

Smart Card

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Abstract: Debit card, credit card all comes under smart card. It contains microprocessor chip which stores the information which can be easily added, deleted and periodically refreshed for additional use. Microprocessor chip is basically used for security purpose. To extract information from the card you need a card reader, when you put your card into the reader it reads the information. Different cards have different functionality, different life and different configuration. There are basically two types of cards contact and contactless cards.

Keywords: Microprocessor, Debit card, Credit card, card reader.

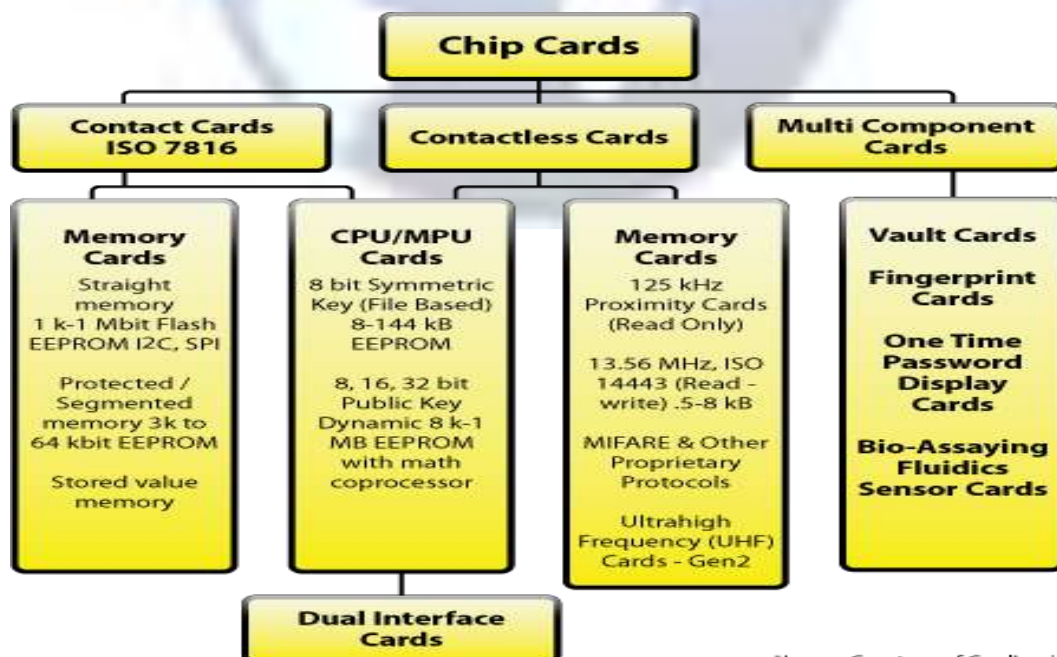
Introduction

It is a simple card which resembles credit card in shape and size, but it is different from credit card it contains microprocessor and it is loaded with data, used for telephone calling, electronic cash payments. It contains a gold contact on one of the side. It is refreshed periodically for additional use. Data on smart card can be easily read, written and deleted. Microprocessor is basically used for security. It contains an ICC called Integrated Circuit Cards. It is used for various purposes like storing medical records, storing digital cash, for generating networks IDs. To extract information from smart card you need a smart card reader. Reader is a small device in which you put your card into it to read it. It has storage capability. Microprocessor build on smart card is basically built for security. It has 8kb of RAM, 360 KB of ROM and 256 Kb of programmable ROM and 16 bit microprocessor. Smart cards are attached to personal computers for authenticating user.

Types of smart Card

Card is defined according to :

- 1) How the card is defined
 - 2) Microchip embedded in the card and its capabilities.
- Below given is the range of smart card available.



*Image Courtesy of CardLogix

Card Construction: - How the card is build gives its functionality and life to the card. Basically cards are made from polyester. Chip is embedded into the card there are up to 30 steps in cards construction.

Contact Cards: - this is the most common type of smart card. When the card is inserted into the card reader it reads the information stored in the card. Based on the requirement according to your application you chose your card.

Straight Memory Cards: - This data does not have any data processing capabilities it only stores data. It is the cheapest among other cards. For these cards you host systems to actually figure which type of card is inserted into the reader. These cards can easily be duplicated.

Protected / Segmented Memory Cards: - These cards have inbuilt logic to control the access to the memory card. These are intelligent cards. It provides protection to both read and write access through password protection. Memory cards are divided into logical sections for multi-functionality. These cards are easily duplicated. This card has hacking problem due to this.

Stored Value Memory Cards: - These are special cards it stores values and these are rechargeable. It also stores permanent security features which include password keys which are embedded into chip. Memory arrays are set up as decremented or counter. It is used for simple applications like telephone card. It contains limited memory units; the card becomes useless when all its memory units are used.

