Data Breach Findings and Mitigation Actions for the Payment System

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Lester Chan
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Agenda

• Introduction
• Global Payment Compromises
• Cyber Attack Kill Chain
• Profile of Large & Small Breaches
• Wishful Thinking Security
• Breach Findings & Security Controls Deep Dive
• Secure Technology to Devalue Data
• Key Takeaways
• Questions and Answers
Payment Card Compromises and Lessons Learned

Glen Jones, Sr. Director Cyber Intelligence
Global Data Compromises

US payment continues to be most at-risk

2011-2015 Compromise Cases by Region

- Global data compromise events are slightly higher in 2015 over those managed in 2014
- The U.S. is the largest contributor, mainly due to its large mag stripe infrastructure and an increase in successful attacks on third party service providers
- VE and AP represent the next largest contributors to known breach events, together comprising a quarter of the total
- Breaches in VE and AP are primarily CNP
Global Data Compromises

Breach trends by merchant level

<table>
<thead>
<tr>
<th>Entity Type</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Level 1</td>
<td>&lt;1%</td>
<td>1%</td>
<td>1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Level 2</td>
<td>&lt;1%</td>
<td>1%</td>
<td>1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Level 3</td>
<td>1%</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Level 4</td>
<td>95%</td>
<td>92%</td>
<td>93%</td>
<td>93%</td>
</tr>
<tr>
<td>Agent</td>
<td>&lt;1%</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>&lt;1%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

- As a proportion of the total number of breach events, L4s remain the vast majority of compromise cases (93% in 2014-2015)
- At-risk accounts in 2015 were largely attributed to L4 merchants
- Level 4 merchants outnumber L1s in the US

*2015 year-to-date

- Fewer level 1 and 2 breaches in 2015
- Threat actors are targeting smaller interconnected merchants in large numbers
- Restaurants and "other retail" make up the biggest portion of total known breaches
- Quick service restaurants, supermarkets, and lodging make up the other top MCCs
# Cyber Attack Kill Chain

## Elements of the attack / opportunities for prevention and detection

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Reconnaissance</strong> – harvesting emails, personal and company information, etc.</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Weaponization</strong> – exploit vulnerability and gain backdoor access</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Delivery</strong> – weaponized payload to victim</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Exploitation</strong> – exploiting a vulnerability to execute code on victim's system</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Installation</strong> – malware on assets</td>
</tr>
<tr>
<td>6.</td>
<td><strong>Command &amp; Control</strong> – remotely operate and control victim’s systems</td>
</tr>
<tr>
<td>7.</td>
<td><strong>Action</strong> – commit harvesting and exfiltration</td>
</tr>
</tbody>
</table>

*Based on Lockheed Martin Cyber Kill Chain*
Profile of Large U.S. Merchant Breaches

Large merchant breach root causes

<table>
<thead>
<tr>
<th>Root Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Had privileged accounts compromised</td>
</tr>
<tr>
<td>Had sysadmin accounts exploited</td>
</tr>
<tr>
<td>Had weak application security testing</td>
</tr>
<tr>
<td>Had inadequate security event monitoring</td>
</tr>
<tr>
<td>Had weak anti-malware detection on POS systems</td>
</tr>
<tr>
<td>Had weak segmentation between CDE and core</td>
</tr>
<tr>
<td>Most had completed PCI DSS validation before incident, but environment did not reflect what was assessed</td>
</tr>
<tr>
<td>Had a weak audit function</td>
</tr>
</tbody>
</table>

* Based on US forensic investigation reports
Profile of Small (Level 4) U.S. Merchant Breaches

What do breached small merchants have in common?

- Third-party remote access for POS management (LogMeIn, for example)
- Always-on remote access
- Single-factor authentication

- Few host, user, network security controls
- No security monitoring

- Did not have application white-listing
- Did not use anti-malware software

- None had completed PCI DSS validation before incident

- Common / shared username & password
- Intrusion began with spear phishing attack against POS integrator

* source: US forensic investigation reports
Wishful Thinking vs. Effective Security Controls

**Perceived Security**

- A plan to implement security
- A firewall (ANY/ANY ALLOW)
- Separate networks with two-way trusts
- Intrusion detection technology without process
- SIEM without a plan
- File integrity: change monitoring only
- External account access with shared credentials

**Security Controls**

- Implemented security
- A firewall that blocks traffic
- Truly segmented cardholder data environment
- Risk-prioritized intrusion detection as part of a well-managed, tested process
- SIEM with relevant, risk-prioritized data and retention
- Monitoring for the instruction of new, unexplained files
- External account access with unique credentials
Breach Findings & Security Controls

Lester Chan, Director, Merchant Security
Breaches Continue to Occur
Hackers and fraudsters target specific industries and victims

Small Businesses
- Continue to be targeted fraudsters
- Many have low/no security controls
- Work with a qualified Integrator/Reseller
- Perform security basics
- Implement secure technology – EMV chip, tokenization, P2PE

