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(54) Title: CASHLESS TRANSACTION SYSTEM
"CASHLESS TRANSACTION SYSTEM"

FIELD OF THE INVENTION
The invention relates to a method for initiating and managing an electronic payment system for a user, more particularly a system enabling deposit thereto and withdrawals from participating merchants and for clearance through automated financial clearinghouse systems.

BACKGROUND OF THE INVENTION
There are groups of individuals who could benefit from electronic payment systems but may be excluded from the usual credit card or debit card systems for one or a number of reasons including being less than the age of majority, lacking of a credit history, or merely where individuals desire to separate their usual electronic payment means from institution-specific merchants.

Examples include institutions having internal merchant services such as cafeterias, and provision of other goods and services.

Another aspect is a typical requirement to have a physical device such as a card as the means for both identification of the individual and the individual's financial information. Such cards are easily lost with the inconvenience and risk associated therewith or more simply, merely represent one more item to keep track of in an ever more cluttered wallet.

It would be desirable to have an electronic payment means between a merchant and an individual which implements a user-purchase
SUMMARY OF THE INVENTION

Accordingly, an electronic payment system is provided and which functions as a virtual smart card. A system server is in electronic communication with one or more participating merchants. A merchant is defined as a location at which a user interacts electronically for accessing the system by a transaction, the transaction including financial and non-financial transactions.

In one embodiment, a user is invited to register an identifying number which has a limited number of digits. An account is created and a unique user account number is created having a greater number of digits and which incorporates the identifying number. A personal identification number (PIN) is assigned to that account. A single bank account is maintained, and a database links the various users through their unique account numbers to a fractional monetary value of the account. A sub-ledger of each user's account balance is maintained in a system separate from the banking system. The banking system sees one account and one account balance.

At participating vendors or merchants, at a minimum, a user need only to provide the identifying number and their PIN. No particular physical medium is required. When the identifying number is used in an electronic transaction, it must be distinguished from other coincidentally identical identifying numbers. The merchant's use location, the user's identifying number and PIN is forwarded to the
system server and the corresponding unique account number is retrieved from the
database.

The server maintains the sub-ledger of the user's account. On periodic batch intervals (such as once per day), the server queries the banking system for any credits made to the user account number. The user's sub-ledger balance is updated. Upon a merchant's query, the merchant code and identifying number are matched to the unique user account. The user's balance is checked, the query authorized, and the user's balance in the sub-ledger is debited. Multiple transactions can be made. After a period (such at the end of the day), a settlement is made through the banking system to perform an electronic funds transfer (EFT) to all merchants and the account debited.

The system manages a database comprising clients, users, merchants and user accounts. Clients are typically a company or a school; however a client may include a school district having several schools. Respectively, typical users would be employees and students. A school may include several types of merchants such as a third party independent vendor like a cafeteria or may include the school itself, preferably distinguished from the school as a "client" aspect by terms such as school tuck shop or school store. Each user belonging to a client has a unique identification number amongst the client's users. Each user has a sub-ledger user account which can contain a credit balance.

The users are preferably restricted in their access to merchants. The database cross-references users, clients and merchants and particular users or
groups of users can be authorized to access specific merchants. Similarly, certain
merchants are only authorized to provided services and accept a payment request
from particular users. The client typically assigned the authorizations.

Further, the system process both financial and non-financial
transactions. For example, an Asset Management and Student Tracking module
process non-financial transactions such as quantifiable management control
including for issues, returns and losses of school text books, sports and music
equipment, shop supplies, etc. A Student Tracking module processes attendance
information and prints late slips online to provide direct and positive communication
with parents via email and an interactive internet website.

