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CHANGE

Challenge today's security thinking

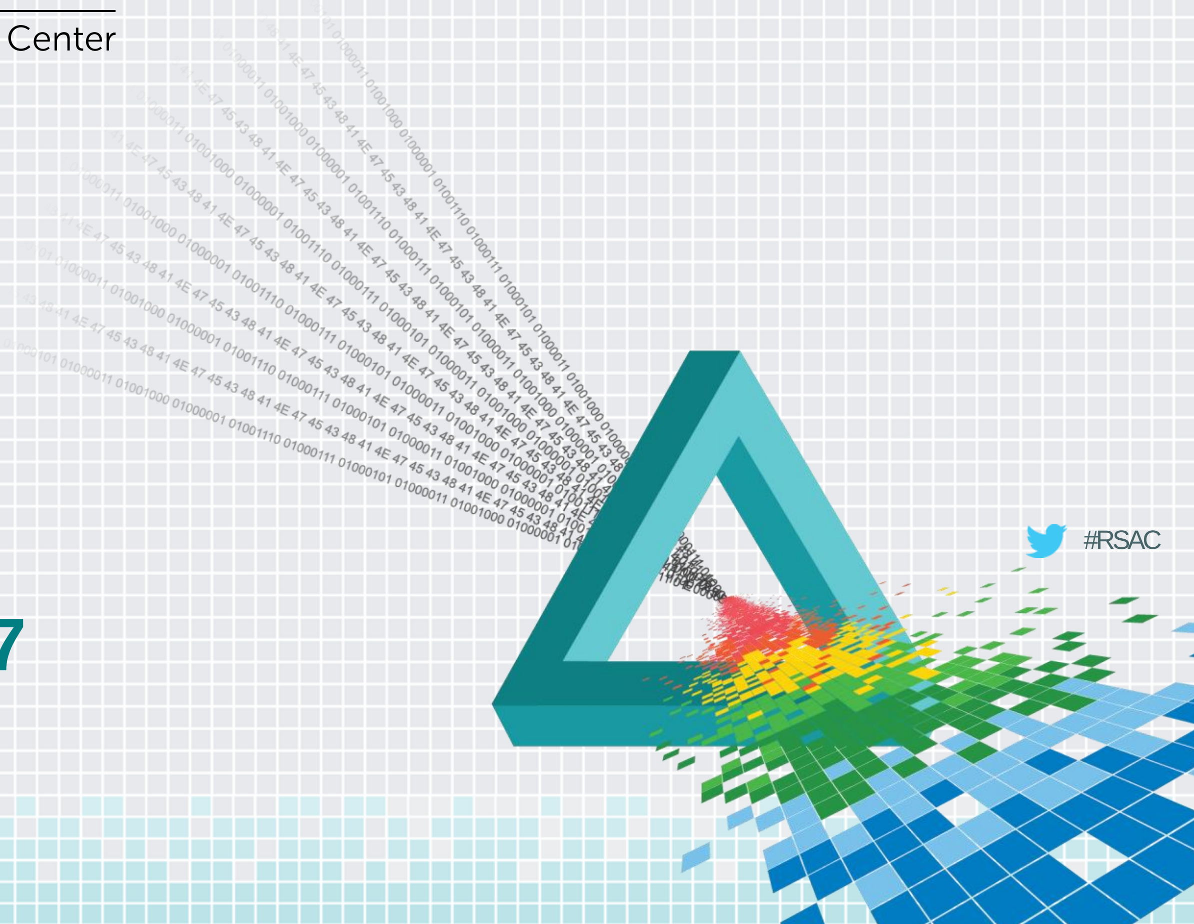
SESSION ID: DSP-R03

POSitively Under Fire: What are Retailers Facing?

Sean Mason

VP of Incident Response
Syntricate

Durango, CO
Population: 17,557



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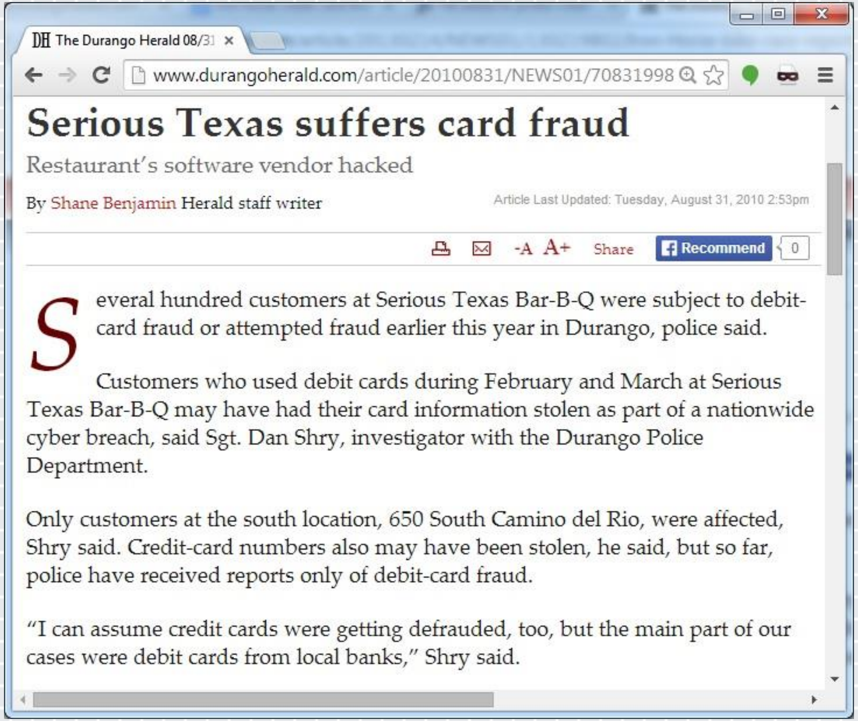
Serious Texas Bar-B-Q POS breach, 2010



