

## **REALITY BYTES: WHAT FOOD RETAILERS SHOULD KNOW ABOUT SMART CARDS IN THE U.S.**

### **Introduction**

After years of use in Europe and Asia, smart cards have burst onto the scene in the United States. Since the mid-1990's, more than 25 million smart cards have been issued through governments, universities, banks and other entities, and today, their use is growing quickly – by some estimates, by more than 45% in the past year alone.<sup>1</sup> With the smart card industry turning its attention toward the retail sector, a host of questions are being raised. This paper will give a brief overview of how smart cards work, where they are being used, and how the emergence of smart cards might impact the grocery industry in the years to come.

### **What is a Smart Card?**

A smart card is essentially a “computer on a card.” Like modern PCs or laptops, smart cards are fully programmable, and able to read, write, store, update and process information. Smart cards today are commonly used with personal computers, point-of-sale devices, vending machines, fare collection devices and access control devices.

With their computing power, smart cards can perform a range of functions far more sophisticated than existing cards, which use more limited technologies like magnetic stripes or bar codes. For example, where memory limitations in existing card systems usually require a separate card for each application, smart cards have the ability to carry a wide variety of applications (i.e., loyalty, ID, payment) on a single card. In addition to having the capacity to contain these multiple applications, smart card computers also have the ability to “firewall” different applications off from each other, in order to ensure that data from multiple applications is not improperly shared.

Smart cards are also generally more durable than magnetic stripe or bar code cards: where these older technologies can easily rub off or be erased by magnets, smart cards carry their microchip inside the card, protecting it (and its data) from normal wear and tear.

Perhaps most significantly, because they are computers, smart cards have the ability to process information and transactions right on the card – without connections to external networks.

With all of these capabilities, smart cards can allow individuals to condense the entire contents of their wallet onto a single card!

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<sup>1</sup> [www.cardtechnology.com](http://www.cardtechnology.com), February 7, 2002.

### *Two kinds of cards...*

There are two kinds of smart cards: **contact cards**, which require that the card be inserted into a reader that makes direct physical contact with the smart card's microchip, and **contactless cards**, which can be read by bringing the card into close proximity (0-6") with a reader that then interacts with the chip through radio waves. The vast majority of smart cards deployed today are of the contact variety. Some smart cards are "hybrid" or "combi" cards that contain both contact and contactless capabilities.

A **contact smart card** can store various amounts of information currently ranging from 2 to 32 KB, with most cards in use today using 8 or 16 KB. While this is a relatively small amount of memory when compared to modern computers, it is important to keep in mind that the very first Apple II had only 4KB of RAM and the first IBM PC contained only 16 KB of RAM.<sup>2</sup> Most smart cards today are far more powerful, both in terms of processing speed and memory! Areas where contact smart cards are widely used include:

- The credit card industry, with products such as the Target smart Visa card or Blue from American Express,
- Identification cards, such as the Common Access Card used by the U.S. military to identify troops and protect access to sensitive computer networks,
- Electronic Benefits Transfer (EBT) cards, such as the Ohio Direction Card.

**Contactless smart cards** are capable of storing the same amount of memory as contact smart cards, however, commercially available contactless smart cards today are generally more limited in their memory capacity, storing only 1-2 KB. As the market demands higher storage capacity from contactless cards, more sophisticated products should become widely available. Areas where contactless smart cards are widely used include:

- Transportation payment systems, such as the Washington D.C. subway system,
- Electronic payment systems, such as Shell's Easypay pass, which allows customers in the Netherlands to purchase fuel at the gas pump simply by waving a key fob containing a smart chip in front of the pump.<sup>3</sup>
- Access control systems, where a user simply waves a contactless smart card in front of a door to unlock it.

Depending on their capabilities, smart cards generally range in price from \$1-9. As the technology advances, prices continue to fall, making this powerful card technology much more affordable.

It is important to note that many smart cards being issued are multi-technology cards, which incorporate both a microchip and other storage mediums, such as magnetic stripes or bar codes. Inclusion of multiple technologies on a single card allows these cards to continue to function with older legacy systems such as magnetic stripe point-of-sale (POS) terminals. All smart credit cards to date issued by banks also include magnetic stripes for this purpose.

