

Smart Card White Paper

Smart Card Technology

Introduction

Smart Card technology is one of the most recent computer revolutions, making its way worldwide into the hands and wallets of everyone. A Smart Card is the size of a standard plastic "credit card" with an embedded microprocessor chip. The chip holds various types of information in electronic form with sophisticated security mechanisms.

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The Smart Card looks and feels like a credit card but acts like a computer. Smart Cards are different from ordinary magnetic strip cards in their ability to process as well as store data. The Smart Card can have many functions such as storing data, make calculations, process data, manage files, and execute encryption algorithms. It makes possible sophisticated and portable data processing applications, and has proven to be more reliable than magnetic strip cards.

There are two types of Smart Cards:

Contact Smart Cards require insertion into a Smart Card reader. It has a small gold chip about 1/2" in diameter on the front, instead of a magnetic strip on the back like a "credit card". When the card is inserted into a Smart Card reader, it makes contact with electrical connectors that can read and write information on the chip.

Contactless Smart Cards require only close proximity to an antenna. It looks like a plastic "credit card" with a computer chip and an antenna coil inside, which allows it to communicate with an external antenna. Contactless Smart Cards are used when transactions must be processed quickly, as in mass-transit toll collection.

Two additional categories, derived from the contact and contactless cards, are Combi cards and Hybrid cards. A Hybrid card has two chips, each with its respective contact and contactless interface. The two chips are not connected, but for many applications, serve the needs of consumers and card issuers. Just emerging is the Combi card, which is a single chip card with a contact and contactless interface. With Combi cards, it is now possible to access the same chip via a contact or contactless interface, with a very high level of security.

The chips used in all of these cards fall into two categories as well: microprocessor chips and memory chips. A memory chip can be viewed as small floppy disks with optional security. Memory cards can hold from 103 bits to 16,000 bits of data. They are less expensive than microprocessor cards but with a corresponding decrease in data management security. They depend on the security of the card reader for their processing and are ideal when security requirements permit use of cards with low to medium security.

A microprocessor chip can add, delete and otherwise manipulate information in its memory. It can be viewed as a miniature computer with an input/output port, operating system and hard disk.

Current Market and Applications

The Smart Card brings a variety of benefits to users. It provides security functions like encryption and electronic signatures, stores up to 100 or more times the information than typical magnetic strip cards, and reduces tampering and counterfeiting through high-security mechanisms. It can also be disposable or reusable.

Today, about 3 billion cards have been issued worldwide with 10% of them in the US. Because of the size and shape of these devices, Smart Cards lend themselves to applications where personal identity, convenience, mobility and security are key factors.

Smart Cards are used all over the world as personal identification cards for corporate building security systems and PC equipment access control. Smart Cards are also used as credit or debit cards. The use of a microprocessor chip enhances the level of automation and security, making credit or debit cards a Smart Card. In automating the transportation area, with billions of transport transactions occurring each day, Smart Cards have easily found a place in this rapidly growing market, such as mass transit ticketing, urban parking, electronic toll collection, and airline applications. Sometimes, Smart Cards are used in customer loyalty or retention-marketing programs, like a frequent flyer card that the end-user inserts into a machine before boarding a plane so frequent flyer miles are added to your frequent flyer Smart Card.

In Europe, Smart Cards are used as small-change debit cards at convenience stores and for phones systems. Currently about 80 countries throughout the world use Smart Cards in payphones. The GSM radiotelephone system (Global System for Mobile Communications) originated in Europe. The system allows each national operator to keep control of the security and payment aspects, but at the same time facilitates cross border use of mobile phones. The GSM subscribers can insert a Smart Card into any GSM phone for personal use since secure data concerning the GSM subscription is held in the Smart Card, not in the telephone.

The world market for smart phone cards is expected to be well over 1 billion in the year 2001.

In Singapore, the CashCard is a Smart Card that acts as an electronic purse; one that holds electronic money. In fact, it is replacing coins and bank notes for everyday purchases such as movies, parking, museums, gas, telephones, vending machines, retail outlets and fast food restaurants. The CashCard is available in several different initial values of \$20, \$50, and \$100 and can be reloaded

In the US, Smart Cards are being used to increase the quality of service in healthcare and reducing its cost by improving the efficiency of handling medical and administrative information. They are useful in a wide range of situations in the medical field.

The chart below gives a general percentage of growth of the worldwide applications.

Card Application	1996	2000	Average Annual Growth
Pay Phone	605	1500	29%
GSM	20	45	25%
Health Care	70	120	14%
Banking	40	250	105%
Identity/Security Access	20	30	280
Transportation	15	200	247%
Pay TV	15	200	247%
Gaming	5	200	780%
Metering/vending	10	80	140%
Retail/Loyalty	5	75	280%

In practice, different Smart Cards and different applications vendors use different hardware and software specifications, which makes it difficult to use a single card for multiple applications. However, all Smart Cards are hardware compatible with Smart Cards readers.

Acer Smart Card Solution

Acer TravelMate 350 notebooks are the first notebooks built with Smart Card security in the industry today. Addressing the data security concerns of the mobile user, the TravelMate 350 provides a smart security solution to the notebook computer and the data inside. Acer Smart Cards are contact Smart Cards, which require insertion into a Smart Card reader already built into the TravelMate 350 notebooks. Acer Smart Cards come with 4K bits of memory, are ISO 7816 Compliant, and can be rewritten and updated

Acer Smart Card implements the "PlatinumSecret" application as a security solution.

Functions of this application include:

PlatinumPAS to check if the Smart Card is registered on the PC. Otherwise, the system will be locked at BIOS level.

PlatinumSecure: Supports user authentication at the operating system level. User needs to enter a valid Smart Card password before getting into the Windows operating system.

PlatinumKey: Based on the web authentication of the Smart Card, users can extend the memory of the card and store information either on the Smart Card or the specific web site. With the unique Smart Card caching technology, users can extend the limited card memory size by using local or web server storage.

The Acer Smart Card with the PlatinumSecret application provides authorized access to the system, enhanced data security with personal identification and encryption, and efficient online login processing to web sites where a security login is required.

Acer Smart Cards are designed for only one user as the Smart Card “key” to the notebook security system. Without the Smart Card “key”, the notebook will not boot. The Acer Smart Card system allows more users to share the hardware without sacrificing security and privacy. Additional users can purchase and register new Smart Cards to the system. However, the Primary Smart Card has the control to add or delete secondary Smart Cards. A total of five users, including the primary user, can be registered on one notebook under the Smart Card security system. Acer is offering an optional secondary Smart Card for customer needs. In many user scenarios, customers may need more than one Smart Card for the best protection and maximum use of their notebooks.

Also, the built-in Acer Smart Card reader is compliant with Microsoft PC/SC and EMV level 1 standards, supporting any ISO 7816 compliant Smart Card. The Smart Card reader has the device driver to interface with standard PC/SC API layers.

The Acer Smart Card system provides a total security solution on TravelMate notebooks and the data inside, and is ideal support for ID logins on your favorite web sites, and for sharing resources with multiple users.

1. Limited to TravelMate notebook with built-in Smart Card feature