Mitigating Large Merchant Data Breaches

August 28, 2013
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Agenda

- Global Threat Landscape
- Common Security Deficiencies
- Intruder Footprints and Attack Prevention
- Secure Technologies
- Q&A
The Visa Global Security Summit is a must-attend event for executives from business, government, academia and law enforcement. The conference will explore the intersection of technology and security, and participants will offer diverse perspectives on how industry and government can collaborate to address cyber security issues.

- Pre-Summit Risk workshops for acquirers, merchants, and processors: Oct 1st
- General Session: Oct 2nd

Register at: https://www.cvent.com/events/visa-global-security-summit/registration-e3c000e253d34af6872c03cd5126c32e.aspx
Visa’s Multi-Layered Strategy

Mitigating fraud through continuous leadership, coordination and investment

Maintaining and enhancing stakeholder trust in Visa as the most secure way to pay and be paid

- **PREVENT**: Minimize fraud in the payment system
- **PROTECT**: Protect vulnerable account data
- **RESPOND**: Monitor and manage events that occur

**Trust and Partnership**

**ADVANCE**: Execute risk strategies for emerging products and channels
Security Vulnerabilities and Prevention Strategies

Ingrid Beierly
## PCI DSS Requirements

### Commonly Identified Security Deficiencies

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Applicable Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Security</strong></td>
<td></td>
</tr>
<tr>
<td>Default or no firewall / router rules</td>
<td>Requirement 1</td>
</tr>
<tr>
<td>No DMZ</td>
<td>Requirement 1</td>
</tr>
<tr>
<td>Insecure remote access, no 2-factor authentication</td>
<td>Requirement 8</td>
</tr>
<tr>
<td><strong>Host-based Security</strong></td>
<td></td>
</tr>
<tr>
<td>Insecure operating systems and databases</td>
<td>Requirement 6</td>
</tr>
<tr>
<td>No patching</td>
<td>Requirement 6</td>
</tr>
<tr>
<td>No or outdated anti-virus signatures</td>
<td>Requirement 5</td>
</tr>
<tr>
<td>No password management or access control lists (ACL)</td>
<td>Requirement 7</td>
</tr>
<tr>
<td>Use of default or shared usernames and passwords</td>
<td>Requirement 2</td>
</tr>
<tr>
<td>No system logging</td>
<td>Requirement 10</td>
</tr>
<tr>
<td>No file integrity monitoring</td>
<td>Requirement 10</td>
</tr>
<tr>
<td><strong>Application Security</strong></td>
<td></td>
</tr>
<tr>
<td>SQL injection / other web-based exploits</td>
<td>Requirement 6</td>
</tr>
<tr>
<td>No secure coding, independent code review, or penetration testing process in place</td>
<td>Requirement 6</td>
</tr>
<tr>
<td><strong>Incident Response</strong></td>
<td></td>
</tr>
<tr>
<td>No incident response plan</td>
<td>Requirement 12</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>No monitoring of systems, logs, access control, etc.</td>
<td>Requirement 10</td>
</tr>
</tbody>
</table>

- Lack of network segmentation has contributed to multiple location breaches

Source: Data breach forensic reports
## Identified Security Vulnerabilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Malware</strong></td>
<td>RAM scraper is the #1 malware used by hackers to steal full track data in memory</td>
</tr>
<tr>
<td>(RAM scraper, Key Logger)</td>
<td>Citadel malware is used to steal VPN credentials and exploit the payment card environment</td>
</tr>
<tr>
<td><strong>Insecure Web Applications</strong></td>
<td>Web Management Console is accessible from the Internet</td>
</tr>
<tr>
<td></td>
<td>SQL injection and xp_cmdshell vulnerabilities</td>
</tr>
<tr>
<td></td>
<td>ColdFusion vulnerabilities</td>
</tr>
<tr>
<td><strong>Insecure Domain Controllers</strong></td>
<td>Use of weak password hash algorithm</td>
</tr>
<tr>
<td></td>
<td>Unrestricted logon rights for privileged accounts stored in the local SAM</td>
</tr>
<tr>
<td></td>
<td>Allowing Internet access</td>
</tr>
<tr>
<td><strong>Storage of Prohibited Data</strong></td>
<td>Troubleshooting/debug mode is enabled</td>
</tr>
<tr>
<td></td>
<td>Secure delete is not used to remove data</td>
</tr>
<tr>
<td></td>
<td>No enterprise-wide cardholder data scans are conducted to identify cardholder data storage</td>
</tr>
</tbody>
</table>
## Indicators of a Compromise (IOC)