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<sup>2</sup> <http://www.apple2history.org/history/ah03.html>

<sup>3</sup> <http://www.semiconductors.philips.com/markets/identification/articles/success/s7/>

### *...and A Multitude of Standards*

One of the challenges the smart card industry has faced is agreement on a single standard for operating the technology. Much as Microsoft Windows and Apple Macintosh, or Betamax and VHS squared off for years, the smart card world has been overrun with a jumble of technology standards that have hampered interoperability. All told, more than 30 smart card operating systems have emerged over the past 15 or so years, confounding retailers and others interested in using the card.

The good news for retailers is that the smart card industry has finally started to move toward a set of interoperable standards and operating rules for cards. In addition, even where systems do differ, software called “middleware” is now built into most smart card systems to ensure that cards from different manufacturers can now interoperate fully. Nevertheless, some smart card vendors continue to push proprietary systems. As retailers and others consider adoption of smart card technology, they need to be careful to ensure that the systems they are looking at are flexible and interoperable.

Two standards that have emerged as leaders in the banking industry in recent years are MULTOS, which is controlled by Mastercard, and Java, which was developed by computer giant Sun Microsystems and later adopted by Visa as the standard for their smart credit cards. In recent months, Java has begun to emerge as the leader between the two by virtue of its larger share of the market. The smart card industry is still young, however, and no equivalent of the PC world’s Microsoft Windows has yet emerged.<sup>4</sup>

#### **EBT & Smart Card Standards**

Retailers, the USDA, state EBT officials, and payment processors are working together to deliver the first national standard for EBT smart card-based programs. Under the chairmanship of FMI through the American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X9A11-EBT working group, the technical specifications for the system have been developed. The standard, ANS X9.93-2002 Financial Transaction Messages-EBT Parts 1 & 2, is expected to be available in 2002.

This standard describes the messages in both offline and online processing environments and is based upon the ISO 8583 standard for card-based electronic transactions used throughout the world. It specifies message structure, format and content, data elements and values for data elements used in EBT transactions. While the standard is designed to process smart card-based WIC transactions, its structure provides a migration path for current (food stamp) and future EBT programs to be used with smart cards.

In addition to standards for operating the cards, the industry – prodded by the U.S. government – has also developed a separate and complimentary set of standards for storing data on cards and sharing data between them. Known as the “GSA Common Data Model” (due to its origins in the U.S. General Services Administration), the standard prescribes a specific way of storing data on smart cards to facilitate seamless

<sup>4</sup> <http://www.cardtechnology.com>, February, 2002

interoperability of cards with different operating systems. With the GSA Common Data Model, a card using the Java operating system can work seamlessly with a card using the MULTOS operating system. The GSA standard was originally developed to ensure that all U.S. government smart cards could interoperate with one another, however, it now is being adapted by many in private industry as well, as a way to ensure better interoperability among all smart cards, both government-issued and private.

### **How are Smart Cards Used in the U.S. Today?**

Smart cards today are used in five main areas: banking, government, universities, telecommunications and transportation. In addition, a handful of pilots have been rolled out in the retail world, including the grocery industry. Following is a survey of the smart card industry as of May, 2002.

#### **Banking/Credit Cards**

After several years of pilots (and several false starts) the banking industry has made a strong push in recent years to issue smart cards to its customers.

The industry has tested smart card payment systems in a handful of settings since the mid-1980's, including high-profile pilots like a Visa smart card test in Atlanta during the 1996 Summer Olympics and a joint Visa/MasterCard pilot on the Upper West Side of Manhattan in 1997 and 1998. Both of these pilots required customers to load cash directly onto their smart chip, where it would then be deducted from the chip at each merchant's point of sale terminal. While greatly hyped, neither of these pilots caught on with either consumers or merchants because they failed to give either group significant value to use the smart card.



For example, in the Manhattan pilot, customers were frustrated that they could only use their smart cards in certain parts of the city, giving them little incentive to store money on the card if they had to leave the Upper West Side. In addition, the card couldn't be used in pay telephones or vending machines, further limiting its utility.

