip with 16K bytes EEPROM, 15K bytes of ROM and 256 bytes of RAM in a package less than 15mm². **Hitachi** extended its H8/310 family of microcontrollers with the H8/3103 with 16K bytes of EEPROM, 20K bytes of ROM and 512 bytes of RAM and a 20mm² die size.

Philips Semiconductors introduced the P83W858 Smart Card crypto controller offering higher levels of security and speed, and **Siemens Semiconductors** announced the SLE 66CX160S microcontroller offering 32K bytes ROM, 16K bytes EEPROM with

around 2K bytes of on-board RAM with a surface size of just 20mm².

Motorola Semiconductor Products and Japan's **Matsushita Electronics Corporation** teamed up to develop next generation FERAM (Ferroelectric Random Access memory)-based Smart Card chips. The first chips are expected to be shipped by the end of 1999. According to Motorola, the new FERAM chips could have capacities of 64K bytes to 128K bytes compared with the current 8K bytes to 16K bytes using EEPROM technology.

Government

At the end of the year, the British government formally legalised electronic signatures using a Smart Card and became the first government to accept electronic forms from the public over the Internet. The pilot scheme will enable people to register on-line as self-employed for tax, national insurance and VAT (Value Added Tax). The forms are digitally signed using Smart Card technology provided by NatWest, the inventors of Mondex. The government says it is the start of its commitment for a quarter of its business to be conducted electronically by the year 2002.

The Malaysian government launched the Malaysian Multipurpose Card (MPC) project with plans for eight applications to be developed on two separate cards by the year 2000. The Government MPC will combine national ID, driving licence, medical, immigration applications and optional E-cash. A Payment MPC will provide international credit, debit, ATM and E-cash functions. E-cash applications and infrastructure developed for the MPC will be compatible with a disposable E-cash card. Banksys' Proton electronic purse technology, will underpin all of Malaysia's Smart Card system.

In the US, the government plans to conduct all government payments and collections electronically. The Treasury is piloting a Smart Card at Fort Knox to replace cash for military personnel. Their pay will be loaded onto the card to pay for purchases and services at troop stores, vending machines, barber shop etc. at the base. The Treasury's Financial Management Service is also piloting a Smart Card-based electronic cheque (e-Check) for secure electronic payments to its suppliers via the Internet.

French Transport System

A contactless Smart Card has been introduced to transport season ticket holders in the French region of Valenciennes.

Semurval, the urban transport management company for the area, has issued 6,000 Transcartes. This figure will soon reach approximately 50,000 when the service is extended to the entire population and its surroundings.

To pay a fare the card is simply moved across a special validator and the money is deducted automatically. All information concerning the journey is stored in the validator. This method increases the speed with which travellers enter the bus.

The season ticket cards have the potential to be multi-application. Future plans include extending the Transcarte to pay for parking fees and to provide access to certain services such as canteens, libraries and swimming pools. The cards can be used on both buses and trains and are also compatible with the card used by the SNCF (French State Railways) on the regional network of the Nord Pas-de-Calais. The operating system has been developed by Bull Information Systems.

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Danish Red Cross Card

Danmont PBS issued a limited edition Christmas Smart Card featuring the Danish Red Cross' design (*see front page*). Approximately 3,000 cards were issued.

Card Forum News

Both good and bad news this month from the Federation of Electronics Industry (FEI) regarding UK and European Smart Card Forums.

Keith Wood, Smart Card Consultant for the FEI, confirmed that in terms of the UK Forum "not much is happening." The group has met only once, in April 1997 (*see SCN March and April 1997*). He said: "The Department of Trade and Industry have been very, very slow in pushing things along. So far, the Forum has not achieved much at all".

On a brighter note he was able to tell *SCN* that the European Smart Card Forum is holding its first meeting on 28 January in Brussels. The group will be called Eforum and will aim to accelerate the widespread acceptance and use of multiple application Smart Card technology.

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Off-line Data Transfer Solution

Landis & Gyr Communications, Visa International and The Metric Group have joined forces to provide a worldwide off-line data transfer solution for Visa Cash cards. Mobix, Landis & Gyr's off-line data transfer solution, will be supplied to Visa International for the first UK Visa Cash programme in Leeds (*see SCN, November 1997*). They will also supply CADix card accepting devices. Data is uploaded from CADix to a hand held terminal and is then transferred to a standard PC acting as a gateway. It is then transferred by modem to the host system.

