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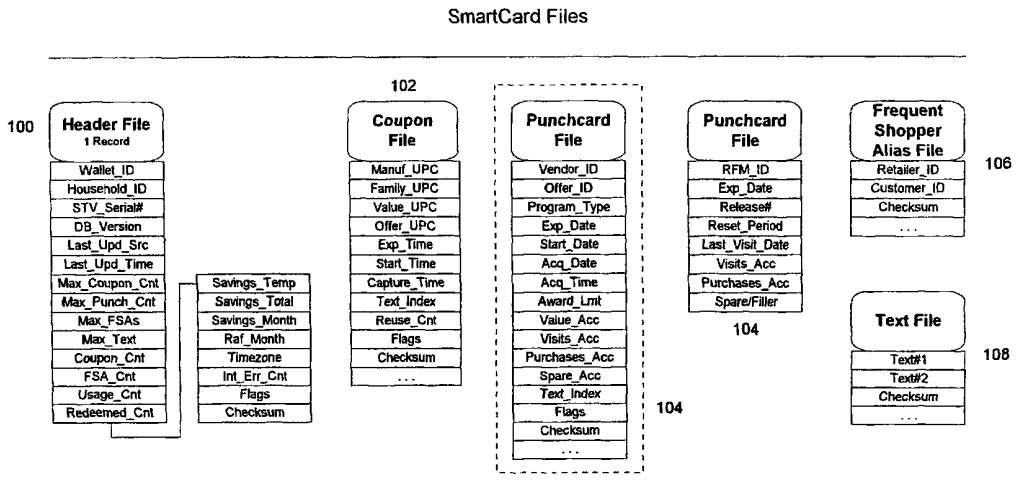
(54) Title: SMART CARD DATABASE



(57) Abstract: The invention comprises a file structure for a smart card used to conduct promotions, such as coupons and loyalty programs. In particular, the smart card can be read from or written to by a wireless device, which may receive data for the promotion through a wireless medium. The promotion is conducted by a consumer who presents the smart card at point of sale.

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SMART CARD DATABASE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to the field of smart cards. In particular, the invention relates to a file structure employed in smart cards for facilitating commercial transactions.

Description of the Related Art

Traditionally, coupons are represented and redeemed by printed matter, which may appear in newspapers or other publications. Likewise, consumer loyalty programs are administered by use of physical punchcards. There are inherent limitations in the use of printed materials for coupons or loyalty programs which render them inadequate for the age of digital transactions. For instance, printed coupons do not allow for one-to-one marketing, as they demand substantial time and cost to print and deliver to the potential user. Moreover, printed coupons and loyalty punch cards are cumbersome to handle.

Smart cards have been proposed as a medium for facilitating promotions such as coupons and loyalty programs. The ubiquity of handheld wireless appliances allows the smart cards to include promotional data transmitted to the wireless unit. This creates an unprecedented opportunity for one-to-one marketing. As such, there is a need for a file structure on such smart cards to facilitate promotions received from wireless units.

SUMMARY OF THE INVENTION

The invention comprises a file structure for a smart card used to conduct promotions, such as coupons and loyalty programs. In particular, the smart card can be read from or written to by a wireless device, which may receive data for the promotion through a wireless medium. The promotion is conducted by a consumer who presents the smart card at point of sale.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 illustrates a file architecture for a smart card supporting promotions according to an embodiment of the invention.

A. System Overview

The present invention comprises a file structure that enables smart cards to support commercial promotions, including but not limited to coupons and loyalty programs. The smart card may be redeemed at a point of sale, such as in a supermarket, to redeem coupons or loyalty points. In embodiments of the invention, the smart card may also be accessed by a portable device which may read from or write to the card. Such a device may also be referred to as an electronic "wallet." The wallet may also receive data via a wireless connection, such as a wireless phone transmission, or a wireless optical signal from a monitor, as described in U.S. Patents 5,594,493, 5,767,896, 5,880,769, 5,907,350, all of which are herein incorporated by reference in their entirety

In embodiments of the invention, the file structure may include the following files:

- Header File 100. This file contains information pertaining to the card as a whole. It is a transparent (i.e., binary) file and comprises one record.
- Coupon File 102. This file contains coupon records. It is transparent. The number of records in the file depends on the amount of memory available on the card.
- Punchcard File 104. This file contains punchcard (loyalty program) records. Like the coupon file, it is transparent and its size depends on available memory.
- Frequent Shopper Alias (FSA) File 106. This file contains frequent-shopper alias records. It is a transparent file. Its size also depends on available memory.

- Text File 108. This file contains display text records for those manufacturers not represented in the Wallet's Flash-based manufacturers profiles database. It is transparent and its size depends on the amount of memory available on the card.
- Secret Key File. This file contains 4 double length secret keys. These keys are not currently assigned to a specific file access regimen.
- Serial Number File. This file contains an 8 byte serial number.