Likewise, merchants were frustrated that they had to install new POS terminals to support an additional payment system which was only used for a handful of transactions per day. Moreover, the merchants were mostly businesses used to receiving small payments in cash, such as newsstands, dry cleaners and fast food merchants. Even with more than 100,000 smart cards distributed, neither merchants nor their customers caught on to the idea of using a debit card to pay for small purchases.<sup>5</sup>

Undaunted, however, banks have pressed on with new models for smart payment systems which aim to address the problems with the first pilots by developing a stronger business case for the technology. This is not just because the cards look neat (although some banks have had success marketing smart credit cards as a "card of the future"). Rather, it

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<sup>5</sup> <http://www.efc.ca/pages/media/nytimes.04nov98.html>

is because smart cards have some inherent capabilities that are lacking in today's generation of magnetic stripe cards that should help banks over the long run:

**1. Smart cards make counterfeiting and credit card fraud very difficult.**

With any credit card, the issuing bank runs the risk associated with fraudulent creation or use of the card. While fake magnetic stripe cards can be created rather easily, smart cards contain a much more sophisticated level of security based on the information that is encrypted in their microchip. With these enhanced security features, even the most seasoned of hackers will find it difficult to craft a counterfeit card.

**2. Despite the dot-com bust, the number of transactions taking place over the Internet is rising – and with it, so is the level of credit card fraud.**

Credit card issuers generally look at their transactions in two ways: those where they know that the credit card is physically present, such as at a grocer's POS terminal, and those where the card is not, such as a transaction conducted over the phone or the Internet. Given that fraudulent use of an account is much more likely in the latter situation, transactions where the card is not present have a much higher level of risk, and with the increased risk, comes a higher transaction cost.

Banks are looking to smart cards as a way to ensure that a customer's credit card is present even in online transactions, thus reducing their liability and costs. By reading credit card information directly off of a customer's smart credit card (instead of having the consumer type the number in by hand), banks can be assured that the card and customer are actually present at the other end of the transaction, even when the customer is shopping from a home PC in a suburban living room.

**3. Smart credit cards can securely process transactions offline.**

While today's magnetic stripe credit cards rely upon dial-up telecommunications networks to obtain real-time authorization, smart cards can store authorization directly on the card. This means that, in the future, a consumer's credit card could automatically authorize any charge that did not exceed his credit limit, without requiring a connection to a dial-up network. Storing authorization on the card may not only improve per-customer processing times; it can also save both merchants and banks some communication costs.

Since abandoning the debit card model and focusing more on traditional credit cards, banks issuing smart cards have begun to flourish. In 2002, smart cards represent a small, but fast-growing portion of the 689 million credit cards in the U.S.<sup>6</sup> All told, more than 17 million smart credit cards have been issued nationwide, up from only 5 million one year ago.<sup>7</sup> Most of these are split evenly between Visa, which is issuing smart cards

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<sup>6</sup> Visa Business Volume & Reporting, First Quarter 2001.

<sup>7</sup> CardTrak Online 1/02; Card Technology 4/02

through a handful of banks and Target retail stores, and American Express, which launched the very first nationwide smart credit card in the U.S. with its *Blue* offering three years ago. Until recently, Mastercard was not a player; however, Citibank announced in December, 2001 its intention to offer a smart Mastercard. Many estimate that all magnetic stripe credit cards will migrate to smart cards by 2010.

To date, all smart credit cards issued by U.S. banks also include a magnetic stripe, in order to facilitate use with existing POS systems. In support of the banking industry's efforts, companies like Hypercom, Verifone and Igenico now manufacture point-of-sale terminals for retailers capable of handling smart card transactions.<sup>8</sup> As these systems roll out over the next few years, transactions which rely on smart card microchips for data exchange will become more common.

### *American Express*

With the introduction of its *Blue* credit card in 1999, American Express became the first company to market a smart credit card nationwide. To date, American Express has issued more than 7 million *Blue* cards, marketing *Blue* as a futuristic credit card. With its initial roll-out of the card, American Express sent a free smart card reader to customers that could be attached to their home computers.



Despite its hi-tech looks, the *Blue* card has to date made very little use of its smart chip, using it only as an “e-wallet” that, when tied to a consumers smart card reader, can automatically fill out customer information forms when shopping online. A recent study by Brittain Associates showed that few who used the card took advantage of the e-wallet function when making online purchases.<sup>9</sup>

American Express has started to look for ways to expand the smart chip function. For example, during the 2001 holiday season, American Express established a chip-based loyalty program for *Blue* customers at Virgin music stores.