Visa Cash was introduced to Leeds in October 1997. It is anticipated that up to 70,000 cards, 60 card re-

loading locations and 2,000 merchant terminals at car parks, newsagents and food outlets will be involved in the pilot.

The Mobix system will be managed by Leeds City Council and the CADix card accepting devices are being integrated into parking meters supplied by The Metric Group.

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Police Utilise SIM Technology

The mobile criminal fraternity are being pursued by the ever increasing sophistication of police technology.

Suspects caught with digital mobile phone in hand are unwittingly providing the police with a large amount of information which maybe used in trials to verify contacts, times and locations.

Police in London started the initiative with the purchase of several ORGA Dr Sim devices for the checking and downloading of GSM/DCS SIM Smart Cards and mobile phone data.

ORGA says that Dr SIM is now approved and recommended to all UK police forces. Developed four years ago, Dr SIM allows non-technical personnel to thoroughly evaluate SIM cards and provide instant customer service at the point of sale.

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Security System to Protect Data

A new security system has been introduced which claims to prevent unauthorised access to the data stored in a PC notebook. Access to the PC is possible only with a registered Smart Card and correct PIN number. Important data on the hard disk is encoded.

The package is called Norman Smart Access and consists of the following - software developed by Norman Data Defense Systems, a Smart Card supplied by ODS and a PCMCIA card reader from SCM Microsystems.

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Boots Plans for Advantage Card

It has been reported this week that Boots the Chemist has plans for its Smart Advantage Card, rolled out across the UK last September (*see SCN August 1997*).

The card has been a great success and has beaten all internal predictions. The company had aimed to issue four million cards by December 1997 and eight million in the first year of the scheme. In fact Boots had received five million applications by the end of November and is expected to announce it's six millionth card soon. The card accounted for 24% of Boots counter sales in the final quarter of 1997.

Boots plans to capitalize on this success by combining the loyalty card with Medilink, a card issued to customers who buy prescriptions at its stores. Additional, separate information could easily be stored on the Advantage Card's chip. Ian Wright, Director of Communications at Boots said: "It is possible and it is something we are considering."

Coin Free Laundry Services

A leading US supplier of card and coin-operated laundry services is planning to convert a substantial portion of its laundry machines to cashless systems over the next two years and has ordered 50,000 Smart Card laundry terminals from Schlumberger.

Mac-Gray Corporation owns and operates about 120,000 card and coin-operated washers and dryers in more than 17,000 multiple housing laundry rooms and universities located throughout the Northeast, Midwest and Southeast states.

Stewart MacDonald, Chairman and CEO of Mac-Gray, said they could provide a "bundled amenity program based upon the one-stop-shopping concept," indicating that the card would be upgraded for access control to building, for example and store electronic value for purchases not only in the laundry room but at on-site vending machines or business centres (Personal Computers, faxes, photocopiers, etc.).

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SignaSURE Integrated with e-Lock

Frontier Technologies has integrated Datakey's SignaSURE Smart Card with its e-Lock information security suite to provide more powerful security to protect corporate information as well as portability of personal information. e-Lock uses the Microsoft CryptoAPI interface to the SignaSURE Smart Card.

Carl P Boecher, President and CEO of Datakey, said the deal would provide users with an additional level of security for business sensitive information that is not available with software-only security systems.

"Hardware tokens such as Datakey's SignaSURE Smart Card are designed to optimise security while at the same time affording users the capability to use secure applications from virtually any location," said Dr Prakash Ambegaonkar, Chairman and CEO of Frontier Technologies.

The SignaSURE family of products use Datakey Smart Card or smart key tokens in a public key

infrastructure to carry secret and sensitive cryptographic data, and to perform the critical functions of key generation, digital signature generation and encryption key "unwrapping."

e-Lock Desktop 2.0 is now available at US $249 and e-Lock Director 2.0 at US $1000.

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Smarty Certified by Mondex

Fischer International Systems Corporation has announced that its Smarty Smart Card Reader has been certified by Mondex International with a Type Approval Certificate to work with Mondex International's Smart Card electronic cash card.

