APPARATUS, METHOD AND SYSTEM FOR FACILITATING PAYMENT OF MONETARY TRANSACTIONS

FIELD OF THE INVENTION

The present invention relates to cards used to provide payment for monetary transactions. In particular, but not exclusively, the present invention relates to an apparatus, system and method for facilitating payment of monetary transactions using a card device which stores money in a digital format.

BACKGROUND TO THE INVENTION

Most currencies around the world utilise coins for their smaller denominations of currency. Consequently, people will generally carry both notes and coins to provide payment for cash transactions or as a result of receiving change following payment. As such, wallets and purses have been designed to allow a user to carry currency in the form of both notes and coins. However, it is generally a nuisance to carry coins as they often fall out and become lost, or can become too bulky in large amounts which will result in the wallet/purse deforming in shape.

To avoid the need to carry coins, many people now rely on the use of a debit card or credit card for purchases which will ensure that the exact amount can be paid with no change required. However, there are often times when coins are still required, such as for parking ticket machines or vending machines which may only accept payment via coins. To date, there has not

yet been an effective solution which provides a means for eradicating the need to carry coins for all required purposes.

There have also been many cash cards developed in an attempt to alleviate the need to carry cash around. However, these cash cards have presented a number of card processing infrastructure problems which have failed to solve the pitfalls of making cash cards a cost-effective and simple alternative to using cash or debit/credit cards. Though the cash cards are processed using existing ATM and EFTPOS network systems, they are still exposed to considerable surcharges charged by the merchants. In addition, use of these cash cards is often merchant bound, restricted to certain retail outlets or franchise groups.

In this specification, the terms "comprises", "comprising" or similar terms are intended to mean a non-exclusive inclusion, such that a system and/or apparatus that comprises a list of elements does not include those elements solely, but may well include other elements not listed.

OBJECT OF THE INVENTION

It is a preferred object of the present invention to provide an apparatus, method and/or system for facilitating payment of monetary transactions using a card device which stores money in a digital format that addresses or at least ameliorates one or more of the aforementioned problems of the prior art.

It is a preferred object of the present invention to provide an apparatus, method and/or system for facilitating payment of monetary

transactions which is rechargeable with further monetary amounts and allows a balance of a transaction to be credited to the card device.

SUMMARY OF THE INVENTION

Generally, embodiments of the present invention relate to an apparatus, method and system for facilitating payment of a monetary transaction.

According to one aspect, although not necessarily the broadest or only aspect, embodiments of the present invention reside in an apparatus for facilitating payment of monetary transactions comprising:

a card device configured to store a plurality of discrete monetary values, the card device comprising a microchip for storing encrypted information including a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations and a denomination non-specific balance;

wherein the card device is rechargeable with further monetary amounts and allows a balance of a transaction to be credited to the card.

Preferably, the payment is by cash.

Preferably, the payment is by the card device.

Preferably, the plurality of digital notes and/or digital coins is/are stored in a digital format as follows: [Issuer] [Currency] [Denomination] [Serial Number] [Issuer Signature].

Preferably, the encrypted information includes one or more of the following: unique identification code; secret key; private key; cash balance;

user signature.

Suitably, the microchip stores at least one asymmetric key for authentication and verification of the card device.

Suitably, a first asymmetric key is a secret key.

Suitably, a second asymmetric key is a public key.

Suitably, the card device is recharged at a recharge terminal or at a card issuer.

Preferably, the recharge terminal allows the user to select one or more of the plurality of selectable digital coins and/or digital notes to be dispensed from the recharge terminal in the form of cash.

According to another aspect, although again not necessarily the broadest aspect, embodiments of the present invention reside in a method for facilitating payment for monetary transactions including:

reading at a point of sale a card device having a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations;

encrypting and transferring a plurality of transaction data associated with the monetary transaction to a server in communication with the point of sale;

interrogating a database of the server to verify details of the transaction; and

processing the transaction to debit and/or credit the card device.

Preferably, the plurality of transaction data comprising one or more of the following: a location of a point of sale; a card reader ID; an unique

identification code for the transaction.

Preferably, the method including reading the card device via a computational device.

Preferably, the method including storing the plurality of transaction data on an internal storage device of the computational device.

Preferably, the method including transferring the plurality of transaction data from the internal storage device to an external storage device in communication with the computational device.

Preferably, the method including automatically transferring the plurality of transaction data from the internal storage device to a nominated bank for transaction verification and fund clearance via a communications network.

Preferably, the method including manually transferring the plurality of transaction data from the external storage device to a nominated bank for transaction verification and fund clearance.