DH The Durango Herald 08/31
www.durangoherald.com/article/20100831/NEWS01/70831998
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Serious Texas suffers card fraud

Restaurant's software vendor hacked

By Shane Benjamin Herald staff writer

Article Last Updated: Tuesday, August 31, 2010 2:53pm

Several hundred customers at Serious Texas Bar-B-Q were subject to debit-card fraud or attempted fraud earlier this year in Durango, police said.

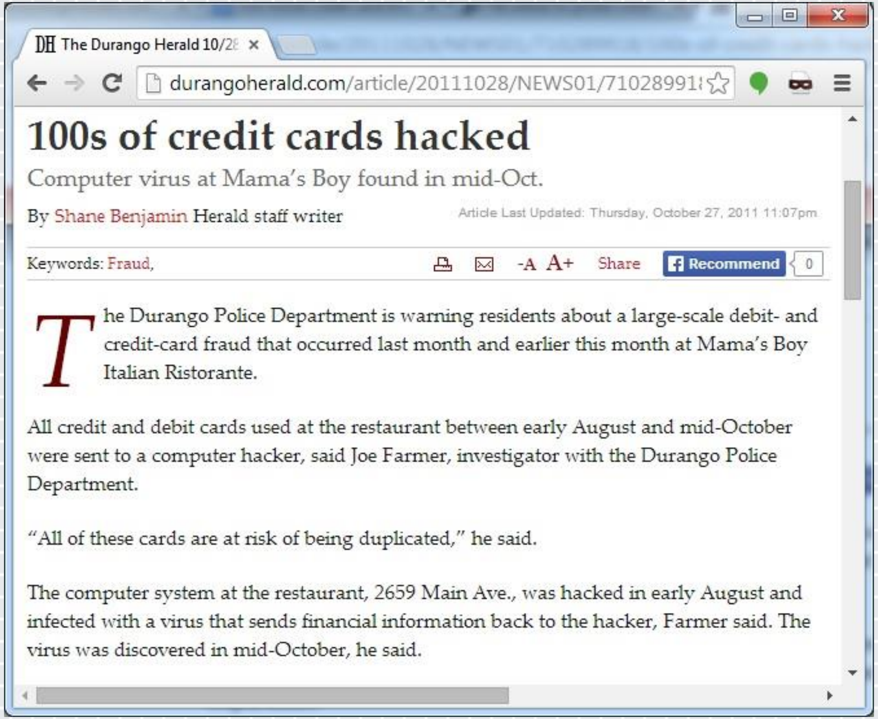
Customers who used debit cards during February and March at Serious Texas Bar-B-Q may have had their card information stolen as part of a nationwide cyber breach, said Sgt. Dan Shry, investigator with the Durango Police Department.

Only customers at the south location, 650 South Camino del Rio, were affected, Shry said. Credit-card numbers also may have been stolen, he said, but so far, police have received reports only of debit-card fraud.

"I can assume credit cards were getting defrauded, too, but the main part of our cases were debit cards from local banks," Shry said.

More than 270 of the stolen credit cards used for fraud nationally

Mama’s Boy POS breach, 2011


DH The Durango Herald 10/2
durangoherald.com/article/20111028/NEWS01/71028991
Keywords: Fraud,
-A A+
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100s of credit cards hacked

Computer virus at Mama’s Boy found in mid-Oct.

By Shane Benjamin Herald staff writer

Article Last Updated: Thursday, October 27, 2011 11:07pm

The Durango Police Department is warning residents about a large-scale debit- and credit-card fraud that occurred last month and earlier this month at Mama’s Boy Italian Ristorante.

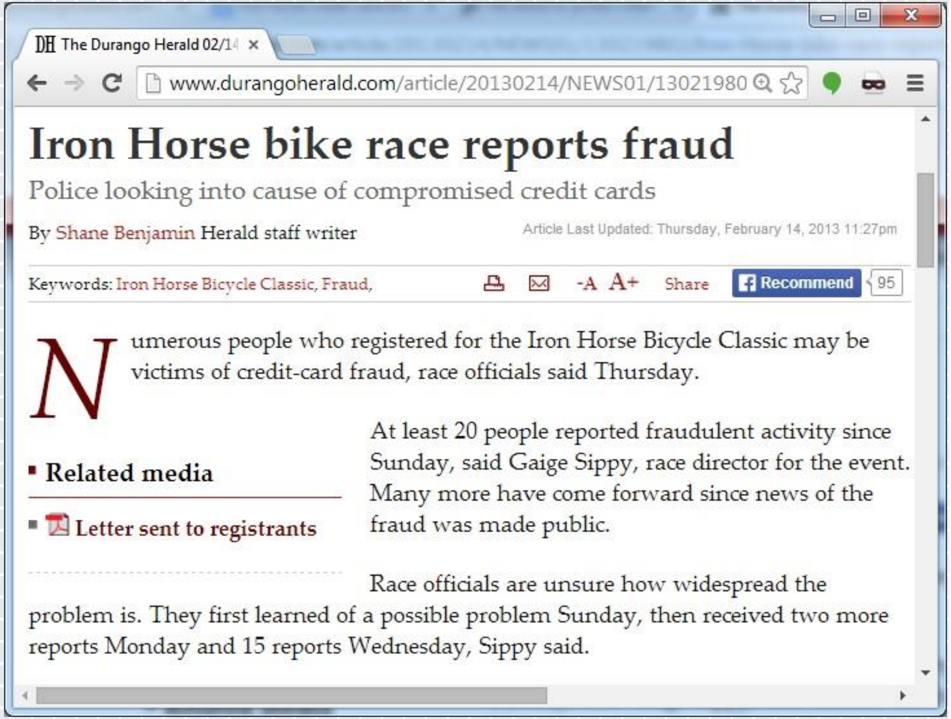
All credit and debit cards used at the restaurant between early August and mid-October were sent to a computer hacker, said Joe Farmer, investigator with the Durango Police Department.

