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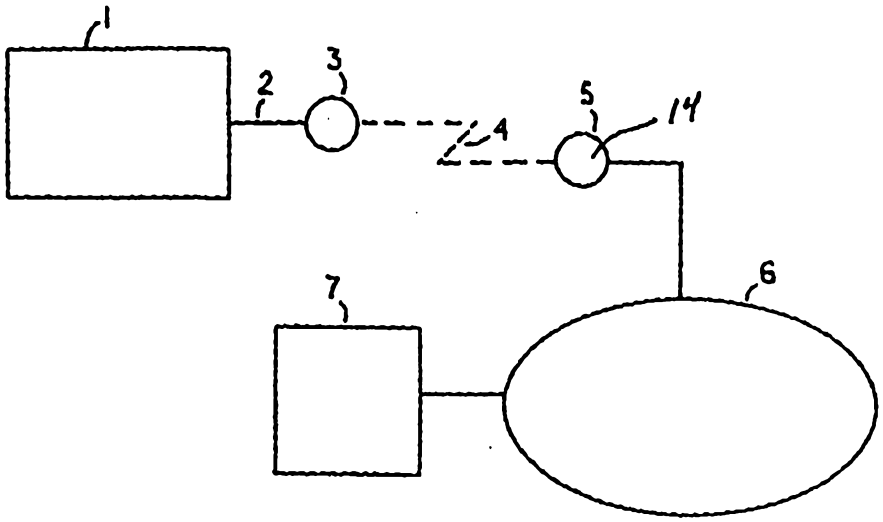

(57) Abstract

A system for conducting banking transactions using a remote terminal (1) with access to an ATM host computer (7) through a remote terminal (1) which includes a communication protocol of an ATM machine, a host computer (7) for the ATM, and a non-continuous communications link (4) between the remote terminal (1) and the host computer (7), including a first emulator (3) on the remote terminal side of the non-continuous communications link (4), the first emulator (3) emulating to the remote terminal (1) a continuous communication link with the host computer (7); and a second emulator (14) on the host computer side of the non-continuous communication link (4), the second emulator (14) emulating to the host computer (7) a continuous communication link with the remote terminal (1).

Specification

"METHOD AND SYSTEM FOR REMOTE TERMINAL DIAL-UP"

Cross Reference to Related Application

This application is a continuation in part of pending U.S. Patent Application Serial Number 08/334,875, filed 11/7/94, entitled METHOD AND SYSTEM FOR REMOTE DIAL-UP ATM, invented by Wayne Averill and Frank Nagelmann, and owned by Cash on Demand, Inc., the owner hereof; priority is claimed to said pending U.S. patent application for common subject matter.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a method and system for connecting fully functional (including cash disbursing and deposit accepting) remote automatic teller machines (ATMs) via a dial-up telephone connection directly to a financial institution's host computer and/or to an ATM EFT network that interconnects to host computers in other financial institutions.

Brief Description of the Prior Art

The ATM and its associated ATM card have evolved from a way to reduce teller requirements in bank lobbies to an integral part of American banking life. Today there are 475 Million bank cards in circulation. There is a real and growing demand for ATMs in retail environments. However, the standard industry practice of using high cost dedicated data circuits and remote ATM logistics including cash restocking, deposit removal, periodic maintenance, and servicing have made remote ATM deployment for merchants and even some bank branches spotty at best.

The market place has driven partial solutions to the remote ATM problem. The major solution has been the creation of interconnected regional and international ATM networks so a client of a particular bank on the interconnected networks can, generally for a fee, use

the ATMs of any of the banks on the network. However, the customer is still generally forced to go to a bank.

Another partial solution has been the use of the ATM card for point-of-sale (POS) transactions. POS transactions can use either a credit card or a debit card. In a routine POS transaction, a customer's credit card is scanned at the merchant's location. The information from the credit card and the amount of credit sought is transmitted over a POS network to the credit card issuer's central computer which verifies the availability of credit and then performs a debit and credit reconciliation by appropriate adjustment of the customer's and merchant's accounts. In a POS transaction using an ATM card, POS networks route the POS transaction to the appropriate regional ATM network to debit the ATM card holder's bank account and credit the merchant's bank account. Instead of a credit card, the ATM card merely acts as a debit card.