<table>
<thead>
<tr>
<th>File Name</th>
<th>Purpose</th>
<th>File Size (bytes)</th>
<th>MD5 Hash</th>
</tr>
</thead>
<tbody>
<tr>
<td>System32.exe</td>
<td>Backdoor</td>
<td>618570</td>
<td>b9cf8e70681755c1711c38944695eeaa</td>
</tr>
<tr>
<td>Svcsec.exe</td>
<td>Backdoor</td>
<td>614474</td>
<td>25f7b169b43c4d5db472afb0ee09b035</td>
</tr>
<tr>
<td>CiscoSvc.exe</td>
<td>Memory Parser</td>
<td>N/A</td>
<td>9f456687aad8d329e347fb00fe01e6b4a3224de91bab9d0c22498853de86808d</td>
</tr>
<tr>
<td>CiscoLog.exe</td>
<td>Memory Parser</td>
<td>N/A</td>
<td>4b9b36800db395d8a95f331c4608e947</td>
</tr>
<tr>
<td>oposvc.exe</td>
<td>Memory Parser</td>
<td>69632</td>
<td>dd90c44afa5da730b8cb979667ae8fd3</td>
</tr>
<tr>
<td>apve.exe</td>
<td>Citadel variant</td>
<td>274432</td>
<td>f45c85e5b1a46dd773d2dc907f782f2c</td>
</tr>
</tbody>
</table>

Source: Data breach forensic reports
Attack Prevention: Security Strategies and Actionable Items

- The following slides will cover strategies and actionable items for these security domains:
  - Network Security
  - Point-Of-Sale Security
  - Secure Web-based Applications
  - Administrator Accounts
  - Incident Response
Network Security Actionable Items

- Segregate the payment processing network from other non-payment processing networks
- Implement strict inbound and outbound filtering on the firewall rule sets (critical on outbound traffic)
- Perform penetration testing to identify security gaps
- Identify systems (such as jump servers) that have access to the payment card and ensure systems are secure
- Deny Remote Desktop Protocol (RDP) logons
- Secure domain controllers (DCs) and implement a process to have a repeatable and secure deployment of DCs
Point-Of-Sale (POS) Security Actionable Items

- Implement point-to-point encryption (P2PE) PEDs
  - EMV capability
  - Secure Reading and Exchange of Data (SRED)
  - Hardware-based encryption

- Install PA-DSS compliant payment applications

- Deploy the latest version of operating systems and ensure it is up-to-date with security patches, anti-virus, FIM, HIDS

- Perform a binary or checksum comparison

- Disable unnecessary ports and services, null sessions, default users and guests

- Enable logging of events and make sure there is a process to monitor logs on a daily basis
Implement least privileges and access controls lists (ACLs) for users and applications on the system.

Implement a security policy that includes operating system security configuration to include the following:
- Security installation guide
- Password management guide to manage users on the system
- Mechanism to ensure consistent security baseline on critical systems

Implement an enterprise-wide cardholder data scan to identify storage of clear-text data and perform a secure delete of any data identified.
Secure Web-based Applications

Actionable Items

- Perform detailed and manual web application penetration testing against applications in your environment
- Review all web-based management consoles and ensure it is configured in a secure manner
- Ensure all web servers are hardened and up-to-date with the latest security patches and hotfixes
- Implement a Web Application Firewall (WAF) to help mitigate web-based attacks
  - A combination of insecure code and dangerous stored procedures could execute statements at a higher level privilege
Administrative Accounts Actionable Items

- Use two-factor authentication when accessing the payment processing networks
- Limit administrative privileges on applications
- Periodically review systems (local and domain controllers) for unknown and dormant users
- Apply same security on database users
- Do not use weak encryption algorithm for passwords (e.g., NTLM)
Incident Response Actionable Items

- Deploy Security Information and Event Management (SIEM)
- Review logs and offload to a dedicated server (e.g., syslog and in a secure location where hackers can’t tamper with logs)
- Invest in an incident response team
  - Knowledge
  - Training
  - Certification
- Test your incident response plan
- Implement Indicators of Compromise (IOC) signatures on your solution
Secure Technologies and U.S. Authentication Roadmap

Tia D. Ilori
Secure Technologies

Advance cardholder data security through the use of robust technologies design to further protect customer data:

- **EMV Chip Technology**
  - Protects against counterfeit cards by replacing static data with dynamic

- **Point-to-Point Encryption (P2PE)**
  - Protects cardholder data from the point of data entry to the payment card processor
  - Shields against malware that “sniffs” and “captures”

- **Tokenization Technology**
  - Replaces cardholder data with surrogate values, or “tokens”
  - Allows merchants to limit or eliminate the storage of cardholder data

If properly implemented, all three can reduce the scope of PCI DSS compliance.