“All of these cards are at risk of being duplicated,” he said.

The computer system at the restaurant, 2659 Main Ave., was hacked in early August and infected with a virus that sends financial information back to the hacker, Farmer said. The virus was discovered in mid-October, he said.

Open since the 80s,
closed 4 months later

Iron Horse web site breach, 2013



Iron Horse bike race reports fraud

Police looking into cause of compromised credit cards

By Shane Benjamin Herald staff writer

Article Last Updated: Thursday, February 14, 2013 11:27pm

Keywords: Iron Horse Bicycle Classic, Fraud,

Numerous people who registered for the Iron Horse Bicycle Classic may be victims of credit-card fraud, race officials said Thursday.

- Related media
- Letter sent to registrants

At least 20 people reported fraudulent activity since Sunday, said Gaige Sippy, race director for the event. Many more have come forward since news of the fraud was made public.

Race officials are unsure how widespread the problem is. They first learned of a possible problem Sunday, then received two more reports Monday and 15 reports Wednesday, Sippy said.

2,500 web site registrations, unsure how many cards stolen

Thousands of small business are breached

- In 2010, I personally saw several dozen POS breaches
- 190+ POS breaches in 2013 Verizon DBIR
  - Verizon is 1 of 23 PCI Forensics Investigators
- US-CERT Alert TA14-212A: July 31, 2014
  - POS “Backoff” malware identified in over 1,000 US businesses
- Breached small businesses sometimes notify customers
  - Post a notice on the store window
- Small merchant breaches rarely make the news in larger cities
  - The media has “better” content (e.g. violent crime, celebrities)

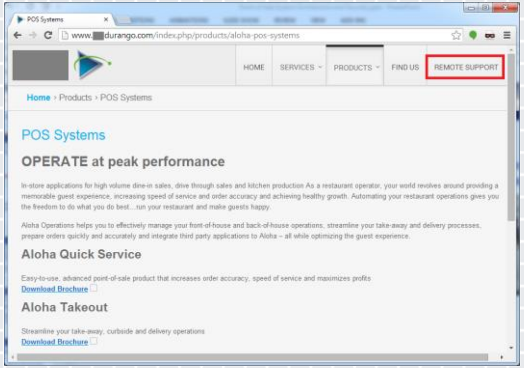
SMB breaches are usually opportunistic

Opportunistic POS Attack Methodology:

1. Scan internet for pcAnywhere, VNC, RDP ports
2. Exploit vulnerable versions, brute force password guessing
3. Instant admin access to entire POS environment
4. Drop keystroke recorders, network sniffers, RAM scrapers
5. Automatically transmits stolen card data

Why so easy?!

- Small business owners use remote desktop to work remotely
  - “The POS dealer keeps me safe”
  - “Why would hackers come after me?”
- Local POS dealers use remote desktop for support
  - Most are power users
  - Security what?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Aloha Takeout