SUMMARY OF THE INVENTION

Most ATMs are connected by an internal bank network routed to a central computer (a "host" or "host computer") of a financial institution or a shared host computer of a group of financial institutions. Host computers are sometimes interconnected to form a host network. ATMs are polled by their host at regular intervals for data. If an ATM is not polled for a certain period of time or the communication connection is broken, the ATM shuts down and must be restarted by commands from the host. The polling relationship between ATMs and their host requires continuous communications through a dedicated line. This makes dial-up communications impossible.

Host networks are interconnected through regional, national and international ATM networks such as Cirrus® and Plus System® and regional networks such as Star System®, Pulse®, Alert®, Honor®, NYCE®, MagicLine®, Tyme®, Shazam® and Minibank® ("inter-host networks"). This permits an ATM card user of any host network (a

"client") to use, for a fee, all ATMs of all financial institutions on the inter-host network if he is a client of any one financial institution. To cross between host networks, the host identifies the ATM card user as a non-client and passes the transaction data on to an inter-host network for routing to the host where the ATM card user is a client. A standard host thus has two functions; processing its client's ATM data or passing its non-client's ATM data on to an inter-host network.

In accordance with a first aspect of the present invention there is provided a system for conducting financial transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising (a) a remote terminal which includes a communications protocol of an ATM, said remote terminal having the capability of dispensing funds therefrom, (b) a host computer for said remote terminal, and (c) a non-continuous communications link between said remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer.

In accordance with a second aspect of the present invention there is provided a system for conducting financial transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising (a) a remote terminal which includes a communications protocol of an ATM, said remote terminal having the capability of dispensing funds therefrom, (b) a host computer for said remote terminal, (c) a non-continuous communications link between the remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer, and (d) a means for emulation of a continuous communications link between said remote terminal and the host computer.

In accordance with a third aspect of the present invention there is provided a system for conducting banking transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising (a) a remote terminal which includes a communication protocol of an ATM machine, said remote terminal having the capability of dispensing funds therefrom, (b) a host computer for said remote terminal, (c) a non-continuous communications link between the remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer, (d) a first emulator on the remote terminal side of the non-continuous communications link, said first emulator emulating to the remote terminal a continuous communication link with the host computer; and (e) a second emulator on the host computer side of the non-continuous communications link, said second emulator emulating to the host computer a continuous communications link with the remote terminal.

In accordance with a fourth aspect of the present invention there is provided an emulation system for installation within an electronic interconnection between a host computer and a remote terminal having the capability of dispensing funds therefrom comprising a first emulator for interconnection in electronic communication with said remote terminal; a second emulator for interconnection in electronic communication with said host computer; said first emulator and said second emulator being electronically adapted for a non-continuous communications link therebetween, said non-continuous communications link being the primary communications link between said first emulator and said second emulator.

In accordance with a fifth aspect of the present invention there is provided a method for establishing a non-continuous communications link between a remote

terminal having the capability of dispensing funds and a host computer, wherein said remote terminal and said host computer require an apparently continuous communications link therebetween, comprising the steps of (a) interconnecting a first emulation means with said remote terminal, said first emulation means acting to emulate a host computer, (b) interconnecting a second emulation means with said host terminal, said second emulation means acting to emulate a remote terminal, (c) establishing a non-continuous communications link between said first emulation means and said second emulation means, said non-continuous communications link being the primary communications link between said first emulation means and said second emulation means.

The present invention can be embodied in the configuration of a host emulator located proximate to an ATM and directly connected thereto, separated by a dial-up telephone connection from an ATM emulator located proximate to the host and directly connected thereto. The increasing affordability of computing power makes smart remote terminals cost effective and the present invention possible.

The host emulator maintains the on-line status of the ATM at the ATM site. The ATM emulator maintains the on-line status of the host. When a client inserts his ATM card, the host emulator dials the ATM emulator at the host site, thus creating a virtual dedicated circuit linking the ATM to the host via the switched network. The ATM is identified by the host, and maintains direct communications with the ATM until the transaction is completed. By this configuration, a polling relationship between industry standard ATMs and the host is emulated; however, the ATM can now use a dial-up telephone line to connect with a host computer only when needed to process a client's transaction.