### *Visa*

In terms of breadth of offerings, the smart card leader to date in the credit card industry is Visa, which has issued more than 7 million smart credit cards, and worked to develop a single standard to ensure interoperability between all Visa smart cards. In October 2000, Visa introduced a new multi-application smart card for \$3.56 per card,<sup>10</sup> and in January 2002, rolled out a new smart card developed in partnership with IBM, which is now available to Visa issuers at only \$1 per card.<sup>11</sup>

In an effort to capture more of the Internet market for credit card purchases, Visa has also developed a “Smart Visa Ready” logo to be placed on home and business computers

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<sup>8</sup> CardTrak News 5/9/01

<sup>9</sup> CardTrak Online 5/01

<sup>10</sup> CardTrak Online 5/01

<sup>11</sup> CardTrak Online 1/02

which identifies machines ready to accept Visa smart cards. At least one major computer manufacturer – Compaq – has announced they will produce PCs with Visa-ready smart card readers, and others are likely to follow over the next year.<sup>12</sup>

Like American Express, smart Visa cards generally limit use of their smart chips to functions like e-wallets, although Visa plans to incorporate additional functions like the ability for cardholders to “digitally sign” documents over the Internet soon.<sup>13</sup>

Perhaps the most interesting smart Visa card, and, indeed, most interesting smart credit card in general is the Target smart Visa program, run by Retailer’s National Bank. Target announced last year that it would be the first American retailer to adopt a nationwide branded smart card, and to date, has signed up more than 2.5 million smart card accounts.<sup>14</sup> Target currently has a total of 36.4 million branded credit cards, and plans to convert most or all of these cards to smart cards in the coming months.



While transactions with the Target Visa will initially be processed using a magnetic stripe on the back of the card, Target is in the process of installing smart card terminals in all 990 stores and report that they will complete this task by June 2002. Once installed, customers using their Visa at Target stores should be able to process their transaction using the card’s microchip.<sup>15</sup>

When shopping at Target stores, cardholders are awarded benefits from the Target Rewards program, where they accumulate one point for every two dollars spent. Points are redeemable for reward certificates worth 10% off a full day of shopping at Target stores.

Additionally, Target is setting up a special loyalty program to give exclusive offers and discounts to Target cardholders who use their smart cards to sign onto Target’s webpage. Target is currently issuing free smart card readers to each Target Visa holder for this purpose. Special offers will be downloaded onto the chip to be redeemed at Target stores.<sup>16</sup>

It is worth noting that Visa is providing a significant subsidy to Target to get their smart Visa off the ground, in the hopes that it will serve as a catalyst for other new smart credit card programs. One recent publication estimated Visa’s contribution at \$55 million.<sup>17</sup>

After Target, Visa’s top issuer is Provident Bank, who has issued more than 1 million smart Visa cards to date and announced it intends to migrate each of its 17 million credit card accounts to smart cards. Close behind them are Fleet Boston and First USA/Bank One, which each



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<sup>12</sup> CardTrak Online 5/01

<sup>13</sup> CardTrak Online 8/01

<sup>14</sup> [www.cardtechnology.com](http://www.cardtechnology.com), 3/5/02

<sup>15</sup> CardTrak Online 11/01

<sup>16</sup> [http://www.target.com/common/financialservices/target\\_visa\\_main.jhtml](http://www.target.com/common/financialservices/target_visa_main.jhtml)

<sup>17</sup> Card Technology, 4/02



have issued less than 1 million smart cards. Visa has announced that it expects to have eight smart credit card issuers by February, 2003.<sup>18</sup>

### *Mastercard*

While a bit late to the party, Mastercard arrived on the smart card scene in December, 2001 with Citibank's new Citi Smart Card. Like its American Express and Visa brethren, the Citi card's initial functionality is limited to storing web sites, user ID/passwords, and an e-wallet. For the future, however, Citibank is preparing to offer cardholders digital certificates on their smart card for online authentication, as well as the ability to download special loyalty programs and discount offers.

Two additional applications on the drawing board that are especially interesting are the ability for cardholders to store e-tickets for airline flights on their smart chips and an option for cardholders to store information from multiple credit cards from different issuers on the smart chip of their Citibank card. Under this scenario, individuals using their Citi card could carry all of their credit and debit cards on a single smart card. At the time of payment, one would insert his or her Citi Smart Card into a reader and choose from the smart chip which payment system was desired.<sup>19</sup>



### **Government**

Over the past ten years, both states and the federal government have looked to smart cards to enhance delivery of benefits, improve security and make government more efficient.