Streamline your take-away, curbside and delivery operations
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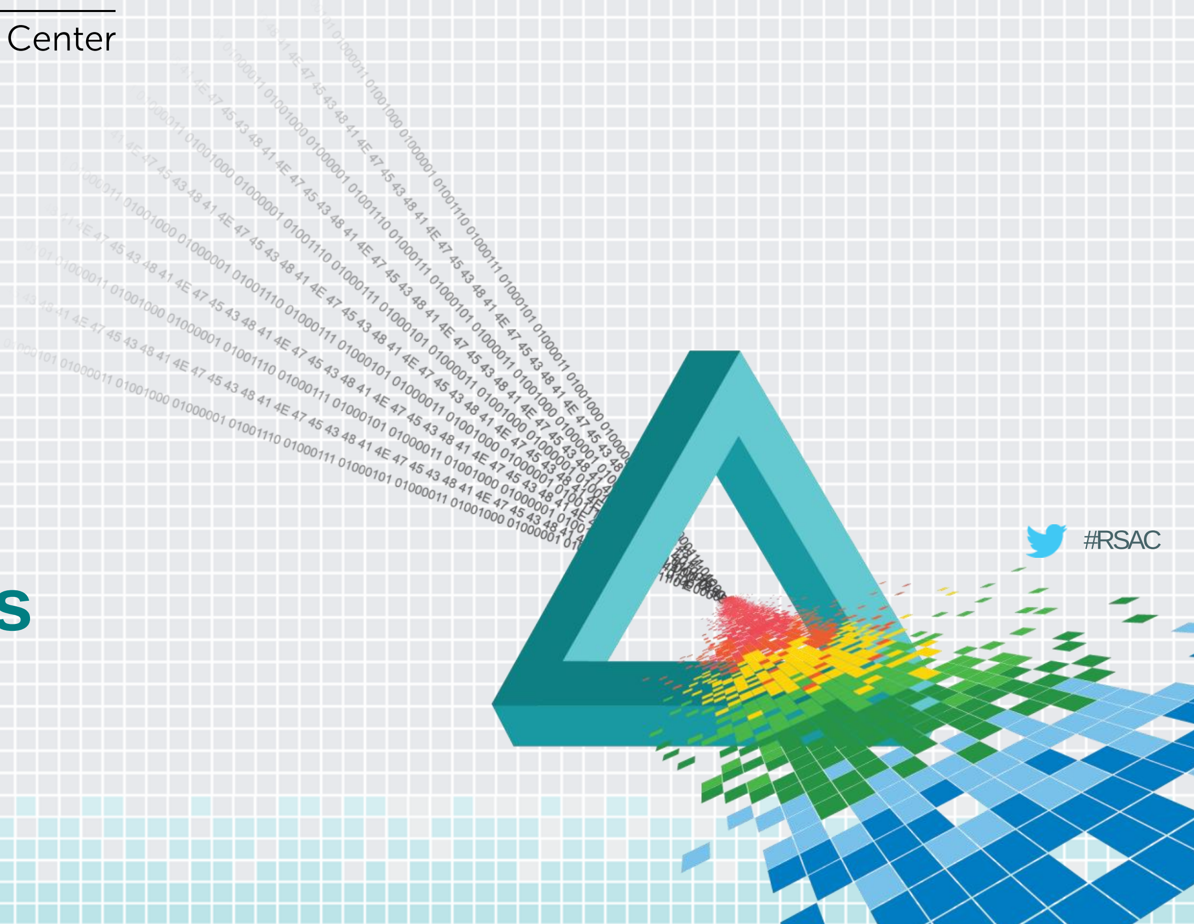

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Targeted Breaches

Examples of targeted breach victims

- 2004 to 2006 - Boston Market, Barnes & Noble,
  Sports Authority, Forever 21
- 2005 - CardSystems, DSW, Office Max
- 2006 - TJX Companies, Inc.
- 2007 - Dave & Buster's
- 2008 - Hannaford, Heartland, RBS WorldPay
- 2011 - Sony, FIS
- 2012 - Global Payments
- 2013 - Target, Neiman Marcus
- 2014 - P.F. Chang's, Home Depot

Legitimate hacking

Targeted Attack Methodology:

1. Perform footprinting and reconnaissance
2. Gain initial entry. Common methods…
   a) SQLi
   b) Buying backdoor access on black market
   c) Compromise a 3rd party with access
3. System and network enumeration
4. Privilege escalation
5. Lateral movement to establish a beachhead
   a) Drop a diverse set of backdoors
   b) Steal user passwords, target domain controllers and file servers
6. Find pivot points into the card data environment (CDE)
7. Modify code or drop malware to harvest card data
8. Exfiltrate undetected through obfuscation, throttled transfer rates, "blending in"

Fig. 1 "Hacker"

No Microsoft Windows? No problem!

- They know Linux, Solaris, AIX, etc.
  - Backdoors are planted there too (e.g. LKMs)
  - Privileged credentials are stolen
- Systems for ATM limits and fraud detection are compromised
- Perform PIN-based attacks (e.g. HSM API brute force[1])

[1] Webinar: “Don’t be the next victim on PIN-Based attacks”, Verizon Business 2009

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Payment Processing Architecture Crash Course

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Electronic cash registers (ECRs)

- Communicate with each other on a hub using IRC (Inter-Register Communications)
- Communications device attached to one register connects over dial-up or encrypted IP direct to processor
- Not hacked remotely

Standalone terminals

- Dial-up and IP enabled
- Encrypted IP connection direct to processor
- Also not hacked remotely

Point of sale (POS)

- Many run on Windows unhardened
- POS terminals (aka registers) run the POS client component
- Registers communicate with a "back of house" POS server
- Peripherals attach via USB or COM
  - Magstripe readers (MSR)
  - PIN Pads
  - PIN Pad/magstripe reader all-in-one
  - MICR check readers
  - Barcode scanners
  - Receipt printers