These files shall be described in greater detail infra.

B. File Organization

All files described are elementary (data) files that reside within the same dedicated (directory) file. This dedicated file lies just beneath a master file. In embodiments of the invention, the other files are all fixed-length and are created during the manufacture process. In a non-limiting embodiment of the invention, the files may have identifiers. As an example, these identifiers may be:

2B00 Directory
2080 Secret Key File
2B02 Header File
2B03 Coupon File
2B04 Punchcard File
2B05 FSA File
2B06 Text File
2B08 Serial Number File.

C. File Contents

The contents of the individual files are described herein.

Header File

In an embodiment of the invention, the header file 100 includes a single record comprising the following fields:

- Wallet ID. 4 bytes.
- Household ID. 8 bytes.
- Serial Number. 8 bytes.
- Database Version. 1 byte.
- Last Update Source. 2 bytes.
- Last Update Time. 3 bytes.
- Maximum Coupon Count. 2 bytes.
- Maximum Punchcard Count. 2 bytes.
- Maximum FSA record Count. 2 bytes.
- Maximum Text record Count. 2 bytes.
- Current Coupon Count. 2 bytes.
- Current Punchcard Count. 2 bytes.
- Current FSA record Count. 2 bytes.
- Card Usage Count. 2 bytes.
- Total Coupons Redeemed. 2 bytes.
- Total Savings Accumulator. 4 bytes.
- Monthly Savings Accumulator. 4 bytes.
- Temporary Savings Accumulator. 4 bytes.
- Reference Month. 1 byte.
- Timezone. 1 byte.
- Internal Error Counter. 2 bytes.
- Flags. 1 byte
- Spare Bytes 39 bytes.

- Checksum. 2 bytes.

  Total file size = 100 bytes.

Coupon File

In an embodiment of the invention, the coupon file 102 includes records with the following format:

- UPC Manufacturer Code. 5 bcd digits.
- UPC Family Code. 3 bcd digits.
- UPC Value Code. 2 bcd digits.
- UPC Offer Code. 5 bcd digits.
- Expiration Time. 3 bytes.
- Start Time. 3 bytes.
- Capture Time. 3 bytes.
- Text File Index. 1 byte.
- Reuse Counter. 1 byte.
- Flags. 1 byte.
- Checksum. 2 bytes.

  Total record size = 22 bytes.

Punchcard File

In embodiments of the invention, the punchcard file 104 includes records with the following format:

- RFM ID. 8 bcd digits.
- Expiration Date. 2 bytes
- Release Number. 1 byte.
- Reset Period. 1 byte.
- Days Since Last Visit. 1 byte.
- Purchases Accumulator. 2 bytes.
- Visits Accumulator. 1 byte.
- Spare/Filler. 4 bytes

Total record size = 16 bytes.

FSA File

In embodiments of the invention, the FSA file 106 contains records with the following format:

- Retailer ID. 2 bytes.
- Customer ID. 8 bytes.
- Checksum. 2 bytes.

Total record size = 12 bytes.

Text File

In embodiments of the invention, each text record 108 has the following format:

- Text Line #1. 20 bytes.
- Text Line #2. 20 bytes.
- Checksum. 2 bytes.

Total record size = 42 bytes.

Secret Code File

The size of this file is controlled by the card manufacturer.

Secret Key File

The size of this file is 64 bytes containing 4 double length keys.

Serial Number File

This file comprises a single 8 byte serial number.

D. Access Methods

In preferred embodiments of the invention, files are accessed via secret codes (sometimes called PINs) as opposed to secret keys. Other embodiments utilize secret keys, and include a Secret Key file. In embodiments of the invention, codes presented to the card will be transmitted in the clear (not encrypted). This avoids the placement of cryptographic software in the wallet. In alternative embodiments, codes are presented to the card in encrypted format, and wallets include DES or other cryptographic software.

In some embodiments, the code for read-access is the same for all files, while the code for update-access is the same for all files, but different than the read-access code. There is no need for a code for write-access, as it is not needed for file creation. In embodiments of the invention, the secret codes are based upon diversification of a code derived from a scrambling of the card's serial number. Other embodiments for generating such codes will be apparent to one skilled in the art. Each serial number is unique and is created during the manufacture process. This serial number is generally distinct from the serial number assigned by the microprocessor manufacturer. The serial number can always be read in the clear.

E. File Sizes

In embodiments of the invention, the size of the Secret Code File and the Header File 100 are fixed. All other files may grow or shrink, depending on the amount of smartcard memory available. Non-limiting scenarios include:

- 1 Kbyte available, excluding Header and Secret Code, Secret Key, and Serial Number Files.
- Coupon File 102: 30 records for a total size of 660 bytes.
- Punchcard File 104 : 10 records for a total size of 160 bytes

- FSA File 106: 4 records for a total size of 48 bytes.
- Text File 108: 3 records for a total size of 126 bytes.

