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Contactless Crazy

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Abstract

There seems to be a tremendous amount of activity in the field of contactless smart cards, especially in the payments arena. What's the excitement about, and why is it happening now?

Contactless Crazy

The link between the use of smart cards in the mass market and secure electronic business on the Internet has always been interesting but the promise has remained unfulfilled, for a variety of reasons. One of those reasons (but not the only one) has been lack of �consumer excitement� about the technology. Some of the most valuable and widespread uses of the technology are essentially invisible (as in the case of GSM phones) and others of no real benefit (to the consumer) above the familiar magnetic stripe �dumb card�. Things may, however, be about to change as smart cards catch the wireless wave.

There is a mass-market explosion in the use contactless smart cards, dual-interface (contact and contactless) smart cards, Radio Frequency Identification (RFID) smart tags and the like. RFID chips are particularly interesting, because they have become smaller and smarter to the point where we can now add them to everything from medicine bottles to cans of beans and read and update the data on them a distance. They are causing a revolution in the retail supply chain with Procter & Gamble, Gillette and other companies using the technology to track products from assembly line to store shelves [1]: Gillette reckons that its sales would be 15% higher if shelves were always stocked so last year it started tracking its Mach3 product at a Tesco store in Cambridge and plans to spend around $50 million for half a billion tags and for outfitting store shelves with monitors [2].

The technology is already widely used is transportation: mass transit and road tolls, where drivers put a

vicinity tag on their dashboard (see, for example, not London which has opted for a bizarre number plate-reading alternative) to be read by roadside gantries. The use of these tags for other purposes is snowballing: in several areas in the US drivers can use their road toll tags to pay for burgers at drive�through windows [3]. Also in the US, more than six million people (when Mobil launched the scheme, they were expecting a million [4]) have the well-known Exxon-Mobil SpeedPass tags, used for payment at more than 7,500 petrol stations (and now other retailers as well) and similar schemes are growing. In South Africa, BP�s is expecting 400,000 customers for its Fuelmaster contactless scheme, already live in 500 filling stations.

This particular use contactless smart cards (ie, for making payments) is turning out be one of the retail payments world�s most interesting trends. It was becoming clear, at least five years ago, that contactless cards were much more popular with consumers than contact cards for making �purse� (ie, small retail) purchases and were generating a far greater transaction volumes [5]. Europay had even talked about a contactless version of their Clip purse. The consumer preference for contactless had, however, also been noticed by non-banks.

One such non-bank was Sony, who developed the EDY (Euro�Dollar�Yen) contactless purse in Japan, aiming for nothing less than the full-scale replacement of contact smart cards. EDY cards allow shops to reduce processing of cash register transactions to just 0.2 seconds. Users recharge the cards by depositing cash in special machines [6]. Taking the system even further, the Japanese mobile phone operator NTT DoCoMo has distributed personal digital assistants (PDAs) with EDY chips embedded in them in the city of Sapporo: customers uses the PDAs to pay for subway fares, concert tickets and vending machine purchases. After it rolls out its third-generation high-speed network, DoCoMo may well build the EDY chip into its mobile phones as standard issue.

The canonical example is, as always, the Hong Kong mass transit smart card, Octopus (which has around 7 million cards in circulation). The cards are used in phone booths, vending machines (Octopus-enabling vending machines led to a 15% increase in sales), snack bars and coffee shops in addition to the subway [7]. Other cities are watching with interest: London�s Oyster card is, according to the scheme operators Transys, likely to have both credit card and electronic purse functionality in the future [8]. Interestingly, Octopus enables mobile phone payments that bypass both banks and mobile operators: they sell Nokia phone covers that have the Octopus RFID chip glued in to them! Thus, consumers have a quick and easy way to pay using their mobile phones, using neither bank nor mobile services. And the transactions are really fast: sub�300 milliseconds.

Contactless payment initiatives are being explored worldwide: with pilots underway in North Carolina (2Scoot [9]) and Singapore (Go Virtual[10]). BankAmerica, a major Visa issuer in the US is already experimenting with the technology [11], American Express have announced their ExpressPay trial (which uses a branded keyfob as the chip carrier) and at the end of last year, MasterCard launched its contactless credit card (known as Paypass [12]) with a number of banks and retailers in Florida.

When PayPass was launched, in Orlando, consumers were provided with contactless MasterCards to use in the equipped retailers. When the programme was extended to Dallas, consumers were provided with Nokia phone covers with the PayPass chip inside them, thus providing a convenient and simple way for them to use their mobile phones to pay at points of sale. This is an interesting illustration of the inevitable interaction between contactless smart cards and pervasive wireless networks: the smart card vanishes into the consumer device.

What is behind this surge of activity in the contactless world? The first formal release of the international contactless standards has clearly helped and will yield economies of scale for the device manufactures and consequently drive down cost. At the same time, experiences from the marketplace are maturing and feeding back into the development of new technologies. Look at the Japanese initiative to link eLWISE card technology (essentially large flash memory) and the NICE platform architecture (essentially secure application download) in a 16-bit dual-interface card with 1Mb flash, 8Kb RAM and 4Kb bootstrap ROM, supporting 7816 and 14443 (1024-bit RDA, ECC and ESIGN) [13]. If they really can deliver these chips at the mooted $1 price point, it�s hard to imagine why anyone would use any other card.

The trend toward contactless extends to beyond payments, retail and transport. In another Government example, the US Department of Defense have stated that the next generation of their Common Access Card (CAC) will incorporate contactless technology. With this kind of impetus, the drive for the kind of dual-interface secure $1 card mentioned above is going to be strong. The tide is not only unstoppable,

it�s accelerating: STMicroelectronics has shipped 34K contactless chips to Japan for the contactless ID card pilot, Philips will soon announce a 64K contactless chip specifically designed to store biometric data and aimed at the passport and travel documents sector, and Australia may be planning a pilot with a 512K Sharp chip [14].

The impact of standardisation and cost�reduction in the contactless world will be, as in other sectors, the creation of a mass market that exploits the main characteristics of contactless smart cards. In strategic terms, we think that the key charactertistic is that they deliver significant business benefits in terms of

Lifetime cost of ownership. Transit operators calculate that the annual maintenance costs for magnetic stripe readers are about 12% of cost, whereas contactless readers average only 5% (meaning around $75 for contactless) [12].

Transaction time. For historical reasons, and because of their origin in the mass transit sector, the interfaces to contactless smart cards are many times faster than to contact cards.

Form factor. As it operates remotely from the reader, the physical size and shape of the contactless device is unimportant. The attraction for consumers is obvious [15].

These three factors mean that many players (including, crucially, retailers) are beginning to realize that contactless cards are more than a convenience for consumers but a vehicle for finally realizing the long-touted benefits of the smart card revolution.

In the specific case of retail e-payments, the implications are obvious: major markets, including the US and Japan, may well �leap frog� directly to contactless cards and bypass the conventional contact card completely [16]. This could be the first step to the retail payments industry may decide to abandon the �traditional� payment card for the contactless solutions preferred by consumers [17].

This will open up an attractive landscape for online commerce. If your laptop and PDA contain both contactless smart card chips (for secure identification and key storage) and contactless chip readers (for user identification and authentication) then buying something on the Internet may become as simple as sitting down at your PC with your wallet in your pocket and clicking on the �buy it� button.

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