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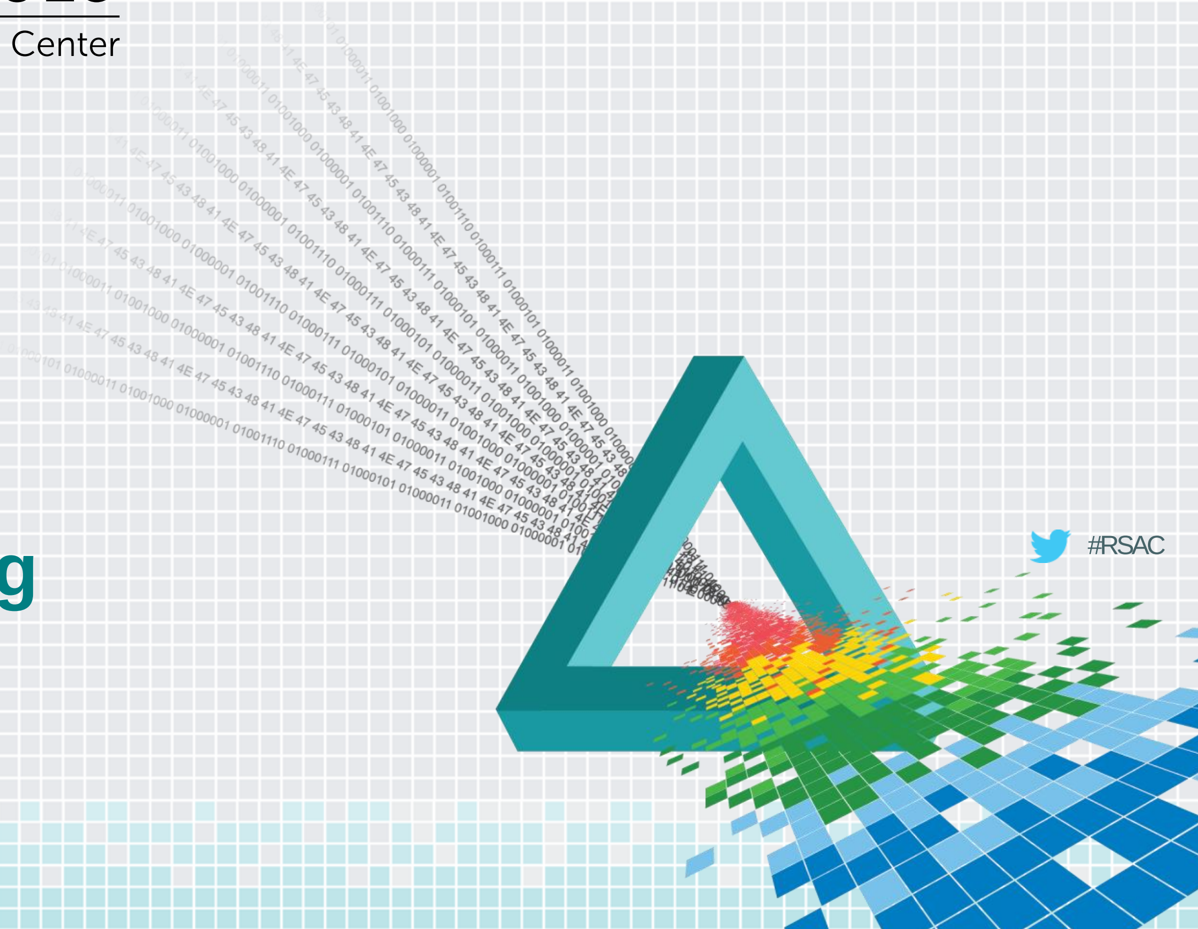

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Card Data Reading Dissected

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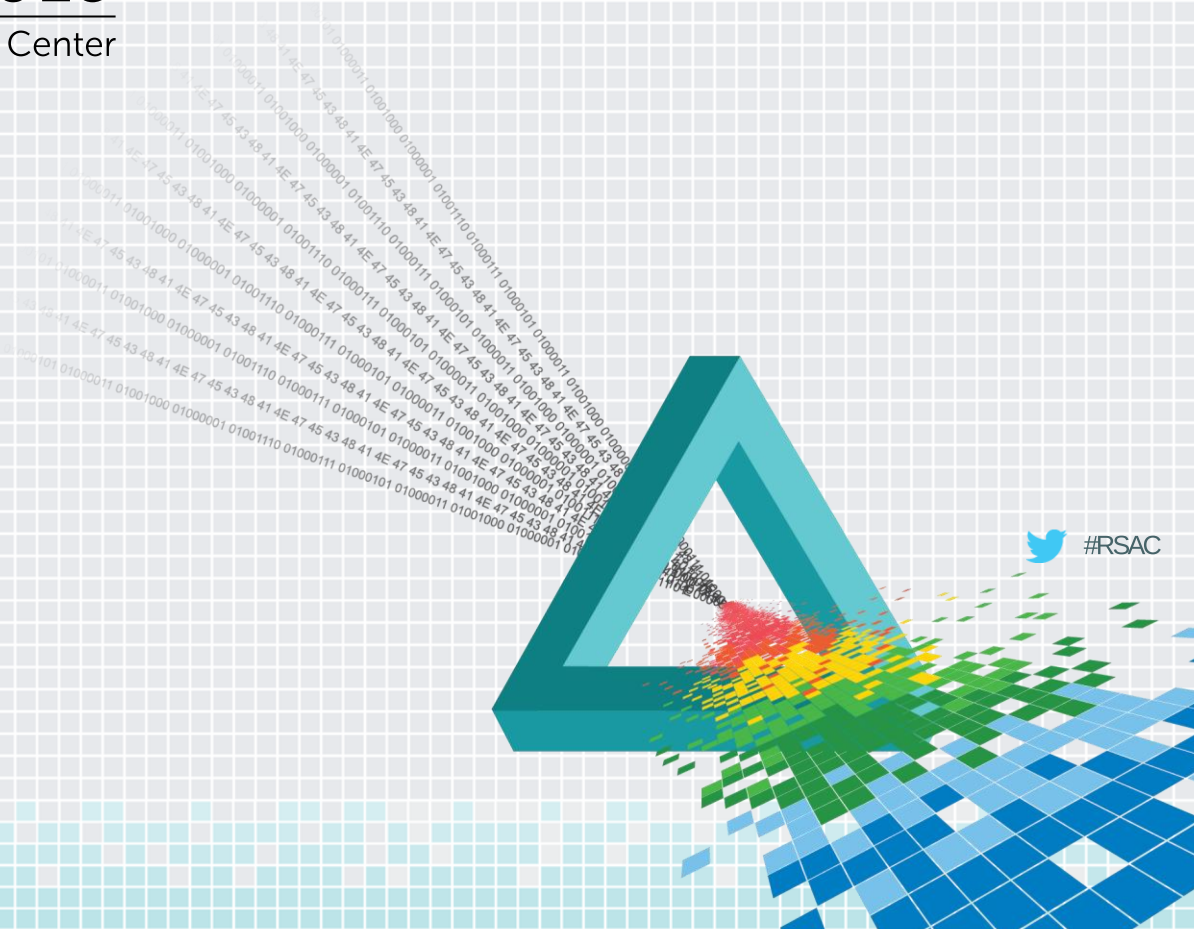