A total of 994 bytes for these 4 files.

- 2 Kbytes available, excluding Header and Secret Code, Secret Key, and Serial Number Files.

Coupon File 102`: 60 records for a total size of 1320 bytes.

Punchcard File 104: 20 records for a total size of 320 bytes.

FSA File 106: 8 records for a total size of 96 bytes.

Text File 108: 6 records for a total size of 252 bytes.

A total of 1988 bytes for these 4 files.

- 3 Kbytes available, excluding Header and Secret Code, Secret Key, and Serial Number Files.

Coupon File 102 : 90 records for a total size of 1980 bytes.

Punchcard File 104: 30 records for a total size of 480 bytes.

FSA File 106: 12 records for a total size of 144 bytes.

Text File 108: 9 records for a total size of 378 bytes.

A total of 2982 bytes for these 4 files.

- 4 Kbytes available, excluding Header and Secret Code, Secret Key, and Serial Number Files.

Coupon File 102: 120 records for a total size of 2640 bytes.

Punchcard File 104: 40 records for a total size of 640 bytes.

FSA File 106: 16 records for a total size of 192 bytes.

Text File 108: 12 records for a total size of 504 bytes.

A total of 3976 bytes for these 4 files.

F. Conclusion

The foregoing description of various embodiments of the invention has been presented for purposes of illustration and description. It is not intended to limit the invention to the precise forms disclosed. Many modifications and equivalent arrangements will be apparent.

CLAIMS

What is claimed is:

1. A file structure for a smart card, wherein the smart card is associated with an electronic wallet, the electronic wallet including a wireless handheld device adapted to read from and write to the smart card, the file structure comprising:

a header file, the header file including an a first record, the first record identifying the electronic wallet.

2. The file structure of claim 1, wherein the first record has a size of four bytes.

3. The file structure of claim 1, wherein the header file further includes a second record, the second record identifying a household corresponding to the electronic wallet.

4. The file structure of claim 3, wherein the second record has a size of eight bytes.

5. The file structure of claim 3, wherein the header file includes a third record, wherein the third record contains a serial number.

6. The file structure of claim 5, wherein the third record has a size of eight bytes.

7. The file structure of claim 6, wherein the header file includes a fourth record, wherein the fourth record indicates a current coupon count for the smart card.

8. The file structure of claim 7, wherein the fourth record has a size of two bytes.

9. The file structure of claim 7, wherein the header file includes a fifth record, wherein the fifth record indicates a number of the total coupons redeemed by use of the smart card.

10. The file structure of claim 9, wherein the fifth record has a size of two bytes.

11. The file structure of claim 10, wherein the file structure includes a sixth record, such that the sixth record indicates a total monetary amount saved by use of the card.

12. The file structure of claim 11, wherein the sixth record has a size of four bytes.

13. The file structure of claim 11, wherein the file structure includes a seventh record, such that the seventh record indicates a time zone.

14. The file structure of claim 13, wherein the seventh record has a length of 1 byte.

15. The file structure of claim 13, wherein the file structure includes an eight record, such that the eight record has a checksum.

16. The file structure of claim 15, wherein the eight record has a size of two bytes.

17. A file structure for a smart card, wherein the smart card is associated with an electronic wallet, the electronic wallet including a wireless handheld device adapted to read coupon data from the smart card and may write coupon data to the smart card, the file structure comprising:

a coupon file, the coupon file including

a first record containing a UPC Manufacturer code for a coupon on the wallet.

a second record containing a UPC Family code for a coupon

18. The file structure of claim 17, wherein the coupon file further includes

a third record containing a UPC Value code for a coupon.

19. The file structure of claim 18, wherein the coupon file further includes a fourth record containing a UPC Offer code for a coupon.

20. The file structure of claim 19, wherein the coupon file further includes a fifth record containing an expiration time for a coupon.