In an augmented embodiment, the ATM emulator may operate to either connect the ATM to an ATM network (as discussed above), or it may directly connect the ATM to a particular ATM card issuing financial institution, specifically the financial institution encoded in the user's ATM card. In the latter case, the ATM will display the specific user transaction screens of the particular financial institution, whereby the user views instruction screens that the user is familiar with. In this way, the user of any ATM receives screen instructions as though from a dedicated ATM of the card issuing financial institution.

Advantages of at least preferred embodiments of the present invention are:

(a) The invention eliminates the cost of dedicated lines for ATM data transactions.

(b) The invention permits installation of ATMs without installation of dedicated lines, dedicated networks or dedicated host computers.

(c) The invention permits greater competition to provide ATM's service to more customers at more locations through greater flexibility to share revenues with merchants.

(d) The invention permits ATM service in more marginal foot traffic locations.

(e) The ATM relies on the switched network, and consequently has higher reliability since the ATM can take advantage of back-up or alternate routing algorithms typical of switched networks.

(f) The invention speeds installation time and lowers installation cost.

(g) A user of any ATM can receive screen instructions in the familiar format of the user's card encoded financial institution.

Still further advantages will become apparent from a consideration of the ensuing description and drawings of preferred embodiments of the present invention, by bay of

example only.

IN THE DRAWING

FIG. 1 is a block diagram illustrating the system and method of the present invention in connection with an ATM.

FIG. 2 is a schematic of a minimal function network access controller (MFNAC), a remote network end point.

FIG. 3 is a schematic of the communication's traffic and connections in the ATM standby mode of the present invention.

FIG. 4 is a schematic of the communications traffic

and connections in the ATM processing mode of the present invention.

FIG. 5 is a schematic diagram of an augmented system and method of the present invention for connecting an ATM to one or more financial institutions without utilizing an ATM EFT network.

Reference Numerals in Drawings

1. An industry standard automatic teller machine (ATM) with standard 9600 baud modem.

2. A digital connector from the ATM to a minimum function computer network access controller (MFNAC).

3. A minimum function computer network access controller (MFNAC).

4. A dial-up telephone connection (a switched network).

5. A network access controller (NAC) of a commercial computer network exchange service with access to ATM networks.

6. An ATM network.

7. A host computer to the ATM in communication to the ATM network carrying the ATM's data.

8. A 9600 baud modem.

9. A 1200 baud modem.

10. A dial-up interface employing a SNA/SDLC (IBM® System Network Architecture/Synchronous Data Link Control) protocol.

11. External power supply module.

12. Internal lithium battery.

13. A host emulator at the MFNAC.

14. An ATM emulator at the NAC.

15. A financial institution.

16. A switch processor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a typical configuration of the components of the present invention. An ATM 1 represents one of a number of commercially available ATM's configured with a 9600 baud modem using a SNA/SDLC

(IBM® System Network Architecture/Synchronous Data Link Control) protocol. A digital connector 2 represents an RS 232 electrical interface employing a serial binary data interchange between the ATM 1 and a minimum function network access controller (MFNAC) 3, fully described in the discussion of **FIG. 2** below. A dial-up telephone connection 4 represents a potential commercial telephone connection through a switched network from the MFNAC 3 to a full function network access controller (NAC) 5 of a commercial computer network service with access to an ATM network 6. A host computer 7 represents the central computer for the ATM 1 having communication with the ATM 1 through the ATM network 6. The NAC 5 has ATM polling response emulation software at its location.

FIG 2. shows a schematic of the MFNAC 3. The MFNAC 3 is a Z-80 based network access controller providing the functionality of an SDLC network interface with autodial and network management capabilities. In addition to its support logic, the MFNAC 3 contains 256k of CMOS RAM (random access memory) and EPROM (erasable, programmable, read only memory). A modem 8 represents a 9600 baud modem in the MFNAC 3 in communication with the 9600 baud modem in the ATM 1 via the digital connector 2. A modem 9 represents a 1200 baud modem in the MFNAC 3 capable of communications with the NAC 5 via dial-up interface 10. The MFNAC 3 is powered by an external power supply module 11. Auxiliary memory power is maintained by an internal lithium battery 12. The MFNAC 3 communication and dial-up features are driven by software that provides host emulation to the ATM 1, running SNA/SDLC firmware.