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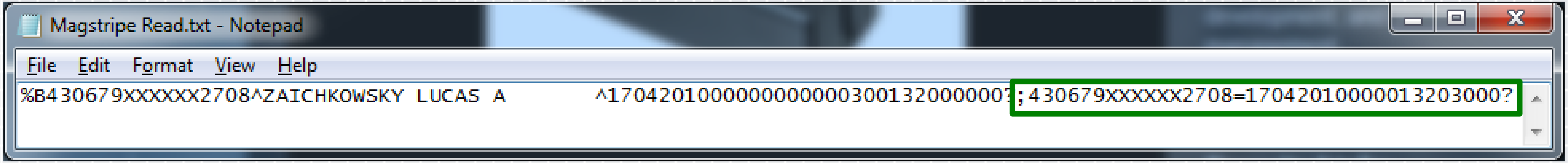
Demo: Magstripe

Peripherals: Magstripe readers (MSRs)

- Most are configured for “keyboard emulation”
  - Swipe card > keyboard rapidly types magstripe data
- HID mode installs USB device with drivers and API interaction
- It’s all unencrypted
- Only Track2 is needed to clone magstripe cards for fraud



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Peripherals: PIN pads

- Uses TDES algorithm and DUKPT key management for encrypting the PIN
  - Example encrypted PIN block: B07F65762F0F4701
  - Yes, this is secure
- Decryption keys held by payment processor, not the merchant
- PCI PIN Transaction Security (PTS) approved
  - Rigorous process with lots of anti-tampering requirements/testing

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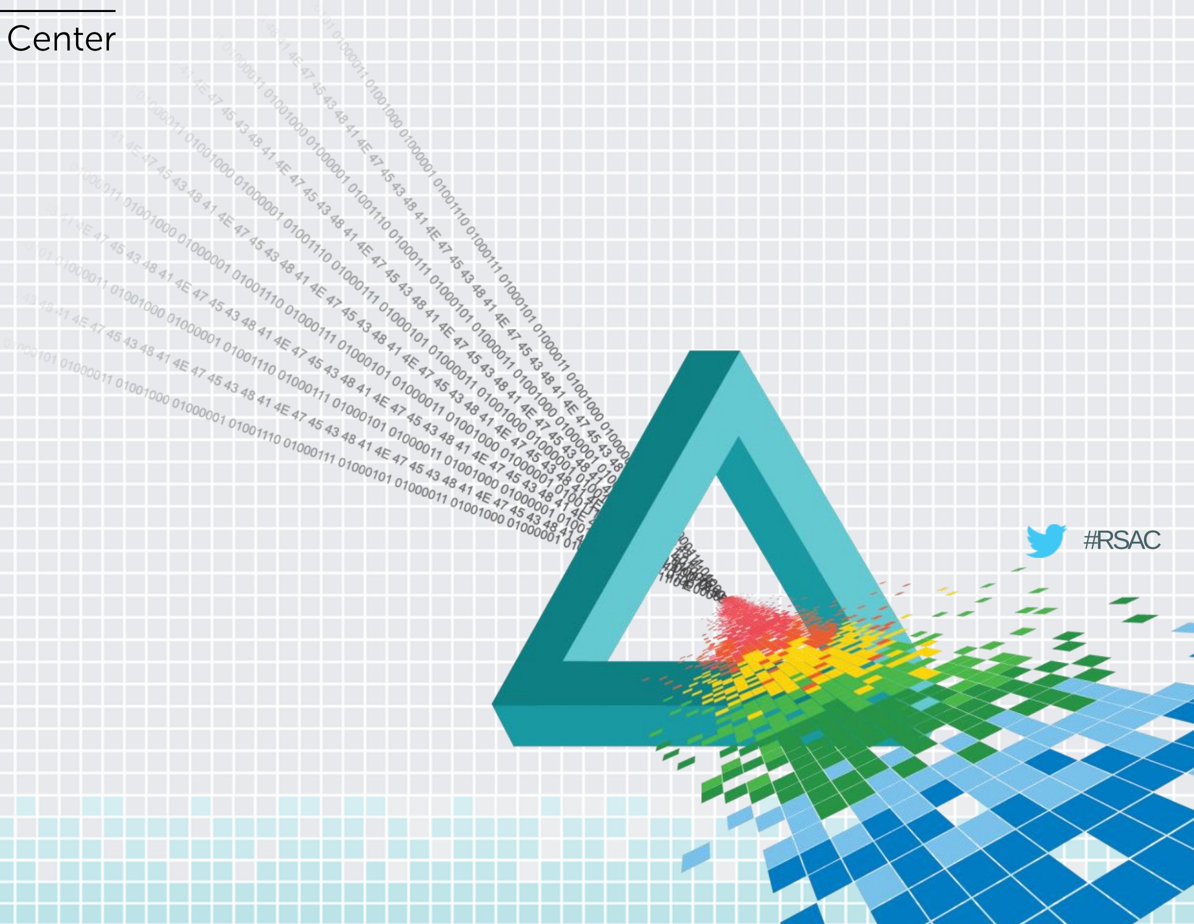

