MagneSafe™ Security Architecture

Better Protection for Cardholders and their Personal Data

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Note
The use of: Encryption; Counterfeit Detection;
Tamper Recognition; Tokenization;
Data Relevance & Integrity;
Dynamic Transaction Authentication

vs.

End to End Encryption

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Introduction

The payment industry is caught up in a security quandary. The PCI DSS has provided a set of rules in an attempt to shore up protection of cardholder data and improve the overall security of the payment system. But the new regulations, system changes, documentation, audit requirements, and threat of financial penalties have imposed new burdens on merchants and payment intermediaries prompting some to question whether the gain is worth the pain. Whereas convenience was once the hallmark of credit, debit and ATM card networks, these days regulatory issues, liability concerns, and financial costs that now extend well beyond interchange fees have dampened the mood of card accepting retailers to the point where cash and checks look more appealing. Now merchants and other payment system intermediaries are being asked to invest even greater sums in technology to further secure the cardholder. Will these investments payoff or invite more oversight, regulation and needless cost?

What is the Problem?

Instead of a regulatory and punitive approach to payment security, we need to examine and discover the underlying problem. Why is cardholder data in need of so much protection? The industry is spending small fortunes on PCI compliance and while many advocate that compliance measurement is but a snapshot in time and

genuine security should be the goal,

few have done a root cause analysis of the problem and laid out options that would truly secure cardholders and their personal data.

Understanding Criminal Motivation

So let us examine the issues. The first question is "What makes cardholders' data attractive?" Unfortunately, criminals have given us the answer: It's plentiful, static, easy to acquire and very useful to commit fraud. The next question is "How can we make it unattractive?" The answer is we must make it harder to acquire the data and make it more difficult to use. To date, PCI mandates have only focused on the first half of the solution – making data acquisition more difficult. To restore confidence and convenience to the payment system, we must make stolen data very difficult to use. The following material describes a range of possible solutions and an explanation and assessment of each.

Possible Solutions

The cardholder data is attractive and insecure. How can the payment industry secure itself? Possible solutions are:

- Encryption
- Counterfeit Detection
- Tamper Recognition
- Tokenization
- Data Relevance & Integrity
- Dynamic Transaction Authentication.

Encryption

Encryption is very useful. Encryption protects data by scrambling it. It makes the data unreadable unless you know the secret key. To be useful, a strong algorithm must be employed along with sound key management practices. PCI has mandated the encryption of cardholder data transmitted across open, public networks and whenever it's stored. This was an excellent directive. PCI recognized that access by thieves to large, concentrated storage facilities of cardholder data is highly attractive and extremely dangerous because it allows quick and efficient theft of data.

The PCI mandate to encrypt data post-authorization closes a big hole, but this encryption offers no protection for the millions of other locales where cardholder data may be obtained. The PCI mandate might be expanded to include the protection of cardholder data in transit over private networks. This should prove valuable because it will further constrict the avenues available for data theft. But once again,

encryption cannot protect cardholder data that lives outside the network.

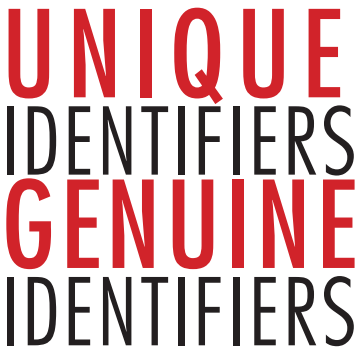
That data is widely available from other data capture venues: pocket skimmers, false front ATMs, tampered POS terminals, unattended gas pumps, phishing and pharming sites, and telephone scammers. At best, requiring the encryption of cardholder data on all networks and in storage protects the intermediaries of the payment system, but does little to protect the cardholder. The criminals can still get the data; they just cannot get it as quickly or efficiently.