FIG. 3 shows a schematic of the communication's traffic and connections in the ATM ready state of the present invention. A host emulator 13 at the MFNAC 3 sends a periodic "polling" communication to the ATM 1 which responds back to the host emulator 13. An ATM emulator 14 at the NAC 5 responds to periodic "polling" communication from the host computer 7. The host

emulator 13 and ATM emulator 14 are software driven. The dial-up telephone connection 4 between the MFNAC 3 and the NAC 5 is not connected.

FIG. 4 shows a schematic of the communication's traffic and connections in the ATM processing state of the present invention. Processing of actual data between the ATM 1 and the host computer 7 causes the host emulator 13 at the MFNAC 3 and the ATM emulator 14 at the NAC 5 to stand aside, creating a virtual dedicated circuit linking the ATM 1 to the host computer 6 via the switched network. The dial-up telephone connection 4 between MFNAC 3 and NAC 5 is connected after dial-up.

Operation - FIGS. 1, 2, and 3

The present invention has essentially two operational states, ready to process (the ready state) and processing (the processing state). **FIGS. 1, 2, and 3** describe the ready state. In the ready state, the host emulator 13 is periodically polling with an electronic signal the ATM 1 to maintain the ready state of the ATM 1. This is achieved by the host emulator 13 replicating the electronic signal demanded by the polling response specification of the ATM 1 and the host emulator 13 receiving the electronic response generated by the ATM 1. Simultaneously, across the open dial-up telephone connection 4, the host computer 7 is periodically polling the ATM emulator 14 to maintain the ready state of the host computer 7. This is achieved by the host computer 7 generating the electronic signal demanded by the polling specifications of the ATM 1 and the ATM emulator 14 receiving said signal and responding with an electronic signal duplicative of the poll response specification of the ATM 1.

Communications between the ATM 1 and the MFNAC 3 are continuously maintained between the ATM 1's 9600 baud modem and the MFNAC 3's modem 8 over the hard wire connection provided by the digital connector 2. Communications between the host computer 7 and the NAC 5 are continuously maintained through the ATM network 6

providing such services and functionality.

Operation - FIGS. 1, 2, and 4

FIGS. 1, 2, and 4 describe the processing state of the present invention. Initially, the present invention is in the ready state. An ATM card is inserted into ATM 1 and the client enters his personal identification number (PIN). This data is encrypted at the ATM 1 and is resident in the memory of the ATM 1 for the duration of the transaction. When the host emulator 13 next polls the ATM 1, the presence of client's identification data at the ATM 1 causes the MFNAC 3 to communicate over dial-up telephone connection 4 to the NAC 5, an electronic signal to the ATM emulator 14 to stand aside and permit the next host computer 7 poll to travel to the host emulator 13, which will in turn stand aside, permitting the true host computer 7 poll to be received by the ATM 1. This sequence creates a virtual dedicated circuit linking the ATM 1 to the host computer 7 until the client transactions are concluded. At the conclusion of the client transactions (as defined by operational specifications at the host computer 7), the host computer 7 will resume transmission of polling signals.

The MFNAC 3 controls the duration of the virtual dedicated circuit through a series of timers activated by the absence of communication between ATM 1 and the host computer 7. When any timer is tripped, the MFNAC 3 reactivates the host emulator 13 and the ATM emulator 14 and then terminates the dial-up telephone connection 4.

The MFNAC 13 provides four communication timer intervals (T 1 - 4). If any of these timers expire, the MFNAC 13 will drop the connection of the connection attempt to the NAC 5. The timer intervals are:

T1 = 60 seconds. Dial-up to the NAC 5, connect and receive the host computer 7 message within 60 seconds.

T2 = 15 seconds. On receipt of the host computer 7 message, T2 will cancel T1, T3 and T4 and extend the NAC 5 connection for 15 seconds.