According to another aspect, although again not necessarily the broadest aspect, embodiments of the present invention reside in a computer-implemented method for facilitating payment of monetary transactions, the computer-implemented method including:

implementing computer readable program code components configured to cause reading at a point of sale a card device having a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations at a point of sale; and

implementing computer readable program code components configured to cause encrypting and transferring a plurality of transaction

data associated with the monetary transaction to a server in communication with the point of sale;

implementing computer readable program code components configured to cause interrogating a database of the server to verify details of the transaction; and

implementing computer readable program code components configured to cause computer readable program code components configured to cause processing the transaction to debit and/or credit the card device.

According to another aspect, although again not necessarily the broadest aspect, embodiments of the present invention reside in a system for facilitating payment of monetary transactions comprising a card device and a computational device coupled to be in communication with a server via a communications network, the server comprising a database and account system for processing and managing at least one transaction using a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations stored on the card device.

Preferably, the computation device processes the transaction to debit and/or credit the card device.

Preferably, the computational device is in the form of a card reader.

Preferably, the computational device comprises an internal storage device for storing a plurality of transaction data associated with the transaction.

Preferably, the computation device is in communication with an external storage device for receiving and storing the plurality of transaction data from the internal storage device.

Preferably, the card device is rechargeable with further monetary amounts and allows a balance of a transaction to be credited to the card device.

Further features and forms of the present invention will become apparent from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

By way of example only, preferred embodiments of the invention will be described more fully hereinafter with reference to the accompanying drawings in which like features have like reference numerals, wherein:

Fig 1 is an apparatus for facilitating payment of monetary transactions according to embodiments of the present invention;

Fig 2 is a system for facilitating payment of monetary transactions according to embodiments of the present invention; and

Fig 3 is a method for facilitating payment of monetary transactions according to embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the present invention will be described with reference to the apparatus, method and system for facilitating payment of monetary transactions using a card device which stores money in a digital format. However, it should be appreciated that embodiments of the present invention can be used to provide payment for a range of different applications, such as EFTPOS payments, automated pay stations, vending machines, self-serve pay stations, parking meters and the like. It will be appreciated that variations need to be made as required. It is envisaged that the infrastructure for the present invention will be able to be implemented without disturbing or undermining the current networking systems to create a complimenting product and business mechanism. It will be acknowledged that different versions of the system and/or apparatus will be provided to suit different financial transaction systems in each country. However, it is envisaged that the card device will be accepted internationally.

Referring to FIG 1, the apparatus 100 for facilitating payment of monetary transactions is provided in accordance with embodiments of the present invention. The apparatus 100 comprises a card device 110 preferably comprising an integrated circuit or microchip, which can be used as a cash card, e-wallet or smart card for various payments. However, other suitable forms of the card device 110 can also be utilised.

The card device 110 is issued by a card issuer 400, such as a bank or other suitable financial institution. Preferably, one bank is responsible for issuing the card device 110 and responsible for holding and clearing all

funds. All participating banks will fall under one umbrella, governed by a central general ledger database system and central general ledger account system. In further embodiments of the present invention, the supply and management of the card device 110 can be provided by any other suitable service provider. The card issuer 400 will have an issuer code 410 which can be an IBAN (international bank account number) or Swift Code or any other code capable of identifying the card issuer 400. Preferably, the card device 110 is associated with at least one bank account. The bank account is a nominated account which can be an existing account or a new bank account. The card issuer 400 will charge a service fee for providing the services and apparatus, preferably a flat fee.

Each card device 110 has a UID (Unique Identification Code) 111 that identifies the card device 110 to banks, financial institutions, merchants, vending machines and other organisations or facilities where the card device 110 is used. The card device 110 comprises at least one asymmetric key, shown in Figure 3, attributed to the card device 110 which is managed by the card issuer. These asymmetric keys function as authentication codes which are verifiable by signal coordination so that the card device 110 will be accepted by EFTPOS facilities and other merchant payment systems. According to a preferred embodiment, a first asymmetric key is a Secret Key (SK) 510 and a second asymmetric key is a Public Key (PK) 520. The UID 111 and SK 510 are encrypted so that they can only be accessed and managed by the card issuer. The UID 111 can also be encrypted with a second secret key (K2) which is managed by the issuer and stored at a

central database utilising a secure encryption method such as RSA so that the UID 111 will remain hidden and will only be readable by a computational device having an appropriate decryption key.