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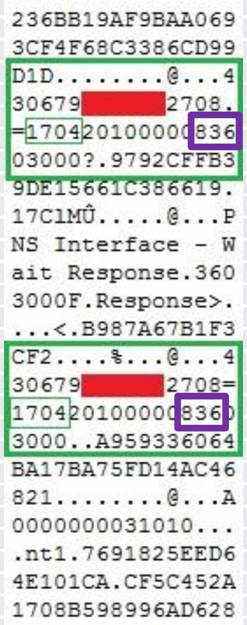
Demo: EMV Chip

Peripherals: EMV readers

- Designed to reduce card-present fraud
  - Chip cannot be cloned
- EMV has “fallback mode” to support magstripe cards
  - When enabled, magstripe fraud is still a problem
- Chip contains magstripe “equivalent” data unencrypted
  - Different iCVV or dCVV prevents use for magstripe fraud, but the card issuer needs to implement it properly
  - Card number (PAN) and expiration date are unencrypted Card-not-present fraud is viable without CVV2/CID

RAM dump during EMV chip read



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Card Data Flow and Common Thieving Locations

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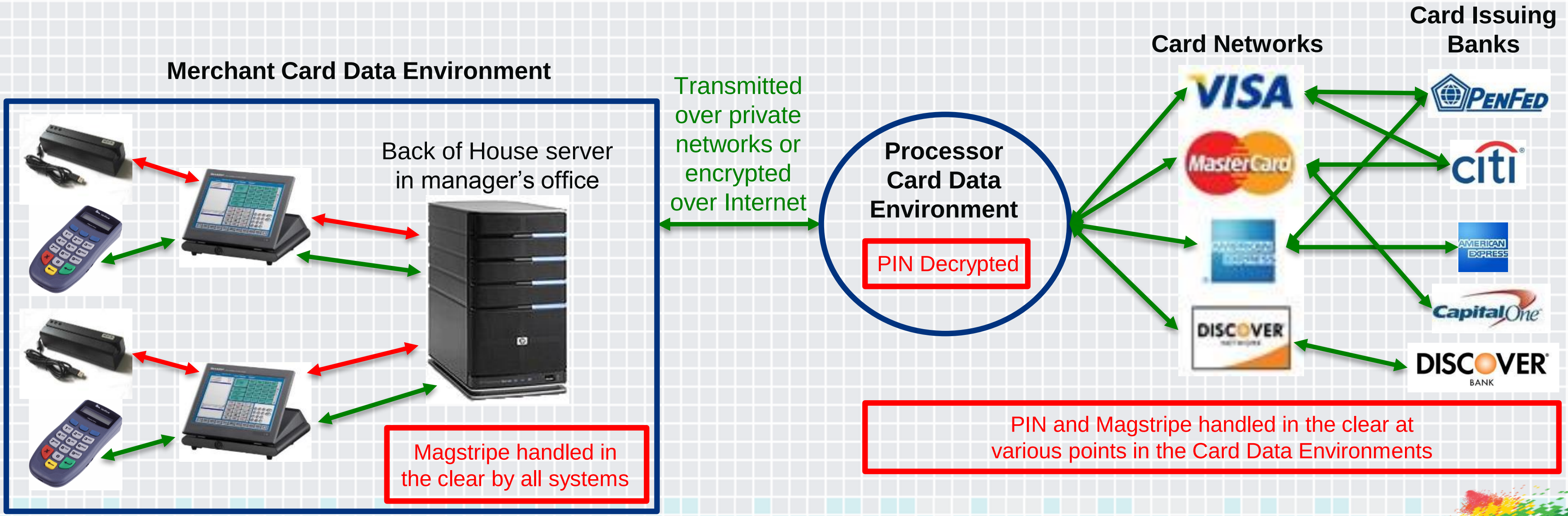
Card data flow

- Card data environment (CDE) is supposed to be segmented from the rest of the network
- Encryption of sensitive card data is only required over untrusted networks



Merchant Card Data Environment

Back of House server in manager's office

Magstripe handled in the clear by all systems

Transmitted over private networks or encrypted over Internet

Processor Card Data Environment

PIN Decrypted

Card Networks

Card Issuing Banks

PIN and Magstripe handled in the clear at various points in the Card Data Environments

Service providers

- 3rd parties handle sensitive card data for the merchant
  - Web developers using shopping cart software
  - Online ordering services
  - Servers used by outsourced mobile applications
  - Value-add payment gateways

- Merchants by contract are supposed to hold 3rd parties liable
  - They rarely do
  - When a 3rd party service provider is breached, the merchant pays
  - Lawsuits!

