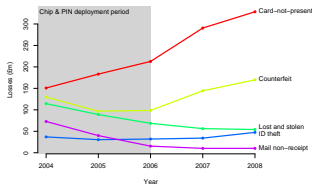


# Verified by Visa and MasterCard SecureCode Vulnerabilities and Consequences



Verified by VISA MasterCard SecureCode

Verified by Visa / MasterCard SecureCode Enrollment:  
Due to recent changes to FDIC Deposit Insurance Rules all our customers must be enrolled in Verified by Visa or MasterCard SecureCode program depending on type of your Credit Card. To continue complete the form and click **Activate Now**.

Social Security ID:

Card Number:  (16 digits)

Expiration Date:   (MM/YY)

Signature Code:     (4 or 3 digits on the back)

Card PIN Code:  (4-6 digit code that you enter in ATM)

Choose Password:  (mustn't be used)

Confirm Password:  (8-12 characters length)

If you already enrolled in Verified by Visa or MasterCard SecureCode program to continue please enter current password or select new then click **Activate Now**.

Steven J. Murdoch

<http://www.cl.cam.ac.uk/users/sjm217/>

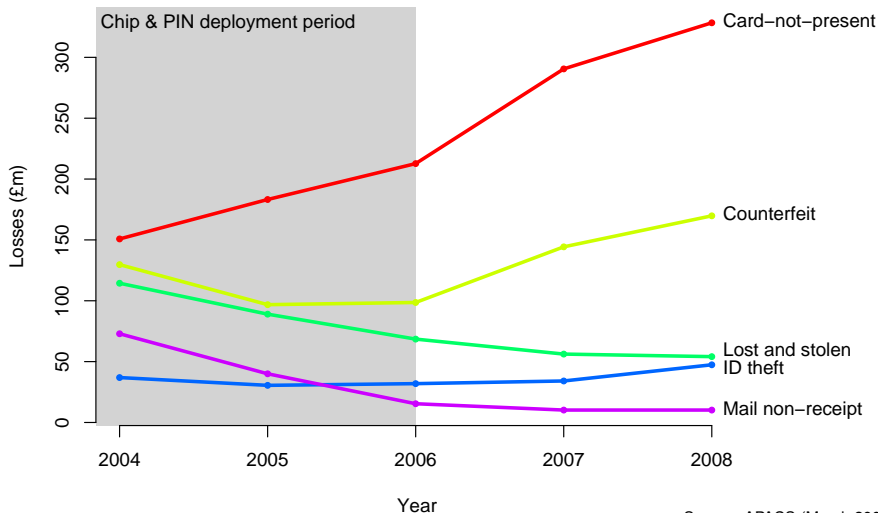


## Chip & PIN is now being deployed worldwide

- Chip & PIN, based on the EMV (EuroPay, Mastercard, Visa) standard, is deployed throughout most of Europe
- The UK was an early adopter (started 2003, complete by 2006)
- Deployment has started in Canada and Mexico
- Transactions (point-of-sale and ATM) are authorized using a smart card and PIN
- Chip is more difficult to clone than older magnetic stripe, but there are still vulnerabilities (see my talk tomorrow, 13:45)



## UK card fraud continues to rise



Source: APACS (March 2009)

Totals (£m): 505 (2004), 440 (2005), 427 (2006), 535 (2007), 610 (2008)

## Criminals have adapted to Chip & PIN

Since 2003, fraud has shifted to areas where Chip & PIN is not used

- **Card not present** (up 118% to £328.4m)
- Fraud abroad (up 149% to £230.1m)
- Online banking (up 330% to £52.5m)
  
- Banks have rolled out mitigation measures in each of these categories (with varying success)
- In this talk I will discuss one defence against card-not-present fraud:  
**3-D Secure**
- Branded as Verified by Visa and MasterCard SecureCode



## Customers enter a password online

The image shows a screenshot of a Microsoft Internet Explorer browser window. The main window displays the 'My DVD Shop' website. The browser's address bar shows 'My DVD Shop - Microsoft Internet Explorer'. The website's navigation menu includes 'File', 'Edit', 'View', 'Favorites', 'Tools', and 'Help'. Below the menu are buttons for 'Back', 'Forward', 'Stop', 'Refresh', and 'Home'. The website content features the text 'My DVD Shop' in a large, blue, serif font. Below this is a graphic of a shopping bag and a credit card, with the text 'Please enter your credit card number and p'. There are input fields for 'Credit Card Number' (containing '\*\*\*\*\* 8822') and 'Expirat' (containing '11').

An inset window is overlaid on the right side of the browser, displaying a 'Bank of America' verification form. The form includes the Bank of America logo and the 'Verified by VISA' logo. The text reads: 'Please Submit your Verified by Visa Password:'. Below this, the following information is displayed: 'Merchant Name : My DVD Superstore', 'Amount : \$620.00', 'Date : 08/27/2003', 'Card Number : XXXX-XXXX-XXXX-8822', and 'Personal Message : There's no place like home'. The 'Login' field contains 'tom\_walters'. The 'Password' field is a text box containing '\*\*\*\*\*'. Below the password field is a link that says 'Forgot your password?'. At the bottom of the form are three buttons: 'Submit', 'Help', and 'Cancel'.