In a broad aspect, a system for conducting electronic financial
transactions comprises

maintaining at least one source bank account which is electronically
linked for accepting a withdrawal request and electronic deposit to at least one
merchant's merchant bank account;

maintaining a database of clients, each client having a plurality of
users authorized to electronically access the at least one source bank account,
each user having a unique user account number in the database, a user PIN and a
user account balance,

establishing a unique user account number for each user from
-a user-identifying number being unique amongst the users of
the client,
- a number representing the client, and
- padding to a greater and pre-determined number of digits so as
to establish the unique user account number in the database; and

maintaining a database of authorized merchants that are authorized
by the client to receive a withdrawal request from users of client; and

for each electronic transaction,

receiving a withdrawal request from a merchant for a user including a
withdrawal amount, the user-identifying number and the user PIN; and

comparing the user-identifying number, the client and the merchant to
establish that the merchant is an authorized merchant, and if so authorized

- debiting the withdrawal amount from the user account balance

for the user’s user account number, and

- periodically conducting settlement electronic financial

transaction between the at least one source bank account for one or more users

and the authorized merchant.

Preferably, a merchant terminal device would at a minimum enable

input or reading of the user’s user-identifying number, PIN and to identify the

merchant. The merchant terminal could also identify the client under which it is

authorized, such a particular school or commercial institution. The unique user

account number which may include the client to which the user belongs.

Additionally, the system can manage non-financial transactions at

recognized and authorized merchants.
BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a flowchart of various users, merchants, clients, a banking system and a server in electronic communication as part of a cashless transaction system according to one embodiment of the invention;

Figure 2 is a flow chart illustrating some of the elements of the server of Fig. 1; and

Figure 3 illustrates a transaction between a user and a merchant.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to Fig. 1, a system is provided for enabling cashless financial transactions between users belonging to a client and merchants authorized to conduct transactions with those users. Illustrative, but not limiting in its context, one embodiment of the invention would enable a young student John Smith in a first school to present an easily remembered or familiar identification number (ID) to a school cafeteria. While conventional cards may be used, a student could easily lose the card, while a familiar ID can be recited from memory. The cafeteria as a merchant would electronically forward a merchant identifier, the familiar ID (being a student number or other numerical ID that could even be specified by John and initially registered with the system) and a PIN to a server which would confirm John Smith of that first school is permitted to engage in a transaction with that cafeteria and to confirm a positive credit balance in a sub-ledger for John Smith so as to authorize the transaction. At some point in time, such as at the end of the day, the
transactions, the sub-ledger balance and the merchant’s bank account are
reconciled through an automated clearinghouse system. A positive balance would
result from an earlier deposit such as that made by John's parents. Integrity of the
system is assured through assignment of a unique account number generated from
the familiar ID, the account number being unique from any other account number at
the server. The account numbers would be unique even if the same familiar ID was
used by students or employees at different schools or places of business. Each
school, or school system, would be identified as a different institution or client and
the account number would reflect the membership of the student for that client. A
typical client of the present system comprises a school system having many
schools; the students in the plurality of schools in that school system all belonging
to the same client and having unique student ID’s therein.

Accordingly, in greater detail, a system for conducting electronic
financial transactions comprises a server 20 in communication with merchants 21 at
known institutions 22A, 22B over a distributed network 23 such as the internet.
The server manages user accounts and credit balances, authenticates
debit requests by merchants 21 for a user, and settles financial accounts between
the server account and the merchant’s account.

The server manages a database comprising clients, users, merchants
and user accounts. Through an interactive interface or other registration process,
clients and one or more of the client’s users are recorded in the database. Each
user belonging to a client has a unique identification number amongst the client’s
users. Each user has a sub-ledger user account which can contain a credit
balance. The database cross-references users, clients and merchants.

Merchants are associated with a particular institution 22A,22B ... . A
user of the institution can include an employee a company, or a student at a school
or students in a school system.

A user can be authorized to frequent one or more merchants and a
merchant can be authorized to service one or more clients and the client’s users.
For example, a first merchant and all users of a first client are authorized to conduct
financial transactions according to an embodiment of the invention. A second
merchant is not so authorized, however can be authorized to conduct financial
transactions with a sub-set group of users of the first client, or perhaps specific
users of a second client such as those users of the client in a specific geographical
area.

The database further comprises a user account number and PIN to
uniquely identify the user’s accounts and authorize access thereto. The user
account number is generated at the server. The PIN may be generated and is
typically changeable by the authorized user.