Some of the top government smart card projects include:

#### *U.S. Department of Defense*



The Department of Defense (DoD) has used smart cards since 1994 to consolidate multiple paper-based ID's into a single card that can store personnel data. Among other applications, military personnel can use their smart cards at some DoD facilities, such as the U.S. Navy's Great Lakes Training Center, to make purchases at DoD commissaries.

DoD is currently issuing 4.3 million smart cards to replace their old plastic ID's. The new cards will be used to protect access to secure DoD computers and streamline administrative and business processes. Ultimately, the card will serve as an "all-in-one" card for DoD personnel, used for everything from unlocking doors to boarding military planes to processing through chow lines.

#### *U.S. Department of Veterans Affairs*

<sup>18</sup> [www.cardtechnology.com](http://www.cardtechnology.com), 2/11/02

<sup>19</sup> CardTrak Online 1/02



The Department of Veterans Affairs initiated a pilot in 2000 to issue smart cards to 50,000 veterans. The VA Express Card carries a veteran's demographic and health information, allowing him or her to automatically check in at hospitals without filling out forms. The card also carries emergency health information and contains a digital certificate, which allows veterans to securely access sensitive health information and apply for benefits online.



### *U.S. General Services Administration*

The headquarters of the U.S. General Services Administration (GSA) in Washington, D.C. currently uses smart cards to secure building access and make purchases via a purse on the chip from vending machines. A smart card system was also used by GSA to ensure physical security for the last two Presidential inaugurations.

The GSA also oversees a \$1.5 billion, 10-year contract for government procurement of smart cards. Four primary contractors were chosen for this contract: MAXIMUS, EDS, Northrop-Grumman and KPMG.

### *State of Ohio*

In a program many Ohio grocers are already familiar with, the state of Ohio currently uses smart cards in their statewide Electronic Benefit Transfer (EBT) program. Food stamps are distributed each month to about 300,000 households via the card.



Transactions are processed entirely off-line, with the complete transaction taking place directly on the card's microchip, which eliminates the need for live dial-up networks to process transactions. Without the dial-up network, merchants have experienced increased transaction speeds, as well as cost savings due to lower per-transaction costs. With the Ohio program, settlement occurs at the end of each day with all of a merchant's EBT transactions transmitted at once to a host computer, which then reimburses the merchant's depository account.<sup>20</sup>

### *State of Wyoming*

The state of Wyoming runs an off-line smart card-based EBT program similar to Ohio's for distribution of Food Stamp benefits to beneficiaries across the state. Wyoming has taken their project a step further, however, to also include benefits from the Women, Infants and Children (WIC) on the card.<sup>21</sup> Texas and New Mexico are also moving ahead with similar WIC smart card pilots.<sup>22</sup>

### *Western Governors Association Health Passport*



A consortium of states affiliated with the Western Governors Association recently completed a pilot in North Dakota, Nevada and Wyoming to tie multiple government health services and benefit programs to a single smart card. Health Passport Cards include information for programs such as Medicaid, Women, Infants and Children (WIC) EBT, Food Stamp EBT and

<sup>20</sup> <http://www.state.oh.us/opp/oppsmtcd.htm>

<sup>21</sup> <http://www.welfareinfo.org/smartcardsystem.htm>

<sup>22</sup> <http://www.fns.usda.gov/wic/CONTENT/technology/wicebtstateprojects.htm>

Head Start, as well as cardholder health and immunization information.<sup>23</sup>

### *New England Partners*

A consortium of New England states (ME, NH, VT, MA, RI, and CT) is currently working to implement a smart card-based system to deliver WIC food benefits as well as maintain and exchange health services information in partnership with a variety of health service providers.<sup>24</sup>

### **University**

Approximately 25 universities have adopted smart card ID systems over the past five years. Most universities use smart cards to carry an “e-purse” for students – essentially



an offline debit card on the chip that allows students to store money on the smart card's chip. A number of schools also use the smart card to administer school meal plans, unlock doors, log on securely to campus computers and track student's academic status. All told, about 1 million smart cards have been issued at universities overall.

### **Telecommunications**

The largest smart card technology application to date in America has been as a device to ensure security in telecommunications. Smart cards have been used for several years as the access cards for satellite television services like DirecTV and Echostar, where more than 17 million cards have been issued. In addition, smart cards are used as the “identity” chip in more than 18 million American wireless phones adhering to the Global System for Mobile (GSM) communications standard. In both applications, the identity of the device is stored on the smart chip instead of in the device, allowing consumers to easily transfer their digital identity from one device to another. For example, a consumer with a 4-year-old GSM phone who wishes to upgrade to newer equipment need only transfer his old smart card to his new phone in order for the same phone number to be maintained.