T3 = 10 seconds. If the status response is sent to the host computer **7** before T2 expires, T3 extends the time remaining in T2 for 10 seconds.

T4 = 60 seconds. If another customer request is sent to the host computer **7** before T2 expires, T4 will cancel T2 and extend the NAC **5** connection for 60 seconds.

It is therefore to be understood that the present invention depicted in **FIGS. 1 - 4** provides a facility that allows an ATM to access a select financial institution or number of financial institutions from an ATM that is not directly connected to that financial institution through the regional or international ATM EFT (electronic fund transfer) networks. An augmented embodiment of the present invention is depicted in **FIG. 5** which allows an ATM 1 to directly access a financial institution **15** without using the ATM EFT networks **6**. In this embodiment, a particular ATM card holder's financial institution **15** is directly accessed through a switching process without access to the ATM EFT network **6**. The process is accomplished by using the ATM emulator **14** as a network controller which provides a routing function. In this direct mode, the controller **5** acts only as a router, to route the transaction directly from the controller **5** to the participating financial institution **15**. ATM cards that are not issued by a financial institution that participates in the direct dial access interconnection are interconnected through a switch processor **16** for access to their accounts by the ATM EFT networks available to the ATM.

This alternative direct dial up method allows participating financial institutions to use the ATM terminals of other participating financial institutions. By doing so, the ATM user views the screen messages and ATM options of the financial institution encoded in the user's ATM card. This screen function may be performed by installing a range of screen message alternatives either at the controller **5** or at the ATM **1**. Once a user's card has been read by the ATM, the controller **5**,

or a memory reading device at the ATM 1 can determine if the card was issued by a participating financial institution 15. If so, the financial institution's screen messages are displayed; if not, a standard screen message is displayed as the controller 5 accesses the ATM EFT networks 6.

Summary, Ramifications, and Scope

The present invention is unique in providing a method and system for on-demand communications between a remote ATM and a host computer. Such a method and system has heretofore eluded the market place even though economic benefits have generated significant interest and attempts to invent such a system. The present invention is also unique in providing a method and system for on-demand communications that is adaptable to host computers or ATM's or both that demand apparently continuous communications between the host computer and the ATM. This means that ATM emulation or host computer emulation can be provided to the ATM and/or host computer whose functionality demands such apparently continuous communications. Moreover, the present invention is also unique in providing a method and system for joining or adding heretofore incompatible host computer networks through ATM emulation and/or host computer emulation as necessary for compatibility.

The present invention has been described in terms of the presently preferred embodiment using a dial-up telephone connection to provide a non-continuous communications link. Of course, the non-continuous communications link could be provided by many alternative means as demanded by a particular ATM to host computer system including, without limitation, communications via microwave, satellite, cellular, high frequency radio, low frequency radio, etc.

The present invention has been described in terms of the presently preferred embodiment using a standard ATM that provides basic functionality such as data, cash and deposit protection; cash disbursement; deposit acceptance; account balance information; transfers

between accounts; stamp purchasing; coupon issuance; etc. Of course, the present invention is compatible with ATMs of less or more functionality. Moreover, the present invention anticipates the increasing functionality of ATMs over time and intends that its operation with such increases in functionality of ATMs be considered as within the scope and spirit of the present invention.

Although the present invention has been described in terms of the presently preferred embodiment, it is to be understood that such disclosure is purely illustrative and not to be interpreted as limiting. Consequently, without departing from the spirit and scope of the invention, various alternations, modifications, and/or alternative applications of the invention will, no doubt, be suggested to those skilled in the art after having read the preceding disclosure. Accordingly, it is intended that the following claims be interpreted as encompassing all alternations, modifications or alternative applications as fall within the true spirit and scope of the invention.

In the claims that follow and in the summary of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprising" is used in the sense of "including", i.e. the features specified may be associated with further features in various embodiments of the invention.

1. A system for conducting financial transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising:

(a) a remote terminal which includes a communications protocol of an ATM, said remote terminal having the capability of dispensing funds therefrom,

(b) a host computer for said remote terminal, and

(c) a non-continuous communications link between said remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer.

2. A system as described in Claim 1, wherein the non-continuous communications link is a dial-up telephone connection interface.