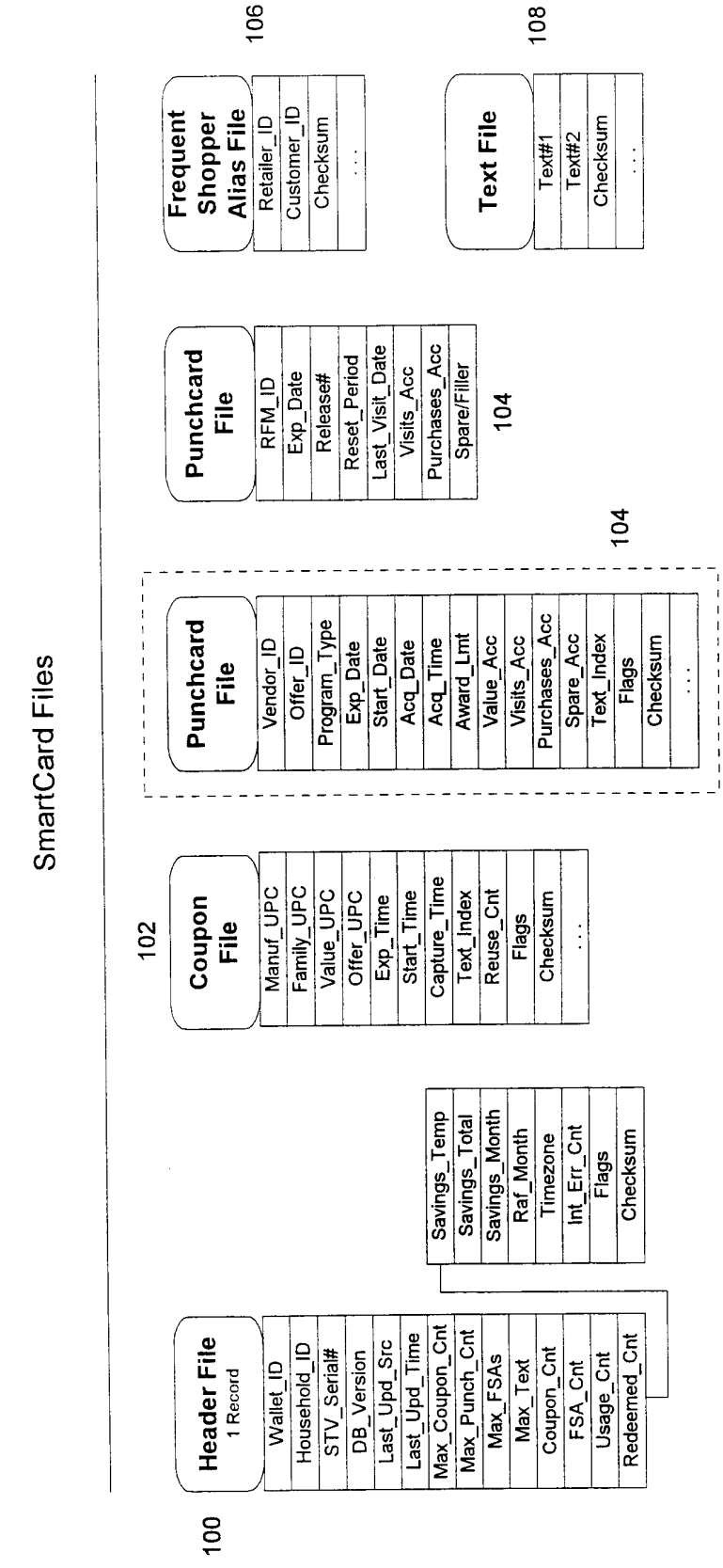
SmartCard Files
100
Header File
1 Record
Wallet_ID
Household_ID
STV_Serial#
DB_Version
Last_Upd_Src
Last_Upd_Time
Max_Coupon_Cnt
Max_Punch_Cnt
Max_FSAs
Max_Text
Coupon_Cnt
FSA_Cnt
Usage_Cnt
Redeemed_Cnt
Savings_Temp
Savings_Total
Savings_Month
Raf_Month
Timezone
Int_Err_Cnt
Flags
Checksum
102
Coupon File
Manuf_UPC
Family_UPC
Value_UPC
Offer_UPC
Exp_Time
Start_Time
Capture_Time
Text_Index
Reuse_Cnt
Flags
Checksum
...
104
Punchcard File
Vendor_ID
Offer_ID
Program_Type
Exp_Date
Start_Date
Acq_Date
Acq_Time
Award_Lmt
Value_Acc
Visits_Acc
Purchases_Acc
Spare_Acc
Text_Index
Flags
Checksum
...
104
Punchcard File
RFM_ID
Exp_Date
Release#
Reset_Period
Last_Visit_Date
Visits_Acc
Purchases_Acc
Spare/Filler
106
Frequent Shopper Alias File
Retailer_ID
Customer_ID
Checksum
...
108
Text File
Text#1
Text#2
Checksum
...

FIG. 1

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/23455

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G07F7/08 G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G07F G06F G06K G07G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	US 5 834 756 A (GUTMAN JOSE ET AL) 10 November 1998 (1998-11-10) abstract column 8, line 64 -column 10, line 48 ---	1,3,5
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
17 January 2001	24/01/2001

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Int ational Application No
PCT/US 00/23455

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 5 880 769 A (MORRIS JOHN C ET AL) 9 March 1999 (1999-03-09) cited in the application abstract; figures 1,3,4 column 2, line 45 - line 65 column 5, line 56 -column 7, line 3	7,17
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4

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