### **Transportation**

With their ability to quickly process transactions on card and link to multiple administrative systems, smart cards have emerged as a top technology for electronic collection of transportation fares. Highlights include:

#### *Washington, DC*

The Washington Metropolitan Area Transit Authority uses a stored value contactless smart card called SmarTrip to collect subway fares and quickly process passengers.<sup>25</sup> The city of Chicago recently announced their plans to adopt a similar system,<sup>26</sup> as did the Los Angeles County



<sup>23</sup> <http://www.westgov.org/wga/initiatives/hpp/>

<sup>24</sup> <http://www.fns.usda.gov/wic/CONTENT/technology/wicebtstateprojects.htm>

<sup>25</sup> <http://www.wmata.com/riding/smartrip.htm>

<sup>26</sup> <http://www.transitchicago.com/store/faremedia/>

Metropolitan Transportation Authority.<sup>27</sup>

### *Puget Sound*

The Puget Sound area in the state of Washington is putting together a regional smart card fare collection system which will allow customers to use one fare card on seven different transportation systems in the four-county Central Puget Sound area. A single smart card for fare collection is being used to link trips between buses, ferries, and rail.<sup>29</sup>

### **Can a Smart Card be Dumb?**

When it comes to looking at contactless payment systems such as Washington D.C.'s SmarTrip subway fare card or ExxonMobil's Speedpass, it's easy to get confused about whether the device is a smart card. To consumers, both devices work essentially the same way: consumers swipe their card or key fob over a reader and it automatically pays for the service being purchased. Inside, however, the two devices work very differently.

Washington D.C.'s SmartTrip card is a true smart card: not only can it transmit information to the machine that reads it, but that machine can also write new information back to the card. Passengers "load up" their card with subway fares by transferring money onto the card. Each time a passenger moves through a subway turnstile, a device in the turnstile asks the SmarTrip card how much money it contains and then deducts the appropriate fare from the card – without confirming that information to a central database. The SmartTrip card's ability to communicate and process transactions on the card is what makes it a "true" smart card.

ExxonMobil has a payment system called Speedpass: a small key-fob with a transponder inside that is used to process payments both at the gas pump and inside gas stations at the cash register. Unlike the SmartTrip card, however, the Speedpass is a static device that cannot be written to or altered, nor can it relay any significant information to the machine that reads it. Instead of smart card technology, Speedpass relies on another technology known as Radio Frequency Identification (RFID) which simply transmits a single unique number that then automatically links to a customer's credit card or checking account via a central network. In short, the Speedpass has no "smart" capability. Automated drive-through toll collection systems like the E-ZPass system used up and down the East coast use similar RFID technology, as does a new contactless retail payment system called FreedomPay.<sup>28</sup>

Does the lack of a smart chip make the E-ZPass and the Speedpass "dumb"? On the contrary, they are very smart inventions that offer consumers tremendous convenience and value. Just be careful not to call them a smart card.

<sup>27</sup> [http://www.mta.net/press/2002/02\\_February/mta\\_027.htm](http://www.mta.net/press/2002/02_February/mta_027.htm)

<sup>28</sup> While FreedomPay relies on RFID technology, the company claims its POS devices are also capable of reading contactless smart cards. [www.freedompay.biz](http://www.freedompay.biz).

<sup>29</sup> [http://transit.metrokc.gov/programs\\_info/smartcard/smartcard.html](http://transit.metrokc.gov/programs_info/smartcard/smartcard.html)

## **Grocery**

While smart cards have not yet burst onto the grocery scene in a major way, a couple of chains have used the technology, mostly for loyalty programs.

Furrs stores in Albuquerque, New Mexico tested a combination smart card loyalty and coupon program in late 2000. Nearly 100,000 smart cards were issued in this test. Cards were linked both to loyalty programs at the cash register, as well as new smart card coupon dispensers which were placed on the shelf by certain products in the store. Customers moving through the store and seeing such a dispenser, for example, at a display of Chef Boyardee products, would insert their smart card into a shelf-side reader and have a special Chef Boyardee coupon electronically downloaded to their card. This coupon could then be redeemed at the checkout register.<sup>30</sup> With current technology, this system could easily be enhanced to allow customers to securely download their coupons online over the Internet from home.