3. A system as described in Claim 1, wherein the remote terminal is an automatic vending machine.

4. A system as described in Claim 1, wherein the remote terminal is an ATM.

5. A system for conducting financial transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising:

(a) a remote terminal which includes a communications protocol of an ATM, said remote terminal having the capability of dispensing funds therefrom,

(b) a host computer for said remote terminal,

(c) a non-continuous communications link between the remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer, and

(d) a means for emulation of a continuous communications link between said remote terminal and the host computer.

6. A system as described in Claim 5 wherein the non-continuous communications link is a dial-up telephone connection interface.

7. A system as described in Claim 5, wherein the remote terminal is an automatic vending machine.

8. A system as described in Claim 5, wherein the remote terminal is an ATM.

9. A system as described in Claim 5, wherein said means for emulation includes an emulator on the remote terminal side of the non-continuous communications link.

10. A system as described in Claim 9, wherein electronic polling communications and electronic responses thereto periodically occur between said remote terminal and said emulator.

11. A system as described in Claim 5 wherein said means for emulation includes an emulator on the host computer side of the non-continuous communications link.

12. A system as described in Claim 11 wherein electronic polling communications and electronic responses thereto periodically occur between said host computer and said emulator.

13. A system for conducting banking transactions using a remote self-service terminal with on-demand access to an ATM host computer for every transaction, said system comprising:

(a) a remote terminal which includes a communication protocol of an ATM machine, said remote terminal having the capability of dispensing funds therefrom,

(b) a host computer for said remote terminal,

(c) a non-continuous communications link between the remote terminal and the host computer, said non-continuous communications link being the primary communications link between said remote terminal and said host computer,

(d) a first emulator on the remote terminal side of the non-continuous communications link, said first emulator emulating to the remote terminal a continuous communication link with the host computer; and

(e) a second emulator on the host computer side of the non-continuous communications link, said second emulator emulating to the host computer a continuous communications link with the remote terminal.

14. A system as described in Claim 13 wherein the non-continuous communications link is a dial-up telephone connection interface.

15. A system as described in Claim 13 wherein remote terminal must have apparently continuous communications with the host computer.

16. A system as described in Claim 13 wherein the host computer must have apparently continuous communications with the remote terminal.

17. A system as described in Claim 13 wherein host computer electronic polling communications are periodically sent from said remote terminal to said first emulator, and responses thereto are sent from said first emulator to said remote terminal; and wherein ATM electronic polling communications are periodically sent from said host computer to said second emulator, and responses thereto are sent from said second emulator to said host computer.

18. An emulation system for installation within an electronic interconnection between a host computer and a remote terminal having the capability of dispensing funds therefrom comprising:

a first emulator for interconnection in electronic communication with said remote terminal;

a second emulator for interconnection in electronic communication with said host computer;

said first emulator and said second emulator being electronically adapted for a non-continuous communications link therebetween, said non-continuous communications link being the primary communications link between said first emulator and said second emulator.

19. An emulation system as described in Claim 18 wherein said first emulator is adapted to provide electronic signals responsive to polling electronic signals received from said remote terminal.

20. An emulation system as described in Claim 18 wherein said second emulator is adapted to provide electronic signals responsive to polling electronic signals received from said host computer.

21. An emulation system as described in Claim 18 wherein said first emulator is designed to electronically communicate with said second emulator through said non-continuous communications link upon the receipt of electronic signals from said remote terminal.

22. A method for establishing a non-continuous communications link between a remote terminal having the capability of dispensing funds and a host computer, wherein said remote terminal and said host computer require an apparently continuous communications link therebetween, comprising the steps of:

(a) interconnecting a first emulation means with said remote terminal, said first emulation means acting to emulate a host computer;

(b) interconnecting a second emulation means with said host terminal, said second emulation means acting to emulate a remote terminal;

(c) establishing a non-continuous communications link between said first emulation means and said second emulation means, said non-continuous communications link being the primary communications link between said first emulation means and said second emulation means.

23. A method as described in Claim 22 wherein said first emulation means provides signals to said remote terminal representative of a host computer in continuous communication therewith, and said second emulation means provides electronic signals to host computer representative of a remote terminal in continuous communication therewith.