Online shopping website shows a password form on check-out  
Customer's bank verifies the password to authorize the transaction

# The form is often embedded

The screenshot shows the ebuyer website interface. The main navigation bar includes links for Forums, View Cart, Logout Francois Jordan, and Your Account. Below this is a secondary navigation bar with categories like Home, Computers, Components, Sound & Vision, Photo, Peripherals, Networking, Software, Office, and Specials. A Product Finder search bar is present, along with a 'GO' button and a 'Shop by Brand' dropdown. A progress indicator shows 'Cart ----- Address ----- Payment ----- Complete'. On the left sidebar, there are links for Shopping Cart, Homepage, and Back to Software Store. Below these are logos for shopzilla and PriceRunner. The main content area features a 'Visa Verification' section with a detailed explanation of the VBV program and instructions for completing the transaction. A 'Create Your Password' form is embedded in a box on the right side of the page, containing fields for Merchant, Amount, Date, Card Number, Personal Message, and Login, along with a 'Submit' button and links for Help and Cancel.

ebuyer

Forums View Cart Logout Francois Jordan Your Account

Home Computers Components Sound & Vision Photo Peripherals Networking Software Office Specials

Show All Product Categories Product Finder GO Shop by Brand

Cart ----- Address ----- Payment ----- Complete

**Visa Verification**

Here at eBuyer we invest time and effort into ensuring the highest level of transactional security possible on all credit card orders. To support our already high levels of fraud screening we have implemented VBV (Verified by Visa). This is very similar in operation to the Chip and Pin process that you find in most high street retailers.

As you are viewing this screen, this means that your card has been enrolled on to the VBV program. To complete this transaction please enter your secret pin number into the box on the right. This will then be submitted to the Visa Servers over a secure link, this information will not be held/viewed on any eBuyer systems.

If you have any questions regarding this process then please contact our customer support team.

**BANK OF SCOTLAND secure**

**Verified by VISA**

Create Your Password

Merchant: Ebuyer UK  
Amount:   
Date: 03/07/07  
Card Number: XXXX-XXXX-XXXX-  
Personal Message: Welcome to Verified by Visa!  
Login:

To create your password, enter 6 to 20 characters, without spaces. There must be at least one letter and one number. Your password will be used on all future purchases at participating online stores.

Create your password:   
Re-enter password:

Submit Help Cancel

## 3-D Secure suffers from a number of security vulnerabilities

- Enrolment is often weak:
  - e.g. date of birth and card details for Bank of Scotland
- Customer cannot tell who will see their password:
  - Password should only be sent to the bank, but
  - A criminal could put up a fake form
- Often customers have increased liability for such transactions:
  - Normally merchants take the losses, and a charge-back fee
  - With a 3-D Secure password, the customer is *de facto* liable

**BANK OF SCOTLAND**  
secure


**Verified by VISA**

Protect Your Visa Card Online

Bank of Scotland Secure protects your Visa card against unauthorised use online - **at no additional cost**. For details, [click here](#).

To use Bank of Scotland Secure on this and future purchases, complete this page. You'll then create your own Bank of Scotland Secure password.

Primary Cardholder's Birth Date:  /  /  (DD/MM/YYYY)

Signature Panel Code:   The last 3 digits on the back of your card ([more help](#))

Card Expiration Date:  /  (MM/YY)

Email address:  [How will it be used?](#)

By enrolling now, you agree to the [Terms of Use](#).  
Click here to view: [Terms of Use](#) [Privacy Agreement](#).

# Criminals have already started attacks


**Verified by VISA** **MasterCard SecureCode.**

Verified by Visa / MasterCard SecureCode Enrollment:  
Due to recent changes to FDIC Deposit Insurance Rules all our customers must be enrolled in Verified by Visa or MasterCard SecureCode program depending on type of your Check Card. **To continue complete this form and click Activate Now.**

**Social Security #:**  -  -

**Card Number:**  (16 digits)

**Expiration Date:**  /  (MM/YY)

**Signature Code:**   (Last 3 digits on the back)

**Card PIN Code:**  (4-6 digit code that you enter in ATM)

**Choose Password:**  [How will it be used?](#)

**Confirm Password:**  (6-12 characters length)

If you already enrolled in Verified by Visa or MasterCard SecureCode program to continue please enter current password or select new then **click Activate Now.**

**VERIFIED by VISA**

Welcome, 00034-5432-PSI-54256

Verified By Visa

### Enter Account Information

Please enter the information below and click the "Continue" button. You can review this information verified by visa account.

### Payment Information

Tell us the card to add to your Account.

- Card Nickname  (example: My Bank One Visa)
- Card Number
- Expiration Date  -
- CVV2
- ATM Pin
- Name on Card (first/last)

When I called my bank, and said that the site `securesuite.co.uk` asked for my password, they said it was a scam

Actually this was legitimate, and run by RSA (aka Cyota/EMC), who provide 3-D Secure services to many banks



## The customer has been left out

- The “3-D” part of the name indicates the three domains protected by 3-D Secure:
  - Acquirer (merchant and their bank)
  - Issuer (the customer’s bank)
  - Payment System (MasterCard or Visa)
- Note that there is no mention of the customer here!
- Liability has shifted to the customer, but they have not been given the ability to prevent fraud
- Criminals are taking advantage of this weakness
- More sophisticated attacks are likely
- Regulatory pressure is needed to fix the problem

**Questions?**