INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

Proximity Card

Mr Saoud Sarwar
HoD of Computer Science & Engineering Department
Al-Falah School of Engineering & Technology

Ms Munmun Ghosh
Assistant Manager (IT)
East West Info Solution.

Abstract:

The extensive use of proximity cards today by most of the companies and people offer their users the dual advantage of both the access controls i.e. logical as well as physical. They are easy to use as they simply require to be waived in front of the card readers instead of swiping and thus saving time. The RF used in these cards can penetrate through the wallet, purse, brief case etc. and provide hands-free access thus increasing their ease to use, to a great extent. They provide us with a wide variety of functions and gaining popularity due to their high level of sophistication and great deal of convenience for a diverse range of applications from access control to time and attendance to event management to cashless and contactless payment and many more acting as an electronic purse. Besides providing so many facilities to extend the comfort level of their users these cards have to face some security implications. This paper deals with the various functionalities of proximity cards as well as the different security issues and some approaches to handle them.

Keywords: proximity cards, card readers, swiping, RF, sophistication.

Introduction-What Is A Proximity Card?

Proximity card more commonly known as prox card is a contactless IC device widely used for security access or payment systems. A prox card simply has to enter the proximity range of the reader which can be as close as an inch and there is no requirement of being swiped, inserted or contacted with the reader. Lots of companies use proximity cards extensively to have a control of their employee's physical access. Most commonly known as contactless smartcards, their standard can refer to the newer 13.56 MHz RFID cards. They can also refer to the older 125 kHz devices.ISO/IEC 14443(proximity card) standard covers the modern proximity cards while ISO/IEC 15693 (vicinity card) is another related standard for longer range operation. Typically the range of prox cards is from 0 to 3 inches (0 to 8 cm) for reading. They are read-only devices and there is no possibility to write back the information on to the chip of the card. The amount of information stored by these cards is relatively small and the communication takes place through an antenna to a receiver which is remote. The user will be able to leave the proximity card inside his wallet or purse and it can be used for various purposes like identification, keycards, payment cards and transit fare payment cards.

How Does A Proximity Card Work?

A proximity card is powered by resonant inductive coupling via a LC circuit which includes an IC, capacitor, and coil which are connected in parallel. The card reader produces an electromagnetic field that excites the coil in turn and the resonant current that is produced will charge the capacitor, and in turn will energize and power the IC.While reading, the IC transmits the card number through the coil to the card reader. There are various protocols through which card readers communicate with each other: The Wiegand protocol for example that consists of a data 1 and a 0 circuit. The size of the earliest cards was 26 bits. A common format is 26-bit Wiegand which uses a facility code, also known as a site code. This is a unique number code which is common for all the cards in a specific set. The idea is to have an organization with their personal facility code and a pack of numbered cards which increments from 1. Therefore we can have various organizations with card sets with same numbers but as the codes differ from each other, the cards workable at only one organization. Due to an increase in demand the bit size is also increased, to continue provide unique numbers. According to ISO 6523and ISO/IEC 15459 standard, Netherlands based NEN, an international registration authority, internationally harmonizes and allocates the numbering system.In companies using prox cards, an employee holds his card within a few inches in front of the card reader to get an entry inside a restricted region. On receiving a unique ID from the card, the reader transmits to a central computer only after which it is decided whether he will get an entry or not.

Figure 1: Anatomy of a proximity card: coil and IC

Source: http://en.wikipedia.org/wiki/Proximity_card

Various Applications Of Proximity Cards

Proximity cards due to their high level of sophistication provide a lot of ease for a various ID applications. These cards offer a wide variety of functions. The information is stored in an embedded antenna allowing cardholders to perform operations, as the card is simply waived in front of the reader rather than swiped.

Among the various applications provided by the prox cards some include physical and logical access control, security check, time and attendance, network login, biometric verification, cashless transactions, and management of various events.

In contactless payment the transactions can be almost twice as fast as conventional cash, credit, or debit card purchase because no signature or PIN entry is typically required for purchases. The antenna and the chip allow the customers to wave their cards in front of the reader at the point of payment. The main advantage is the hands-free access as the RF can penetrate through wallets, purses, brief cases etc., thus time is saved. Some researches indicate that consumers are likely to spend more money due to the ease of small transactions.

Many companies use proximity cards to gain control over the access whether physical or logical. Each employee is provided a prox card, which he has to hold in front of the reader to get an entry in the restricted area. A country can use this technology in the identity cards which are carried by all citizens. Prox cards are gaining their popularity because of the simplicity and high level of sophistication offered by them in the fields of identification, security and controlling access – especially the door access, where quick, hands-free access is preferable. They are of great use to organizations, as they provide access to computers, networks and resources of the enterprises thus enabling us to get an access to the computer system and restricted area and greatly reducing the organization's overall security cost.

Additionally the proximity cards can be used for various other purposes like authorization on the web, digital signatures and email encryption. They are used a lot in garages where they provide a hands-free access: RF can penetrate as said earlier.

Prox cards can be used in pharmaceutical stores, restaurants, super-markets, and different places of business as electronic wallets. The card chip can be loaded with funds which can be spent in vending machines or at various merchants allowing hands-free access and thus saving time and increasing the ease of use. The applications of these cards can include their use as credit or ATM cards, in a fuel card, authorization cards for pay television, and pre-pay utilities in household. Cryptographic protocols are used to protect the transaction of money between the Contactless smart card and the accepting machine. The various applications of prox cards are fare payment in public transport, logical and physical both the access controls, cashless transactions, parking, electronic purse, toll payment, student IDs in schools and colleges, employee IDs in corporate and public sectors and other documents for secure travel.