The Smarty reader, which supports Smart Cards from Schlumberger and Gemplus, looks like a 3.5 inch diskette, has a slot in the back for a Smart Card, and fits into any Personal Computer's 3.5 inch floppy disk drive to access Smart Card information. With Smarty, Mondex cash cardholders can use their PC and the Internet to access their bank accounts and add cash to their cards from the convenience of home, 24 hours a day.

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3.85 billion Smart Cards by 2002

Widespread adoption of Smart Cards by financial institutions, governments and mass transit authorities is beginning to happen and will accelerate according to a Datamonitor report, *Global Smart Card Opportunities, 1997-2002*, which forecasts that 3.85 billion Smart Cards will have been issued globally by the year 2002. The report says Europe will remain the largest Smart Card market, but the US market will grow the fastest.

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AFC System for French Students

A contactless automatic fare collection system has been introduced in the French Department of Meurthe et Moselle to cut the costs of school transport which will no longer be free for most students.

The cost of transporting pupils to and from school has almost doubled in the area in the last 10 years (from 65 to 120 million French francs), mainly because children and teenagers go to school for a longer period of time and can now attend the school of their choice which may be further away from their home.

The first stage of the scheme, called ACCUEIL 54, covers 30,000 cards which can be used on 210 buses and reloaded at 21 points of sale. In the second stage, to be completed by September, the installation will be extended to all 510 buses.

The scheme has been introduced to raise awareness that due to rising costs, public transport can no longer be offered to schoolchildren as a free service.

Starting with this school year, 10 per cent of the expenses for school transport will be covered by the parents' contribution, and the remaining 90 per cent will still be financed by the authorities. Families with many children or with a very low income will be exempted from payment.

The different tariffs for children in elementary school, junior high school and in senior high school, are administered by the system.

In addition, the system will provide useful information on the number of rides per student type, utilised bus capacities, and point to further cost reduction potentials as well as provide accurate revenue collection.

ACCUEIL 54 is based on MIFARE contactless technology and has been implemented by French system integrator Applicam using TP 4100 driver consoles by AES Prodata and Magic 9000 personalisation terminals supplied by Schlumberger which also supplied the MIFARE Easypass cards.

Data collected from the bus terminals is transmitted to the central server through the GSM network. Technical equipment at the central site includes a PC network running under Windows NT, a dedicated network server, data collection stations from the bus terminals, personalisation stations for Smart Cards, and management stations to operate the system.

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Smart Ticketing on Nice Buses

Nice, on the French Riviera, is to use contactless Smart Cards on its public transport bus network. Semiacs, which operates the SunBus network, has awarded a FF 18 million contract to Ascom Monétel to renew its fare collection system.

Ascom is to supply dual-system validators (magnetic and contactless) for the city's 300 buses, 100,000 contactless Smart Cards and some 100 retailer-sited vending machines and six booking office machines. The contract calls for all equipment to be installed by mid-1998.

The cards being supplied by Ascom will be compatible with electronic purse applications. They can be read in contactless mode or inserted in a terminal for reloading.

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More Banks Join Visa Cash in HK

Visa International has announced that seven more Member banks have joined the Visa Cash scheme in Hong Kong. The Bank of East Asia, Chekiang First Bank, Citibank, Hong Kong Chinese Bank, Shanghai Commercial Bank, Wing Hang Bank and Wing Lung Bank have joined with the Bank of China Group of 13 banks and Standard Chartered Bank to form a 21-bank electronic cash payment system.

To date, around 130,000 disposable Visa Cash cards and over 80,000 reloadable Visa Cash cards have been issued.

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Smart Card Diary

Smart Card '98, Olympia 2, London, UK, 17-19 February, 1998.

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International Card Manufacturers Association Spring Workshops - Card Production Issues and Answers - Hyatt Regency, Chicago, USA, 12/13 March; and the Amsterdam Hilton, Amsterdam, The Netherlands, 11/12 May.

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NZ Retail Solutions 98, Auckland, New Zealand, 23-25 March, 1998.

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News in Brief

The PC/SC Workgroup, a collaboration of leading Smart Card and PC companies to integrate their technologies, has announced version 1.0 of the PC/SC specifications. The Workgroup is also talking with the OpenCard Framework group to achieve compatibility between the two approaches. Workgroup Web site: www.smartcardsys.com.