Cardholder data is vulnerable at all times when not encrypted. It is un-encrypted on the card itself which puts all parties in the payment world at risk, even if their networks and servers are fully encryption secured. Two and a half billion branded payment cards are in circulation that all contain data in the clear. The magnetic stripe data is not secret. It is used for transaction routing and is nothing more than a magnetic barcode - a series of zeros and ones, decodable by any first year computer science student. To ask the payment community to protect this data is an impossible task. This is akin to asking the payment industry to protect consumer personal identification numbers (PINs) with end to end encryption, after they have been written in the clear on a magnetic blackboard for the world to see. The reading method for cardholder data is in the public domain and is well described in both American and International standards documentation. The magnetic stripe cardholder data was never intended to be shrouded in secrecy. The attempt to protect it by encryption is a recent phenomenon, in reaction to large data breaches.

The encryption conundrum is further complicated by the brand rules that require the POS to "to read and transmit the entire unaltered contents of the Magnetic Stripe". Some parties have interpreted this to mean "encryption prior to authorization is not allowed". This ambiguity must be resolved and the language clarified.

Counterfeit Detection

A second option for consideration would be Counterfeit Detection. This can be described as the ability to determine that the data emanated from a legitimate card. If you can successfully identify the token that carries the data and determine that the token itself is authentic, then you can deduce that the data has not been obtained by a breach or a social engineering ruse. In a data breach the criminals take the stolen track data and transfer it to an available magstripe card. This might be an expired financial transaction card or it may be an old hotel door access card or a piece of white (unprinted) plastic. Some data hijackers have access to sophisticated card printing and embossing machines which can turn out cards that look perfectly legitimate. The thieves then use these cards at ATMs, gas pumps or stores to make unlawful purchases. When the card data on the cloned card is identical to the customer's real card, the transaction will be authorized unless the card has been reported stolen or is flagged because it falls outside the cardholder's normal usage pattern. When the token that carries the data can be validated, the counterfeit copies, made with stolen data, can be rejected.



How can one tell that the data emanated from a legitimate source? All magnetic stripe cards have unique identifiers buried within the magnetic material. They are like fingerprints that are present at birth and change little as you age. Like snowflakes, no two are alike. Similar to DNA, these magnetic markers are biometric tags or "Digital Identifiers" (DIs) which can be used to recognize each individual card. If the card can be identified by its bio tag or its DI, then the accepting or authorizing party can have a high degree of certainty that a genuine card was presented at the point of sale, that the usage is appropriate, and that the transaction may be safely approved. Conversely, if the card fails the authentication routine, because its bio tag or DI is not recognized, then the transaction may be declined in real time. One such DI authentication method is called MagnePrint.

Tamper Recognition

Next, an accepting or authorizing party must be able to determine that the data on a genuine token has not been modified or substituted. This is important because a genuine card may be used at POS but if cardholder data from another card has been substituted (transferred onto the magstripe) or the original data has been altered, the system needs to be smart enough to recognize this attempt at fraud. In this instance the magnetic fingerprint buried within the magnetic material can be fused to the encoded cardholder data so that a change in the cardholder data with produce a different MagnePrint DI than the one stored on the cardholder authorization database, and the transaction can be declined.

Data Relevance & Integrity

It's important to know that the card data is "fresh". This means the authorizing party must be able to determine if the swipe, tap, dip or insertion occurred quite recently. A sound verification method can "time bound" the data to ascertain that it is not from an old swipe that was trapped but not used. Data of this type should be treated as "stale" or out of date and lead to a decline at the POS. To know that the data is fresh, the reader or the secure card reader authenticator (SCRA) itself must be capable of mutual authentication, session management, and data integrity verification.

Tokenization

The merchant community has repeatedly voiced their opposition to any obligation to store and safeguard cardholder data. After the data has been transmitted for authorization, there is no need for the merchant to retain cardholder data, provided the POS system can leave behind only masked or tokenized data. With minor infrastructure adjustments, masked PAN data can be used for settlement and chargeback inquiries, liberating the merchant from a burdensome responsibility.