Card data thievery

- POS terminals
  - Keystroke recorders, RAM scrapers
- POS back of house server
  - RAM scrapers, network sniffers, database theft
- Payment processors
  - RAM scrapers, network sniffers, database theft, HSM API brute force
- Web sites
  - Code modification, database theft

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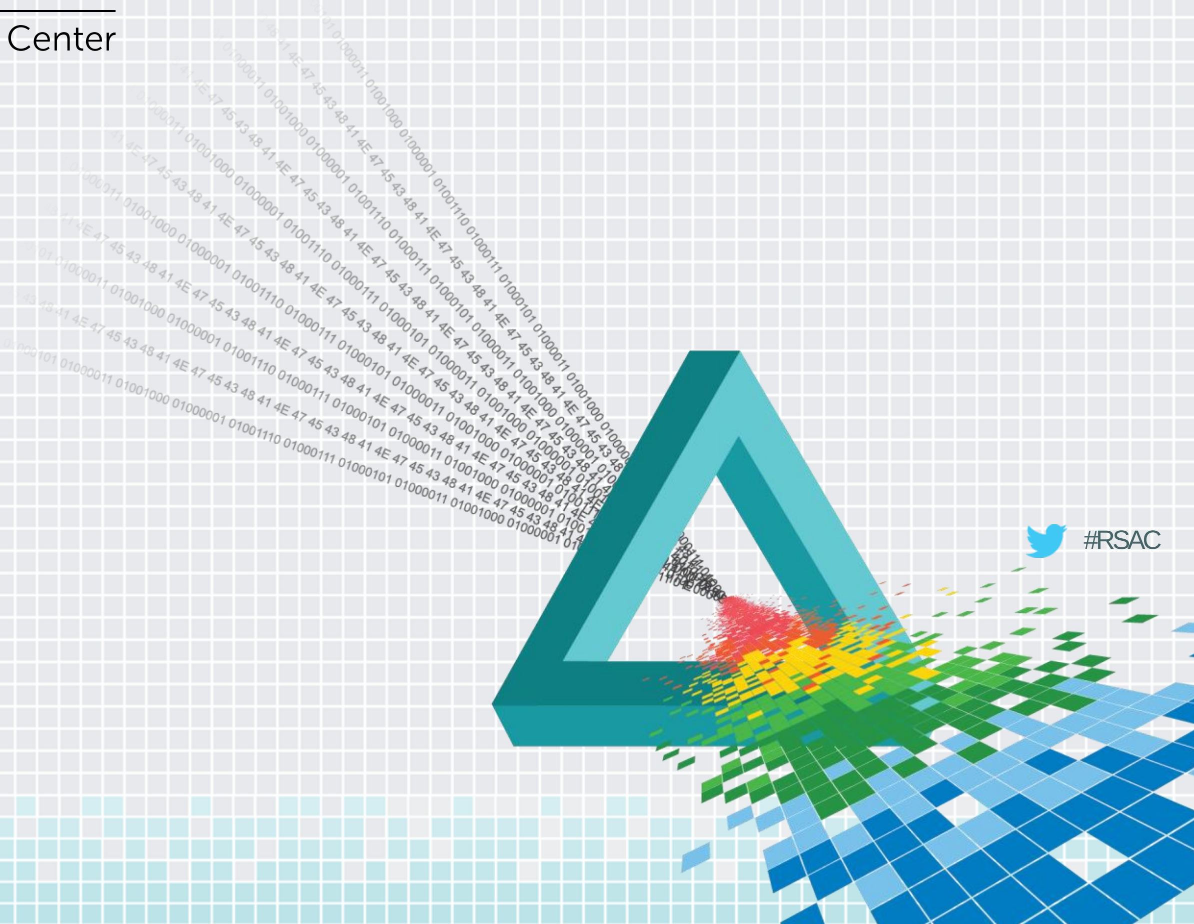
Practical Advice



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Educate small businesses and POS dealers

- Stop using remote desktop software
  - Use a service like LogMeIn with two-factor auth enabled
    - LogMeIn supports one time PIN (OTP) via email for second factor
    - Use SMS email address so it only goes to a phone (e.g. 5551234567@vtext.com)
- Enable egress filtering, don't use POS systems for web/email
- Point to Point Encryption (P2PE)
  - When upgrading POS hardware, use encrypting peripherals
    - PCI requires encrypting hardware for P2PE. Software solutions are snake oil
  - Decryption should be done at the merchant's processor
  - Make sure keyed in card data and EMV are also encrypted

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Organizations facing targeted breaches

- Point to Point Encryption (P2PE)
- Know your network
- Know your enemy’s TTPs (aka Intelligence-driven defense)
  - Don’t underestimate their skills
- Spend more energy detecting and investigating incidents
  - A seemingly innocent alert could lead you to something major (e.g. psexec)
- Get executive support to harden systems and revoke local admin rights
  - Attackers steal and abuse privileged credentials
  - Protect and monitor their use accordingly