As detailed below, the user's signature is also encrypted in the card device 110 with the secret key, generated via a digital signature algorithm. Preferably, the signature pattern can be electronically identified by using an electronic signature pad or the like which allows the user to provide their signature without it being seen by the merchant or sales person. Preferably, the format of the card device 110 is as follows:

[issuer Code] [encrypted UID] [issuer's signature]

[Cash Balance]

[Issuer] [Currency] [Denomination] [Serial Number] [Issuer Signature]
[Issuer] [Currency] [Denomination] [Serial Number] [Issuer Signature]
...
[Issuer] [Currency] [Denomination] [Serial Number] [Issuer's Signature]

The card device 110 comprises a plurality of selectable digital notes 120 and/or a plurality of selectable digital coins 130. Preferably, the digital notes 120 and digital coins 130 are associated with a plurality of selectable denominations. For example, Australian currency would have digital notes 120 in denominations including one hundred, fifty, twenty, ten and five dollar denominations and digital coins 130 in two dollar, one dollar, fifty cent, twenty cent, ten cent and five cent denominations. Preferably, a preset

amount of each denomination will be provided to amount to a maximum limit of the card device 110 and the float amount of each denomination will be adjusted upon making a payment or dispensing of the digital notes 120 and/or digital coins 130 or having a balance for a transaction credited to the card device 110. Each digital coin 120 and/or digital coin 130 is encrypted with the user's secret key so that it can be tracked whether it is stored on the card device 110, located within a computational device or in the process of being transferred. Each digital note 120 and digital coin 130 is stored in a digital format as follows: [Issuer] [Currency] [Denomination] [Serial Number] [Issuer Signature]. Some examples of digital notes 120 and coins 130 are:

issuerCode USD 100 SN1000000000001 signature
issuerCode USD 100 SN1000000000002 signature
...
issuerCode USD 20 SN1000000010003 signature
issuerCode USD 20 SN1000000010004 signature
...
issuerCode USD 10 SN1000000020005 signature
issuerCode USD 10 SN1000000020006 signature
...
issuerCode USD 5 SN1000000005007 signature
issuerCode USD 5 SN1000000005008 signature
...
issuerCode USD 2 SN1000000008009 signature
issuerCode USD 2 SN1000000008010 signature

The card device 110 is assigned a maximum limit to the amount of money which can be stored on the card device 110 at any time. For example,

the maximum card amount is five hundred dollars. This limit is variable by the card issuer 400. Preferably, the card device 110 will be provided with a number of options for the prescribed maximum limit so that a person can obtain a card device 110 which is most suited to their spending requirements and affordability. The maximum amount payable for a transaction will be the maximum limit provided on the card device 110. The card device 110 has a denomination non-specific balance, preferably in the form of a cash balance 150. The cash balance 150 is the amount of available cash that can be used for the card device 110 and is not related to the total amount of digital notes 120 and digital coins 130 stored on the card device 110. The cash balance accumulates when a balance from a transaction is credited to the card device 110. For example, if a transaction totalled $19.50 and a digital note for $20 was debited from the card device 110, a credit of $0.50 will be credited to the cash balance 150 on the card device 110. Alternatively, the $0.50 can be credited as a digital coin 130 for the fifty cent denomination. The cash balance 150 is encrypted with the secret key and can only be accessed via the card issuer 400 using an appropriate decryption key.

The card device 110 is rechargeable and can be recharged by paying with cash in the form of notes or coins at a recharge terminal 610 or at the counter of the card issuer 400. Preferably, the recharge terminal 610 can also allow a user to select one or more digital notes 120 and/or digital coins 130 to be dispensed as cash by the recharge terminal 610. The card device 110 can only be recharged to the maximum limit of the card device 110. The card device 110 can also receive transactions reversed back onto the card

device 110 and cash balance 150 amounts from transactions to the maximum amount of the card device 110. Preferably, the card device 110 will only be able to receive digital notes 120, digital coins 130 and/or cash balances 150 if the total balance has not been exhausted. Preferably, the card device 110 will have an expiry date which is preset to one to two years or any other suitable timeframe.

As illustrated in Figure 1, the apparatus 100 comprises a microchip or integrated chip 140. The microchip 140 is also operatively coupled to a storage medium in the form of memory 141. Memory 141 comprises a computer readable medium 142, such as a read only memory (e.g., programmable read only memory (PROM), or electrically erasable programmable read only memory (EEPROM)), a random access memory (e.g. static random access memory (SRAM), or synchronous dynamic random access memory (SDRAM)), or hybrid memory (e.g., FLASH), or other types of memory as are well known in the art.

Referring to Figure 2, a system 300 for conducting financial transactions is provided in accordance with embodiments of the present invention. The system 300 comprises the apparatus 100 as described above to be received within a computational device 310 in the form of a card reader. According to some embodiments, the card reader 310 is in the form of a modified EFTPOS card reader terminal. The card reader 310 comprises an internal storage device 320 for storing a plurality of transaction data associated with the monetary transaction.