Authentication Roadmap

U.S. EMV chip roadmap supports three primary opportunities

1. **Build framework** for mobile payments and future innovation leveraging EMV infrastructure for both contact and contactless payments.

2. **Support interoperability and improve authorization decisions** as EMV adoption continues to grow worldwide.

3. **Reduce reliance on static data** and incidence of counterfeit fraud.

### U.S.

- **2011**: Guide and Enforce Security Standards
- **2012**: Technology Innovation Program (TIP)
- **2013**: Acquirer Chip Processing
- **2015**: POS Liability Shift
- **2017**: ATM & AFD Liability Shift

### Global

- **2011**: TIP
- **2012**: POS Cross-Border Liability Shift (excluding U.S.)
- **2013**: Promote adoption of dual-interface chip terminals
- **2015**: Counterfeit fraud liability shift applies to contact only and dual-interface

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1. Dates and/or timelines may change
2. Visa Europe announced a corresponding program
EMV Chip Technology

Chip cards, also known as smart cards, can be contact or contactless

- A chip card is simply a plastic card containing an integrated circuit
- The chip is usually powered by the reader and relies on a reader to function
- Contact cards communicate with the reader over a contact plate. The plate must come into contact with the terminal usually via a dip reader
- Contactless cards communicate via radio frequency (RF) and must contain an antenna
- Dual interface cards combine both technologies and can communicate either way
Encryption is designed to protect cardholder data from the point of data entry to the payment card processor
- Designed to protect cardholder data in transit
- Protects against malware that “sniffs” and “captures” cardholder data transmitting
- Uses a key management feature making cardholder data unreadable to anyone that does not have a special “key”

Tokenization defines a process through which PAN data is replaced with a surrogate value known as a “token.”
- Designed to work in concert with encryption to eliminate storage of cardholder data.
- Allows merchants to limit the storage of cardholder data to within the tokenization system
- The security of an individual token relies on the infeasibility to determine the original PAN
Visa Merchant Data Secure with Point-to-Point Encryption (VMDS with P2PE) is being developed to:

- Protect Sensitive Card Data Information
- Encrypt from the POS to a Card Network
- Integrate Seamlessly into Existing Business Processes
- Encrypt All Card Brand Data in Transit
- Be a Leading Industry Standard
- Offer Scalable Technology and Be Flexible for All Merchant Sizes

Proposed service in development and presented for discussion purposes only; service functionality, features and timelines subject to change by Visa at any time.
Visa plans to expand the VMDS Product Suite by providing customers with solutions for enterprise security.

**Roadmap for Development**

- **Q2 2013**
  - **Hardware Encryption**
    - Secures data from the brick and mortar POS to the acquirer and VisaNet

- **Q3 2014**
  - **Tokenization**
    - The expanded VMDS product will allow merchants to store PAN data using a token
  - **Product Evaluation Summit**
    - Conference hosted by Visa for customers to share changes in the industry and discuss new product features

- **Q3 2014**
  - **Software Encryption**
    - The final tool in the VMDS suite will include software encryption, primarily used for card-not-present, e-commerce transactions

*Proposed service in development and presented for discussion purposes only; service functionality, features and timelines subject to change by Visa at any time.*
Visa Ready Program mPOS Overview

Foster innovation by making it easier to navigate the complexities of the payment ecosystem and develop best in class offerings

- Innovative payment methods like mobile Point-of-Sale devices being introduced in marketplace
- Visa Ready provides guidance for vendors to meet Visa’s requirements for a reliable, convenient, and secure mobile point of sale experience
- Mobile payment application vendors submit solution to participating third-party lab for evaluation and approval
- Financial institutions and merchants can benefit from certified Mobile Payment Acceptance Solutions
- Visa Ready mPOS solutions can be found at https://technologypartner.visa.com/mPOS/default.aspx
Encryption and Tokenization: Protecting Customer Data

- Wednesday, September 18, 2013 - 10:00 am Pacific time
- Tia D. Ilori | Americas Payment System Security
- Sue Zloth | Global Acquirer Processing

When a customer swipes, dips or types their payment card information, they want to trust that their personal and financial information will be safe. Recently, enterprise data breaches have exposed millions of cards to hackers, bringing into question this trust.

The webinar will cover the following:

• How can a merchant be sure data is secure?
• What tools can merchants use to mitigate risk?
• How does EMV fit with Encryption and Tokenization?
• How do Encryption and Tokenization affect PCI compliance?