A Card Reader

A proximity card reader is based on a very simple mechanism and is a highly simple control system, due to which it can be installed at any place on the computer, or on the office table or at the entrance of a building. Prox card readers are well-known for their versatility and are quite easy to use. They are encoded in such a manner that they read and respond to the various electronic signals received from access cards. We don't require directly contacting our cards with the reader, even if we show our cards from a distance of an inch it will work. However, few require touching the cards simply on the magnetic face of the reader. Rechargeable batteries are used by most of the readers, while other readers have a battery backup system. We can also customize the readers to have usernames and passwords.

A benefit of these readers is their durability which is also offered by Cardkey, Motorola Indala, Cotag, Keri and EyeDentify among the others. No battery is required to send a RF signal to the reader thus making the cards passive. The RF output from the reader provides the power to retransmit the signal.

Can proximity cards be scanned from a greater distance? What are the implications?

It is possible because of the radio frequency (RF). Distance prox readers can read at a distance of one foot and greater. They use an embedded antenna which transmits RF, usually of low frequency. When a prox card enters the range, it transmits a signal to the reader, which allows or denies the access depending on the signal which is decoded.

Prox cards are available in various ranges for a variety of purposes. The RF proximity technology for access control purpose can be categorized into three types: proximity, distance proximity and long range

proximity.Many of these readers can go to a distance of six feet and beyond, suitable for automobile access. The three-foot range is useful for door entry.

Security Implications

Does the convenience of proximity cards come at a trade-off in the level of security? The main issue is not necessarily how can we fool it in real time, but can we copy the card information and duplicate a card to obtain surreptitious access? It is possible but the complexity of the current systems means an expert would have to jump through quite a few hoops to fool a reader. The cards can be duplicated and the information can be stolen as easily as to take a key impression.

More perniciously, it's quite practical that we can read anyone's card without taking it out from his wallet or purse. The distance at which the cards are powered is lesser than the distance at which they can be read this fact can also be easily exploited; if a reader is exciting the card then another reader can easily read the same card even from the other side of a wall. This means that a sniffer hiding near a legitimate reader can easily intercept the transactions from a significant distance.

Sometimes in a door entry system, the card broadcasts can be recorded and replayed and the door can be easily opened i.e. it can be easily mimicked. If card is close enough to reader, user can be tracked and card can be copied.

A prox card can be vulnerable to a spoofing attack, where an attacker can scan the card or eavesdrop while it is scanned i.e. can program a separate device to emit an undistinguishable simulation of the signal that appears valid at all future times.

Thus according to the security assessment, it is relatively easy to duplicate the prox cards, there is also a possibility that the card- reader lines can be tapped, predictable modifications can be done to deactivated cards after they were reported stolen and the use of cards as collateral.

Some card readers can be purchased free of cost and connected to a laptop with little requirement of technical knowledge. Even cell phones have being created with in-built card readers which can steal our personal data. How many times have we walked by someone carrying a briefcase? Would we even be suspicious? By simply walking past us, this person can acquire our credit card information like number, expiration date and much more.

Some Approaches To Deal With The Security Issues

Proximity card holders

Prox cards require very special care due to their high-tech nature of their design and high cost per-card. The card holders are used by a large number of employees to protect their prox cards. These card

holders provide both protection as well as functionality .When used with strap attachments like strap clips, the straps thread through the slots provided in the holder locking the card very effectively in the holder.

Secure Wallets, Secure Sleeves and Secure Badge holders
These RFID blocking products provide RFID shielding of the contactless cards by blocking the RF signals required to read the data contained on these cards. They protect our cards from electronic pickpocketing or e-pickpocketing crime as it is called, where the valuable information in our cards can be stolen without even touching our cards.

Enhancing Proximity Card Systems
A secondary method can be added to the prox card system. Human beings verifying the card system can change a good security system to a system that is nearly a perfect one. We can enhance these cards by fixing photos, adding names and other personal information like age, address to the card. A 2D bar-code can be used for security issues with a local database. This bar-code can help the security staff to quickly search for an ID holder from their database by picture comparison, adding an extra security layer to the overall framework. An ID and bar-code or a RFID proximity system can be used independently; but combining both of these approaches together will create an unparalleled level of facility and security.

Conclusion
Proximity cards are becoming popular nowadays and they are extensively used at the present time by many companies and people. They are highly sophisticated and provide a great deal of convenience and ease and thus they are used for diverse range of applications from cashless money transaction to managing events to time and attendance to contactless payments during purchase of goods and many more serving like an electronic purse for us. These cards help us a lot in time management by providing various functionalities thus increasing the comfort level of their users to a great extent but they have to face some security implications also.

Reference

1. http://www.plagtracker.com/report/5a529c9ce12046eb739606d4c5758420/#

2. http://www.plagtracker.com/report/5a529c9ce12046eb739606d4c5758420/#

3. http://www.plagtracker.com/report/5a529c9ce12046eb739606d4c5758420/#

4. http://www.plagtracker.com/report/5a529c9ce12046eb739606d4c5758420/#

5. http://en.wikipedia.org/wiki/Access_badge

6. http://en.wikipedia.org/wiki/Proximity_card

7. http://www.thefreelibrary.com/All+About+Proximity+Cards-a01073879933

8. http://www.articlesbase.com/electronics-articles/all-about-proximity-cards-444637.html

9. http://www.alphacard.com/id-cards/rfid-cards.shtml