Overseas, Edah, a supermarket chain headquartered in the Netherlands, has issued more than 1.6 million smart loyalty cards. Each card stores a shopper's loyalty points directly on the card's smart chip, allowing users to check their point total at any time in Edah stores. The Edah system is also used to deliver special offers to consumers based on their individual buying preferences; unique offers are stored on each individual's smart card. One key advantage of this system is that it enables a more sophisticated loyalty system without the need for costly on-line communications links and in-store networks.<sup>31</sup>

## **Where Else Will Smart Cards Soon Be Used?**

Since the events of September 11, 2001, smart cards have emerged as a top candidate for many new governmental homeland defense and security needs because of their ability to securely verify the identity of individuals and protect access to critical facilities, such as airports. Because some of these new cards may also have the ability to tie into electronic payment systems, the rollout of smart cards for security purposes may concurrently boost the use of smart cards in financial applications.

Smart cards are particularly suited for these applications because they are especially difficult to counterfeit. Because each card carries an actual computer, production of a counterfeit card would require not only accurate graphics and card materials, but also the ability to perfectly duplicate a card's computer chip, software and unique encryption keys – making counterfeit cards virtually impossible.

An added security feature of smart cards is their ability to carry a biometric – such as a fingerprint or iris scan – that is unique to the individual to whom the card was issued. By encoding one's fingerprint, for example, on a personal smart card and requiring that any individual using that smart card first verify that his or her fingerprint matches the fingerprint on the card, smart cards offer strong protection against unauthorized use and

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<sup>30</sup> [www.softcardsystems.com/firsttest.html](http://www.softcardsystems.com/firsttest.html)

<sup>31</sup> <http://www.schlumberger.com/ir/news/sct-edah0698.html>

identity theft. Anyone who might steal an individual's card will find it useless because they will be unable to use that card due to their biometric not matching. The notion of storing a biometric on a smart card has gained tremendous momentum in the wake of September 11 as a way to prevent identity theft.

### **Where is the Grocery Industry Going with Smart Cards...and Have we Already Been There?**

As smart cards begin to enter the retail market, it is worthwhile for the grocery industry to look back at the historical evolution of payment systems introduced by the financial industry and consider the costs and benefits associated with past migrations to new payment technologies. With smart cards able to radically transform the way existing payment and settlement streams work, knowledge of past migrations can help guide grocers in the right direction for the future.

Those in the industry for a while may recall the grocery industry was one of the last to accept credit card transactions in the U.S. The nature of the grocery business – with very thin profit margins – made the costs associated with credit cards unattractive, and it was only consumer demand for alternate payment systems that led the industry to start accepting credit cards.

The move to electronic draft capture (EDC) at the point-of-sale (POS) terminal in the 1980's radically changed the way grocers and banks did business. By digitizing the bulk of the transaction information, electronic draft capture allowed grocers to automate much of the credit card payment process, enabling faster processing time and lower per-transaction costs.

On the flip side, the move to electronic draft capture and POS devices has prompted more consumers than ever before to pay with credit cards, and with this trend, grocers now can count on a larger portion of their sales being earmarked directly to the per-transaction fees charged by the banking industry. As many retailers may recall, the industry gave merchants some temporary reductions in these fees as an incentive to install POS terminals, however, over time, these fees generally went back to their previous levels.

With banks having a strong incentive to migrate their cards to smart chip technology due to cost savings and better marketing opportunities, grocers will likely begin to feel a push from the banking industry to install new smart card capable POS terminals in their stores over the next few years. If history is any guide, grocers may again be given incentives for installation of these terminals, setting the stage for the replacement of the current magnetic stripe infrastructure with one relying on smart chips, but the transaction fee structure will need to be evaluated to ensure retailers don't get saddled paying fees that inflate bank profits.

### **In Summary, Just What Should Grocers Keep in Mind as They Look At Smart Cards?**

*1. Smart cards can work differently from magnetic stripe systems in the way they process payments.*

Unlike magnetic stripe cards, smart cards have an ability to internally process transactions offline. Because each card is a full computer, authorizations for purchases can be stored on the smart chip instead of a central database. Transactions can be authorized by a smart card at the point of sale – without requiring a dial-up connection, routers, databases and other infrastructure associated with remote authorization. To the extent that smart card payment systems take advantage of this capability, transaction and settlement costs can be reduced, as can chargebacks.