To register visit: https://visa.adobeconnect.com/e4ay2juyjcq/event/registration.html
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PCI SSC Community Meeting

PCI Security Standards Council (SSC) North America Community Meeting

September 24-26, 2013

Las Vegas, Nevada

Visa will host “office hours” throughout the community meeting

- Participating organization are encouraged to take advantage of this unique opportunity to engage with Visa representatives

- For more information please visit https://www.pcisecuritystandards.org/communitymeeting/2013/north-america
Questions?
Appendix
What To Do If Compromised

- Take compromised system off the network
- If you must rebuild system, take a forensic image prior to rebuild
- Review firewall configuration and disable any unnecessary inbound and outbound traffic
- Pair down ACLs, ports and services between PCI and non-PCI environment
- Create strict ACLs segmenting public facing systems and backend database systems that house payment data (e.g., DMZ)
- Change all passwords on the network including applications and local accounts
- Review all access to the payment processing environment and terminate connectivity
What To Do If Compromised (cont.)

- Notify your acquiring bank
- Engage a PCI Forensic Investigator (PFI) https://www.pcisecuritystandards.org/approved_companies_providers/pci_forensic_investigator.php
- For more information, please refer to Visa’s What To Do If Compromised, available at www.visa.com/cisp under the ”If Compromised” section
- You can also contact Visa Fraud Control and Investigations at usfraudcontrol@visa.com or (650) 432-2978, option 4
Resources

Visa’s U.S. Data Security Program

- Data Security Alerts, Bulletins and Webinars
- Data Security Best Practices
- Data Security Press Releases and Third Party Media Articles
- Global Registry of Service Providers – PCI DSS Validated Entities
- Technology Innovation Program
- PIN Security and Key Management Program
- What To Do If Compromised manual
- Responding to a Data Breach guidelines

Comments to cisp@visa.com

www.visa.com/cisp
Resources

PCI Security Standards Council

- PCI Data Security Standard (DSS)
- Payment Application Data Security Standard (PA-DSS)
- PCI PIN Transaction Security (PTS)
- PCI Point-to-Point Encryption (P2PE)
- PCI DSS Applicability in an EMV Environment
- PCI DSS Tokenization Guidelines
- Self-Assessment Questionnaires (SAQ A, B, C, VC-VT, D, P2PE-HW)
- Qualified Security Assessor (QSA) List
- Approved Scan Vendor (ASV) List
- PCI Forensic Investigator (PFI) List
- FAQ Database

www.pcisecuritystandards.org
Encouraging Terminal Adoption

Building processing infrastructure for chip and mobile acceptance

- TIP recognizes and incents merchant chip investments, while maintaining expectation for merchants to protect cardholder data
- Participation results in cost savings by waiving the annual PCI DSS validation exercise
- Eligible merchants must meet all of the minimum qualification criteria
  - PCI DSS compliance or remediation plan
  - No storage of prohibited data
  - At least 75 percent of merchants’ transactions must originate from dual interface chip terminals and can process end-to-end chip transactions
  - No involvement in cardholder data breach

- Mandate for U.S. acquirer processors and sub-processor service providers to support chip processing, effective April 1, 2013
- Acquirers must certify the ability to comply
- Visa will require support of Field 55 and additional related chip fields for VIP authorization messages between the acquirer and Visa
- Acquirers should also ensure downstream connections certify to their own platforms prior to the deadline

1 Dates and/or timeline may change
2 Merchants previously involved in a breach may qualify if they have completed subsequent PCI DSS validation
Managing Liability

Liability shift rewards the entity making the investment in EMV. It is not a mandate to issue or accept chip cards.

Visa intends to establish a U.S. liability shift for domestic and cross-border counterfeit POS transactions.

- If a card is contact chip-capable and the merchant has not invested in chip, liability for counterfeit fraud will shift to the acquirer.
- The chip card’s counterfeit fraud protection plus the liability shift encourage issuer chip adoption by providing dynamic authentication that helps better protect all parties.
- The liability shift does not cover:
  - Cards without a contact chip
  - Card-not-present transactions
  - Lost-and-stolen fraud

### Liability Shift

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Merchant Terminal</th>
<th>Liable Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Chip or Dual Interface</td>
<td>Magstripe Only</td>
<td>Liability Shifts from Issuer to Acquirer</td>
</tr>
</tbody>
</table>

Note: When a chip-on-chip transaction occurs, in the unlikely event there is counterfeit fraud, liability follows current Visa International Operating Regulations.

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