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Gemplus Corporation has been granted full accreditation by Mondex International to perform application loading, enablement, and customisation of Smart electronic cash cards for Mondex members. Its Shakopee site has a Smart Card application loading capacity of 600,000 cards per month.

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ORGA Card Systems UK and loyalty experts ICLP are to develop and market a turnkey customer loyalty and payments system based on the Visa chip loyalty specification.

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NEC is to support the initiative by SGS-Thomson Microelectronics and Motorola Semiconductor Products Sector in developing interoperability standards for contactless Smart Cards and readers so that their contactless microcontroller products will be compatible and interoperable.

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VeriFone, parent company Hewlett Packard and IBM are to work together to ensure that their Secure Electronic Transaction (SET) products for electronic commerce on the Internet are interoperable. They plan to publish a Developer's Reference Guide which will be submitted to Visa and MasterCard for integration with future SET definitions.

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The US government's General Services Administration has released the first proposed government-wide technical guide for introducing Smart Cards to Federal agencies. Interested parties are encouraged to review and comment on this draft before 28 February. Called *Government Smart Card Technical Interoperability Guidelines*, they can be found on Web site: http://policyworks.gov/smartgov

Telecommunications equipment manufacturer Lucent Technologies has launched a low-cost digital signal processor (DSP) which it claims will dramatically improve the performance of digital cordless telephones, answering machines and modems on Internet computers. The silicon chip processes audio and video information at ultra high speeds for telephone and television systems.

Visa International is to help develop Sun Microsystems' Java Card API (Application Programming Interface) and plans to introduce Java card-based Smart Cards in mid-1998 as second generation Smart Cards.

Integrated Circuit Card Standards and Specifications: Part 16

Electronic Payment Systems - SET (part 3)

This month we will look at how the payment gateway or effectively the Acquirer/Issuer handles the payment authorisation request. Regrettably the complexity continues but we will conclude this part of the series by showing how much simpler the whole process could become if we use Smart Cards.

Referring back to last month, the authorisation request message was shown to be constructed of 7 components. We can now look at the operation (*figure 1*) the payment gateway needs to effect in order to check the authenticity of the request. There are 2 basic operations used to check the request message,

(1)   Check the authorisation request message.

This message was enciphered by the randomly chosen K2 produced by the Merchant. The key (K2) is recovered by deciphering the (K2) digital envelope using the payment gateway's secret key exchange key. Decipherment of the authorisation request allows us to receive,

■   The OI digest (contained in the authorisation request message)
■   The authorisation request message data
■   The authorisation request message signed hash digest

The authenticity of the authorisation request is then checked by generating a hash of the provided authorisation request message and comparing it with the result of verifying the signed hash digest.

(2)   Check the OI/PI binding

The enciphered Cardholder payment message is deciphered using the Cardholders randomly chosen (K1). This key is recovered from the (K1) digital envelope using the payment gateway's secret key exchange key. The Cardholder's account data is also recovered from this digital envelope. The deciphered payment message includes the following data components,

■   The OI/PI (Order Instruction/Payment Instruction) Dual Signature
■   The payment instruction

The Dual Signature is checked using the Cardholders public key provided as part of the Cardholders key certificate. This produces the concatenated OI/PI digest. The payment instruction is hashed to produce the PI digest whilst the OI digest has already been recovered from the authorisation request message. This allows the reconstructed OI/PI digest to be compared with that provided as the dual signature. This process effectively ensures the binding of the order and payment instructions.

The payment gateway now has all the information required to complete the authorisation process,

■   Payment instruction
■   Authorisation request message
■   Cardholder account data

This allows the Acquirer to contact the Card Issuer such that the appropriate response can be made to the Merchant.

As mentioned previously SET only defines the payment gateway and in no way attempts to specify the interaction between the Acquirer and Issuer. Such communications are assumed to take place using existing mechanisms.

The payment gateway (the Acquirer) now responds to the authorisation request as shown in *figure 2*,

(1)   Generate an enciphered authorisation response message.