The user account number is a number having sufficient numbers of
digits to enable assignment of unique numbers to every user of every client in the
database. In most instances a suitable length is 20 digits.

A component of the user account number is the numeric ID which is
unique from other numeric ID’s for the client. Due to the finite number of users in an
institution, the ID would typically be an employee number or student ID number
which is familiar to the user.

The familiar ID, limited in numerical combinations, is restricted for in
distinguishing unique users in a small population. The greater number of digits of
the user account number comprises a more secure and unique number amongst all
users of all participating clients. The greater number of digits of the account
number incorporates the fewer digits of the familiar ID. The familiar ID is preferably
parsable or recognizable within the final user account number. For example, a user
from a first school 22A can have an 8-digit student ID “12345678”. For ease of
recognition of their own user account number, it is advantageous to reflect the
user’s 8-digit student ID and to pad it with 12 additional digits to form a 20-digit
account number “987654321098 12345678” which is unique in the server.
Similarly, a 6-digit student ID “123456” from a second school 22B would be padded
with 14 additional digits to form a 20-digit account number “98765432109876
123456”.

Preferably, the unique user number includes the familiar ID, and an
indication of the client.

There are many forms of algorithms known to those of skill in the art
which can provide unique account numbers. Padding can be through masks or
hashing algorithms. In one embodiment, the padding digits may comprise a hash
based in part upon a unique number assigned to the particular client.
The server 20 is also in electronic communication with the electronic banking system such as an automated clearinghouse system ACH System 24 which is authorized to engage and settle electronic financial transactions.

The known ACH System 24 is in communication with and enables transactions between the server 20, a system or source bank account 25 and one or more merchant’s bank accounts 25.

ACH Systems 23 are known to those of skill in this art. Simply, as it applies in Canada, the relevant ACH system 23 is the Automated Clearing Settlement System (ACSS) handing about 99% of the volume of transactions and the Large Value Transfer System (LVTS) which clears about 85% of the value of the transfers such as in settlements of a day’s cumulative transactions. More information is available from the Canadian Payments Association at www.cdnpay.ca. In the US, the Federal Reserve Banks are collectively the largest automated clearinghouse operators in an ACH System 30. There are also private-sector ACH operators processing the balance of the financial transactions. More information on US ACH Systems is available at the National Automated Clearinghouse Association (NACHA) at www.nacha.org.

In one embodiment, the system limits the user’s access to participating merchants. A participating merchant 21 would be a merchant authorized to receive funds from users of the institution. For example, in an education institution context, a student user may be able to freely access the system for payment of various school fees and cafeteria fees of that particular
A participating merchant has a merchant identification ID. The
merchant ID is associated with a particular institution 22A, or 22B or institutions 22a
and 22B and is stored in the database.

The merchant has a terminal for electronic access to the server 20.
The terminal at its most elementary comprises means for entering the user numeric
ID and communicating the user ID and merchant ID to the server. More preferably,
the merchant terminal comprises additional entry parameters or alternate means of
entry. Alternate parameters includes the entire user account number, either
manually or through the alternate means of entry. Such alternate entry means
include magstripes, barcodes, and iris / palm-metric readers.

The client, such as a particular school or commercial institution in
which the merchant operates, is identified. The merchant terminal device could
identify the clients with which shoes users the merchant is authorized to conduct
transactions. The ID of the merchant terminal could be cross-referenced at the
server to identify its authorized clients or particular users of the client. Preferably,
the unique user account number includes an indication of the client to which the
user belongs.

With reference to Fig. 2, in use, the system maintains a database of
clients and a plurality of users. One more clients are registered with the system and
assigned a client ID. Users of the client are registered, possibly in a bulk
registration initiated by the client or as individual users indicate their interest is
accessing the system.

Users are provided with an access interface to register or amend their
user account information. Users preferably choose their familiar ID, such as their
student number. The system could suggest their student ID and provide an option
to enter an alternate ID which is compared against other users of the client to
ensure it is unique. A personal identification number PIN is either initially assigned
and subsequently changed by the user or the user is prompted to enter a desired
PIN.