The card reader 310 is coupled to be in communication with an

external storage device 330, such as a USB disk, digital disk drive or flash memory device, via an appropriate connection cable. Preferably, the external storage device 330 has its own UID 410 and name of the bank or financial institution to which it belongs. The external storage device 330 is tamper-resistant and is designed to corrupt data in the event that an attempt is made to connect it to a foreign machine or object which does not belong to its related bank or financial institution. Preferably, the external storage device 330 will be a stand alone unit. In an alternative embodiment, the external storage device 330 could be installed with a computing device or provided in some other suitable form dependent on the national transaction processing systems of a particular country.

The card reader 310 is coupled to be in communication with communications network 312 such as a local area network (LAN) and/or global communications network such as the Internet 306, via conventional wireless and/or wired connections. The card reader 310 is in communication with a server 340 of the card issuer via global communications network 306 and communication network 312 as appropriate. Preferably, the server 340 comprises a general ledger database system 350 comprising account information and information relating to the card device 110 and a general ledger accounts system. The database structure can be divided as follows: national directory, states, zones including east, west, north and south, suburbs and business names. In an alternative embodiment, this structure can be varied to suit other financial systems. The database 350 is interrogated to identify card device 110 and decrypt information stored on the

card device 110. In the database 350, all transaction data generated with each card device are received from various banks and are sorted and compiled in order of terminal number and its business name and stored within the business directory. The transaction data is then used for cross-matching with the external storage device 330 for the clearing of funds.

Referring to Figure 3, a method for conducting financial transactions is provided in accordance with embodiments of the present invention. According to some embodiments, the method 400 includes a user at 410 providing a card device 110, which has been obtained from a card issuer, at the point of sale for payment of a monetary transaction. The method 400 includes storing the plurality of transaction data on the internal storage device of the card reader 310. Preferably, the transactions data will be encrypted by the card reader 310 with the card issuer's Public Key (PK) 520 before being transferred to the internal storage device 320 or sent to the server 340 via internet. The method 400 includes separately encrypting each transaction with details including one or more of the following: a transaction UID or unique code; a time of the point of sale; a location of the point of sale; a card reader ID. The transaction data and monetary value will accumulate in the exact order of each transaction on the internal and external storage devices 320, 330. Preferably, all transaction data will be backed up over a network system onto the database 350 which will temporarily store all the account information for a prescribed period of time. Preferably, the information will automatically be purged from the EFTPOS facility once the transaction has been completed.

The method includes the card device 110 being read by the card reader 310 and the user entering their security key. The transaction data is sent in real-time to the server 340 of the card issuer for decryption and validation. It is envisaged that the card issuer will have a blacklist 360 containing information relating to fraudulent activity or fraudulent card devices 110, stolen or lost card devices or digital notes or coins and the transaction will be blocked if validation is not successful. Preferably, validation of the card device 110 must occur prior to actions including, but not limited to, making payments, adding digital notes 120 or coins 130, changing the cash balance 150. Preferably, the card reader 310 will validate the card device 110 before accepting it by validating the UID 111 with the issuer's Public Key (PK) 520. The card device 110 will also be checked to ensure there is sufficient balance to complete the transaction. The card device 110 will be declined once the balance has been exhausted. The method includes numbering all transaction receipts and recalling the receipt details if the transaction is cancelled.

The method 400 includes at 420 exporting the transaction data from the internal storage device 320 to be temporarily remitted on the external storage device 330 and providing the external storage device 330 to the card issuer for clearing. Preferably, the external storage device 330 is removed by the merchant entering an unlocking code and taken to their nominated bank or card issuer for verification, processing, sorting and cross-matching data with the database 350 for accounting and reconciliation for funds clearing and printing of statements. The collected funds will be converted into dollars

and cents and a statement will be generated with the details of each transaction recorded. In an alternative embodiment, the card reader 310 and/or external storage device 330 can be linked to the merchant account in a related bank to allow the transfer and clearance of the money into their nominated account. Funds will be instantly cleared by the nominated bank or card issue into the merchant's account and settled with funds adjustment and bank cheques issued from the general ledger system. Merchants will receive cleared funds once verification and cross matching of data from the external storage device 330 and the database 350 is done. The final settlement is with the participating banks and the general ledger system internal bank adjustments which will be adjusted and settled with bank cheques.Transaction details will also be transferred to the card user's bank central database from server to server. Preferably, data records in the central database in each business name directory will be stored for a predefined period and then purged from the system.