24. A method as described in Claim 22 including the further steps of interconnecting said remote terminal and said host computer in a direct communications mode to establish communication therebetween, said establishment of direct communication mode including the steps of:

(a) providing a communication between said remote terminal and said first emulation means;

(b) providing a communication between said first emulation means and said second emulation means;

(c) providing a communication between said second emulation means and said host computer;

(d) providing a communication between said host computer and said remote terminal; and

(e) providing further communications between said remote terminal and said host computer.

25. A system for conducting financial transactions substantially as herein described with reference to the accompanying drawings.

26. An emulation system substantially as herein described with reference to the accompanying drawings.

27. A method for establishing a non-continuous communications link between a remote terminal and a host computer substantially as herein described with reference to the accompanying drawings.

Dated this 5th day of May 1999

Cash on Demand, Inc.

By their Patent Attorneys

GRIFFITH HACK

41998/96

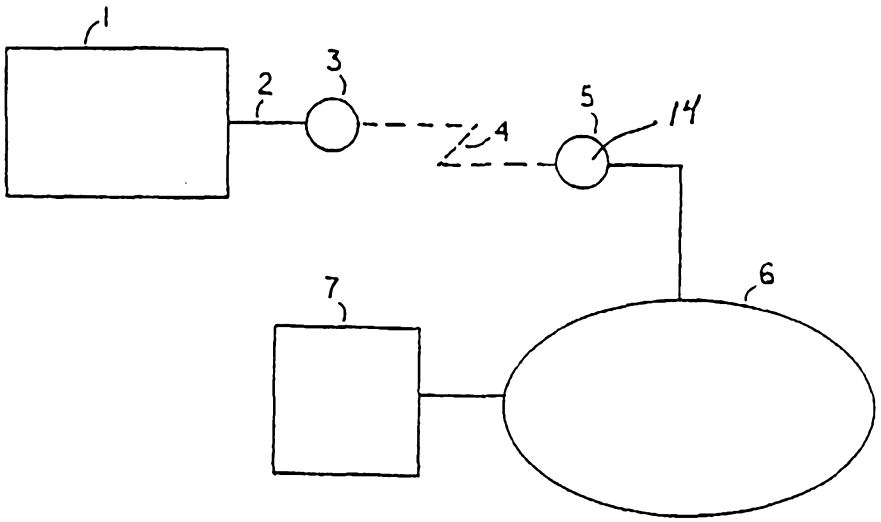

FIG. 1

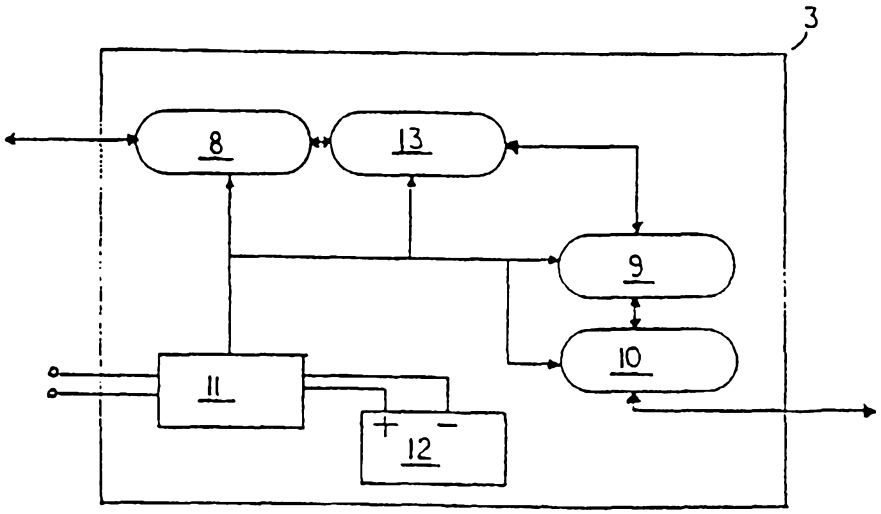

FIG. 2

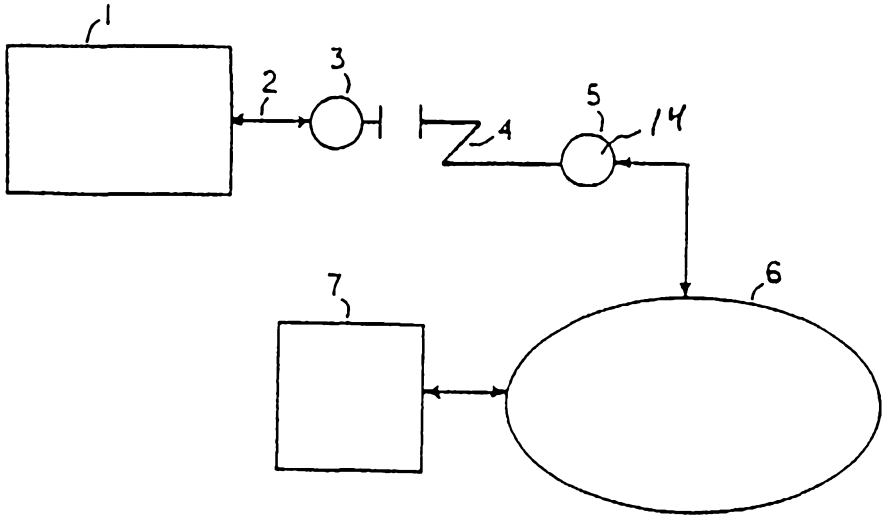

FIG.3

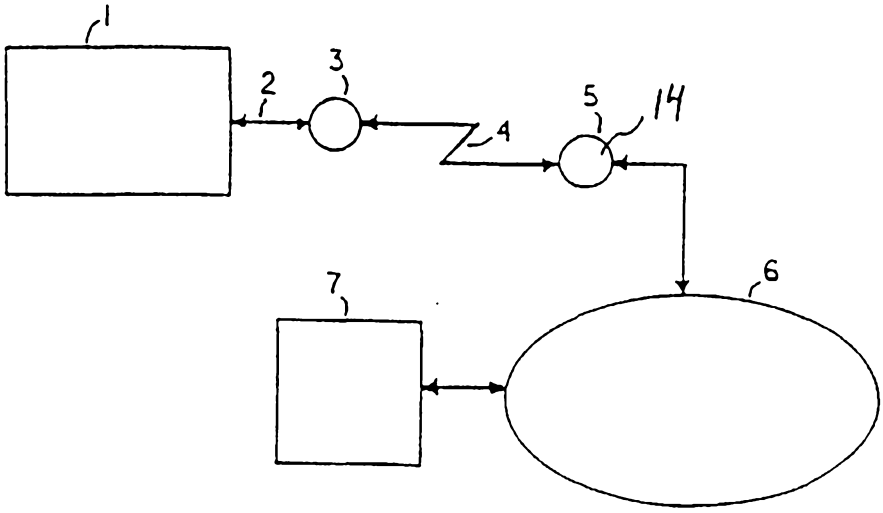

FIG.4

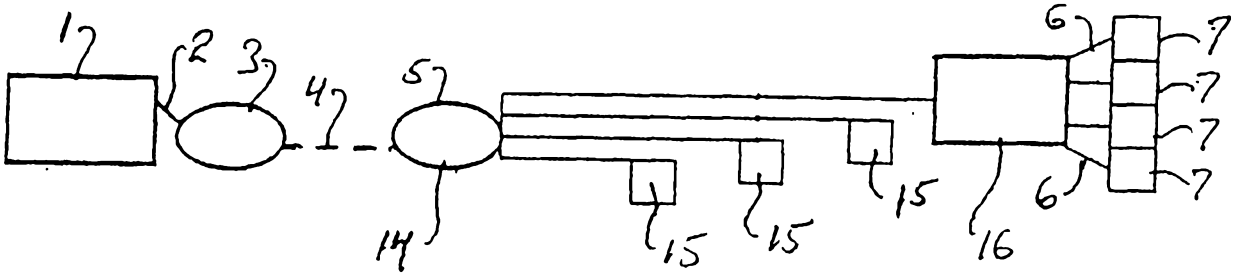

FIG. 5