The system generates a unique user account number for the user in
the database of all clients. The familiar ID is padded and generated as necessary
to the greater number of digits used to uniquely identify the user. In some
instances, a device may also be generated including a magnetic card, or to obtain
biometric data for association with the user account.

The system maintains at least one source bank account. The user
account number is associated with a sub-ledger maintained in the database which
represents the user’s balance in the source account.

Users or benevolent third parties can make deposits to the user
account number through their own personal online banking portals; said deposits
being directed to the system’s source account which is registered with the ACH
System.
The system is electronically linked to participating merchants for accepting a withdrawal request from a user.

When a user requests a good or service from a participating merchant, the merchant forwards the request to the server including the amount of the transactions, an identification of the merchant, the user's familiar ID or full user account number and the PIN. The server ascertains the user account number from the familiar ID as necessary and then determines if the user is authorized (compare user account number an PIN) and if the particular user and merchant are authorized to conduct the requested financial transaction.

The user can conduct a transaction without necessarily possessing a physical card. The server need only be able to ascertain the authority of the merchant and the user to conduct a transaction. In one scenario, the familiar ID is compared with a merchant ID and the server determines if the merchant and the user are associated with a common client. In another scenario, the merchant terminal could be programmed to accept only users of the particular client. In such instances a user account number, incorporating identification of the client, could be vetted at the merchant terminal without accessing the server. In the preferred scenario, the familiar ID and the merchant is are submitted for the server to establish the authorizations necessary to permit the transactions and to verify the presenting individual's right to debit the sub-ledger for the user.

If the transaction is not authorized, then the merchant receives back a declined message.
If authorized, then the merchant is advised that the transaction was approved. Periodically, the system conducts a settlement electronic financial transaction between the source bank account and the bank account of the authorized merchant. The periodicity is generally dependent upon economies of substantially real time or batch settlements. Typically settlement can occur at the end of each business day.

Settlement comprises accessing the ACH System for transferring an amount, typically the transaction amount, to the merchant’s account. The user’s account balance in the sub-ledger is debited. Further, any deposits to the user’s account are acknowledged and the ACH System debits the payor’s account to the credit of the systems’ source account.

Various options are available using a system of the various embodiments discussed above.

Options for assigning a user’s familiar ID include: pre-determination and specification of the familiar ID by the client for their plurality of users, auto-generating familiar ID’s by the server, and preferably selection of familiar ID by the user themselves, subject to a uniqueness confirmation. As user’s selection of a familiar ID would typically include their employee number, student identification number or drivers license number.

As discussed above, the cashless transaction system is integrated with the banking systems. The system functions as a virtual smart card. The system enhances known prepaid cash or debit cards (such as prepaid phone cards)
in that: there are no expiry dates or preset limits, there are no age restrictions or
credit application procedures; and maintenance of the account balance is dynamic.
This system and the banking system process all monetary and non-monetary
transactions either online or offline, at the point-of-sale (POS). Users can also
deposit money into their user account at the POS, with telephone banking, at ATMs
or over the Internet through most financial institutions.

Through an interactive interface to the server, a user can register
virtually any identifying familiar ID number they choose to obtain user account. To
use the user account for a transaction, a user only needs to provide their familiar ID.
The user does not require the use of any physical medium, however, optionally, the
means for identifying the user can take on any physical form to communicate the
familiar ID or the whole of the user account number including cards magstripes,
barcodes, and biometric means such as iris scanners, fingerprint and palm-metric
readers.

To expand the range of authorized merchants, the system can be
integrated with third party Internet based shopping cart applications, Windows®
based hand-held devices and Windows® based POS software.

The interface to the server is interactive which allows users to register
their user accounts and to view of all of their monetary and non-monetary
transactions in real time. Additional functionality of the system includes providing
users and authorized third parties such as parents of student users with direct
positive confirmation of attendance, issued school assets and purchases.