Dynamic Transaction Authentication

Data obsolescence or auto-expiration by dynamic authentication is another method to assure that the cardholder track data is genuine – and has not been obtained from a breach or from a counterfeit card. By this method the system is able to observe unique transaction values that are produced by the interaction of the card DI, the swipe, and the reader (SCRA) at POS. Much like a One Time Password (OTP), a one time use dynamic Transaction Authentication Value (TAV) is generated at the reader (SCRA). This dynamic value will be rejected if it is presented a second time to the authorization system. This method of authentication does not depend on time boundaries. It does rely on the principle of entropy in its validation process. A stochastic value is produced by unique circumstances – that is the card DI, the swiper, and the reader (SCRA) coalesce to generate dynamic digital output that changes in an unpredictable way but within boundaries that allow it to be correlated and authenticated. The MagnePrint DI provides a unique TAV for each transaction. Once used, the TAV becomes obsolete. If it is presented to the authorization system a second time, the transaction will be declined.

"WE MUST MOVE FROM STATIC DATA TO DYNAMIC DATA FOR AUTHENTICATING CONSUMERS CARDS"

- Gerry Sweeney Global Head, eCommerce & Authentication Visa, Inc.

Is there a Best Practice?

The answer lies in understanding what we are trying to accomplish and who and what we are trying to protect. If we are interested only in protecting the merchant or other intermediaries from a claim of breach, and the resulting liability, then encryption may be quite adequate. In the event of a compromise, the parties who cannot decrypt will be able to plausibly deny they had access to the cardholder data because it was encrypted. If the accepting party had no knowledge of the key, they would have no ability to observe cardholder data, and thus theoretically no culpability.

End to End Encryption – Is it enough?

Encryption must not be confused with counterfeit recognition or tamper evidence. A card that has been cloned or altered will be encrypted at the POS just like a genuine card is encrypted. At the point of authorization, both the counterfeit card and the genuine card will appear to be identical, and each will have received equal protection during transmission. It is useful to note at this point that a merchant who encrypts data from the point of swipe and has no access to the key may not have any systemic knowledge of cardholder data, but a dishonest employee can still methodically steal cardholder data by other means, such as using imprinters, cameras, pocket skimmers, or a pencil and notepad. Encryption cannot protect data that has been - or can be exposed by some other means.

ENCRYPTION IS NOT ENOUGH ONLY A COMBINATION OF CRYPTOGRAPHIC AND AUTHENTICATION TECHNIQUES WILL PROTECT CARDHOLDER DATA

Plausible deniability or Maximum Cardholder Protection

If the objective is to protect the cardholder and his data from fraudulent use, along with the confidence, time and money he stands to lose, then encryption by itself is ineffective. If the intention is to spare the consumer anxiety, aggravation and financial loss, then other authentication methods are required.

The better way to protect the cardholder and his data is a robust combination of cryptographic and authentication techniques. The DI and its generated dynamic TAVs provide an ability to verify that the reader (SCRA), the card, the card data, the host, and the cardholder are genuine. This form of confirmation serves and protects every participant in the payment industry: the cardholder, the merchant, the processor, the acquirer, the brand, the issuer and law enforcement.

Making the data useless

Of equal importance, this process (the generation of a dynamic one-time use, DI derived, TAV) renders stolen cardholder data useless to the thieves. It removes the incentive to attack processors and merchants because the thieves can no longer profit from the data theft. The thief must have the genuine card with its original cardholder data intact in order to generate a valid TAV. For criminals, encryption makes theft more complex whereas dynamic authentication takes the profit out of the crime. Authentication protects the cardholder data even if it has been obtained illegally.

Authentication as a forensic tool

An additional benefit of an authentication DI is its ability to leave behind evidence of “card present”. There are times when a cardholder repudiates a legitimate transaction, with a claim that his card was not used and an inference that a counterfeit card was used instead. Because the card itself can be authenticated and determined to be genuine, the cardholder’s disputed transaction may rightfully be resolved in the issuer’s favor.