This is constructed in a similar fashion to that shown before where a digest of the response message is signed by the payment gateway's secret signature key. This signature along with the response message is enciphered by a randomly chosen symmetric key (K3).
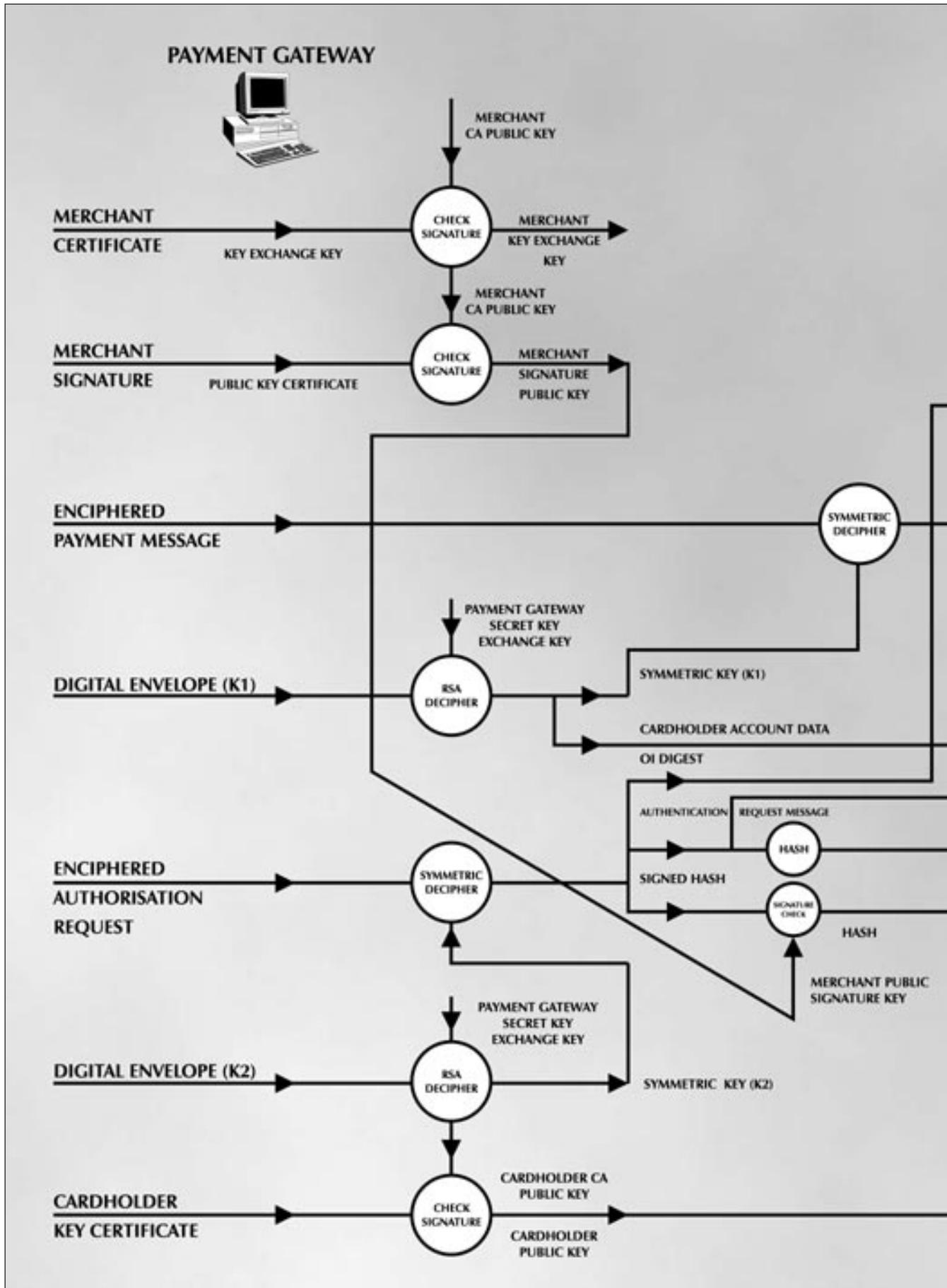
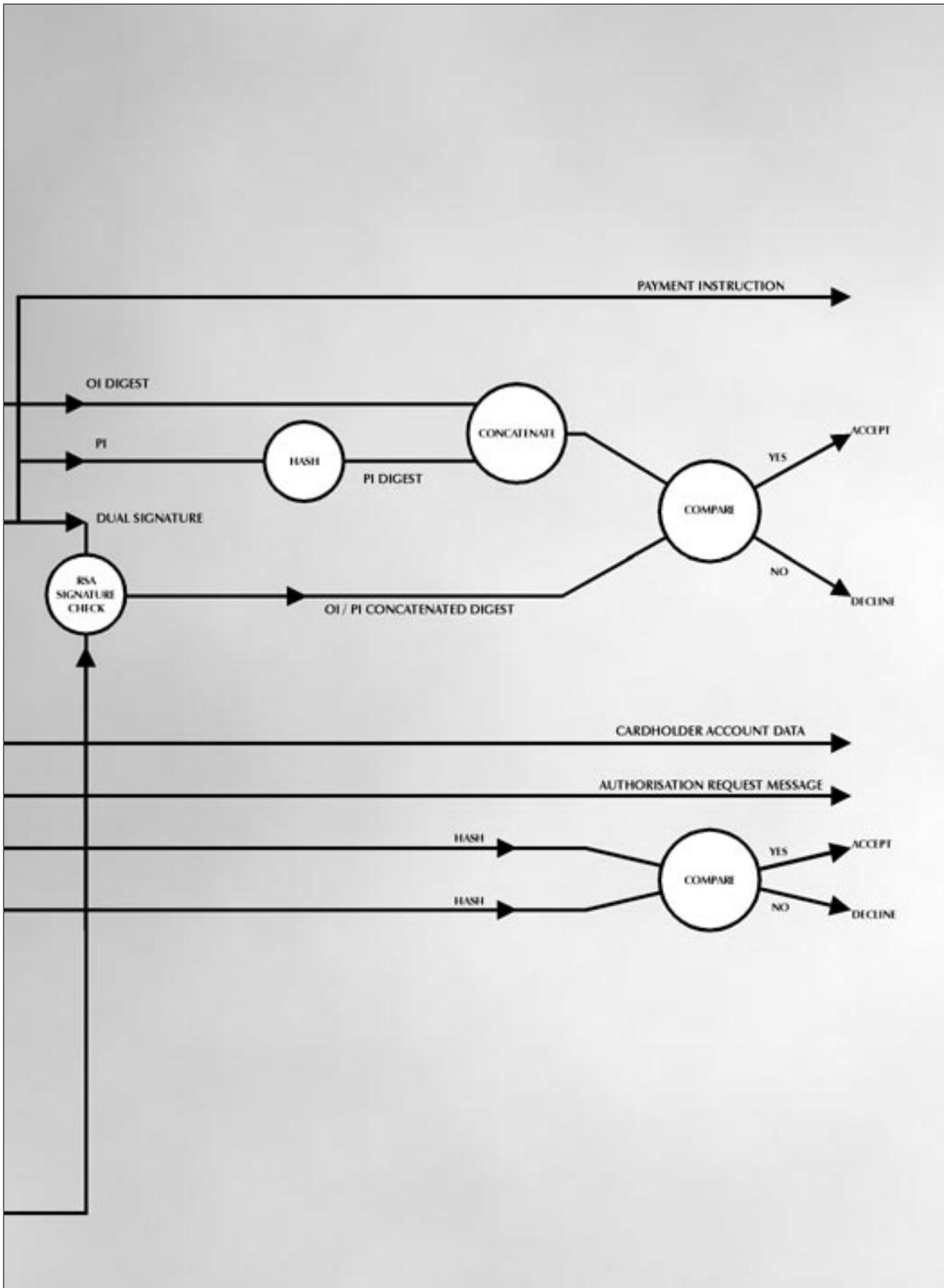(2)   Generate an enciphered capture token.