CPU/MPU Microprocessor Multifunction Cards: - These cards have dynamic data processing capabilities. It allocates memory into independent sections to specific applications. Within the card microprocessor chip is embedded which stores data and manages applications. This capability allows multiple applications to store on the card. It stores identification of the user and allows it to update their information. It is of great convenience and security. The chip inbuilt in card supports public key infrastructure with math co-processor. It is quite expensive as compared to other cards.

Contactless Cards: - As the name suggests it is contactless means it does not requires actual physical contact between card reader and card. These cards have limited memory like 125 MHz. Another card has memory or we can say UHF card which had memory around 960 MHz. These contactless cards first used in transportation applications so that loading and unloading of material takes place quickly as that time security was not an important issue. They are speedy as compared to other cards and they gained popularity in retail stores. The main drawback is their limited memory and the limited distance between card reader and card.

Multi-mode Communication Cards: - it has multiple method of communication. This card actually determines what card it is hybrid or dual interface card. This card includes card which have magnetic strips or bar code.

Hybrid Cards: - it contains multiple chips within a single card. Each is connected to their separate interface. Hybrid card have multiple chips in the same card.

Dual Interface Card : -These cards have one chip which controls the communication interfaces. The chip may be attached to the embedded antenna through a hard connection, inductive method or with a flexible bump mechanism.

Multi-component Cards: - These types of cards are made for market purpose. In this card Fingerprint sensors is build. This card belongs to only specific user contains information about the user and their account related information.

Applications

1. The most common applications are Credit card, Electronic cash, Computer security systems, Wireless communications, Banking, Satellite TV, and Government Identification.
2. **Payphones**
Outside United States payphones are widely used. The main advantage of the payphones that users do not have to remember the long Pin nos. Payphones are easily reloadable which includes features like phone banking, automatic memory dialing and on-line services.

3. Mobile Communications

it is used as an identification device for Phone users. Card contains microprocessor which stores the information about the user so that any user can use any phone terminal.

4. Banking & Retail

It can be used as credit card, debit card. The microchip on the card uses authentication to protect users.

5. Electronic Purse

It stores electronic cash on your smart card after you purchase any goods same amount is subtracted from the smart card and immediately same amount is debited from the user account. It can be used easily for buying various goods like groceries, transport tickets etc.

6. Health Care

Patient's information can be stored on smart card. Smart card reader can easily access that data and update, delete that information. Doctor and nurses carry smart card, and each smart card has unique id, which secures data and you can easily access private information stored on smart card.

7. ID Verification and Access Control

Smart card contains public key encryption to store the identity of the card owner. For security purpose it stores users picture or fingerprints. It is also used for network access. You can easily identify the user.

Smart cards offer more security than magnetic cards

1. Smart card is very similar to credit card, but is it more secure than credit card and it is used with various applications. Credit card is made of plastic and information is stored on magnetic tape and it makes read/write operation easy. But it has certain disadvantages.
2. In contrast to credit card smart card uses microprocessor to store information. It does not ask for security because its information is stored in microprocessor. Card communicates with microprocessor to derive information.
3. Smart card consists of 3 memory banks which include one RAM and two ROMs and additional ROM and these are controlled by microprocessor.
4. Smart card is also used for security systems in computer, wireless communications, and Satellite TV access. In Germany each citizen has their own smart card for health insurance.
5. It is used with personal computer to secure internet transactions.

Why smart cards are growing in popularity?

Smart card used in various ways around the world. They are used for banking and paying phone bill purposes. Smart card is used for various types of authentication. It is used to verify bank account, phone card to authorize the service. So various engineers thought if it can be used in such various applications why it cannot be used for network security. It can be used with network because of the following reasons:

- 1) It is not easy to gain access, because in addition to user password you must also have card to access the data. So it increases security.
- 2) So it is called Multilayer security.
- 3) They do not depend on the external source to apply security, so it cannot be hacked easily.
- 4) It is quite flexible because PIN can be changed timely for added security.
- 5) They are inexpensive as compared to other authentication methods like biometric devices etc.

Conclusion

Smart cards have inbuilt microprocessor which stores information and provides security. It is refreshed periodically for additional use. And the information can easily be read, written and updated based on the requirement. Smart cards become the authentication technology. They provide security through cards and they can be debit or credit cards and they are quite flexible to use and provides security. It provides more security than magnetic cards. They are various cards like Straight Memory Cards, Protected / Segmented Memory Cards, Stored Value Memory Cards, CPU/MPU Microprocessor Multifunction Cards etc. Smart cards are used in wide range of applications like banking, health care, mobile communication etc.

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