According to some embodiments, the method 400 includes implementing computer readable program code components 143 for facilitating payment of monetary transactions in accordance with the teachings of the present invention.

In an alternative embodiment, the card device 110 can be used as a normal cash card which can be read using a standard cash card reader.

Hence, the apparatus, method and system of the present invention provides a solution for facilitating payment of monetary transactions which eliminates processing fees normally charged by a clearing house network,

eliminates the need for a network to process funds, provides no hold on processing fees and charges and has no additional charges to print statements for such transactions. The present invention will eradicate the need to count, bag and lug coins to the bank to be deposited which will save time and money. It is envisaged that use of the present invention will also lesson health and safety hazards for all retailers and staff connected with heavy weight lifting, metal allergies, metal poisoning and transporting via people and armguards etc.

Throughout the specification the aim has been to describe the invention without limiting the invention to any one embodiment or specific collection of features. Persons skilled in the relevant art may realize variations from the specific embodiments that will nonetheless fall within the scope of the invention.

We claim:

1. An apparatus for facilitating payment of monetary transactions comprising:

a card device configured to store a plurality of discrete monetary values, the card device comprising a microchip for storing encrypted information including a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations and a denomination non-specific balance;

wherein the card device is rechargeable with further monetary amounts and allows a balance of a transaction to be credited to the card device.

2. The apparatus of claim 1, wherein the payment is by cash.

3. The apparatus of claim 1, wherein the payment is by the card device.

4. The apparatus of claim 1, wherein the plurality of digital notes and/or digital coins is/are stored in a digital format as follows: [Issuer] [Currency] [Denomination] [Serial Number] [Issuer Signature].

5. The apparatus of claim 1, wherein the encrypted information includes one or more of the following: an unique identification code; a secret key; a private key; a cash balance; an user signature.

6. The apparatus of claim 1, wherein the microchip stores at least one asymmetric key for authentication and verification of the card device.

7. The apparatus of claim 6, wherein a first asymmetric key is a secret key.

8. The apparatus of claim 6, wherein a second asymmetric key is a public key.

9. The apparatus of claim 1, wherein the card device is recharged at a recharge terminal or at a card issuer.

10. The apparatus of claim 9, wherein the recharge terminal allows the user to select one or more of the plurality of selectable digital coins and/or digital notes to be dispensed from the recharge terminal in the form of cash.

11. A method for facilitating payment for monetary transactions including:

reading at a point of sale a card device having a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations;

encrypting and transferring a plurality of transaction data associated with the monetary transaction to a server in communication with the point of sale;

interrogating a database of the server to verify details of the transaction; and

processing the transaction to debit and/or credit the card device.

12. The method of claim 11, wherein the plurality of transaction data comprises one or more of the following: a location of the point of sale; a card reader ID; an unique identification code for the transaction.

13. The method of claim 11, including reading the card device via a computational device.

14. The method of claim 11, including storing the plurality of transaction data on an internal storage device of the computational device.

15. The method of claim 14, including transferring the plurality of transaction data from the internal storage device to an external storage device in communication with the computational device.

16. The method of claim 14, including automatically transferring the plurality of transaction data from the internal storage device to a nominated bank for transaction verification and fund clearance via a communications network.

17. The method of claim 15, including manually transferring the plurality of transaction data from the external storage device to a nominated bank for transaction verification and fund clearance.

18. A computer-implemented method for facilitating payment of monetary transactions, the computer-implemented method including:

implementing computer readable program code components

configured to cause reading at a point of sale a card device having a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations; and

implementing computer readable program code components configured to cause encrypting and transferring a plurality of transaction data associated with the monetary transaction to a server in communication with the point of sale;

implementing computer readable program code components configured to cause interrogating a database of the server to verify details of the transaction; and

implementing computer readable program code components configured to cause computer readable program code components configured to cause processing the transaction to debit and/or credit the card device.

19. A system for facilitating payment of a monetary transaction comprising a card device and a computational device coupled to be in communication with a server via a communications network, the server comprising a database and account system for processing and managing at least one transaction using a plurality of selectable digital notes and/or a plurality of selectable digital coins associated with a plurality of selectable denominations stored on the card device.

20. The system of claim 19, wherein the computation device processes the transaction to debit and/or credit the card device.

21. The system of claim 19, wherein the computational device is in the form of a card reader.

22. The system of claim 19, wherein the computational device comprises an internal storage device for storing a plurality of transaction data associated with the transaction.

23. The system of claim 22, wherein the computation device is in communication with an external storage device for receiving and storing the plurality of transaction data from the internal storage device.

24. The system of claim 19, wherein the card device is rechargeable with further monetary amounts and allows a balance of a transaction to be credited to the card device.