Set the cardholder data free

Cardholder data theft is not the actual problem. It becomes the problem only because the data can be used so easily to commit fraud. It's more important to stop the payout of dollars (the fraud) than to stop the theft of data. This is the only practical approach once we recognize that we will never be able to keep the track data cloaked in secrecy and out of the hands of criminals.

MagneSafe

MagneSafe™ is a digital identification and authentication architecture that safeguards consumers and their personal data. Designed to exceed PCI regulations, MagneSafe leverages strong encryption, secure tokenization, counterfeit detection, tamper recognition, data relevance and integrity, and dynamic digital transaction signatures, which together validate and protect the entire transaction and each of its components.

A key feature of MagneSafe is MagnePrint® card authentication, a patented, proven technology which reliably identifies counterfeit credit cards, debit cards, gift cards, ATM cards and ID cards at the point of swipe, before fraud occurs. MagneSafe's multi-layer security provides unmatched protection and flexibility for safer online transactions.

MagneSafe secure card reader authenticators established the de-facto industry standard for securing cardholder data. Available in standard footprint and backwards compatible track data format, encrypted output, MagneSafe technology is supported by MagTek, Magensa.net, BCI, Seguritek, Hypercom, Ingenico, ARTS, Cherry Keyboard, Tatung, GE Money, Element Payment Systems, NMI, PPI, Budget/Avis, Intuit, PayPal, Merchant Warehouse and many other vigilant payment industry participants. Collectively this group of inventive payment system providers has greater than a 60% market share.

"THE RIGHT LONG-TERM GOAL IS TO MAKE DATA UNUSABLE TO CRIMINALS AND THEREFORE REDUCE THE INCENTIVE TO STEAL IT."

- Ellen Richey
Chief Enterprise Risk Officer Visa, Inc.

WHEN WE FACE THIS REALITY

and adopt dynamic authentication, the cardholder data can once again ride in the clear on public communication channels and be used, without fear, for its intended purpose - machine readable data to route transactions and identify the communicating parties. Once authentication is in place, there is little need to encrypt the cardholder data.

Conclusion

While End-to-End Encryption has received much attention in the media and industry focus groups, its usefulness to prevent fraud is limited. An investment in hardware and decryption services that does not encompass a multi-layer authentication strategy is a poor use of resources. The payment community must be motivated less by fear of liability and more by a genuine commitment to protect the consumer. It is interesting to note that a morally compelling strategy focused on consumer protection has positive ROI for retailers and an added advantage that it simultaneously protects all the other stakeholders.

THE ONLY PRACTICAL APPROACH... WE WILL NEVER BE ABLE TO KEEP TRACK DATA CLOAKED IN SECRECY AND OUT OF THE HANDS OF CRIMINALS.

About MagTek

Since 1972, MagTek has been a leading manufacturer of electronic devices and systems for the reliable issuance, reading, transmission and security of cards, checks, PINs and other identification documents. Leading with innovation and engineering excellence, MagTek is known for quality and dependability. MagTek products include secure card reader authenticators, check scanners, PIN pads and distributed credential issuing systems. These products are used worldwide by financial institutions, retailers, hotels, law enforcement agencies and other organizations to provide secure and efficient electronic payment and identification transactions.

Today, MagTek continues to innovate with the development of a new generation of security centric products secured by MagneSafe™. By leveraging strong encryption, secure tokenization and real time authentication, MagneSafe products enable users to assess and validate the trustworthiness of credentials used for online identification, payment processing, and other high-value electronic transactions.

MagTek is based in Seal Beach, California and has sales offices throughout the United States, Europe, and Asia, with independent distributors in over 40 countries. For more information, please visit www.magtek.com or contact your MagTek representative at 1-800-4MAGTEK.