Integrators & Resellers
- Targeted by hackers
- Improper implementation
- Always-on remote access
- Enroll into the Qualified Integrator/Reseller program
- Ensures that PCI DSS and PA DSS applications are installed properly

Hospitality Industry
- Hotels and restaurants continue to be targeted
- Typically, back of house servers
- Social engineering or spear phishing attacks
- Malware on systems allows attackers to gain access
- Ensure anti-malware and file integrity monitoring are used
### Breach Findings to Security Controls

**Mapping vulnerabilities to PCI DSS requirements**

<table>
<thead>
<tr>
<th>Breach Findings</th>
<th>PCI DSS Requirement</th>
<th>Lack of Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Access</td>
<td>8.1.5 - Manage IDs used by vendors to access, support, or maintain system components via remote access</td>
<td>• Two-factor authentication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Always on remote access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No review of remote access accounts</td>
</tr>
<tr>
<td>Network Segmentation</td>
<td>Strongly recommended to separate the CDE from core network and reduce PCI scope</td>
<td>• Flat networks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Little/no controls between CDE and core network</td>
</tr>
<tr>
<td>Elevated Privileges</td>
<td>7.1 Limit access to system components and cardholder data to only those individuals whose job requires such access.</td>
<td>• Justification for elevated privileges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Includes service and admin accounts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allows an attacker to install malware</td>
</tr>
<tr>
<td>Weak IT Audit</td>
<td>10.1 Implement audit trails to link all access to system components to each individual user.</td>
<td>• Log retention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improper logs</td>
</tr>
<tr>
<td>Internet Egress/Ingress</td>
<td>1.3 Prohibit direct public access between the Internet and any system component in the cardholder data environment.</td>
<td>• Outbound FTP, HTTP, HTTPS from CDE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allows attacker to exfiltrate harvested cardholder data</td>
</tr>
</tbody>
</table>
Fraud Migration to Other Channels
Fraud will migrate to e-commerce, automated fuel dispensers, and ATMs

- Fraud and attacks will continue in card not present/e-commerce channels
- Insecure websites and mis-configured security settings make it easy for attackers to exploit
- Internet facing websites make it easy for attackers to exploit weaknesses

- Scan for vulnerabilities
- Be aware of OWASP Top 10
- Properly scope all payment applications
- Work with a QIR on implementation best practices

- AFD liability shift to EMV chip in 2017
- Fraudsters will continue to target AFDs
- Stations in remote locations often targeted
- Skimmers and overlays are more sophisticated

- Regularly review pumps for devices
- Review POS for overlays
- Know who to contact if known or suspected attack

- ATM liability shift to EMV chip in 2017
- White label ATM higher risk for skimming and other overlay devices
- Remote locations or foreign countries are at higher risk for fraud and attacks

- Regularly review ATM devices for tampering
- Ensure software is kept up to date
- Know who to contact if known or suspected attack
Implement Secure Technology

Benefits of secure technology

Implement EMV Chip Terminals
- EMV chip or “smart” cards are credit, debit or prepaid cards that have an embedded microchip
- Microchip generates a dynamic one-time use code (a cryptogram)
- Prevents the data being re-used to create counterfeit cards
- Reduces overall PCI scope

Implement Tokenization
- Token replaces account number with unique digital token
- If payment token is used as the account number, it will be identified as stolen and rejected
- Devalues payment card data

Implement Point to Point Encryption
- Secures the payment card transaction from swipe to processor
- Implement an approved PCI PTS terminal
- Reduces overall PCI scope

Benefits of Implementing Secure Technology
- Reduce your liability from counterfeit fraud
- Reduce risk to the Payment System
- Partner with your Integrator/Reseller to simplify implementation
- Reduce your overall PCI scope
- Enroll in the Secure Acceptance Incentive Program that grants safe harbor from non-compliance fines
Key Takeaways

• Breaches continue to occur with fraud and attacks to migrate
• Scrutiny between controls documented in ROC and PFI report
• Control effectiveness is as important as the control itself
• Additional analysis on security controls:
  – Remote access
  – Network segmentation
  – Elevated privileges
  – Weak IT audit
  – Internet ingress/egress
• Impacts to small businesses, integrators/resellers and hospitality merchants
• Many large merchant breaches over the last several years were preventable
• Fraud to migrate to CNP, AFD and ATMs
Upcoming Events and Resources

Visa Data Security Website – www.visa.com/cisp
• Alerts, Bulletins
• Best Practices, White Papers
• Webinars

PCI Security Standards Council Website – www.pcissc.org
• Data Security Standards – PCI DSS, PA-DSS, PTS
• Programs – ASV, ISA, PA-QSA, PFI, PTS, QSA, QIR, PCIP, and P2PE
• Fact Sheets – ATM Security, Mobile Payments Acceptance, Tokenization, Cloud Computing, and many more...
Questions?