*It is important to note that smart cards can also be configured to process transactions online, with the system working the same way as today's electronic payment systems.* Grocers should consider how installation of smart cards will affect their overhead and transaction costs over the long run and negotiate with financial institutions accordingly. By designing a store-branded smart card system, grocery stores can have better control over issues like operating rules and transaction costs.

*2. Smart cards cost more than magnetic stripe cards, but can save over the long-term on infrastructure costs.*

Smart cards today range in price from \$1-9, on average. Use of the computer chip on smart cards require installation of a new smart card-readable POS device, which adds additional cost. As described above, however, smart cards need not rely on expensive dial-up connections for transactions, which can reduce the effective cost of equipment upgrades and ownership over the life of the system.

*3. Additional functionality of smart cards presents new options for consumers and retailers alike.*

With smart card technology dramatically declining in price and gaining acceptance with consumers and retailers, retailers have a new opportunity to offer consumers a host of new services integrated on a single smart card. Options include:

**More Personalized Marketing**

Smart cards present many new opportunities for grocers to market directly to individual consumers via their cards. For example, in addition to housing existing loyalty programs on the card, retailers can use the card as a vehicle to offer customers downloadable coupons and promotions. These new promotions could be downloaded to the card either via the Internet, through a kiosk when a customer enters a store, at an “e-coupon” station in the aisles, or via the POS terminal at the time of purchase.

**New Partnerships with Non-Grocery Retailers**

With their ability to store benefits directly on the chip, smart cards can allow grocers to more easily tie in their loyalty programs with non-grocery retailers, allowing for new cross-marketing opportunities with other partners. For example, a grocer's smart loyalty card could generate points that could link to loyalty programs with gas stations or video rental stores. With benefits stored on chip, an online database linking these programs would be unnecessary, making establishment of these cross-marketing initiatives much easier to coordinate and less expensive to maintain.

### **Integrated Loyalty and Payment Programs**

Many consumers are frustrated with the amount of "frequent shopper cards" that they must carry in their wallets these days. By tying, for example, a consumer's supermarket club card onto his or her smart payment card (credit or debit), retailers can offer their customers a less bulky wallet and a more seamless experience at the check-out counter. A "Jenny's Grocery smart card," for example, could reduce the amount of cards a consumer carries and generate new marketing opportunities.

Taking that concept one step further, the grocery industry could offer added convenience to customers by developing a "one loyalty card, multiple loyalty applications" standard where a consumer could store multiple retailer loyalty programs on a single card. When consumers shop at Jenny's Grocery, they'd simply insert their "universal" card, select the Jenny's loyalty application and payment system of choice; that same card at a Bob's Grocery would prompt its user to activate the Bob loyalty application and payment system.

*While individual retailers may be reluctant to let their proprietary applications reside on a single card, the opportunity for consumers to use a single card to both pay for purchases and receive loyalty benefits at any retailer is one of the most compelling argument for consumers to adopt smart cards.*

#### **4. Remember, there is no one global standard for smart cards.**

With no single standard yet in place for smart cards – or even smart card payment systems – retailers should educate themselves about the variety of card formats and supporting software systems before committing to a specific standard or technology application.

### **Conclusion**

Smart cards are almost certain to play an increasing role in the way which grocers do business in the not-so-distant future. By working with FMI as these card systems move forward, and by designing new payment and loyalty programs in stores which take full advantage of smart cards' strengths and capabilities, grocers can ensure that they are smart about smart cards before consumers drive the demand again.



### **Additional Smart Card Resources**

<http://www.cardtechnology.com/> Smart card news bulletins updated daily, as well as links to stories from Card Technology magazine and the annual smart card industry's CardTech SecureTech conference.

[http://egov.gov/smartgov/smart\\_card.htm](http://egov.gov/smartgov/smart_card.htm) SmartGov, the U.S. General Service Administration's smart card website, with links to the GSA smart card standard and news about various government smart card programs.

<http://www.dell.com/downloads/global/vectors/smartcards.pdf> Gives a detailed technical and engineering overview of smart card technology and explains in detail how a smart card can be used with "digital signatures" for secure online transactions.

<http://www.smartcardalliance.org/> Smart card industry association with a variety of information on smart card technology and usage in the U.S.

<http://www.cardweb.com/> "The U.S. Payment Card Information Network" – has frequent updates on smart credit card developments.