The Acquirer defines a capture token which the Merchant can use for subsequent payment capture. This token is enciphered with another randomly chosen symmetric key (K4). The (K4) digital envelope is constructed using the payment gateway's public key exchange key.

Next month we will complete our discussion of the SET protocol.

David B Everett

PAYMENT GATEWAY

MERCHANT

AUTHORISATION RESPONSE MESSAGE

HASH

SYMMETRIC ENCIPHER

ENCIPHERED AUTHORISATION RESPONSE

PAYMENT GATEWAY
SECRET SIGNATURE KEY

SIGNATURE CREATION

K3

RANDOMLY CHOSEN KEY 3

MERCHANTS
PUBLIC KEY EXCHANGE KEY

RSA ENCIPHER

DIGITAL ENVELOPE (K3)

CAPTURE TOKEN

SYMMETRIC ENCIPHER

ENCIPHERED CAPTURE TOKEN

K4

RANDOMLY CHOSEN KEY 4

PAYMENT GATEWAY'S
PUBLIC KEY EXCHANGE KEY

RSA ENCIPHER

DIGITAL ENVELOPE (K4)
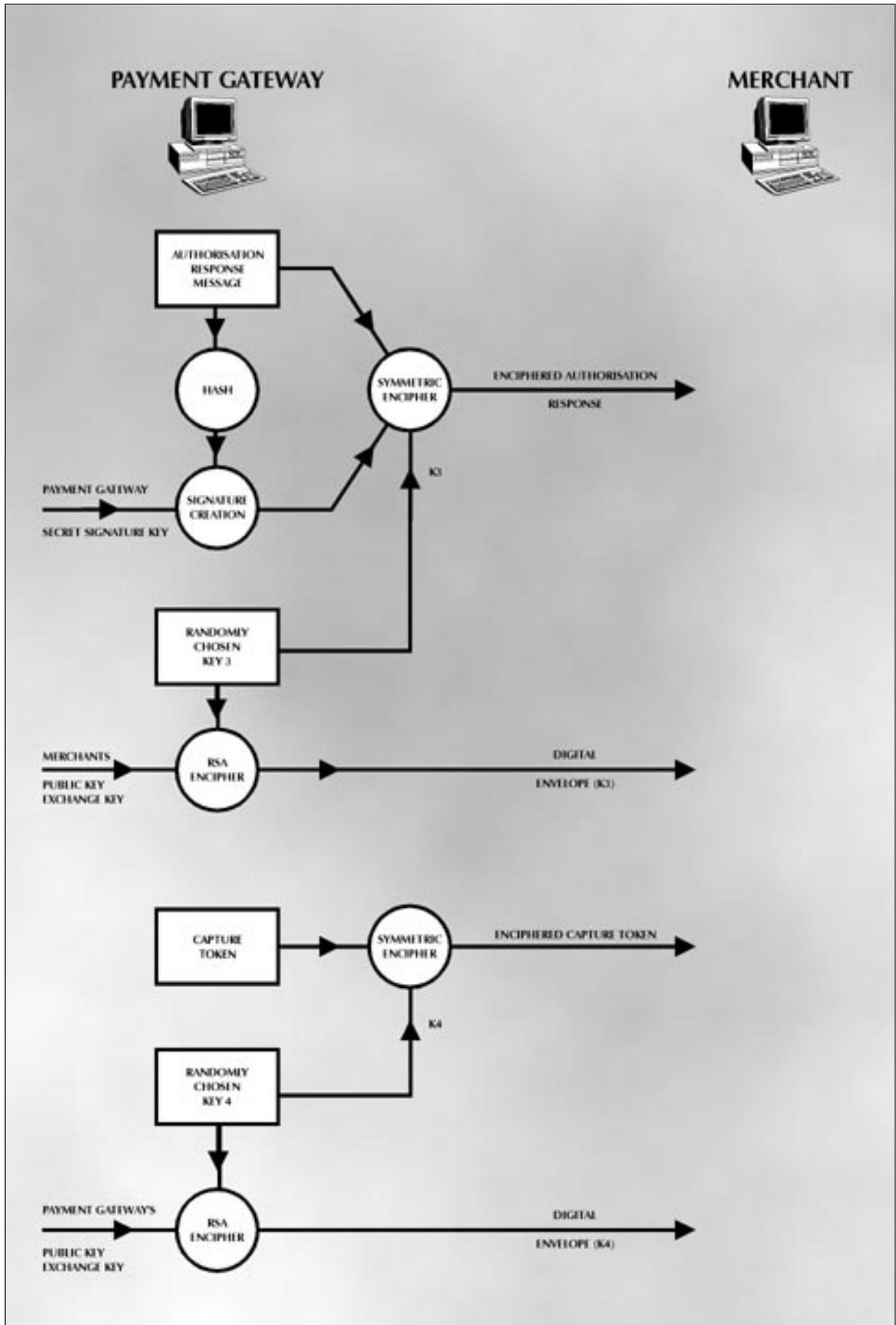
Sheffield University Card

Sheffield Hallam University and Midland Bank launched a multi-application Mondex student card in September last year (see front).

