

What's So Smart About the Smart Card



Consider this: You're walking in a mall and are suddenly struck by thirst but have no change to buy a soda. No problem—you have your mobile phone. By simply pointing your phone at the soda machine and entering a code, a can comes rolling toward you.

Too futuristic? No. In many countries this is considered an everyday convenience that is powered by smart-card technology. Consumers in France and Finland, Australia, and the Asia-Pacific region experience the benefits of currency-free living, whether it's buying a can of soda from a vending machine or riding the metro with a swipe of a card.

Today, this new technology is making its way across North America.

"Right now we are seeing major activity in smart cards here in the United States with interest from wireless operators, the banking industry, and even enterprise markets like corporations and governments," said Paul Beverly, chairman of the Smart Card Alliance and vice

president of smart cards and terminals for SchlumbergerSema in Austin, TX. "The value proposition behind the smart card offers tremendous opportunity to make all of our lives easier."

Why Smart Cards Now?

The growth of the Internet and such technology as mobile phones and personal digital assistants has created an appetite for information from a host of institutions. This same surge also has made protection of personal information more valuable to consumers. The demand for increased security, online or off, also is creating a need for consumers to make the leap from traditional magnetic-stripe cards to a smart card that prevents hacking.

Take it from France where financial and telecommunications fraud was problematic in the early '90s. As one of the first countries to embrace smart-card technology, France serves as a testament to the product's security.

"The French banks in their first year had reduced the fraud rate by 90 percent," says Alex Giakoumis, director of corporate business development of smart card and secure microcontroller ICs for Atmel Corp. in San Jose, CA. "The remaining 10 percent fraud was not from smart-card usage but from transactions made outside France where the magnetic-stripe card was used."

"A major weakness of magnetic-stripe cards is that it is relatively easy to read the data held on the card and even use this data to make fake or duplicate cards," Giakoumis continues. "The smart-card chip is designed and manufactured with a number of advanced security features, which make it practically impossible for anyone to gain unau-

thorized access to the data held on the chip."

Consumers can call from any GSM (global system for mobile communication) phone in the world just as if they were at home. The GSM platform is based on smart-card technology, making roaming and service areas a non-issue.

"A person flying from Singapore can arrive in London and call home or the office by simply plugging their SIM (subscriber-identity-module) card into any public phone," says Giakoumis, who spent the early '90s participating in a European Telecommunications Standards Institute working group, which defined the GSM platform.

Why Isn't It in the United States?

Smart-card technology has taken awhile to catch on in the tech-innovative United States.

"In the United States, and North America in general, we were not plagued by the same levels of fraud they saw in Europe," says Donna Farmer, CEO and president of the Smart Card Alliance in New York. "That's because we have a good telecom infrastructure here. If someone were to snag my card in the United States, there was never a great deal of fear that I would be liable for more than \$50."

The United States stands apart from most of the world in its use of mobile-phone platforms such as CDMA and TDMA. GSM and SIM cards are standard for mobile phones in Europe and Asia.

But the smart-card siesta seems to be drawing to a close. According to a recent survey by the Smart Card Alliance, smart-card usage in the United States and Canada increased 37 percent in 2000 from

SMART CARD HISTORY

1967 Jurgen Dethloff and Helmut Grotrupp of Germany, regarded as inventors of a smart card forerunner, filed patents.

Jules Ellinboe filed a U.S. patent on an active Element Card.

1979 Smart card invented

1981 First phone memory cards introduced

1988 First integrated-circuit bank card unveiled

1993 First GSM-SIM card launched

1997 First JavaCard multiapplication card

1999 First USB card

2000 Multiapplication deployment begins

2001 First 32-bit operating system on smart card

(Source: SchlumbergerSema)

1999 figures. The fastest growing market segment between the two years was the financial-market sector, which grew 244 percent.

"We've really seen a surge in interest and usage here in the last 18 months—particularly with issuers like Target/Visa and American Express," Beverly says. "That has been spurred on by the development of multiapplication cards programmed in Java language. Java offers an open language and has been a major technology in making smart cards available to many issuers."

Smart Cards in Use

Chances are if you work for a large, international company like Sun Microsystems, you already use smart cards, called Common Access Cards, to gain entrance to your building and log on to your computer. Or if you are a student at the University



Figure 2. Using the GSM-SIM card, subscribers can call anywhere from any country using any GSM phone by plugging in their SIM card. Charges are deducted from the account. (Source: SchlumbergerSema)

of North Carolina or Florida State, your student-ID cards are smart cards that allow you to pay for books, meals, and even withdraw money from the ATM.

Now, government agencies such as the Pentagon are adopting the technology. The Department of Defense (DoD) began piloting the technology in 1993. With the adoption of token security based on the Public Key Infrastructure standard, the technology was deemed secure enough for the DoD to begin rolling out Common Access Cards to its estimated 4-million employees in late 1999. Completed roll out is expected by 2003.

It seems more credit-card issuers are introducing smart credit cards to consumers. American Express was one of the first national issuers featuring smart-card technology when it launched the Blue card in 1999.

BEYOND THE MAGNETIC STRIPE

While comparisons are often made between traditional magnetic-stripe cards and smart cards, the likeness is apples to oranges.

- ▶ **Data Storage Capacity:** Mag-stripe cards typically hold up to 200 bytes of data. Smart cards hold up to 128,000 bytes of data. That figure is increasing.
- ▶ **Data Manipulation Capability:** Smart cards are powered by a chip that can manipulate data and perform calculations like a computer. Mag-stripe cards are limited to read-only interaction.
- ▶ **Security:** Mag-stripe cards are easy to fake or duplicate. The smart-card chip has built-in encryption making information on the card accessible to only authorized users.
- ▶ **Cost:** This is where the mag-stripe card looks better. Their cost ranges from 50 cents to \$2, versus \$2 to \$7 for smart cards. Then again, smart-card proponents say, consider what you are getting for your dollar with a smart card: greater storage, data manipulation, and fraud protection.


(Source: Atmel Corp.)

Last summer, Target teamed up with Visa to offer the Smart Visa Card, the first such card offered by a major retailer. The cards enhance online security and offer loyalty programs. There are promises of more applications to come.

Commuters in Washington, D.C., are already enjoying the benefits of smart cards after the Washington Metropolitan Area Transportation Authority (WMATA) rolled out its smart-card program, SmarTrip, in 1999. Commuters can use the card for riding the metro and paying for parking. In 2003, the authority hopes to have smart-card readers on buses and with regional-transportation providers to make area public transportation virtually hassle-free.

"We have about 60-percent market penetration with the smart cards," says Greg Garback, executive officer for the Department of Finance and Program Development at WMATA. "Commuters are going through turnstiles five times faster than mag-stripe users. Also, users can carry significantly higher values

on these cards and know they are secure.

"Based on the experience we've had here in Washington, we think consumers embrace this kind of technology," Garback continues. He adds that the agency has invested little to promote the program. Most adopters have been from word-of-mouth. "There's a definite value-add to the consumer. Ultimately, we are working toward getting a smart card with interoperability for commuters to travel up and down the Eastern seaboard before the end of the decade." 

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