The cards are accepted at a variety of locations including Ponds Forge Leisure Centre and student accommodation at Truro Works and Regency House.

Cumberland Card Care, a local firm, will be partnering Midland Bank and Sheffield Hallam University through relationships with local retailers who will offer discounts based on the SHUcard.

The SHUcard has been issued to 26,000 students and staff. Each card bears the card holders photograph and staff or student number.

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Europay Re-appoints Chairman

Dr Kurt Richolt, Chairman of the Board of Directors of Europay International, has been re-elected for an additional term of three years as from April 1998. He has played a key role in the consolidation of the organisation's renewed alliance with MasterCard - Europay's strategic global partner.

Loose Chippings

- Siemens are to introduce Fingertip, a fully functional prototype of a fingerprint recognition circuit in CMOS technology, at Smart Card 98 in February.

- ICL, Fujitsu Limited and Amdahl are joining forces to develop a global programme to meet the growing demand for Smart Cards. Entitled SmartCARD Vision, the programme will focus on the development of Smart Cards, related equipment, consultancy and operations support.

- Paramedics who treat people at medical emergencies will soon have immediate access to vital medical details. Information, such as blood group, will be stored on a coin shaped microchip small enough to wear on the back of a watch. The chip, developed by Mervelier of Switzerland, will be coded in the five most common languages and will be available from May.

- London Transport expects to complete its £1bn Prestige Smart Card ticketing contract in February. Transys, lead by EDS, are the only consortium left.

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Sunflowers and Butterflies

The picture above was commissioned by Schlumberger who asked the artist to reflect the development freedom and versatility of their Cyberflex Smart Java Card. Sacha, the artist, used the sunflower to represent openness and the butterfly to portray freedom. The painting was produced on the unusual medium of plastic card blanks. The painting was displayed at Sclumberger's Java conference at Cartes 1997 and was then broken into sections and sent as Christmas gifts to clients.

Caption Competition Winner

Last month *SCN* announced a Caption Competition to celebrate Christmas and asked for your witty, Smart Card related suggestions.

The photograph featured Albert Andoh, SCN's Marketing Manager and his dancing partner, and here are a few of the captions that we received: "SCN marketing technique number 72 - the backbreaker guaranteed subscription sign up!" and "Get your 'ANDOH' off my card wallet".

The winning entry, however, was sent in by Mike Bates of NWDT. His entry says: "It's amazing what you can 'pick up' with an SCN subscription." He receives a free copy of The International Smart Card Industry Guide 1997 / 98 plus a disposable camera.

Award for Intellect Terminal

Intellect's hand-held Smart Card Universal Payment Terminal (*SCN December 1997*) won the Best New Solutions award at the Canadian Retail Strategies and Solutions show in Toronto.

ANZ Piloting Mondex

ANZ is piloting Mondex electronic cash with its employees at group headquarters in Melbourne, Australia. Initially, employees will be able to make purchases from the staff cafeteria and social club and reload their cards at unattended load devices and at Mondex compatible telephones.

In the second half of 1998, ANZ will join with its Mondex Australia consortium partner banks - Commonwealth Bank, National Australia Bank and Westpac Banking Corporation - to launch Mondex publicly.

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Setec Contract in Thailand

Finnish company Setec Oy is providing a key management system for public payphones to the Telephone Organisation of Thailand.

Setec, which develops and manufactures Smart Cards and systems, says its SetKey System will be used to create the keys in order to authenticate disposable Eurochip payphone cards for use in TOT payphones.

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BT's Christmas Card
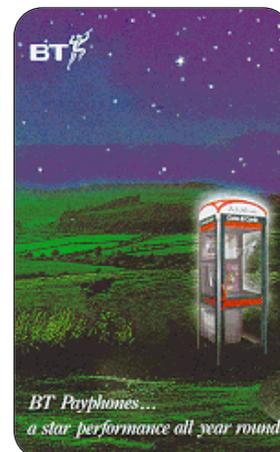
BT's Christmas celebration involved the creation of a special limited edition phonecard which was sent to important customer contacts.

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